

# The Effects of Streaming Video on Teacher Attitude and Instructional Practice

**Jessica Yusaitis**

Hezel Associates, LLC

[jessica@hezel.com](mailto:jessica@hezel.com)

**Barbara C. Storandt**

Hezel Associates, LLC

[barb@hezel.com](mailto:barb@hezel.com)

## INTRODUCTION

At the helm of an educational climate in which school improvement efforts demand both adequate classroom techniques and individual student information, Project VITAL (Video in Teaching and Learning) provides educators across upstate New York with a unique opportunity to combine streaming video technology and student performance data.

The VITAL resources offer teachers video-based instructional materials – developed by PBS Channel Thirteen/WNET – that align with New York State standards and core curricula to target students’ particular Math and ELA learning needs. These on-line videos are available to teachers via the VITAL resource website, which additionally includes supplemental activities, assessments and worksheets so each lesson can be used as a stand alone piece. Teachers can link to VITAL from the nySTART reports, which collate student performance on New York State’s comprehensive Math and ELA exams given annually to all students in grades three through eight. The nySTART reports make these performance data available electronically by content strand at various disaggregated levels. When used together, VITAL and nySTART have the potential to help teachers monitor and adjust their instruction to reflect the specific learning needs of each student as identified by state tests.

Prior to statewide rollout, VITAL underwent extensive pilot testing in order to determine how forth and fifth grade teachers use the resources in their classrooms to teach math and ELA concepts. The pilot study employed an experimental design that gathered multi-level data through a variety of quantitative and qualitative data collection methods. This paper illustrates key findings from the pilot study, including the frequency and nature of teachers’ VITAL use, as well as the impact of VITAL on instructional practices and on teacher attitudes toward instructional technology and data usage.

## THEORETICAL FRAMEWORK

Research has been legitimizing video in education and laying its foundation in schools for years. This research suggests that auditory and visual methods of presenting information lead students to process information more quickly, facilitating a

progressive learning process (Campbell, Lum, & Singh, 2000). Video presents a means of igniting cognitive engagement, controlled by the level of interaction between viewer and video (Saltrick, Honey, & Pasnik, 2004). Moving images allow students to better understand processes and mechanisms – video uses these images to transform implicit information too difficult to describe with text into clear, vivid descriptions (Hartsell & Yuen, 2006).

However, there is less research to support the groundwork for *streaming* video. Streaming video is acquired from the Internet via compression and buffering techniques that allow for real-time transmission and viewing; in lieu of downloading an entire video file – which can take hours – teachers can download smaller clips of digital video files (Hartsell & Yuen, 2006). Despite its lack of a core research base, on-line video has the potential to be more adaptable and interactive in the educational arena than its traditional counterparts (TV, VHS, DVD, etc.), and its fundamental clip form allows teachers more flexibility in re-sequencing, combining with other learning technologies, and linking to their curricula (Shephard, 2003). As video continues to exhibit greater classroom potential, the technological means of displaying video – particularly streaming Internet video – are becoming more accessible to educators. According to the National Center for Education Statistics, while only three percent of instructional classrooms were connected to the Internet in 1994, 93 percent of classrooms had Internet access in 2003 (with no significant variation by locale).

Technology alone is not enough – serious school improvement efforts should combine both adequate classroom techniques *and* individual student information. Multiple studies have found that classroom practices and student background combine to have a clear effect on student achievement (Wenglinsky, 2002). Teachers should use assessments of student performance, rather than informal assumptions, to inform instructional decision-making; such early assessments can deter remediation down the road (Waters, Burger, & Burger, 1995).

Project VITAL provides NYS educators with means to address both necessities by combining streaming video technology *and* student data.

## METHODS

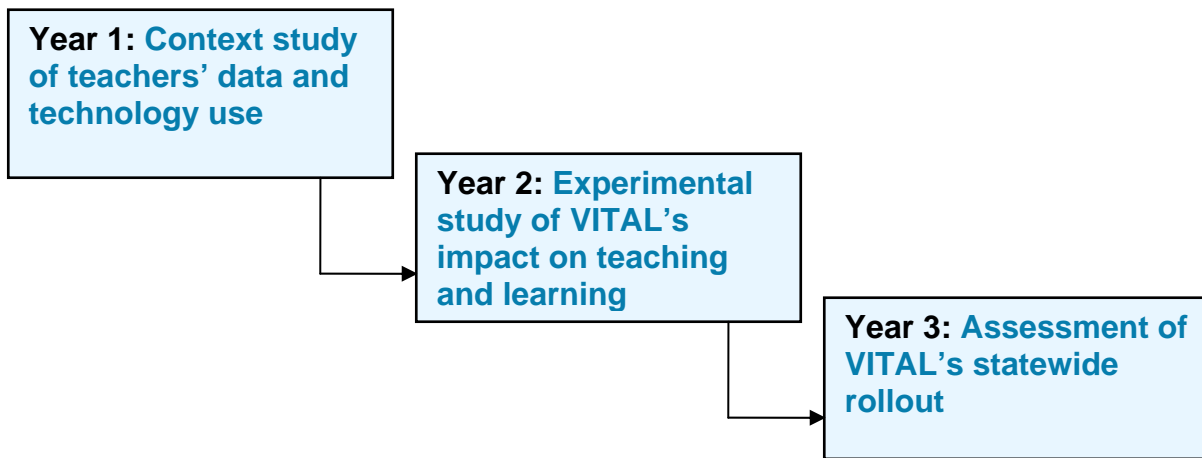
The evaluation team began with a set of guiding research questions that examine whether, how, and under what conditions VITAL exerts a meaningful impact on teachers and students over the course of three years:

1. To what extent does VITAL contribute to changes in teacher practice and improved student performance? To what extent are changes consistent across content areas and grade levels?
2. How do teachers use VITAL, and what conditions and factors (teacher, school, district, etc.) influence this use?

3. What internal and external conditions are necessary to support the integration of VITAL into schools' existing professional development efforts, particularly in Title I and underserved schools?

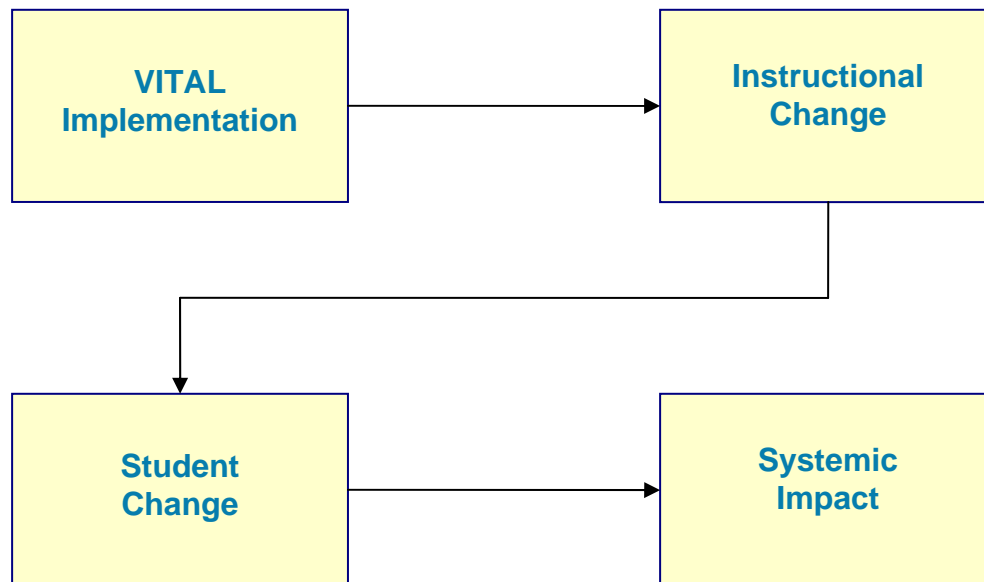
Figure 1 shows the primary research activities that were used to answer these questions. The focus of this discussion is on Year 2's experimental study, which primarily addresses research questions one and two, and was informed by Year 1's contextual study of data and technology use in NYS schools.

**Figure 1. Project VITAL 3-year evaluation plan**



The model guiding the evaluation assumes that initial changes at the teacher level – particularly in attitudes about instructional technology and data usage, followed by changes in teacher practice – must occur prior to any changes at the student level (e.g., student achievement) (See Figure 2). The evaluation accommodates these assumptions as its focus shifts from teacher level outcomes to student change and, by Year 3, system impact.

**Figure 2. Project VITAL evaluation logic model**



In order to examine teachers’ use of the VITAL materials and determine their impact on teacher attitudes, instructional practice and student performance, the evaluation team organized and conducted an experimental study incorporating random assignment of treatment conditions to half of the 200 participating fourth and fifth grade teachers. Further, teachers were each assigned to use either the math VITAL resources or the ELA (they could not use the non-assigned subject when reporting their experimental activities). After usual participant attrition, the evaluation successfully tracked a total of 147 teachers (See Table 1).

**Table 1. Participant assignments**

Group	Grade Level	Math	ELA
Control (n = 74)	4	n = 15	n = 23
	5	n = 17	n = 14
	4 & 5	n = 4	n = 1
Treatment (n = 73)	4	n = 21	n = 13
	5	n = 17	n = 18
	4 & 5	n = 3	n = 1

Participating teachers were recruited from five diverse geographic locations across New York State: Buffalo, Long Island, Westchester, Rochester, and Syracuse. Like all teachers of grades four through nine across New York State, the teachers in the control group had access only to their students’ nySTART reports during the 2006-2007 school year. Teachers in the treatment group had additional access to the embedded VITAL videos and instructional support materials that accompany the nySTART reports. By

including teachers from several schools and districts that represent various demographic configurations across the state’s different geographic regions, the evaluation team was able to enhance the generalizability of findings.

During the experimental year, VITAL provided the pilot teachers with a total of 26 math lesson packages and 22 ELA lessons. VITAL developers additionally provided teachers with one in-person training<sup>1</sup> at local PTV stations in each of the five recruitment areas.

Data were collected via monthly lesson logs and discussion board postings, as well as from a series of three attitudinal surveys, real-time electronic tracking of VITAL website activity, and a one-time summative focus group. These data were then analyzed using several participant and school variables represented during the study (See Table 2).

**Table 2. Variables included in analysis of experimental data**

Teacher-level	School-level	District-level
Gender ( <i>Female, Male</i> )	Title I Status ( <i>Title I, Non-Title I</i> )	Geographic location ( <i>City, Rural, Town, Urban Fringe</i> )
Grade level ( <i>4<sup>th</sup>, 5<sup>th</sup></i> )	School size ( <i>0-422, 423-559, 560-1032</i> )	Training location ( <i>Buffalo, Long Island-Westchester, Syracuse, Rochester</i> )
Content area ( <i>ELA, Math</i> )		
Number of years teaching ( <i>1-10 yrs, 11-20 yrs, 21+ yrs</i> )		
Experiment assignment ( <i>Control/ Treatment, Math/ELA</i> )		

VITAL’s effect on student performance will be examined in year three of the study, as the evaluation will consider VITAL students’ performance data from New York State math and ELA exams for the 2006, 2007 and 2008 school years.

## FINDINGS

### *VITAL’s Quality*

Teachers who used VITAL were impressed by the quality of the tools. Nearly all teachers in the treatment group (92.0%) found the VITAL video resources to be appropriate for their content areas and grade levels. Further, 84.0 percent of teachers felt the videos’ content challenged students to think deeply about concepts. As one

<sup>1</sup> Due to inclement weather, the Buffalo training took place online rather than face to face.

ELA teacher noted, “You have to think when you do VITAL, and that’s one of the hardest things you can ask kids – or anybody – to do.”

Teachers found that VITAL effectively addressed the math and ELA content included in the New York State fourth and fifth grade standards. However, both math and ELA teachers expressed concerns about VITAL’s overall capacity to address more granular topics taught throughout the year; teachers’ criticisms were related more to an insufficient quantity of resources as the study progressed than any particular lesson’s ability to meet its stated content objective(s). Both math and ELA teachers believed VITAL’s quality would greatly benefit from a larger selection of VITAL materials, including both introductory and more advanced lessons, available for each topic. In essence, teachers were asking for resources that could support their differentiated instruction. ELA teachers in particular felt VITAL presented a rich opportunity for cross-curricular connections through integrating science and social studies content into the ELA activities. As one teacher noted, “With increased mandates [for literacy], the ability to include and integrate various curriculum content areas is just smart teaching.” Teachers reported a high level of satisfaction with VITAL’s ability to address different student learning styles throughout the school year; VITAL’s apparent strength for reaching multiple learning needs can be found in its characteristic multi-media design. One teacher explained, “For visual learners, the pictures are captivating and self-explanatory, and for auditory learners, the ‘text’ is easy to follow using a vocabulary that is child-based and easy to understand.” Special education students, in particular, related well to the visual portrayal of concepts. However, teachers would like additional, more specific support from VITAL for differentiating their instruction within each VITAL lesson.

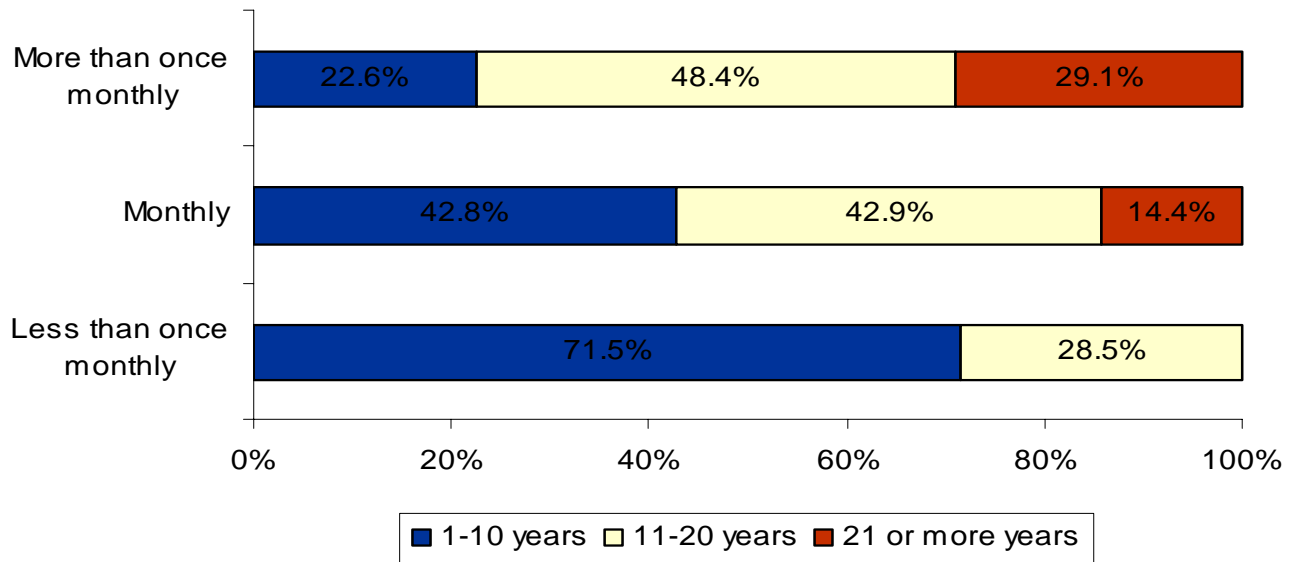
#### *Frequency of VITAL Usage*

By electronically tracking teachers’ access to various locations on the VITAL website, we were able to track the frequency of teachers’ general VITAL video usage and identify three different types of VITAL users: teachers who used VITAL *less than* once a month, those who used it *only once* a month<sup>2</sup>, and those tended to use VITAL *more than* once a month. The greatest proportion of both math and suburban teachers (60.9%) were among those who downloaded VITAL videos *more than* once a month. Approximately the same proportion of math and ELA teachers used VITAL once a month or less, while the study’s smallest (K12 enrollment less than 422 students) and most urban districts comprised the greatest proportion of teachers who used VITAL *less than* once monthly. Further, there appears to be a positive relationship between the number of years of teaching experience represented by our study participants and the frequency of VITAL video use – the longer the participants have been teaching, the more apt they were to be more-than-monthly video users (See Figure 3).

---

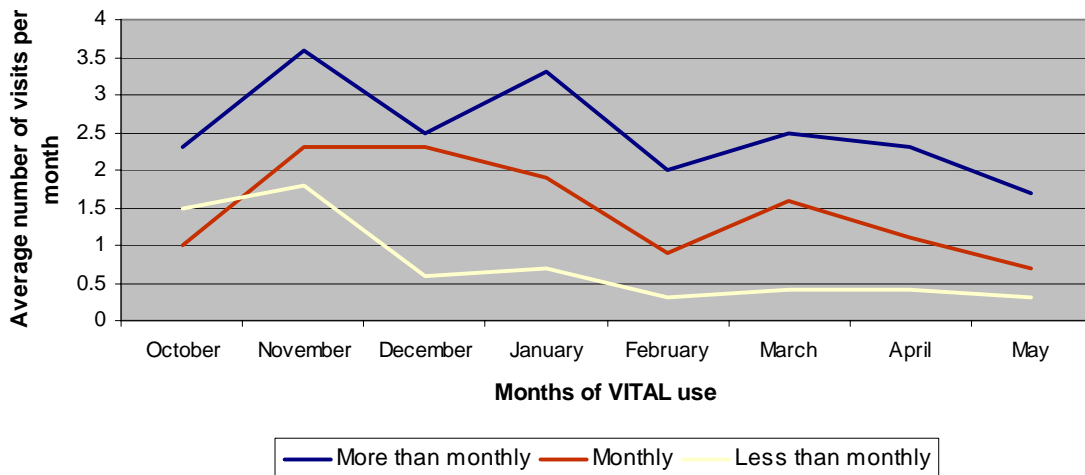
<sup>2</sup> The minimum use requirement during the study was one VITAL lesson per month.

**Figure 3. Frequency of VITAL use by experience**



Throughout the seven months during which participants were required to use VITAL for the study, most teachers downloaded more than the seven minimum video clips (one teacher downloaded as many as 40), though math teachers downloaded more clips than ELA teachers. As the study progressed, teachers in all three groups tended to download fewer clips, which may be attributed to the limited number of VITAL resources available during the pilot year – as well indicative of a novelty effect associated with VITAL use (Figure 4).

**Figure 4. Frequency of overall VITAL use by type of user**



### *Nature of VITAL Usage*

Teachers preferred to download, rather than stream, the VITAL video prior to the lesson taking place. Downloading enabled teachers in districts with too little bandwidth to access VITAL at home, download the clip, and still use VITAL in their classrooms. Downloading also ensured that each clip viewed was of the highest possible video quality. Teachers tended to use VITAL to deepen previously presented content, develop student skills and assess student learning.

In addition to video clips, VITAL provides video transcripts, associated worksheets and learning activities, which teachers used frequently. Math teachers were more apt than their ELA colleagues to download and use multiple VITAL clips, associated activities, transcripts and materials in each lesson. ELA teachers initially used less of the resources and decreased this usage over time.

Although teachers primarily used the VITAL activities to instruct the whole class simultaneously, they unanimously agreed the resources have the capacity to be implemented in other ways, including with individual students or in small groups. One teacher had only seven students in her class, and she found it very effective to seat the students around one computer and interact with the videos and activities together. Another teacher set up one of his computers as a review station that included the VITAL activities and the associated games.

### *Attitudes*

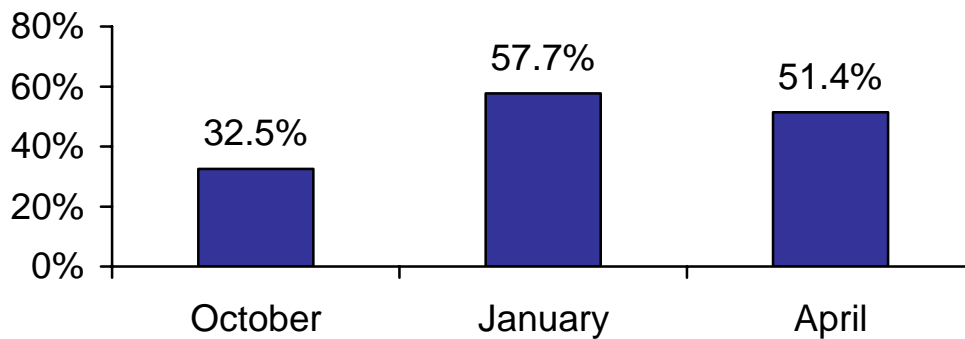
Throughout the course of the study, teachers became more comfortable with the idea of several aspects of using video and technology. Teachers' initial reservations about video's educational capabilities softened, and they increasingly found video to aid in such areas as higher-order thinking and remedial instruction.

Though teachers were increasingly confident in their abilities to use instructional video meaningfully, they were initially skeptical about doing so. Teachers felt as though instructional videos should never be used as a stand-alone teaching method, and should always be used in conjunction with other instructional methods in order to be most effective. However, the majority (59.9%) also felt as though video offers a unique pedagogy that cannot be substituted using other method(s), suggesting that teachers were ready to try video, possibly in new ways, at the study's outset.

Teachers additionally believed video was *not* the most effective method for drill or practice activities, such as math fact games and word definition memorization, suggesting that teachers felt VITAL may provide sound higher order learning activities for students. In support of this trend, the data in October reveals one-third of teachers initially found video to be effective for providing students with such higher-order thinking activities as analysis and synthesis; by April, the percentage was greater than

half (Figure 5). Additionally, the majority of teachers felt as though video can greatly enhance both remedial (79.2%) and enrichment (85.0%) education.

**Figure 5. Percentage of teachers throughout the study who find video aids students in their higher-order thinking**



Nearly every teacher in the experiment (treatment and control groups) felt as though video makes a lesson more appealing to students and conveys concepts in ways that more traditional methods cannot. As the experiment continued, teachers who used VITAL increasingly reported that incorporating video makes a lesson more effective for achieving student learning. Further, while 70.0 percent of participants consistently reported throughout the year that video improves retention of *content knowledge*, those who said video improves retention of *learned skills* increased from 60.0 percent in October to 73.0 percent in April.

Though teachers recognize the growing importance of state test data, they still have mixed feelings on data's capacity to effectively measure student knowledge and skills. A lack of detectable change in teacher attitudes about using student performance data in their instruction during the study is logical, due to the delayed statewide release of student performance data and the low frequency of teachers in the experiment who had local access to the nySTART system. The evaluation plans to follow the experimental teachers' VITAL use during the 2007-2008 school year to determine whether changes in their practice are evident and attributable to their continued use of the VITAL materials. When the nySTART reports are connected with VITAL for 2007-2008, teachers may be able to address learning needs identified by student data through the use of VITAL lessons with one click of a mouse.

Greater than half of teachers who used VITAL believe that using state test data to focus instruction on both individual student needs (60.8%) and on the whole class (72.1%) can improve learning. Statewide VITAL users may find the nySTART reports to be useful in this capacity, as they will allow teachers to easily manipulate variables (i.e. gender or SES) according to state test outcomes to help inform whole class and individual instruction. Almost all teachers (93.0%) would find instructional resources that address

specific performance indicators particularly helpful for using data to inform instruction. When the direct link between nySTART and VITAL goes live for the 2007-2008 school year, teachers may find VITAL's resources especially beneficial for helping teachers customize learning at the performance indicator level.

### *Teacher Practice*

Two key changes in teacher practice were detected during the study, though neither can be solely attributed to VITAL use. First, math teachers' reported use of instructional technologies in general and video in particular increased during the experiment, whereas ELA teachers' use of both declined. Second, we have limited data to suggest that teachers shifted the way they used video – from using it to provide a mode of lesson introduction and/or review to delivering the lesson's primary content. While our data cannot fully attribute either change to teachers' use of VITAL, these findings show promise for VITAL's potential statewide.

At the beginning of the study, about half of all teachers used traditional video (e.g. TV, VHS, DVD) in their lessons. After their first month of using VITAL, 72.9% of teachers reported using traditional video in their lessons, of whom 83.8% were ELA and 62.0% were math teachers. This trend continued through the study's duration as ELA teachers used VITAL less than they did during the fall and winter months, and as ELA participants preferred to incorporate more traditional instructional technologies, such as overhead projectors and VHS video, into their lessons.

Math teachers seemed to seek new and different applications of technology during the study when compared with their ELA colleagues. Unlike ELA teachers, math teachers appeared to replace their use of traditional video with Internet-based video during the experiment. Math teachers also used computer-based instructional technologies, such as PC's, laptops, projectors and the Internet, more often than their ELA counterparts.

In October, 71.4% of teachers described how their prior use of video tended to be for introductory or review activities and rarely to present a lesson's primary content. By April, 60.0% of teachers *preferred* using video to present lesson content, including greater than 80.0% of math teachers. This suggests that teachers, and math teachers in particular, not only view instructional video as a valid means for conveying concepts, but feel their use of Internet-based video from reputable sources may be more effective at engaging students and conveying both knowledge and skills than other means.

### CONCLUSION

Though the suggested magnitude of VITAL's implementation and impact differed between math and ELA teachers, video proved to be a potent, revered instructional tool in the classroom. Teachers reported a need for video-based resources, and they prefer those vetted by a reputable source – such as VITAL's developers, PBS Channel Thirteen/WNET. VITAL's video clips downloaded easily, which enabled teachers in

districts with too little bandwidth to access VITAL at home, download the clip, and still use VITAL in their classrooms. Further, teachers found that VITAL aligns with their subject areas (math, ELA), grade levels (4, 5) and local curricula, and they relish having access to instructional resources that show real-world applications of concepts. Participants appreciate VITAL's ability to successfully address their students' learning needs, as well as the flexibility the short video clips allow them among their busy lesson plans. There appears to have been a positive relationship between the number of years of teaching experience represented by our study participants and the frequency of VITAL video use – the longer the participants have been teaching, the more apt they were to be more-than-monthly video users.

As is common with implementing new innovations, there appears to have been a novelty effect among VITAL users in which initial use was high and subsequent use trailed off. This finding is particularly interesting even though teachers were initially skeptical about their abilities to use instructional video meaningfully. Use of VITAL may have declined during the year because teachers voiced a need to see more VITAL clips per lesson, more lessons to address each standard, and more standards covered by the suite of VITAL materials. Teachers also wanted VITAL to make more cross-curricular connections with science and social studies.

Two key changes in teacher practice were detected during the study, though neither can be solely attributed to VITAL use. First, math teachers' reported use of instructional technologies in general and video in particular increased during the experiment, whereas ELA teachers' use of both declined. Second, we have limited data to suggest that teachers shifted the way they used video – from using it to provide a mode of lesson introduction and/or review to delivering the lesson's primary content – during the experiment. While our data cannot fully attribute either change to teachers' use of VITAL, these findings show promise for VITAL's potential statewide.

Though limited change was identified during the experimental study, Year 3's expansion of VITAL may spur greater detectable change and may better reflect VITAL's potential. While VITAL left a good impression on teachers, we will be able to see VITAL's impact on learning when we collate and analyze the treatment students' math and ELA state test data before, during, and after VITAL exposure.

## REFERENCES

Campbell, C. S., Lum, J. F., & Singh, N. (2000). SMIL: You're really learning now. *Syllabus*, 14 (1), 24-26, 61.

Center for Children & Technology. (2004, January). Television Goes to School: The Impact of Video on Student Learning in Formal Education. *Educational*

*Development Center, Inc.:* Saltrick, S., Honey, M., & Pasnik, S. Retrieved September 7, 2007, from [http://cct.edc.org/admin/publications/report/PBS\\_tv-school.pdf](http://cct.edc.org/admin/publications/report/PBS_tv-school.pdf)

Hartsell, T., & Yuen, S. (2006). Video streaming in on-line learning. *AACE Journal*, 14(1), 31-43.

Shephard, K. (2003). Questioning, promoting, and evaluating the use of streaming video to support student learning. *British Journal of Educational Technology*, Vol. 34, No. 3, pp. 295-308.

Waters, T., Burger, D., & Burger, S. (1995). Moving up before moving on. *Educational Leadership*, 39.

Wenglinsky, H. (2002). "How Schools Matter: The link between teacher classroom practices and student academic performance." *Education Policy Analysis Archive* 10(12).