

**Vermont's Title II-D *Enhancing Education
Through Technology* Program
Fall 2010 Interim Report**

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Interim Report on Evaluation of Vermont's Ed-Tech Program

Introduction

The federal Enhancing Education Through Technology (Ed-Tech) program provides grants to state education agencies. The goal of these grants is to improve student achievement by using technology in elementary and secondary schools. Administered by the U.S. Department of Education's Office of School Support and Technology Programs, the program is a funding source authorized under Title II, Part D, of the No Child Left Behind Act (NCLB, 2002). In Vermont, Ed-Tech funds have been allocated to local school districts by both formula (on the basis of their proportional share of Title I funding) and competitive grants administered by the Vermont Department of Education (VTDOE). These grant programs are designed to support the specific goals of Vermont's Ed-Tech program, which are as follows:

- Change classroom practices as teachers participate in professional development and learn how to integrate technology into their instruction.
- Increase the ability of principals and other school leaders to support and evaluate teacher practices in technology integration through the professional development program provided as part of specific programs.
- Expand student access to flexible learning environments.
- Increase students' mastery of the 21st century skills¹ required for success in meeting the Vermont grade level expectations for each subject area or discipline by providing electronic learning resources supported by professional development programs for teachers and school leaders.
- Sustain and expand programs beyond the grant years and beyond the grant participants as a result of professional learning networks created during the grant program.

Vermont's Ed-Tech program supported five competitively awarded grant-funded programs for the 2009–10 and 2010–11 academic years.² The following brief summaries are based on descriptions included in the grant proposals accepted by VTDOE:

- Content-Based Technology Grants (CBTGs) were awarded to 53 grantees at 39 schools. The goal of these grants was to provide modest financial assistance to schools with high poverty and the greatest need for technology support, including schools identified for improvement under NCLB. Through the grant, schools developed programs to integrate technology and equipment in specific content areas, such as reading, English/language arts, science, and health.

¹ 21st century skills are commonly understood to include critical thinking, problem solving, communication and collaboration (see Partnership for 21st Century Skills, n.d.).

² In June 2010, Vermont introduced the Educate and Innovate Grant as the final round of competitive grants funded from additional funds allocated to the Ed-Tech program as a part of the American Recovery and Reinvestment Act (2009). This interim report does not provide information on Educate and Innovate Grants, as funding had not yet been disbursed at the time of our evaluation activities (November–December 2010).

- The eLearning Project assists teachers and school leaders, through research-based professional development, to become more proficient in effective student-centered, technology-rich teaching and learning. Through the eLearning Project, participants also have access to an interactive network of resources that supports their ongoing work, with the ultimate goal of establishing a statewide communication network to support educators in their work. Six schools were designated as demonstration sites for deep implementation of student-centered, technology-rich learning. Participating educators at these schools received intensive coaching and professional development.
- The Learning Network of Vermont (LNV) is a video-conferencing network currently operating in 104 elementary, middle, and high schools in Vermont. Its goal is to promote flexible learning environments for students. LNV participant schools have access to the Center for Interactive Learning and Collaboration (CILC), which provides interactive video distance-learning programs and virtual field trips for students.
- The Vermont Virtual Learning Cooperative (VTVLC) provides K–12 programs and courses in a wide variety of subject areas. It partners with schools across the state to offer online classes to students around Vermont. Schools receive seats for their students in courses being offered through VTVLC in exchange for providing a teacher to teach an online course. Additionally, VTVLC offers professional development for teachers, guidance counselors, and administrators on topics related to online education and learning.
- The Impacting Tobacco Prevention With Technology program combines Ed-Tech funds with state of Vermont Tobacco Use Prevention Program funds to enhance existing tobacco-use prevention education by integrating technology into health curricula and teaching methodologies. Grants were awarded to five grantees to purchase interactive whiteboards and supporting equipment, such as projectors, software, computers, cameras, and student response systems for teaching the tobacco prevention curriculum. This program concluded in June 2010.

Evaluation Overview

Evaluation of the Vermont Ed-Tech program provides formative and summative feedback to VTDOE. There are four phases to the evaluation. The first phase, February 2010 to April 2010, sought to describe the different grant programs in terms of their goals, activities, expected outcomes, and available data sources. During this phase, evaluators interviewed program administrators of the competitive grant programs. The deliverable of this phase was a revised evaluation plan and detailed profiles of each program. The second evaluation phase, from April 2010 to August 2010, reported on the initial implementation of programs. During this phase, the evaluators conducted surveys and interviews with teachers and grant managers. The deliverable of this phase was an interim evaluation report on program implementation, submitted to VTDOE in August 2010.³ The third evaluation phase, from September 2010 to January 2011, provided a more focused study of implementation in a small number of schools in each program based on interviews and classroom observations. Its deliverable is this evaluation report. The fourth evaluation phase, from February 2011 to June 2011, is designed to collect additional data via

³ http://education.vermont.gov/new/pdfdoc/pgm_edtech/initiatives/educ_edtech_interim%20evaluation_report.pdf

surveys and interviews, as well as extant data about program participation, to arrive at summative conclusions about the entire program.

The evaluation is designed to provide VTDOE with actionable answers to the following questions:

1. To what extent and with what fidelity are the grantees of the five Ed-Tech-funded competitive programs making progress toward their stated objectives? What has facilitated or hindered progress?
 - 1a. To what extent have grant funds been spent so far and on what?⁴
 - 1b. What trainings and other program activities are being offered?
 - 1c. What technology resources have been and will be purchased, distributed, and supported?
2. How effectively do schools support the implementation of project goals?
 - 2a. What is the extent of teacher (and other staff) participation in program activities?
 - 2b. What are the opinions of these participants about the quality and effectiveness of professional development?
 - 2c. To what extent are teachers provided opportunities to collaborate on implementing program objectives for technology integration?
 - 2d. To what extent do administrators support, advocate, and encourage technology integration?
 - 2e. To what extent and from what sources do teachers receive technology support?
3. Do the Ed-Tech-funded competitive grant programs promote technology integration in support of student-centered learning?
4. What are the learning outcomes of the program in terms of student engagement, motivation, and mastery of Vermont grade-level expectations?
5. To what extent are changes in teaching and learning adopted and sustained, as indicated by continued and expanded use of such practices by teachers and school leaders who participated in the program? What are the plans for sustaining funding (if necessary) once the grant ends?

Purpose and Organization of Report

This report summarizes the findings from the third evaluation phase. It focuses on the four competitive grant programs in operation during the 2010–11 school year (the CBTG Program, the eLearning Project, LNV, and VTVLC). The report provides formative feedback about program participation, implementation, and perceived impact at the school level. It addresses all five evaluation questions to the extent possible. The findings are reported in separate sections for

⁴ This evaluation question is not addressed in this report; it is addressed on an annual basis.

each grant program. The sections addressing the CBTG Program, the eLearning Project, and LNV are organized as follows:

- **Program Design** (aligned to evaluation question 1). In the context of this report, Program Design addresses the purpose of technology integration—the intended impact of the integration and the acquisition of resources by schools.
- **Professional Development.** This section summarizes findings related to professional development, including the following evaluation subquestions:
 - 1b: What trainings and other program activities are being offered?
 - 2a: What is the extent of teacher (and other staff) participation in program activities?
 - 2b: What are the opinions of these participants about the quality and effectiveness of professional development?
- **School Support for Technology Integration.** This section focuses on the following subquestions related to opportunities for teacher collaboration, administrative support and direction, and technology support:
 - 2c: To what extent are teachers provided opportunities to collaborate on implementing program objectives for technology integration?
 - 2d: To what extent do administrators support, advocate, and encourage technology integration?
 - 2e: To what extent and from what sources do teachers receive technology support?
- **Impact on Instruction** (aligned to evaluation question 3). This section focuses on the extent to which teachers are integrating technology in designing and assessing student-centered learning experiences.⁵ Additionally, this section summarizes related barriers and challenges to changing teaching practice.
- **Learning Outcomes** (aligned to evaluation question 4). This section focuses on the extent to which student motivation, engagement, and understanding of academic content increased as a result of implementing the grant program.
- **Sustainability.** In this section, findings based on evaluation question 5 are addressed. Sustainability, for the purpose of this report, relates to the extent participants are involved in events to promote support for technology integration, as well as plans to expand the program to other classrooms and schools, while continuing to provide equipment, training, and support after the current grant funding ends.

The focus of the VTVLC program on expanding distance learning, as opposed to integrating technology in classrooms, necessitated a different set of topics that will be described in its discussion section.

⁵ The 2009–12 Vermont State Technology Education Plan defines this outcome as follows: “Teachers create a learning environment in which Vermont students use information and communication technologies to engage in learning tasks that are meaningful, relevant, and authentic, in ways that engage their interest and foster independent and collaborative learning. Best practices lead to activities not always dependent on direct instruction and teacher-imparted knowledge.”

Evaluation Methods

This second interim report uses various data sources and methods of data collection to address the stated evaluation questions and provide formative feedback to VTDOE. Each method employed is described in detail in the following subsections, while key findings from the data analyses are presented in the relevant program sections.

Case Study Methodology and School Sampling Procedure

A case study methodology was used for the CBTG Program and the eLearning Project. This approach involved selecting three schools for each program and conducting a series of interviews and observations in each school. In addition, we selected a seventh school where both the eLearning Project and the CBTG Program were implemented to better understand the interactions between the two programs. Schools were selected based on geographic region (northeast, northwest, southeast, southwest, and central); Table 1 displays the distribution of schools visited with respect to the geographic region of the state. For each major evaluation question, the responses of all interviewees were combined into a single school-level finding. Therefore, the sections of this report devoted to the CBTG Program and the eLearning Project describe the number of schools (four per program) exhibiting a given finding. The school with both programs is therefore counted twice—once in the section on the CBTG Program and once in the section on the eLearning Project.

Table 1. Fall 2010 School Site Visit Sample for the CBTG Program and the eLearning Project

Program	Central Region	Northeast Region	Northwest Region	Southeast Region	Southwest Region
CBTG Program	1	0	0	1	1
eLearning Project	1	0	1	0	1
Both	0	1	0	0	0
Total	2	1	1	1	2

Variations for LNV and VTVLC. The organization of the LNV and the VTVLC programs required evaluation methodologies that differed in certain respects from the one described for the CBTG Program and the eLearning Project. With the early state of implementation, LNV usage is limited to a small number of individuals per school. Therefore, program administrators requested that interviews be conducted with teachers only. Typically, these interviews involved only one teacher per school and were conducted by telephone. A convenience sample was drawn based on the most frequent or recent users of the system, as recommended by a program administrator. As a result, these findings were analyzed across sites, rather than discussing variations by school.

The VTVLC program, like the CBTG Program and eLearning Project, involved site visits to four schools. These four schools were selected based on the recommendations of the VTVLC program administrator. Schools with different foci as well as different student populations were selected, including three rural high schools and one larger urban high school. There were major

differences between the site visits conducted for VTVLC and those conducted for the CBTG Program and the eLearning Project. Because VTVLC is an online learning network, its purpose and focus differ substantially from the other three programs, whose purpose was to integrate technology in face-to-face classrooms. Therefore, it was necessary to develop a unique set of interview protocols. To understand student experiences in the program, we conducted student focus groups. However, it was not necessary to conduct classroom observations. Moreover, because an individual school building does not circumscribe classroom instruction, findings related to the online course experience were analyzed across all respondents rather than aggregated to the school level. Findings related to school-based implementation and impact of the program were, however, aggregated to the school level.

Interviews

Semistructured interviews were conducted with 37 teachers (including teachers who are also grant managers) from three CBTG schools, three eLearning Project schools, five schools participating in the LNV program, and one school that was the recipient of both a CBTG and an eLearning Project grant. Additionally, 11 principals and 6 staff members serving as grant managers (who were not teachers) were also interviewed. Of the six interview sessions conducted with LNV teachers, nine people participated because 2 teachers attended three interviews. The distribution of respondents by type and program is presented in Table 2.

Table 2. Number of Interviewees and Focus Groups by Program

Program	Schools	Teacher Only	Teacher and Grant Manager	Grant Manager Only	Principal	Student Focus Group	Guidance Counselor
CBTG Program	3	7	5	3	3	N/A	N/A
eLearning Project	3	9	1	2	3	N/A	N/A
CBTG Program and eLearning Project	1	1	2	1	1	N/A	N/A
LNV	5	6	N/A	N/A	N/A	N/A	N/A
VTVLC	4	6	N/A	N/A	4	6	6
Total	16	29	8	6	11	6	6

For the CBTG Program, the eLearning Project, and LNV, a single set of interview protocols was designed to align with the evaluation questions. Because of programmatic differences, a unique set of protocols was developed for interviewees at VTVLC sites. These protocols aligned with the evaluation questions, as well as questions specific to the design of the VTVLC program.

The majority of interviews were conducted on-site at the interviewee's school, although five interviews (three for the LNV program, one for the eLearning Project, and one for the CBTG Program) were conducted by telephone. Each interview lasted between 45 and 60 minutes.

Interviewers took notes during the interviews, and all interviews were audio recorded, with the participant's consent, and transcribed for analysis.

Interview Analysis

The analysis of qualitative data employed an inductive approach that incorporated systematic methods of managing data through reduction, organization, and connection (Dey, 1993; LeCompte, 2000). This process relied on systematic procedures for coding and categorizing the data to recognize patterns within and across schools. The evaluation team inductively analyzed interview transcripts by scanning the data for categories of phenomena and relationships among such categories.

The analysis of the interviews employed a two-step process. First, the evaluator developed site profiles based on the responses of all individuals from each school. (For LNV participants, there was one profile that summarized responses across all six interviews from the five schools.) These profiles were organized according to the topics included in the evaluation questions. Second, a cross-site analysis was conducted for three programs (the CBTG Program, the eLearning Project, and VTVLC) to identify themes across school profiles.

Observations

An observation protocol was developed after reviewing commonly used observation protocols for technology programs and adapting items from those protocols to align to our evaluation questions. Specifically, the observation protocol used in this evaluation was based on the content of the Classroom Instruction Scoring System (CLASS; Pianta, La Paro, and Hamre, 2008), the Reformed Teaching Observation Protocol (RTO; Piburn et al., 2000), and the Local Systemic Change observation protocol (Horizon Research, 2005). The observation protocol is presented in Appendix A. The observation protocol was designed to address (1) the level of use of technology and the type of technology being used and (2) the instructional purposes and formats of technology use.⁶

Prior to using the observation protocol in classroom observations, all site visitors participated in an initial discussion and review of the instrument and coded two training videos. For each video, variations among ratings were discussed as a group to clarify the definitions of different ratings. Disagreements between raters were discussed until consensus was met.

Members of the evaluation team observed teachers during one class period during the school day and completed one observation protocol for the time period observed. Eighteen classroom observations were conducted at seven schools participating in the CBTG Program and the eLearning Project to determine the impact of the grant programs on instruction.

⁶ An additional purpose was to describe the extent that technology supported student-centered learning. The ratings of these items are not reported due to large differences among the raters in the frequency of assigning high and low ratings. Based on these differences, it was inferred that the raters did not have a shared understanding of the boundaries of each rating category.

Of the 18 classrooms observations, 11 were conducted in classrooms of teachers participating in the eLearning Project and 7 were conducted in classrooms of CBTG participants. Findings from the observations of the CBTG Program and the eLearning Project are reported together because there was no variation observed between the two programs.

Content-Based Technology Grant Program

This section summarizes the findings related to the CBTG Program and is based on interviews with teachers, grant managers, and principals from four schools. According to records from VTDOE, this grant awarded 39 schools with 53 grants in the amount of \$2,000 to \$10,000 each to develop programs integrating technology based on specific content areas. The following grants were received by the schools visited: one school received three grants for arts, science, and social studies; another school received three grants for world language, social studies, and literature; one school received a grant for mathematics; and one school received a grant for arts/music.

Incorporated in this section are the findings from classroom observations performed at three schools in the CBTG Program, three schools in the eLearning Project, and one school that was a recipient of both an eLearning Project grant and a CBTG.

Program Design

Overall Purpose. At each CBTG site, respondents were asked to describe the main purpose or motivation for the grant program at their schools. At all four schools, interviewees reported that the purpose of the grant funding was to increase student-centered learning to promote students' development of "21st century skills," as well as integrate technology across subjects and grade levels. In the words of one respondent,

The big picture idea is that we're trying to transform teaching and learning in ways that technology enhances. So we're moving toward project-based learning, place-based learning, [and] more collaboration to teach students 21st century skill sets.

Grant managers and principals also commonly noted that an additional motivation for seeking grant funding was to gain resources for the school, including technology and teacher professional development.

In three schools, the staff was highly consistent in describing the program's purpose (little variation existed among staff members); in the fourth school, the staff was moderately consistent (some variation existed among staff members).

Participation and Resources Gained. The following summarizes the number of teachers per school and the types of technology they acquired through the CBTG Program. Twenty-three teachers from the four schools are using grant-funded equipment.

- One school acquired six document cameras that are being shared by 15 teachers across grades K–5. The document cameras are used in all subject areas—beyond the grant-funded area of mathematics.
- Three teachers at one school received 64 Netbook computers dedicated to three content areas, software, headsets with microphones, projectors, digital flip cameras, and Netbook carts. An additional teacher worked with one of these teachers to carry out the grant program.
- Two teachers from one school acquired Adobe Photoshop licenses, musical composition software, and digital cameras.
- Three teachers at one school acquired resources distinct for three content areas. One teacher received an interactive whiteboard and LCD projector; one teacher received 20 iPod Touch units and a syncing/charging station; and one teacher received digital pens that interface with digital lesson material, a high-definition (HD) digital video and still camera, a wide projection screen, and a document camera with a microscope adaptor.

Professional Development

All schools reported a high level of teacher participation in professional development events offered through the grant. The number of teachers in attendance at specific professional development events varied based on the event—from one grant program teacher to a school’s entire teaching staff. Three schools indicated that more than 10 teachers participated in professional development events.

The most common type of professional development offered to staff at the four CBTG Program schools was one-to-one or small group coaching. Three schools indicated that grantee teachers worked individually or in small groups with district-based technology integration specialists and both teachers and technology integration specialists from their schools. This professional development helped teachers learn how to use the acquired equipment and integrate it into their curriculum and class instruction. As one teacher noted, “We had a workshop, right when the document camera was brand new, with our educational technologist and [technology teacher leader] to learn how to use it.”

Grantee teachers also participated in other types of professional development that focused on implementing grant-funded programs. This training included in-service training, self-study, workshops held after school, classroom observations at other schools, and graduate level university courses. In addition to school-based professional development specific to their CBTG Program, three schools sent respondents to institutes and conferences to learn and share with their colleagues. These conferences included the Vermont Fest statewide technology conference and a workshop hosted by the Vermont MIDI Project on infusing music into the curriculum.

Teachers and principals indicated that professional development events varied in length, ranging in duration from workshops of a few hours to conferences lasting two to three days. Overall, at all schools, staff typically spent more than three days participating in professional development.

Reactions to Professional Development. Teachers from all four schools typically reported that professional development increased their capacity to incorporate technology into their curriculum and also promoted technical proficiency with the technology acquired from the grant, such as through hands-on learning. One teacher specifically noted, “The grant paid for a three-credit course on using the Smart Board and that was really important to the implementation. I couldn’t be implementing it without that course.” In one school, staff reported that one limitation of professional development was that it was not specific to their subject area.

Additionally, at three schools, teachers indicated that professional development provided opportunities for collaboration and peer learning. In the words of one teacher, “Mostly I enjoyed talking to other people because it gives different ideas from what I might be thinking about.”

School Support for Technology Integration

Schools were expected to support technology integration through three strategies: opportunities for teacher collaboration, administrative support and guidance, and technology support.

Collaboration. All four schools reported having both formal and informal opportunities for collaboration, although variations were found in the amount of time and frequency of collaboration across the schools. Two schools were characterized as having high levels of collaboration; respondents consistently indicated that there were frequent opportunities for teachers to collaborate. Two schools had moderate levels of collaboration; respondents from these schools indicated that such opportunities existed but were not sufficient to support technology integration.

Teachers in all schools indicated that formal collaboration occurs in the form of regularly scheduled, common planning time for teachers and during staff meetings. At two schools (one with strong and one with moderate levels of collaboration), respondents also indicated that teachers and other staff participate on schoolwide technology teams or committees that function specifically for planning purposes. As one principal explained,

We have a building-based technology team that meets once a month ... It’s also a sharing [process]... That team has a representative from each grade level so they can go back to the grade level teams and share.

Teachers and principals also reported frequent opportunities for informal collaboration, including discussions at lunch or in classrooms of neighboring teachers, to share ideas and student work or troubleshoot issues with the technology.

Administrative Support and Guidance. The four schools visited received varying levels of administrative support and guidance. Administrative support at all four schools included scheduled planning time and general encouragement from the principal to try new practices with technology. Teachers at some schools also indicated that administrators assisted in finding funds for teachers to attend professional development or acquire new technology. At two schools, administrators also encouraged participation among the school community in grant-funded projects.

One school had high levels of administrative support. Teachers there reported that the principal had set teaching goals and expectations for technology integration—for both instructional and noninstructional purposes. To that end, teachers also indicated that the principal scheduled classroom observations to follow up on these goals. The principal explained,

Part of our observation process has to do with technology use and . . . there's a rubric that when I go in and observe, I look for the level of usage. So, through that process, I think people are beginning to realize what the expectation is. It's also giving me a way to see who is using technology, who isn't, and to what level.

Two schools were characterized by moderate levels of support, as indicated by minimal or unclear communication to teachers about expectations for changes in practice (other than to carry out the grant as intended). In these schools, there was no follow-up from the principal, and teacher evaluation was not linked specifically to the grant and technology use. Interviewees from one school also noted that the work on the grant was primarily teacher driven.

Teachers at one school reported having very limited support and follow-up from administrators for technology integration in the classroom.

Technology Support and Resources. Teachers and principals at all four schools reported having access to at least two sources of support for technology. Respondents have access to a district and/or school-based technology staff member for technical and instructional support with technology. Additionally, teachers from three schools rely on assistance from other teachers, in addition to the support provided by district or school-based technology personnel.

In addition to relying on expertise and information sharing with other teachers, teachers at three schools regularly access no-cost, Internet-based resources, such as Google Apps, Google Forms, Web 2.0 tools, and student-friendly search engines. Similarly, teachers commonly indicated that they rely on manuals, handouts, and software received from professional development events.

Impact on Instruction

Respondents from all four schools indicated that their CBTG provided new or enhanced opportunities for technology integration during instruction that were not previously available. For instance, students at one school use their new HD video camera to record science experiments, which are then posted on the class website as an additional resource for students. This application of technology reinforces concepts covered during class because students can review their own work and those of their peers at their convenience. This teacher explained,

[We used the video recorder to tape our science experiments] . . . being able to rewatch the hands-on stuff through the video was really nice for students because they could see how different people's experiments turned out differently.

Fifth- and six-grade students used their iPod Touch devices for a unit on U.S. history covering decades from the 1920s to the 1970s. Students used their Touches to research and download information, images, music, and video clips on their assigned decade. Students also used the devices and microphone-capable headsets to record interviews with community members who lived during a particular decade. Students demonstrated a deeper understanding of this “decades” unit because of their use of multimedia and interactive resources.

Teachers from another school appreciate how their new document cameras facilitate the ease of students sharing their work, such as drawings, writing and poetry, information on topics researched, and model examples of homework. By using the document cameras, all teachers noted that students share their work in front of the class on a daily basis. This more rigorous practice of sharing has helped students become more comfortable with public speaking, become more motivated to do well on assignments, gain confidence in their work, and become more receptive to critique. Teachers from three schools said that these new experiences have increased students’ use and understanding of technology. Because students use technology regularly in the classroom, they are more technically proficient and more responsible for the proper care and use of the equipment.

At another school, the art and music teachers use software programs and digital cameras to add music, digital images, and animation to student projects. However, one teacher (as a specialist teacher) felt that her technology integration efforts were limited by not having computers available in her classroom at all times. She noted, “If I had computers available in [my classroom] all the time, I would probably do the kinds of things that they do in [other] classrooms . . . that’s why I say there are all kinds of possibilities that aren’t available to us yet.”

Observation Findings. Interview results from teachers and principals on the widespread use of technology in the classrooms of the CBTG and eLearning Project schools visited were supported by findings from classroom observations. Observation data are reported together for both programs because there were no differences by program. The findings are presented in narrative format here, and frequency tables appear in Appendix B.⁷

- **High focus on technology.** Observers reported that the student use of technology was a major focus (in terms of importance to the lesson) in 15 of 18 classrooms and a minor focus in 3 classrooms.
- **Types of technology.** Laptop computers were the most widely used form of technology used by students and were present in 15 classrooms. Students were also observed using personal digital assistants (PDAs) in 9 classrooms and desktop computers in 8 classrooms. Interactive whiteboards were used in 4 classrooms, while other types of hardware (e.g., webcams, audio recorders, calculators, and cameras) were observed with less frequency.
- **Types of software.** Office productivity software was observed most frequently, including spreadsheets in 11 classrooms and word processing software 10 classrooms. Other types

⁷ In general, observers could assign multiple descriptive codes to a given classroom, resulting in totals that exceed the N of 18 classrooms.

of software, observed in 3 or fewer classrooms, included presentation, online social networking, database, audio or video image editing, and web authoring software.

- **Technology used by teachers.** Teachers in half of the 18 classrooms visited used laptop computers, LCD projectors, and/or document readers. Teachers used desktop and interactive whiteboards in 4 classrooms and Internet browsing software in 3 classrooms. In 3 classrooms, teachers used no technology.

In summary, the observations of the 18 classrooms in the seven schools visited supports interview findings that the use of technology at schools receiving CBTGs and eLearning Project grants is widespread, particularly by students. Although teacher use of technology was not observed in all classrooms, student use of technology was considered to be a major focus of the day's lesson in the classrooms visited, and there were no instances observed of students not using technology in the classroom.

Promoting Student-Centered Instruction. Respondents from all four schools reported that this grant has increased project-based learning through student collaboration across subject areas and also improved opportunities for student independent learning. Collaboration is facilitated by online programs, such as Google Apps, that allow several students to simultaneously work on one assignment without having to be in the same place. One principal commented,

Project-based learning is huge here. They're all really working together, . . . the regular ed teachers will work with the special ed teachers and all the specialists to develop a unit around a particular project.

Because many digital applications can be personalized, such as "Glogs" (Web-based, interactive posters), students' unique self-expression and interpretation of concepts comes through in their projects. A teacher explained that these types of applications allow for "choice. And there's independence. There's personality and individuality. It comes through in their work. Every Glog is so specific to that child." Teachers from two schools also noted that this grant has allowed them to create more hands-on and kinesthetic learning opportunities for their students. One teacher explained that her students learn more by getting up and interacting with the interactive whiteboard and each other compared to passive sitting and listening. When her students explore a topic in class, rather than demonstrating everything herself, she says, "I want kids hands-on [the board] when we model stuff."

A principal of one school held a slightly different view of the impact of technology on teaching practices. He felt that the grant has supported teachers to carry out existing student-centered learning practices rather than prompting new types of assignments or students' interactions.

Observation Findings. The findings address several factors that are relevant to the goal of student-centered instruction, including the instructional grouping of students, the purpose of the lesson in which technology was used, and the student and the teacher's specific purpose of using technology. The findings are presented in narrative format here, and frequency tables appear in Appendix B.

- **Instructional grouping.** Students typically interacted with technology individually (14 of 18 classrooms) and/or in pairs or small groups (9 classrooms). Technology was less commonly used as a whole-group activity. These ample opportunities for self-directed learning—rather than teacher-controlled, whole-group activities—indicate the promotion of student-centered instruction.
- **Lesson purpose.** Technology was most typically used to develop or deepen conceptual understanding (14 of 18 classrooms) and learn specific facts, such as vocabulary. Other common uses included assessing understanding, practicing skills for mastery (e.g., drill and practice), and identifying prior knowledge. Observers frequently reported multiple purposes for the observed lesson.
- **Purpose of student technology use.** The most commonly observed purposes of student technology use were making a presentation (8 classrooms) and additional skill reinforcement (6 classrooms). Other purposes included researching a topic, online communication, and sorting information, each observed in 5 classrooms.
- **Purpose of teacher technology use.** The most commonly observed purposes of teacher technology use were the presentation of instructional content (usually in a lecture format) in 10 of 18 classrooms. The next most prevalent use of technology was to display noninstructional content, such as instructions for completing a lesson (7 classrooms). Thus, it seems the most typical teacher use of technology is to replace other low-tech means of displaying information, such as overhead projectors or chalkboards.

These findings suggest that teachers and students are using technology for a variety of purposes. Students commonly used technology to support student-centered learning, such as preparing and making presentations, research, and communication. These uses indicate that in some of the CBTG and eLearning Project sites, technology is being used to support the student-centered instructional goals of the Vermont Ed-Tech program. At the same time, they also frequently use technology for practicing academic skills and for teacher presentation of academic content. Although these are not student-centered practices, they are consistent with the technology integration goals of the CBGT program.

Assessment of Student Learning. Interviews with teachers and principals indicated that the grant program’s influence on the assessment of student learning is somewhat mixed. At least one teacher from all four schools reported a change in assessing student learning as a result of technology integration; however, teachers from three schools have not yet altered their assessment practices because of technology.

Of the teachers who reported a change in their assessment practices, teachers from two schools reported an increase in the diversity of assessments, specifically more formative assessment during instruction to gauge student retention and comprehension of material. Teachers from two schools also mentioned that technology integration through the CBTG Program has allowed for more self-assessment and self-reflection, as well as peer evaluation among students. As one teacher explained,

I would say it would be formative assessments because it gives me a chance to see every student share work, listen to suggestions, become a critical thinker, and use

th[e feedback] to improve their work. And without the document camera to be able to get their work up, it would be very difficult to see students go through that process and have an improved piece of writing at the end.

Barriers and Challenges. Although the schools noted that they have benefited from technology integration through grant funding, three common difficulties emerged that limit teachers' technology integration practices. Each school referenced issues with the technology itself, such as technology or applications not working properly or as advertised by the manufacturer, software capabilities not adequately meeting teachers' expectations, and the limited capacity of school servers for file storage. At all schools, teachers also reported time constraints as a limiting issue. For example, teachers who collaborate across subject areas often have limited shared planning time to meet for projects. Another teacher had a hard time leaving her classroom to observe other classrooms at her school because of the cost of a substitute teacher and the time needed to prepare a lesson plan for a substitute to cover. Teachers from three schools also voiced frustration with failed network connections, slow Internet connections, and limited broadband access at both the school and students' homes. As one teacher explained,

There are some students, and even staff members in our community, that don't have access to the Internet at home or have only access to low-speed or dial-up connections. Our one-to-one initiative is only as successful as the number of people that actually have access to online uses outside of the classroom and school day.

Two schools with growing technology programs have teachers who feel somewhat limited because they share technology resources between classrooms and across grade levels. One teacher explained, "To me, the biggest impasse is not having my own [technology] in the classroom full time that belongs to me that I can chain to the floor." These two schools also reported limited financial resources within the school budget as a barrier to growing this program.

Learning Outcomes

Learning outcomes are discussed in terms of impact on student engagement and motivation and impact on understanding of academic content.

Impact on Student Engagement and Motivation. At all four schools, interviewees consistently reported increased student engagement and motivation as a result of the program. Part of the student motivation is related to using hands-on technology, such as interactive whiteboards, AVerPens, iPod Touches, and so forth. One teacher explained, "the [students] really gravitate towards [technology] they can hold in their hand." Students are also motivated and engaged because they have a sense of investment and ownership in using their own piece of equipment or sharing their work in front of the class. In the words of one teacher,

Some kids are so hard to engage or so shy about standing up in front . . . This technology engages them [and] gives them motivation to stand up [so][we can] really hear what they have to say and see their work.

Respondents from two schools also commented that they have observed the expansion of student skills, such as learning how to use a new piece of equipment to complete an assignment or how to solve a math problem using an interactive whiteboard, because of greater access to technology and effective integration in the classroom. One teacher noted that because her students share their work with the class on a daily basis, students have improved their listening, critical thinking, reflection, and critiquing skills.

Classroom observations are consistent with the interview findings regarding the positive impact of technology integration on student engagement and motivation. Observers rated the whether students in the class exhibited high, moderate, or low levels of engagement with the lesson. In 10 of the 18 classrooms visited, high levels of student engagement was observed (i.e., students typically maintained high academic focus for most of the lesson); in six classrooms, moderate levels of student engagement were evident (i.e., students maintained a high academic focus for some but not all of the lesson); and in two classrooms, low levels of student engagement were observed (students did not maintain high academic focus on the lesson).

Understanding of Academic Content. Teachers in each school reported that the integration of technology supported their ability to differentiate instruction for students at different learning levels. For example, teachers consistently commented that students can use the tools and presentation formats that best work for them, as well as work at their own pace. Teachers also noted that they have the opportunity to pace the class differently based on ability levels and give greater challenges to advanced students without intimidating reluctant learners. Similarly, respondents from three schools reported students demonstrating increased comprehension of the material, such as better understanding of concepts in math, science, art, and dance. In the words of one teacher,

We had kids that struggled with so many different things [who became extremely invested and did well [on their project.] [Y]ou wouldn't know otherwise, if you [saw] their end result, that they were a kid that had trouble with science, writing or [even] speaking in front of people.

Sustainability

All four schools have established plans for sustaining the program once grant funding ends as well as expanding the program. At three schools, the plans appeared to be clearly written and highly focused. All four schools plan to cover the costs of sustaining and expanding the program by incorporating it into their school budgets; the respondents at two schools are also seeking additional outside funding. One principal noted,

We're not expecting to fund this all ourselves, but we think that we can continue to access outside resources that will help us to do that. . . . We're going through a period of budget cuts here as every school in Vermont is. But one area that we are keeping intact is our technology commitment.

Staff at each school expressed plans to expand their programs to additional classrooms and teachers within the school. However, a common barrier to program expansion at all schools is the lack of interest or resistance from certain teachers to shift toward technology integration. In addition, three schools noted that other schools in their district have plans to integrate technology into classrooms based on the experiences of these grant-funded programs.

Promotion of Technology Integration. All four schools indicated that they either have promoted or will promote their technology integration programs and prepare presentations for the general public, the school board, and/or parents. Examples of events where both student work and teacher and student testimonials have been showcased include community open houses, school board meetings, themed event nights, and parent nights.

Conclusions and Recommendations

Evaluation of the CBTG Program is based on data collected from the four schools visited. Overall, teachers and principals indicated that they have benefited from participation in the CBTG Program. The schools generally agreed that the purpose of the grant program is to increase student-centered learning, promote students' development of 21st century skills, and integrate technology across subjects and grade levels. Although schools reported challenges related to technical difficulties, limited time, and a lack of interest or resistance from certain staff, teachers and principals also described plans for the sustainability and expansion of the current programs.

In most schools, teachers and principals reported the presence of teacher collaboration, although some teachers reported that the current amount was not fully sufficient. The evaluators recommend that schools should ensure adequate shared planning time between specialists (i.e., art, music, physical education, and library/media studies) and general educators to encourage teacher collaboration and project-based learning across subject areas. Teachers were somewhat mixed in their opinions of the administrative support they receive, particularly related to expectation setting and follow-up, yet all the schools reported that they have access to a variety of resources when it comes to technological support for their program. Perhaps the CBTG Program director can work specifically with teachers from the school that reported low administrative support on strategies to improve support (such as student demonstrations of technology use, sharing end products, and linking student outcomes to evidence-based practices).

As a result of the CBTG Program, grantee teachers from the schools visited reported noticeable changes in their instruction and student motivation and learning outcomes. Respondents from all four schools visited reported increased project-based learning and student collaboration, as well as new learning opportunities for students through technology integration that were not previously available. These findings are supported by data collected from classroom observations, indicating frequent opportunities for self-directed learning by students. Teachers should work with school or district technology staff to improve their students' access to hardware so that grant-funded software and equipment may be better used by students. Although not all teachers reported changes in assessment practices, several teachers noted an increased diversity of assessments and opportunities for more student self-assessment and reflection.

At the four schools visited, there was increased collaboration, student engagement, and opportunities for student-centered project-based learning within the schools.

eLearning Project

According to program documents, the goal of the eLearning Project is to assist teachers and school leaders, through research-based professional development, become more proficient in student-centered, technology-rich teaching and learning. Six schools, in different regions of the state, are participating as demonstration sites, with the intention that they will promote technology integration in their region. Participating educators at these schools receive intensive coaching and professional development. Through the eLearning Project, participants also have access to an interactive network of resources that supports their ongoing work, with the ultimate goal of establishing a statewide communication network to support educators. Technology was not distributed at the school level as part of this grant program, with the exception of each site receiving a flip camera for documenting and reflecting on their work throughout the year.

This section summarizes findings related to the eLearning Project, including interviews with teachers, grant managers, and principals from the four schools visited.

Program Design

Overall Purpose. At each eLearning Project grant site, respondents were asked to describe the main purpose or motivation for the grant program. All four schools identified the primary purpose as providing professional development about technology integration. Respondents typically emphasized the importance of pedagogy over training in technology use. As one grant manager put it,

Technology is secondary and [the eLearning Project is] really about [improving] the pedagogy and the teaching methods we use [and] the transformation from student[s'] being sponge[s] to student[s'] being more involved in their education.

While the eLearning Project grant funded only professional development, interviewees at all schools viewed this program as an extension of their existing technology program, such as one-to-one or two-to-one computing initiatives, as funded by other grant sources. All schools also identified secondary purposes for eLearning Project grant funding, such as increasing student-centered learning, promoting students' development of 21st century skills, and integrating technology across subjects and grade levels. A principal explained,

[We sought to] increase [the] amount of professional development related to our own one-to-one [laptop] initiative. So my understanding when I applied for the grant was that the grant was intended for schools that already had a high level of technology in place or was going in [the] direction of getting that sort of technology in place.

The four schools varied somewhat in the clarity and consistency with which staff described the program's purpose. In two schools, there was strong congruency in responses across interviews,

whereas in the other two schools, respondents described broader technology goals rather than the specific eLearning Project. Although one goal of the program for eLearning Project schools is to become regional demonstration sites to promote technology integration in neighboring schools, interviewees did not explicitly state this as a goal of the program. All teachers viewed their schools as more advanced in terms of technology access and integration compared to other schools; however, the site visitor speculates that teachers may not yet view themselves as “model” schools because they are still building confidence in their own skills and abilities.

Participation and Resources Gained. Schools reported sending teams of three to six teachers to attend the eLearning Project Institute held in January 2010 at the University of Vermont (UVM). The eLearning Project grant program did not fund technology acquisition, however; this grant provided training and education for teachers to build their skills and better engage students with the preexisting technology program. All schools visited appeared to integrate technology into the classroom to some degree, and interactive whiteboards and LCD projectors are in most—if not all—classrooms. Two schools have one-to-one schoolwide computing initiatives. One school has one-to-one programs in five classrooms and a 2:1 ratio of computers per student. The other school uses shared resources, such as two mobile laptop carts with 18 units, a computer lab with 9 desktop units, and 45 Netbooks dedicated for seventh- and eighth-grade students.

Professional Development

Each school’s eLearning Project team expressed strong commitment to gaining skills and resources from professional development received through this grant and investment in strengthening their schoolwide technology integration initiative by sharing their skills gained. The eLearning Project’s primary purpose was to provide teachers with two resources for professional development: attending a one-time institute and ongoing coaching with an expert consultant. At each school included in the evaluation, between three and six teachers reported attending the three-day eLearning Project Institute held at UVM. Program sessions were facilitated by university staff and teachers experienced in technology integration. Attendees from three schools also indicated that they observed technology integration initiatives in classrooms at other schools as part of the institute’s program.

Grantee schools also worked with eLearning Project coaches on an ongoing and as-needed basis. Schools reported that coaches visited their schools approximately three days per month and were also available for e-mail and telephone consultation. Interviewees from all schools also reported working with coaches in the classroom to initiate new teaching methods that further integrate technology into their instruction. As one principal commented,

The eLearning grant funded our consultant who really was the person who [provided] that extra helping hand in the classroom that got teachers off the ground with new ideas, new resources that are web based, those sorts of things.

In addition to the eLearning Project Institute and coaches, the schools reported other professional development activities of varying lengths, ranging in duration from a few hours to semester-long courses. These opportunities included in-service days and short workshops after school hours with colleagues, self-study, and graduate level university courses.

Interviewees from two schools indicated training they received at the eLearning Project Institute has since been integrated throughout most of the school by way of teacher sharing and collaboration. The eLearning Project coach paired with one school worked with almost all the teachers at the school, individually and as a group, who were interested in improving their technology integration strategies. This school has since hired this coach as a consultant subsequent to grant funding for the 2011–12 school year. It is not clear to what extent eLearning Project coaches at other schools work with teachers beyond the initial team. Staff from two other schools acknowledged plans for eLearning Project teachers to provide professional development for the rest of the school in the near future.

One school reported receiving limited support from its eLearning Project coach, who became ill and was not replaced by the program. In addition, teachers in this school did not receive the expected graduate credits for participating in the institute and the grant program.

Reactions to Professional Development. Teachers from all four schools reported that the professional development increased their capacity to incorporate technology into the curriculum. Additionally, respondents from three schools noted that opportunities to collaborate with other teachers and gain resources for specific content areas at the institute and hands-on sessions held at the institute increased teachers' technical proficiency with using technology and Web 2.0 applications. In the words of one teacher,

[A helpful aspect of the institute] was seeing [the] practical applications of Web 2.0 programs. I knew the blogs were out there. I knew the Google Apps were out there. But I hadn't sat down before and had the time to come up with a realistic way to use it with the kids. [At the institute] we had what they called the "sandbox time," so that we could sit down and [play around with] applications.

Along with the eLearning Project Institute, interviewees from two schools indicated that they found visiting and observing model classrooms to be useful for demonstrating schoolwide technology integration. A principal explained,

One of the most beneficial things that we did was [visiting] Edmunds [Middle School] to see what they were doing . . . [we learned] a bunch of stuff from them and really took off with our own [one-to-one initiative], both the physical management of it, online infrastructure, and the professional development related to rolling something like this out.

The four schools consistently indicated that they found the professional development to be a valuable experience. Even with the loss of their eLearning Project coach, teachers from that school found the institute and the work they did with their coach in the fall of 2010 to be useful experiences.

School Support for Technology Integration

Collaboration. At all four schools, interviewees reported both formal and informal opportunities for teacher collaboration. Formal opportunities included regularly scheduled staff meetings, individual sessions with an eLearning Project coach, and shared planning time during the school day. Teachers indicated that these opportunities are used to develop instructional strategies and curriculum materials as well as learn about and troubleshoot technology and applications. As expressed by a principal,

All of our core teachers in our building, PK–8, have common planning time every single day. So they have lots of [time to collaborate]. We really promote a team approach to all teaching and learning here.

Each school visited approached cultivating teacher collaboration somewhat differently. At one school, teachers are involved in a professional learning committee that functions specifically for planning technology integration strategies. At another school, teachers reported sharing technology integration practices by observing other classrooms; this school pays for substitute coverage to encourage classroom observations. In addition to face-to-face collaboration, all interviewees from one school indicated that they contribute on an ongoing basis to their school's online resource and information sharing forum for teachers, students, and parents.

Based on responses, three schools reported numerous and frequent opportunities for teacher collaboration. At one school, however, some teachers voiced the need for more collaboration opportunities.

Administrative Support and Guidance. Based on interviews with teachers, it appears that the administration at all four eLearning Project schools visited generally encourages teachers to try new practices regarding technology. In three schools, teachers noted that the administration also provides additional time for planning and seeks out funds for teachers to attend professional development or acquire new technology. As one teacher explained,

[Our principal has] done a great job of carving out time and finding the resources and using the resources to best fit [teachers'] needs. [O]verall, he's had a constant dialogue, constant communication about how are things working, how are things going, and he's just really been extremely supportive of whatever we need; asking what do you need to make this successful; what do you need to incorporate this; and what's best going to fit our practices and still drive instruction in the classroom?

Two schools had particularly high levels of administrative support because their principals encourage schoolwide participation, set expectations for technology integration, and follow up with teachers on these expectations through classroom observations. Schools that indicated moderate administrative support noted that teachers receive minimal and unclear expectations beyond carrying out the grant as intended, and follow-up is not linked specifically to the grant and use of technology. Demonstrating high administrative support, a grant manager explained,

[Our principal] has expectations that all classrooms will integrate technology. It's a requirement this year that teachers create a technology goal that is measurable. And he has documentation, or he's keeping documentation of our ability to meet the goals that we created.

Teachers at three schools indicated that the administration follows up on teacher technology integration through direct observation of classrooms, with one school using a specific rubric related to technology integration in the classroom. Aside from direct observation, administrators from two schools also engage teachers in informal discussion and during staff meetings to follow up on technology integration in the classroom.

Technology Support for Teachers. At each school, teachers reported receiving support from eLearning Project coaches and school and district technology staff to integrate technology into the classroom and troubleshoot challenges with equipment, network access, and application usage. Teachers from three schools also rely on technology support from other teachers. A principal noted,

One of our teachers at the middle [school] level is incredibly innovative in technology. He is spending half of his time supporting teachers [on technology integration and troubleshooting].

Additional Resources. At each school, teachers indicated having access to additional resources to support technology integration, including the expertise and the experience of other teachers, handouts and materials received at the eLearning Project Institute, and free Internet resources for use during instruction and student projects. Three schools reported generating a teacher resource list based on resources recommended at the institute, with one principal building an online resource list for ongoing use by teachers, which a teacher described as, "ever expanding [and] evidence-based."

Impact on Instruction

At all four eLearning Project schools visited, respondents indicated that technology integration in the classroom has increased teachers' capacity to provide students with opportunities for understanding and using technology. One grant manager explained that students' use of technology in the classroom exposes them to appropriate uses of the Internet and online interactions with their peers and adults. Another teacher described how students' access to technology at their fingertips has enhanced their learning experiences, stating,

Just having that access [to technology resources] and being able to say, "go to this website, search for this" [or] "everybody right now, instead of writing up a lab report on a piece of paper, you're going to include your data [on the class Wiki]. Scan in the data and share it with everybody."

Several teachers at two schools noted that their students have access to e-mail through Google Apps and use e-mail to communicate more frequently with teachers, such as to get feedback on draft assignments or discuss concerns in a more private setting. One teacher noted,

I find that kids are e-mailing me a lot more . . . [for example,] when they're home. So I know immediately what a kid is struggling with on the assignment. I don't have to wait until the next day. I can either help them immediately or it helps me plan [for] tomorrow.

Three schools reported that the eLearning Project grant program has provided new learning opportunities through technology integration that were not previously available. A commonly noted new learning opportunity is teacher use of a class website or a Wiki to post lecture notes and assignments and the use of programs, such as Google Docs, that enable students to create, store, and share work online with other students. A number of teachers noted that these programs take group work and peer editing to a level not previously possible with traditional methods. As one school principal explained,

[Some] teachers are completely redesigning how they approach their curriculum because they have this sort of technology access, redesigning how kids are sharing their written work, how students are engaging with DNA or any of that other stuff, because those weren't resources that were available two years ago. So they're recognizing that their students are becoming more adept at using computers, more engaged by using computers, and therefore needing to redesign what they're doing to funnel that through those technological resources.

Based on the extent to which teachers reported integrating technology into their lessons and assessments, three schools demonstrated strong use of digital learning experiences and assessments because of technology integration and professional development. One teacher from one school noted students' limited access to computers during class instruction as a shortcoming of this grant-funded program.

Promoting Student-Centered Instruction. As a result of the eLearning Project grant, all four schools reported an increase in project-based learning and student collaboration. For example, one teacher noted using Web-based applications to increase collaboration among students, explaining,

Google Docs [and] some of the technology resources allow for greater [student] collaboration. For instance, the MindMeister [program that] we use [in class]. If I assign a group project, kids could share a Mind App with one another and all three or four students could edit it.

Three schools also indicated that the eLearning Project allows teachers to create more hands-on and authentic learning opportunities for students. Teachers spoke of an increase in their use of interactive and hands-on presentation materials, such as document cameras and interactive whiteboards, to more efficiently teach students through demonstration and sharing. One principal noted that increased hands-on and project-based learning has enhanced students' learning experiences. He noted,

[Our] students [are] hands-on learners, but really, they're project-based learners. This grant [helps them] make a shift from just [working] hands-on to students working on a project because they need to accomplish something real.

Assessment of Student Learning. As with the CBTG Program, teachers and principals at the eLearning Project schools indicated that the grant program's influence on assessment of student learning is varied. Although at least one teacher from each school reported changes to student assessment strategies, between one and three teachers from three schools reported that they had not changed the way they assess student learning because of technology integration. Thus, there was no consistent impact on assessment practices at any of the four eLearning Project schools visited.

A subset of teachers from two schools reported an increase in the diversity of assessments used, specifically through formative assessment of student retention and comprehension during instruction. For example, some teachers use response systems ("clickers") to quickly assess student understanding of material covered, while other teachers have students answer questions about a topic (such as a chapter assigned for homework) using Google Forms and then aggregate the results to fuel class discussion. One teacher explained, "It's always fun to try new ways to assess kids using different Internet resources, [providing kids with] more variety than just multiple choice questions."

Teachers from two schools commented that diverse assessments through technology give students more of a choice in how they are assessed and allows for more self-assessment, self-reflection, and peer evaluation. For instance, a math teacher from one school set up five workstations for small groups of students to demonstrate their math competency. Three of the five stations involved student use of technology, such as an interactive math game that is run on the interactive whiteboard and problem solving with their peers via a website and Wiki chat forum. Students could choose to rotate through three of the five stations to test their skills during class. The teacher noted that several students who have trouble sitting still excelled in using the interactive whiteboard game, whereas others were content solving math equations using paper and pencil. By working together, students helped each other better understand the concepts through peer teaching and evaluation. Additionally, two schools reported using adaptive software and Web applications in content areas, such as mathematics, that advance as students' progress.

Barriers and Challenges. Schools' experiences show that technology integration programs are not without challenges and barriers. The schools visited noted common difficulties related to (1) not having enough time to learn how to use new technology, (2) adapting their curriculum for technology integration, and (3) issues with faulty technology. As one teacher explained,

Time is always a barrier to anything you put on a teacher's plate. So finding and allocating time for collaboration and professional development is always going to be an ongoing challenge, particularly when you're balancing district initiatives and other things that need to happen.

Respondents from three schools also reported problems with faulty technology and slow Internet connection or limited broadband access, at both the school and students' homes. Although

schools noted facing difficulties with defective equipment, in all instances, the manufacturer resolved the issues.

Learning Outcomes

Impact on Student Engagement and Motivation. Teachers from all four schools consistently reported increased engagement and motivation of students to learn as a result of technology integration. Teachers commonly noted that students are engaged and motivated while using technology because it is new, interesting, and exciting for them. One teacher stated that motivation and engagement with technology is “huge.” He explained, “Whatever [they are doing] with technology, they’re engaged. Whether it’s because it’s theirs, they can be on their own with it . . . or it’s just something interesting and fascinating for them.”

A number of teachers also indicated that students are engaged by technology because they enjoy sharing their knowledge about technology, such as troubleshooting equipment or using applications, with teachers and their peers. As one teacher explained, “Students get really excited about teaching other students about something they’re good at on the computer that others might not know.”

Understanding of Academic Content. Respondents from all schools also reported that students demonstrate increased comprehension of academic material because of differentiated instruction and improved availability of resources to access information. A teacher expanded his thoughts on this concept, stating,

I think there’s a deeper level of knowledge through [technology integration]. Because again, if they’re being challenged but it’s within their ability, there’s going to automatically be a higher [level of] understanding than if [learning is] boring to them or it’s just too much for them.

All schools reported that technology integration has increased teachers’ capacity to differentiate instruction and more effectively teach students of all learning abilities. Teachers reported being better equipped to simultaneously accommodate different learning styles, such as visual and auditory learners, as well as provide students at different levels the ability to work at their own pace. One teacher elaborated,

When they have everything right in front of them [on their laptop] and they can scroll through at their pace, it’s fantastic. I get much deeper answers on what they would choose and why [because] I can [work with] students at their [own] pace.

Sustainability

All eLearning Project grantee schools reported ways their program is being sustained beyond the grant funded time frame, including strategies to expand to additional classrooms and teachers within the school and use budget funds to retain the eLearning Project coach as a consultant. However, consistent with findings from the CBTG Program (and the LNV program findings

below), three schools indicated that their initiatives were circumscribed by a lack of interest or resistance from certain staff to change or enhance their teaching practices. A principal noted,

Still there are teachers or staff members who do not have a comfort level with technology. I'm fortunate in [that] 90% of our teaching staff is very tech savvy. [However,] the ones that aren't [tech savvy] are the [most] hesitant about trying the next new thing. So those are the things that slow down broad school growth.

Principals and grant managers at each school indicated plans to incorporate the costs of expanding the eLearning Project into their school budgets, and three schools explained that they are also seeking additional outside funding.

Promotion of Technology Integration. All schools indicated that they either have promoted or will promote their technology integration programs and student work, with each reporting that they display student work and information and resources about the project on the school website.

Three schools indicated that they have made or will make presentations to members outside the school through community open houses, school board meetings, and parent nights. Two schools have also shared this project internally among teachers and through Web-based resources. Additionally, two schools reported that other schools in their district now have plans to integrate technology into classrooms based on the experiences of the eLearning Project grantee schools.

Conclusions and Recommendations

The eLearning Project is unique from other Ed-Tech grant programs because it funds professional development rather than focuses on technology acquisition. This program is complementary of the larger Ed-Tech initiative, as schools consistently viewed eLearning Project training as an extension of their existing schoolwide technology programs (e.g., one-to-one or two-to-one initiatives). The eLearning Project director should encourage and work with grantee sites to embrace their role as regional demonstration sites, from which schools with budding or growing technology programs may learn.

The eLearning Project hosted a three-day institute at UVM for grantee teachers and paid for technology coaches to work with the schools three days a month. The beneficial aspects of the institute included hands-on demonstration of practical applications and opportunities for teachers to practice their skills, share ideas, and visit exemplary programs. Teachers gained skills, resources, and technical proficiency that—with support from coaches, technology staff, and other teachers—they applied in their classrooms to better engage and motivate students. The evaluators recommend that future institutes or regional workshops hosted by grantee schools use these strategies for training others. The findings also suggest that coaches played an important role in helping teachers to confidently launch their acquisition of new skills into their daily instruction. In one case, this role was so critical that the school has allocated funds to sustain this position. The eLearning Project director should ensure that coaches, including backup or substitute consultants, are available for teachers throughout the grant time period. Perhaps grantee schools that choose to become regional demonstration sites could identify teachers to provide coaching or mentor support to area teachers.

Administrative support and guidance for technology integration programs at eLearning Project grantee schools appears to be moderate to high. Teachers feel encouraged by their administrators to try new practices, and, at two schools with high administrative support, principals set expectations for technology integration and follow-up with teachers through classroom observations. Teachers also have frequent opportunities to collaborate on implementation, although teachers from one school voiced the need for more collaboration time.

All four schools have integrated technology into the classroom to some degree. This finding is consistent with classroom observations that show technology was prevalent and well used by students during observed classes. Teachers from the four schools have increased project-based learning, student collaboration, and diverse assessment tools as a result of eLearning Project training. Overall, these grantees appear to be pleased with the program's progression, as evidenced by school plans to expand technology integration to additional classrooms by using school budget and external funds. Additionally, schools in the districts of two grantee schools have plans for similar integration programs based on grantee experiences.

Learning Network of Vermont

This section summarizes the key findings from six interviews conducted with teachers from five schools participating in LNV. According to interviews with program administrators, the LNV program is a video-conferencing network currently operating in 104 elementary, middle, and high schools in Vermont. Its goal is promote flexible learning environments for students. LNV participant schools receive credits to purchase interactive video distance-learning programs and virtual field trips for students; these programs are provided by CILC.

Program Design

Overall Purpose. Teachers reported that LNV equipment and CILC programming are used to supplement existing curriculum, as students participate in virtual field trips, cultural exchanges, and expert lectures through video conferencing. In the words of one teacher,

I think first and foremost what we wanted to do was be able to expose our kids to things that are not readily available here in the state of Vermont. While we have lots of good resources, there are things that are just not available.

Four interviewees also indicated that the program has promoted collaboration and communication among teachers and students from schools in different geographic locations.

Participation and Resources Gained. Interviewees viewed participation in this grant program as a way to gain LNV technology for their schools. As part of the LNV program, all schools received a Polycom voice conferencing system, an HD camera, a speaker unit, a dialer unit, and a computer console. The schools paid for or acquired through other resources the HD televisions for the program to run properly.

Five interviewees stated that two to three teachers at their schools have used the LNV system so far. Additionally, a teacher who works at a larger school with multiple classes per grade level said that about 15 kindergarten and third/fourth-grade teachers, in total, have used the LNV program with their students.

Extant data on the level of usage of CILC credits per school was requested by the evaluator but not amenable to analysis at the time of this report.

Professional Development

Between two and four teachers from each school received professional development in the form of two- to three-hour workshops held with their LNV equipment. The workshops were hosted by the program's former director and provided information on how to use LNV equipment and the CILC database.

These workshops enabled teachers to become technically proficient in using LNV equipment and the CILC website. Two teachers also indicated that the workshops provided an opportunity to refine their skills in searching the CILC database and better match programs with their curriculum needs. Additionally, three teachers received ongoing professional development in the form of as-needed support from the program's former director. As one teacher explained,

I think for me, the most helpful thing is that . . . she was easily reachable when you couldn't remember what she said to you or you needed an answer to a question.

School Support for Technology Integration

Teachers and other technology staff from a school or school district support the teachers who use LNV equipment. The use of LNV equipment and CILC programming is primarily teacher driven. Several schools have also used LNV equipment to collaborate with a wider net of colleagues around the state.

Collaboration. Teachers reported collaborating with one another, both formally and informally, on how to use LNV equipment and CILC programming. For example, four teachers reported using planned and regularly scheduled meetings as forums for collaborating with other teachers about using the program in their curriculum. These meetings occurred with teachers, building-based technology committees, and technology teacher-leaders. Four teachers also have taken advantage of informal and unplanned opportunities to share expertise on how to best use the technology in the classroom and set up and troubleshoot the program. These teachers have assisted each other in searching the CILC database and made recommendations on CILC programs that may be a good match for specific units.

In addition to classroom-based uses of LNV equipment, four teachers have used this equipment for collaboration with others around the state. Teachers have hosted or participated in professional development workshops, meetings, or graduate instruction by using the video-

conferencing technology. For these events, schools used their acquired LNV equipment to participate, but the events did not involve using CILC credits or grant funds.

Administrative Support and Guidance. Although all teachers indicated that school administrators are aware of the LNV program equipment and credits to access the CILC content, four teachers specifically felt encouraged by administrators to try new practices with the LNV program. One teacher explained that the LNV program is teacher driven. Only two teachers noted that their administrators allow for time to share and plan with other teachers about using the LNV program.

Technology Support for Teachers. All six teachers have received one-to-one coaching, both planned and informal, with teachers experienced in using LNV/CILC and school or district technology staff, including integration specialists, network administrators, and information technology staff. Teachers have received assistance in registering for CILC programs, conducting test runs of the system, setting up the equipment, and establishing connections with collaborating parties.

Additional Resources. All six interviewees were given access to CILC credits, paid for by the program's grant funding, which could be used to schedule interactive programs, such as virtual field trips to museums or zoos and lectures, discussions, and hands-on activities led by a content-area expert. Additionally, five teachers reported that they have used paper-based resources, such as the LNV system manual, and supplemental materials received from the CILC program. As one teacher explained, CILC resources helped students better understand the material being presented and prepare for discussion with the facilitator. Students could also participate in a hands-on activity (e.g., a science experiment) alongside the facilitator of the session with the equipment they received.

Impact on Instruction

Teachers have used LNV equipment and CILC programming between one and five times. Two of the teachers interviewed also set up two classroom-to-classroom connections between their students and students in Kentucky and Illinois. All respondents indicated that the LNV program provides students with new learning opportunities through virtual field trips, expert-led science experiments, and collaboration with students in other parts of the country that were not previously available. One teacher highlighted some of her students' experiences, stating,

We have had kids who have been to the St. Louis Zoo and kids who have been working with other classes in different parts of the country. We have fifth graders who had a wonderful interview with Senator Leahy last year. So the [CILC] credits [enable us] to do this at no cost, which is a plus, so [students are] getting experiences that they would not otherwise have.

Other experiences that students have had through the LNV equipment include visiting the Museum of Native American History and the Discovery Museum and speaking with experts on specialized topics, such as the journeys of Christopher Columbus and penguins.

Three teachers noted that CILC programs enhance the content of their existing curriculum by providing supplemental or additional resources for learning. As one teacher explained, “Whenever we start a new unit, I check the CILC site to see if there’s something that connects.”

Teachers noted that student age influences how they use the LNV system. For older students, teachers usually engage students with CILC programming at the end of a unit so students are prepared to interact during the session and the experience supplements their prior knowledge on the topic. With younger students, teachers indicated that the LNV experience promotes practices of good listening, speaking, and behavior skills when interacting with an audience.

Promoting Student-Centered Instruction. Four teachers interviewed said that the LNV equipment has increased opportunities for student collaboration by providing a forum for engaging in two-way, interactive learning and dialogue with content experts and their peers from other communities. Additionally, two teachers feel that LNV and CILC programming provides them with a tool for creating hands-on, interactive, and kinesthetic learning opportunities. A teacher explained,

[Students] had a better understanding [because] they acted out the molecules. They built things [as part of the CILC program]. It’s just so hands-on.”

Unlike the eLearning Project and the CBTG Program, most teachers did not indicate that the LNV program had increased project-based learning. However, one teacher reported that using CILC programs at the culmination of project-based learning helped students better understand concepts covered.

Barriers and Challenges. Respondents spoke of a variety of barriers and challenges related to using LNV and CILC programming. All teachers reported technical difficulties with equipment and connectivity.

Three teachers also noted that they do not use LNV in their classroom as often as desired because they have limited time in their schedules to search for appropriate CILC programs and time to connect programs with the curriculum.

Regarding technical difficulties, teachers reported that LNV equipment, such as microphones, have occasionally not worked properly, detracting from the experience because students could not fully communicate with the collaborating party. Network security measures, such as school firewalls, slow Internet connections, and limited bandwidth have also caused problems for several of the teachers interviewed. As a result, images streamed to and from classrooms were distorted on the television screen, or students experienced audio and/or visual delays.

Learning Outcomes

Impact on Student Engagement and Motivation. Interviewees consistently noted that their students have shown increased engagement during the learning experience and increased motivation to learn a specific topic when a unit includes LNV and CILC programming. Teachers reported on a variety of ways that students have demonstrated increased engagement. Four

teachers noted the importance of connecting students with an expert resource. In the words of one teacher,

[It's] something engaging, interesting, not me talking for forty-five minutes. What I like about it is it's having an expert in your room who knows a ton about that one thing.

Understanding of Academic Content. Approximately half of the teachers interviewed indicated that the LNV program supports differentiated instruction by providing students with an alternate way to receive information, communicate, interact, and learn. One teacher explained,

“I think that just that alternative means of delivery of content reaches more kids, rather than having a child read an article out of a magazine. Having the opportunity to interact with an expert professional better meets the needs of many children.”

Two teachers also reported that students of all ability levels can participate in LNV and CILC programming because they have selected are verbal, visual, and hands-on experiences.

Sustainability

Four respondents indicated plans to expand their current programs. Teachers plan to expand classroom use of the LNV system and CILC credits as well as collaborate with other classrooms in the state, country, and world. Using LNV equipment for classroom-to-classroom collaboration does not cost schools money; however, both parties must have access to LNV equipment and must coordinate their schedules to participate. Three teachers also noted that at least one other teacher in their schools plans to use LNV and CILC programs in the spring semester. However, a barrier to sustaining the LNV program at schools is an overall limited engagement of teachers to trying to use LNV equipment and CILC programming. All interviewees consistently reported that other teachers are less inclined to use the LNV system because they are not comfortable with using this type of new technology, have limited time to learn how to use it, are resistant to alter their current teaching practices, and are focused on other projects with students.

Three teachers also noted that sustaining the cost of CILC programming through the school budget was not feasible given the current state of budget cuts. Only two of the six teachers interviewed reported that their schools are looking for outside funding to cover the cost of credits when free credits are no longer available. Because schools may eventually have to pay for credits with their own funding, two teachers questioned if the quality of CILC programs is worth the cost of purchasing credits in place of teachers covering the same material on their own. Teachers also expressed confusion over how CILC credits are distributed to and managed by schools, the actual cost of credits, and who pays for teachers to access free credits. Given the overall limited use of the LNV system at schools, many teachers were concerned that their schools would lose access to CILC credits if they were not used in a timely fashion.

Conclusions and Recommendations

Six teachers from five schools use LNV equipment and CILC programming to supplement existing curriculum, as students participate in field trips, cultural exchanges, classroom-to-classroom collaboration, and expert lectures through videoconferencing. The use of LNV equipment and CILC programming appears to be teacher driven. Teachers take the initiative to work with each other and technology staff to search and register for CILC programs, set up equipment and conduct test runs, and establish network connections. An unintended outcome of this program is that LNV equipment at schools seems to facilitate professional development and collaboration among teachers and professionals throughout the state. Schools with LNV equipment should be encouraged by the LNV program director to explore uses of LNV equipment beyond classroom instruction.

The use of LNV equipment and CILC programming in the classroom offers new learning opportunities because students engage in two-way, interactive, and hands-on learning with people and resources other than their teachers and friends. This program provides students of all ages and learning levels with an alternate way to receive information, communicate, and learn from a wider source of resources. Teachers who use this program as a supplement to their instruction report positive student outcomes. However, all schools are challenged by low teacher engagement with the program in general, possibly resulting from limited technical support for program setup and troubleshooting. Teachers who have pioneered the use of LNV are persistent in helping their colleagues use the program and plan to continue using CILC programs and classroom-to-classroom collaboration. To promote sustainability, the evaluators recommend that the LNV program director work with these teachers to enhance their usage of the program and develop strategies to encourage others to use the program at their schools. The LNV program director should encourage teachers to explore no-cost ways to use LNV equipment as part of instruction, such as classroom-to-classroom connections.

Given the confusion expressed by most interviewees over CILC credits, the evaluators recommend that the LNV director clarify for teachers how these credits are managed, distributed, and paid for, including the cost. Teachers expressed concern about the ability to pay for CILC credits once grant funds are no longer available and doubt school budgets will cover this expense over other teaching methods. However, several teachers said their schools are looking for outside funding to purchase future credits because they value these experiences.

Vermont Virtual Learning Cooperative

This section presents the findings from interviews with teachers, guidance counselors, principals, and student focus groups at four schools participating in VTVLC. The VTVLC program partners with schools across the state to offer online programs and courses to K–12 students in a wide variety of subject areas. Schools receive seats for their students in courses being offered through VTVLC in exchange for providing a teacher to teach an online course. Additionally, VTVLC offers professional development for teachers, guidance counselors, and administrators on topics that involve online education and learning. Through the Ed-Tech grant, this program employs Web 2.0 technology to create a distance-learning portal and support program that are intended to lead to a statewide system of infrastructure and professional preparation for the teachers, guidance, and administrative personnel in Vermont.

The VTVLC program launched in the summer of 2010 across 14 schools, with 75 students enrolled in full-credit math, science, social studies, or English/language arts courses. In the fall of 2010, 147 students across 19 schools enrolled in VTVLC online courses, which were expanded to include art and technology courses. Each course offered in the fall was a two-semester course, with the exception of the art courses that were one semester in duration. The distribution of enrollment by course area is presented in Appendix C.

During the summer, the majority of students enrolled in math or English/language arts courses, whereas during the fall, the most highly enrolled courses were social studies, English/language arts, and foreign language. Overall, course completion was much lower during the summer session compared to the first semester of the regular school year. Course completion was about 50 percent for summer school courses, whereas several course areas (science, foreign language, art, and technology) retained greater than 75 percent of their students in the first semester. Retention rates in math (64 percent) and social studies (50 percent) courses were, however, similar to retention seen in the summer. A chart describing these findings may be found in Appendix C.

The VTVLC Program Model and Evaluation Questions

The evaluation of VTVLC addresses two settings: (1) the local school in which online learning is supported and (2) the online course itself, where instruction and learning occur.

The individual schools and districts participating in the VTVLC program provide support for online learning. They are responsible for supporting both the student and the teacher. Each school designates someone (usually a guidance counselor) who registers students and maintains the roster, serves as a liaison between a student and the online teacher, and monitors a student's progress. Schools may also choose to assign a staff person to supervise assigned online work periods. In most cases, the school is responsible for providing students with the time, computer resources, supervision, and technical support necessary to foster a successful learning experience.

The other setting encompassed by the program model is the online course itself. The evaluation examines teacher facilitation, course content, and student interactions. Instructors lead the courses in the VTVLC program. Specific assignments are due at the end of each week, and teachers are expected to answer questions that students send through e-mail or post to a private discussion thread. Course quality is expressed as the educational value of the topics, the materials, and the assignments. Student discussions are expected to be part of every course, and teachers are expected to monitor and facilitate these discussions. Finally, courses should provide assessment of and feedback on student work.

Based on this model, the evaluation of the VTVLC program addresses the following questions:

1. Why do schools and students participate in VTVLC?
2. What is the impact of school participation in VTVLC on the availability of courses not offered by a local school, the accessibility of courses to eliminate scheduling conflicts, and the flexibility of learning opportunities?

3. How satisfied are school personnel with VTVLC administrative support and professional development?
4. To what extent are schools supporting the participation of teachers and students in VTVLC?
5. What are the opinions of students and teachers regarding the quality of VTVLC courses?
6. To what extent are students enrolling in and passing VTVLC courses? How do these rates vary by curriculum area or student characteristics?
7. What are the barriers to participation?

Reasons for Participation

The four visited VTVLC schools had a variety of motivations for taking part in this grant program. All four schools expressed an interest in expanding learning opportunities for students. One guidance counselor said,

It just seems like a really fantastic opportunity for students. We're a small school in a rural part of the world, and it seemed a way to provide more opportunity.

Three schools mentioned that they were also motivated to provide their staff members with an opportunity to learn how to become online educators, a skill set that these schools thought would be highly valuable to the future careers of their teachers. Two schools mentioned that VTVLC would provide an additional opportunity for their teachers to maintain a full course load. Two schools also mentioned that being able to provide access to courses that were otherwise unavailable was a major contributing factor in their decision to participate in this program. Finally, one school mentioned that course credit recovery was a major reason for participating.

Teacher Participation. All schools recruited their teacher or teachers through a general announcement targeted at teachers interested in learning to become an online teacher. However, one school used the position of online teacher as a means to provide a full-time position for teachers whose positions could be reduced. None of the schools visited mentioned any barriers to teacher recruitment.

Impact on Course Availability, Accessibility, and Flexibility

Each school discussed a variety of factors that motivated students to participate in VTVLC. Each school mentioned that students were enrolling in VTVLC courses to obtain credit in courses they were interested in but were not offered at their schools. These courses ranged from Advanced Placement courses in science and mathematics to advanced art courses in photography and digital animation. One guidance counselor mentioned,

I've had two students in the Advanced Placement environmental science and that's because we don't offer it here. I've got one student in Advanced Placement calculus because she couldn't access it here.

Two schools mentioned credit recovery as a factor motivating students to enroll. One of these schools targeted a select number of students to enroll in VTVLC courses during the summer months to recover credit in courses in which they had previously earned failing grades. As one guidance counselor stated, “[VTVLC] gives a student hope that okay, I screwed up, I don’t have to be punished for a whole year or maybe my whole career for that matter.”

Professional Development and Administrative Procedures

The VTVLC program offers a series of four professional development courses designed to prepare teachers in the practice of online course facilitation and prepare them for the technical and administrative functions of the online course. Each school found the professional development courses to be useful with respect to navigating the learning management system (Moodle). However, teachers from two schools reported that they were not fully prepared to administer an online course. Common problems related to the transfer of typical classroom operating procedures to the online environment (e.g., keeping a grade book up-to-date). One teacher said,

I had to do a lot of the sort-of back end stuff myself, figuring out how to use the grade book and the real nuts and bolts of administering a course. I wish I’d had a little more training before I started.

Administrative procedures refer to the management of the online program by school staff, particularly the interface with VTVLC processes for enrollment and grade reporting. Each school mentioned that it was happy with the overall procedures used to enroll students in the fall. However, three schools mentioned they would be modifying some aspects of their enrollment procedures next year. For example, two schools expressed interest in developing additional procedures that would help identify students who were prepared for online learning (i.e., to work independently).

Communication between the VTVLC program directors and the schools was typically perceived as positive. Three schools mentioned that communication between VTVLC and their schools was strong and positive. One guidance counselor said,

Well, [VTVLC administrator] is amazing and I think you’ll hear that from the instructors. I sent him an e-mail, and the only reason he doesn’t answer right away is if he’s not in the office. He answers immediately or if I call him, he’s just been amazing.

Two schools mentioned that start-up of the program was hectic at the beginning of the year. One school mentioned that it would have been helpful to have additional personnel to help field questions and concerns as they arose.

School Supports for Online Learning

Each school took a slightly different approach to supervising VTVLC student work. Two schools hired additional personnel to help monitor and advise students as they progressed through their

online courses. One school had a course advisor work intensively with their summer school credit recovery students. In discussing the role of the course advisor, one guidance counselor explained, “I can picture her, when I would go into the room this summer, sitting right there with the kids, helping them through it.” This school also employed existing school staff to monitor (to a lesser degree than the summer) student work in their mathematics course during the fall semester. Students at this school enrolled in advanced biology, however, worked without any direct supervision. The second school that hired an additional staff member to supervise students monitored their advanced mathematics students closely. The course advisor was available to students for help and monitored their progress. Students at the other two schools worked independently.

Schools differed in how they structured student work schedules. One school allocated school time for students to work on their online work, with some flexibility. For example, one student had a scheduling conflict during her course meeting block and therefore completed her work outside the scheduled time. The other three schools did not have scheduled time blocks for their students. Some students at these schools mentioned that they would take advantage of free periods (if they had them) to work on their course assignments at the school. Most other students noted that they worked at their own pace outside of class, spending at least a few days a week working with the course materials.

Three schools provided additional support to their teachers by granting them an additional planning period for their online course during the academic year or granting them additional course preparation time for their online course during the summer. Otherwise, these online courses were considered to be the same as any other course offered.

Quality of Online Courses

Teachers and students provided their assessment of course quality in terms of the curriculum focus, instructional formats, assessment procedures, and the overall quality of student work.

Curriculum. Teachers and students at each school provided their feedback on the quality of the online courses they were teaching and taking with respect to the curriculum. Students and teachers at each school felt that their courses were equipped with a curriculum with good depth and breadth of content coverage. One calculus teacher explained,

As for the content, I like it. I like how it’s not all multiple choice; there are some writing assignments. So, it gives a much better view of the student’s understanding than just multiple guess. It’s much more thorough than courses we’ve used in the past. I do think they’re going into more detail.

Another student said, “Our course is quite balanced.” One teacher did, however, mention that there was some redundancy in the course content, but it was otherwise satisfactory.

Instructional Formats. Students and teachers also provided feedback on course structure and instructional strategies. A common theme across all schools was that online communication

between peers was vastly limited. Dissatisfied with the current course structure, one teacher explained,

I don't think it utilizes the forums very well. So, all the students are really independent in the course right now, which is ok, they're all doing their own work, but they might not even be aware that there are other students. . . . I don't think the forum has been used very well.

It appeared that teachers were aware of the forums but may not have been using them because there were several other online course elements to which they and their students were adjusting. One teacher said, "I do want to incorporate more of the online discussions, but I'm not working that in until we were more comfortable." Students also mentioned that peer-to-peer interactions were rare except in the situation in which multiple students from a single school were enrolled in a course. In this scenario, students tended to work together in person when possible.

Assessment. In three schools, based on the student focus groups, there was no evidence of dissatisfaction with the current assessment procedures used in the online courses. However, a small number of students from two schools expressed displeasure with the frequency of assessment. From a different perspective, one teacher mentioned some technical difficulties related to accessing her online grade book. She was concerned that her students were not being provided with accurate feedback. She noted that the issue was resolved but that she now keeps a paper backup.

Quality of Student Work. Several teachers mentioned how impressed they were with the quality of student work. One teacher said, "In many ways, it's better than my in-house students." Another teacher pointed out that the online learning environment demanded strong writing skills, something many of her students did not have going into the course. She remarked,

Two of the kids that I have, conceptually they get it, scientifically they generally get it, but when you're working in an online course, so much of your work that you submit (or all of it) is written. They're writing skills left something to be desired, let's just put it that way.

She mentioned that she was witnessing, as an ancillary effect of the course, improvements in her students' writing. Similarly, another calculus instructor mentioned, "I love how when they get frustrated with trying to make it look right on the computer screen, they'll just go in and start explaining [their equations] with sentences."

Barriers and Challenges

Two common barriers emerged: (1) start-up technical difficulties and (2) the financial sustainability of the program. Technical difficulties were a problem at each school but were minor in scope. One principal explained, "There was a technological barrier. It's new for us. It's new for the students."

Two schools mentioned financial sustainability as a barrier and concern. Although these schools noted that they are interested in continuing participation, student demand has to be present for them to be able to financially support courses like these. Added to this is the financial uncertainty that many schools and districts are currently facing. One principal noted,

We have to devote full-time equivalent for individuals to do it, which costs money. We're in a period of time where we need to cut the budget unilaterally, significantly.

Conclusions and Recommendations

Overall, each school has a favorable opinion of the VTVLC program. The schools had positive communication with VTVLC and noted that the program was quick to respond to problems as they arose. The teachers at each school were maturing as online instructors, having taken at least one professional development course and having instructed a course for a full semester. They were becoming comfortable with online tools and were planning on making better use of the features, such as the online forums, in future semesters.

Although student work was commonly perceived as high in quality, both students and teachers have had to adjust to a new learning environment. They discovered that there were many unanticipated difficulties related to online learning, such as the need for strong writing skills and being able to work independently. As a result, the program should consider how students are selected for enrollment into online courses and what information they are given with respect to taking part in an online program, especially for the first time. Teachers and students expressed a desire for greater online student communication. The VTVLC program should consider opportunities to better support online peer-to-peer interactions and communication.

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Appendix A. Observation Protocol

Preobservation Form

Date	School Name	Grade(s)	Subject(s)	Position/Specialty Area
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Observation Protocol

Name of the competitive Ed-Tech program under which your grant was awarded (if there are more than one, complete a separate survey for each):

- CBTG Program
- eLearning Project

Section I. Contextual Background and Activities

I. Classroom Demographics and Context

A. What is the total number of students in the class at the time of the observation?

- 15 or fewer
- 16–20
- 21–25
- 26–30
- 31 or more

B. Rate the adequacy of the physical environment.

1. Classroom resources:

- 1 (sparsely equipped)
- 2
- 3
- 4
- 5 (rich in resources)

2. Classroom space:

- 1 (crowded)
- 2
- 3
- 4
- 5 (adequate space)

3. Room arrangement:

- 1 (inhibited interactions among students)
- 2
- 3
- 4
- 5 (facilitated interactions among students)

II. Lesson Description

In a paragraph or two, describe the lesson you observed. Be sure to include enough detail to provide a context for your ratings of this lesson and also allow you to recall the details of this lesson when needed in future years for longitudinal analysis. Please provide any information you consider necessary to capture the activities or context of this lesson.

III. Purpose of Lesson

A. What is the lesson focus?

- Reading
- Mathematics
- English/language arts
- Science
- Social studies
- Arts
- Physical education/health
- World languages
- Career and technical education
- Other (describe briefly): _____

B. Indicate the primary intended purpose(s) of this lesson or activity based on the pre-and/or postobservation interviews with the teacher.

- Identifying prior student knowledge
- Introducing new concepts
- Practicing specific skills for mastery (e.g., computation, spelling, grammar, alphabetizing)
- Developing or deepening conceptual understanding
- Developing problem-solving skills
- Learning vocabulary or specific facts
- Developing appreciation for core ideas in the topic area
- Assessing student understanding

IV. Classroom Instruction

A. Indicate the major way(s) in which student activities were structured.

- As a whole group
- As small groups
- As pairs
- As individuals

B. How did students use technology?

Structure of activities during which students used technology:

- Used in whole class activity (e.g., students use clickers or interactive whiteboard)
- Used in pairs or small groups
- Used by individual students (e.g., individual use of drill and practice software)
- Technology not used by students

Level of focus of student use of technology:

- Major focus of student activity
- Minor focus of student activity
- Not a focus of student activity

C. What type of hardware was used by students?

- Laptop computers
- Desktop computers
- Audio recording devices
- Interactive whiteboards
- Webcams
- Calculators
- Digital cameras or video recording devices
- PDAs
- Other hardware (describe briefly): _____

D. What types of software and applications were used during student activities?

- Word processing or publication software
- Presentation software (e.g., PowerPoint)
- Spreadsheet software (e.g., Excel)
- Database software (e.g., Access, Filemaker Pro)
- Graphics or graphics organizers (e.g., Photoshop, Inspiration, InDesign, Gimp)
- Audio or video image editing software (e.g., Garage Band)
- Web authoring (e.g., Netscape Communicator, FrontPage, DreamWeaver)
- Online communication software or applications (e.g., e-mail, chat)
- Online social networking software or applications (e.g., Facebook, Myspace)
- Drill and practice (e.g., keyboarding tutorials, Reader Rabbit, games that teach specific facts)
- Learning and assessment software (e.g., Accelerated Reader, Star Reader, Star Math)
- Other software (describe briefly): _____

E. Evidence Statement (if not clear from previous description of lesson)

F. What is the purpose of student use of technology?

- Additional practice or skill reinforcement
- Online communication
- Analyzing or displaying data
- Sorting or categorizing information
- Writing a paper
- Making a presentation
- Other (describe briefly): _____

G. What is the teacher's use of technology?

Technology resources used by teachers:

- Laptop computer
- Desktop computer
- Interactive whiteboard
- E-mail
- Internet
- Electronic curriculum resources
- Other (describe briefly): _____

Purpose of teacher technology use:

- Presentation of instructional content (e.g., lecture format)
- Display noninstructional information (e.g., homework problems, writing prompt, quiz questions)
- Grading or attendance
- Documenting or assessing student work (e.g., taking notes)
- Communicating
- Researching a topic (e.g., Internet search)
- Other (describe briefly): _____

When the teacher was using technology, what was the major format of interacting with students?

- With whole class
- With a small group
- With individual students
- Alone, not with students

Section II. Ratings

Rate the following items according to this scale:

- Not at all
- Minimally
- Moderately
- Very much so

I. Lesson Design

1. The resources available in this lesson contributed to accomplishing the purposes of the instruction.
2. The design of the lesson reflected careful planning and organization.
3. The teacher presents information through multiple modalities and strategies and uses multiple materials. There are consistent opportunities for interaction with materials/activities. [*Guiding features of this item:* limited use of lecture/presentation in which there is no student talk or participation; teacher uses multiple instructional strategies (e.g., group and individual work, writing and oral presentation, graphical and analytical problem solving); teacher clearly planned out and put effort into the design of the lesson]
4. Students communicate their ideas by using a variety of means and media.

Evidence Statement:

II. Lesson Content

1. Students are presented with challenging open-ended problems.
2. Students explore real-world issues and solve authentic problems by using digital tools and resources.

Evidence Statement:

III. Classroom Culture

1. The teacher acted as a resource person, working to support and enhance student projects or investigations.
2. The teacher consistently provides support for student autonomy and leadership by offering meaningful student choice, responsibilities, and/or leadership. [*Guiding features of this item:* student autonomy is encouraged; student input in the design and implementation of the lesson is valued (e.g., tasks, group or individual work); student responsibility for and leadership of classroom activities is encouraged]
3. The teacher promotes opportunities for meaningful peer-to-peer interactions that serve an integral role within the lesson. [*Guiding features of this item:* students are encouraged to work together on common tasks and assignments; students engage each other in academic discussion; there is a significant amount of student academic exchange]
4. The teacher consistently uses and encourages the sharing of student ideas and opinions and flexibly follows and responds to student comments. [*Guiding features of this item:* the teacher genuinely respects and encourages the presentation of student perspectives; the teacher allows student feedback and interaction to guide the lesson (not adhering rigidly to a schedule or agenda) without losing track of the overall purpose of the lesson]

Evidence Statement:

IV. Student Engagement

1. There is a high level of student attention, interest, and engagement [*Guiding features of this item*: the typical student's level of engagement and attention is high for most of the lesson].

2. Estimate the percentage of the time the lesson focused on or used technology:

- 0%–10%
- 10%–20%
- 20%–30%
- 30%–40%
- 40%–50%
- 50%–60%
- 60%–70%
- 70%–80%
- 90%–100%

Appendix B. Observation Frequency Tables

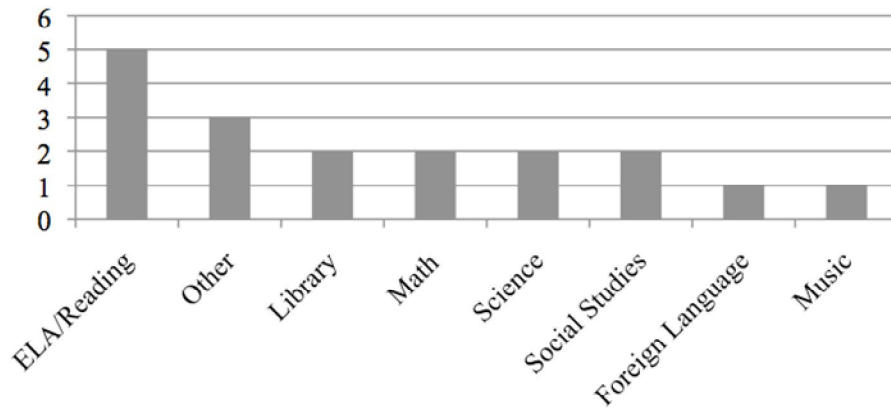
This appendix contains descriptive statistics (i.e., frequency distributions) corresponding to the findings of the classroom observations conducted in 18 classrooms at seven schools that were recipients of either a CBTG, a eLearning Project grant, or both.

Background

Table 1. Grade Level Observed, $N = 18$

Grade	Number of Observations
4	2
5	2
6	3
7	1
8	4
9	0
10	1
11	2
12	1
Mixed	2

Figure 1. Subject Observed, $N=18$



Section I. Contextual Background and Activities

Table B-2. Total Number of Students in Class, *N*= 18

Total Students	Percentage of Observations
15 or fewer	50%
16 to 20	22%
21 to 25	11%
26 to 30	0%
31 or more	17%

Table B-3. Classroom Resources, *N*= 18

Classroom Resources	Percentage of Observations
Rich in Resources	61%
Decent Resources	28%
About Average	11%
Modestly Equipped	0%
Sparsely Equipped	0%

Table B-4. Classroom Space, *N*= 18

Classroom Space	Percentage of Observations
Adequate Space	72%
Sufficient Space	6%
About Average	17%
Tight Space	6%

Table B-5. Room Arrangement, *N*= 18

Classroom Arrangement	Percentage of Observations
Facilitated interactions among students	39%
Sufficient interactions among students	44%
About average	17%
Modest interactions among students	0%
Inhibited interactions among students	0%

Impact on Instruction

Table B-6. Level of Focus of Student Technology Use, *N* = 18

Level of Focus of Student Use of Technology	Percentage of Observations
Major focus	83.3%
Minor focus	16.7%
Not a focus	0.0%

Table B-7. Types of Hardware Used by Students, *N* = 18

Level of Focus of Student Use of Technology	Percentage of Observations
Laptop computers	83.3%
PDA's	50.0%
Desktop computers	44.4%
Interactive whiteboards	22.2%
Webcams	11.1%
Audio recording devices	5.6%
Calculators	5.6%
Digital cameras or video recording devices	5.6%

Table B-8. Types of Software and Application Used by Students, *N* = 18

Types of Software and Applications Used during Student Activity	Percentage of Observations
Spreadsheet software (e.g., Excel)	61.1%
Word processing, or use of publication software	55.6%
Presentation software (e.g., PowerPoint)	16.7%
Online social networking software or applications (e.g., Facebook, Myspace, etc.)	16.7%
Database software (e.g., Access, Filemaker Pro)	5.6%
Audio or video image editing software (e.g. Garage Band)	5.6%
Web authoring (e.g., Netscape Communicator, FrontPage, DreamWeaver)	5.6%
Other Software	5.6%

Table B-9. Technology Resources Used by Teachers, *N* = 18

Technology Resources Used by Teacher	Percentage of Observations
Laptop computers	50.0%
LCD projector or document reader	50.0%
Desktop computers	22.2%
Interactive whiteboard	22.2%
Internet	16.7%
Teacher not observed using technology	16.7%
Electronic curriculum resources	11.1%
E-mail	5.6%

Promoting Student-Centered Instruction

Table B-10. Instructional Grouping, *N* = 18

Student Use of Technology	Percentage of Observations
Used by individual students	77.8%
Used in pairs or small groups	50.0%
Used in whole class activity	38.9%
Technology not used by students	0.0%

Table B-11. Lesson Purpose, *N* = 18

Purpose of Lesson	Percentage of Observations
Developing or deepening conceptual understanding	77.8%
Learning vocabulary or specific facts	50.0%
Identifying prior student knowledge	38.9%
Assessing student understanding	33.3%
Practicing specific skills for mastery (e.g., computation, spelling)	33.3%
Developing problem-solving skills	33.3%
Introducing new concepts	16.7%
Developing appreciation for core ideas in the topic area	5.6%

Table B-12. Purpose of Student Technology Use, *N* = 18

Purpose of Student Use of Technology	Percentage of Observations
Making a presentation	44.4%
Additional practice or skill reinforcement	33.3%
Researching a topic	27.8%
Online communication	27.8%
Sorting/categorizing information	27.8%
Analyzing data	22.2%
Other	22.2%
Collecting data	16.7%
Writing a paper	11.1%

Table B-13. Purpose of Teacher Use of Technology, *N* = 18

Purpose of Teacher Use of Technology	Percentage of Observations
Presentation of instructional content (i.e., lecture format)	55.6%
Display noninstructional information (e.g., homework problems, writing prompt, quiz questions)	38.9%
Other	38.9
Documenting or assessing student work (e.g., taking notes)	11.1%
Communicating	11.1%
Grading or attendance	5.6%
Researching a topic (e.g., Internet search)	5.6%

Appendix C. VTVLC Enrollment and Course Retention

Table C-1. VTVLC Enrollments by Term and Subject Area, 2010

	Math	Science	Social Studies	English/ Language Arts	Foreign Language	Art	Technology	Total
Summer 2010	33	5	12	25	0	0	0	75
Fall 2010	19	14	38	24	35	8	9	147
Total	52	19	50	49	35	8	9	222

Figure C-1. VTVLC Retention Rate by Quarter and Subject Area, 2010

