

# Transforming Educational Societies Through Interactive Videoconferencing

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## ABSTRACT

This article will examine how Project VIEW<sup>a</sup> has built a new foundation for communication structures in education by transforming classroom pedagogy through interactive technologies. In addition, it will present the outcomes of a model of evaluation that is providing formative and summative information on the process of integrating new communications systems into education, as well as information on the direct outcomes and systemic organizational changes that have occurred as a result of that process. In sum, this article presents research-based evidence for technological integration in curriculum that includes structures that work and outcomes that count.

**Keywords:** Videoconferencing, K-12 education, outcomes

There is growing recognition among educational communities that twenty-first century education consists of overlapping, intersecting, continually changing societies of teachers, administrators, parents, students, and informal educators (museum educators, zoo educators, librarians, artists, scientists, etc.). While these societies have divergent missions and goals, there is a common ground in their desire to provide resources that help students to engage in deeper levels of learning and reach higher levels of achievement.<sup>1</sup> The primary challenge in seeking to transform 20<sup>th</sup> century education structures into successful 21<sup>st</sup> century education communities is to develop effective methods for engaging in processes that both realign existing teaching practices and restructure educational communications.

Within and among these formal and informal educational societies, effective communication is an essential core of productive functioning and of program development. In seeking structures for transforming current educational practice into an infrastructure for the future, seamless infusion of interactive digital communications is pivotal.

Project VIEW, an outreach of the Schenectady, New York, City School District, has facilitated the development of a variety of interactive digital communications by creating new alignments of educational communities. Through the Project's facilitation

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of the realignment of classroom structures, linkages, and teaching methodologies, it has sought to fully infuse interactive digital technologies into all levels of educational exchange and

## CASE 1

When the Cincinnati Museum of Art joined with Project VIEW to develop an interactive, point-to-point videoconference program based on its African collections, it brought collaborating teachers from Kentucky together with teachers in New York State. The result of the project was the expansive development of materials that serve both the needs of teachers in these and other diverse states, and the needs of the Museum to reach out to audiences that cannot easily visit its collections.

The project facilitated the creation of collaborating communities of teachers and the museum professionals.. The objective was to discover how the methodologies of the classroom teacher and those of the museum professional can interface and achieve synergy in instruction. As a result, they created a tapestry of interactive communications – including interactive videoconferences and multidimensional websites - to enhance the delivery of lessons about African cultures to students in the classroom. In addition, the participants worked together to create integrated links to the museum's content-rich website from the project web pages on the VIEW website. They also designed classroom-ready lessons that were structured to prepare students to engage in the digital interactions at the center of this program.

Cooperating teachers in both New York and Kentucky communicated with each other and with the museum via video conferencing as they worked to plan classroom activities collaboratively. The videoconference connections also enabled the school classes in both states to communicate with each other and share the project artwork that they had created.

Students learned through direct encounter with museum specialists and reinforced their learning through web-based resources at the museum. The result of these innovative teaching structures and new methods of presentation are higher student outcomes.

content presentation. To accomplish this, Project VIEW has created a model for changing both the methods by which schools educate students and the ways in which schools communicate with each other and with their collaborating partners in education.

At the heart of Project VIEW has been the development and use of interactive technologies – especially interactive, point-to-point videoconferencing – to transform not only the way that educational societies relate to and interact with one another, but also the structures through which they support the delivery of academic content. Core to this transformation from existing methodologies to digitally imbedded pedagogy has been the realignment and expansion of curriculum context beyond the confines of the schoolhouse walls.

To accomplish this transformation, Project VIEW has facilitated change through involvement with several components and layers of reorganization of educational societies. The seamless infusion of interactive digital videoconference communication into educational delivery has been the goal of all programs supported by VIEW.

Project VIEW programs are designed to enable teachers, administrators, students, and external content providers to collaboratively become immersed in the development and use of interactive videoconferencing and in the creation of supporting digital resources to provide enhanced educational opportunities for students in the classroom. In achieving this, Project VIEW has created a model of participant engagement that involves a combination of constructivist training and hands-on program development.

The core of the training and development takes place in an interactive digital environment in which teachers and content provider professionals work together to transform their diverse teaching pedagogy to 21<sup>st</sup> century practice. The goal of this process is to enable the teachers to individually and collaboratively expand their classroom teaching structures and methods through the use interactive web resources and videoconferencing that infuse challenging, curriculum related resources into educational practice.

Among the key elements in the VIEW model has been the depth of both the professional collaboration and the integration of technology in content presentation that occurs with the introduction of interactive technological environments into curriculum delivery. To fully create these important elements, Project VIEW has designed much of its training and development to introduce and nurture methods of collaboration that are founded on true partnership and sharing of expertise and resources.

Representatives of the collaborating communities usually began their participation in Project VIEW with varying expectations and disparate missions; however, the tasks and experiences that they receive are designed to build a fluid interactive modes of communication. They jointly work together to find common ground within their separate educational practices and to create a new collaborative educational community that is bigger than each of their original visions. As a result, the final shared structures of curriculum and instruction that they create are more than a combination of their visions and abilities, rather, they are a ‘whole’ that is greater than the sum of its parts.

## COLLABORATING TEACHERS

The first step<sup>2</sup> in Project VIEW’S model involves the creation of a foundation for integrating interactive digital communication into classroom pedagogy. The goal is to train teachers and content provider professionals to fully participate with interactive videoconferencing through a constructivist, participatory process that focuses on individual competence and interests. Participating teachers and content provider educators engage in VIEW training and guided practice using their best skills to develop fully integrated plans for videoconference integration and content delivery.

The VIEW training involves a combination of guided instruction and hands-on practice that results in seamless integration of digital resources and communications into curriculum. Since the process is a constructivist one, the training allows for broad opportunities for individual and group creative initiative. In many cases, the participants create structures for reaching out to each other via videoconferencing. These collaborating experiences provide peer support and offer collaboration facilitation for designing new models of content delivery. The result of this process has been the development of a menu of collaborating classroom approaches that have proven very effective in providing a platform for achieving higher educational goals for students.

When analyzing the emergence of classroom-to-classroom and teacher-to-teacher videoconference collaboration, important ‘lessons learned’ are often identified. For example, it is apparent that the collaborative videoconference processes can change how content delivery is structured by expanding the source of content from the classroom to the world. Videoconferencing in the classroom can also open up the possibility of curriculum presentation, and design that involves sharing of content and communication with both information sources and collaborating peers at distant locations.

Interactive web resources and real time point-to-point videoconferencing have the effect of dramatically changing the nature of collaborating societies of teachers and content providers. No longer are these communities ‘islands’ of knowledge, providing a top down transference of information from teachers and content providers to students; rather, integrating interactive digital technologies into the classroom enables the collaborating educators (teachers and content provider educators) to transform themselves into information hubs and content managers.

In Project VIEW, collaborating educators learn to design teaching units that utilize multiple sources of content. These sources may include point-to-point student videoconferences with content specialists and interactive websites with traditional and web-based information that can be used for student study and academic research. The sources also include supporting print information and curriculum.

In addition to interactive communications and programming between content providers and students in classrooms, teachers and content providers have increasingly taken part in various configurations of collaborating classrooms (i.e., classes in which teachers have collaborated to create new curriculum designs that incorporate the use of interactive videoconferencing between classes). The capacity to collaborate

with students and teachers in distant communities has not only added to the student understanding of curriculum content, but it also has developed skills for engaging in digital communications that are a foundation for student's future academic and work success.

In sum, through the activities that make up the Project VIEW model, content providers have been able to collaboratively join with teachers to develop and use videoconference programs that are designed to raise student knowledge and skills. By creating activities that communicate content to students through the powerful and dynamic medium of videoconferencing, teachers are transforming their practice. As a result of these activities, content providers find themselves expanding their programming and delivery formats. Interdisciplinary collaborations and distant partnerships are not only feasible, but desirable as content providers and teachers learn new ways of delivering their courses to students.

### ADMINISTRATIVE REORGANIZATION

If societies of teachers and content providers are to transform their practice, it is essential that societies of administrators understand, participate in, and support the overall emerging vision both for new structures in K-12 education and for their accompanying growth in interactive web usage and point-to-point videoconferencing.<sup>3</sup> This need is relevant to both school administrators and informal education institution administrators.

There are many reasons why it is important for videoconference projects to have both the support and involvement of administrators. First and foremost, professional growth and transformation of practice are unlikely to happen in the context of on-going practice without the committed involvement of institutional leadership.<sup>4</sup> Without a strong leadership presence, the projects cannot have a clear path for achieving long-term sustainability because the structures developed through the videoconference project activities cannot become imbedded in the institutional goals and practice. Administrative support is necessary for sustainable change.

In transforming leadership directions and decision-making, pathways for participation by school and content provider communities have been designed. In the spirit of the constructivist approach of the Project VIEW model, administrators have contributed their own best talents to efforts aimed at creating a variety of leadership activities and roles that are crucial to the success of videoconference programming. These activities have resulted in creating an environment in which interactive technologies are transforming the foundation of administrative goal setting and creating an environment for expanding communications and collaborations from the classroom to the national and world communities.

As increasing numbers of administrators have joined the creative efforts to establish videoconferencing in the schools, the importance of their participation has become more and more apparent. Over time, it seems clearer and clearer that without the essential alignment of administrative planning and priorities, the future of videoconference programs is likely to be unstable and unreliable, lacking the fundamental technological and leadership foundations that create and sustain change.

At the core of the interactive technologies, most importantly, is interactive videoconference programming that requires a baseline of connectivity, a foundation of dedicated bandwidth, and a fairly strong commitment from the institution to support communications equipment and flexibility in time allotment.<sup>5</sup> Thus, increasing, schools and content provider institutions are moving toward the capacity to fully engage in interactive videoconferencing.

### CASE 2

The New York State Museum began working with Project VIEW in part to fulfill its mission to provide educational services to the whole State of New York. Located in Albany, the State capital city, the Museum is nearly 300 miles from Buffalo and over 260 miles from the eastern end of Long Island. Interactive videoconferencing has the potential to make serving all schools across the state a reality.

As work on Project VIEW activities began, it soon became apparent that the complex structures of the New York State bureaucracy demanded a coordinated institutional plan to enlist the support of key management leaders in various the museum operations. After many discussions with the Museum staff, a series of meetings with the New York State internet technology specialists from several bureaus and departments were conducted. The result of those meetings was the creation of a plan for technology delivery along with an aligned protocol for coordinating technical and educational support both for the Project VIEW's programs and for future interactive videoconference programming among other participants.

Organizing collaboration of the diverse departments of the Museum, the State, and over 800 potential schools presented many obstacles beyond the active involvement of representatives from the various institutional operations. Among those obstacles were the issues such as the need to create a reliable, constant bandwidth allocation and to the need to restructure staff assignments to accommodate the increasing use of videoconferencing.

As the infrastructure difficulties were dealt with and solved, other issues such as public relations and internal support have arisen. For example, when the development of the project activities and videoconference plan was completed and the program entered into a testing phase, representatives from the New York Board of Regents witnessed a school point-to-point videoconference test. As the Regents looked on, the Museum educator delivered a program about the Iroquois peoples of New York State. As a result of their direct observation, the Regents were very impressed and excited about the potential of videoconferencing in the classroom and they expressed their support for continuation. This allowed the collaborators to develop and implement a working plan that effectively enabled the Museum to introduce interactive technologies to the Museum programming. This inclusion of management from top down helped to accomplish the project's goals.

## PARTNERSHIP RESTRUCTURING

In the past, societies outside of school communities, such as content providers, have contributed only peripherally to the educational needs of the participants in the societies of education. Similarly, as they pursue their instructional missions, school societies – teachers, administrators, parents, students – have had little involvement with the needs and missions of content providers.<sup>6</sup> The introduction of interactive digital technologies has caused a major re-evaluation and restructuring of these long-standing relationships.

Traditionally, educational societies have looked within themselves to develop innovation and expansion in providing students with content and instruction. When they did reach out beyond the confines of the schools, it has been to bring extracurricular experiences to support classroom learning. Likewise, in the past, content providers have focused primarily on their own missions and institutional agendas as they have constructed programs to meet the academic needs of K-12 classes.

In the past few years these traditional structures have begun to change. In an effort to make maximum use of their resources, public and private institutions that can serve as content providers for the schools have made efforts to align their content with the requirements of K-12 Learning Standards. In a parallel mode, the schools have reached out to explore the content available from content provider institutions so that they (the schools) can find ways to integrate it into the education of K-12 students.

Project VIEW has offered participants in their programs a new approach for bringing synergy and collaboration among content providers and schools. To begin, as schools and content providers seek to engage in the kind of partnerships facilitated by Project VIEW, it has been required that they and their participating societies - schools and content providers - examine their common ground and discrete talents and abilities. This process has formed the foundation for creating plans for programs that take advantage of the strengths of each participant.

Underlying this approach has been the mutual agreement that, to create programs that serve the needs of all partners, it is necessary to understand and accept the missions of each other. It is also necessary to enter the process with a solid respect and appreciation of the diverse skills and talents of each of the collaborating partners and their staff.

As projects have been developed, the process of solidifying mutual respect and reciprocal appreciation has created a model in which parallel goals have converged. Often this process leads provider educators and classroom teachers to create a repository of classroom-ready lesson resources that enable teachers to bring interactive web content and point-to-point videoconferencing into the classroom. Increasingly, instruction from informal educators such as museums, zoos, libraries, etc. is enhancing and expanding the scope and depth of classroom curriculum delivery.

### Case 3

When the Philadelphia Museum decided to work with VIEW, its staff had expressed a need to focus programming on areas of its collection that are not fully utilized through the museum's interpretive exhibit planning and its gallery displays. In addition the Museum had a desire to reach a diverse audiences through its collections and was willing to revisit the nature of the institution's exhibits and their accessibility to the public.

In early planning for the VIEW program, the Museum selected one area of its collections that had not been fully utilized in public programming or in gallery display – its Latino Collections. Consequently, a selection of Latino paintings and photographs were identified and made available to the participating group of teachers who joined the museum education staff in creating a new program that could open up themes of Latino arts and culture for a wide array of K-12 classroom uses.

As they began their collaboration with the Museum, the teachers expressed their desire that the work they did would include well-structured standards-based content that aligned with the English, Social Studies and Art curricula. Although the Standards did not specifically require that they utilize ethnic resources in their curriculum delivery, the collaborating educators agreed that the Latino theme would provide a seamless fit with the requirement of teaching to the standards while supporting multicultural education.

As the program development proceeded, the teachers and the content provider staff shared the resources that each could provide to the students. The content provider staff learned not only what a teacher must provide to students but also how the information can best be transmitted. Building on their shared knowledge, participants revisited the curricula and providers infused interactive communications into their program while teachers inserted museum resources into their lesson plans.

The result of the collaboration has been the emergence of integrated lessons examining both the social history and the related literature of Latino art and society. Using resources found on the Museum website and on other websites, the teachers and content providers collaboratively developed a series of preparatory lessons and activities that support a well-designed interactive point-to-point videoconference based on English and Social Studies standards that supports the Arts and multi-cultural education.

Working in tandem, the two societies – the schools and the content provider - have developed a common goal of enhancing student achievement and skills development, and have created a platform for productive collaboration and partnership. The beneficiaries of these efforts has been students who have been able to go beyond the confines of their physical school to expand their cultural experiences, their academic performance, and their technology skills.

## STUDENT CENTERED GOALS

While the instruments of educational change rest in the development and delivery of content, the most significant change occurs as the participating partners turn their transformation into teaching practices that lead to changes in their expectations for participation and performance of the 'consumer' society in education, the students. There is little doubt that interactive digital technologies are changing the way in which students both access information and demonstrate their knowledge and understanding of lessons taught.<sup>7</sup> The expanded communication made possible via videoconferencing serves a core, underlying goal, that is, the development of delivery methodologies and systems that create opportunities to enable students to achieve higher understanding and academic performance.

The improvement of student learning and student performance on curriculum-related tasks, as well as changes in teacher delivery, are the core goals of most educational innovation. The activities of the Project VIEW model are designed to facilitate the achievement of these goals. As a result, the pedagogical transformations facilitated by Project VIEW have yielded a template for program development of student-centered learning environments. This template has enabled VIEW programs to lead to higher levels of student outcomes both within the educational arena and in the 'outside' world as students transfer skills learned to real-life activities.

## EVIDENCE OF HIGHER LEVEL LEARNING

As part of the grant, the evaluation is documenting both levels of student skills observed during videoconferences, and patterns of instructional mode. The following data summarizes information gathered during 33 videoconference observations. These classrooms were in 12 different school districts and 2 were in private schools. Fourteen different content providers

**Table 1**  
**Student Interactions During Videoconferencing**  
**Rated According to Bloom's Taxonomy**  
**of Cognitive Difficulty**

Levels of Student Skills	%*
Level 1: Knowledge ( identifying, describing, defining, recalling)	82%
Level 2: Comprehension (summarizing, interpreting, differentiating)	52%
Level 3: Application (using information/concepts for solving problems)	39%
Level 4: Analysis (recognizing patterns, organizing information)	42%
Level 5: Synthesis (generating from facts, predicting and drawing conclusions)	30%
Level 6: Evaluation (making decisions, comparing principles, judging value)	3%

\*Percentage was based on a maximum possibility of 33 observed classrooms using videoconferences; more than one level of skill is possible per videoconference.

delivered 18 different programs; 29% were in elementary classrooms, 47% were middle school, and 24% were in secondary programs.

## Levels of Student Skills

During the point-to-point videoconferences, level of student skills, rated according to the six stages of Bloom's taxonomy of cognitive skill development, were observed and documented. Table 1 and 2 present the results from the 33 observations.

The majority of VIEW programs engaged students in the knowledge (82%) and comprehension (52%) skill levels; that is, students were actively engaged in learning, rehearsing, and re-enforcing factual knowledge through oral responses to questions and activities that required them to identify, describe define or recall information presented in the pre-videoconference material. Nearly half (42%) of the programs also involved the students in upper-level analytical processes that built upon on that factual knowledge; this was usually accomplished via hands-on activities that were conducted during the session with both the teacher and the content provider managing the tasks. In addition, almost one-third (30%) of the classrooms utilized synthesis skills; in these settings, students were actively engaged in generating hypotheses and drawing conclusions about either the work that they were doing or that the content provider was doing.

Observers noted that these student-centered approaches to learning maintained student interest and motivation throughout the session and that students frequently transferred learning to other settings by self-generating questions of the presenters, the classroom teacher, or their peers. This process of inquiry-based learning was noted to serve all levels of students in the homogeneous classrooms. Advanced students were frequently observed to be transferring learning to new settings while students who were academically at-risk were exploring more advanced questions, phrased in higher levels of cognitive questions, than in other settings.

## Patterns of Instructional Mode

Throughout the videoconference, evaluators observed interactions among the students in the classroom and noted the primary modes of instruction that were used by the content providers as they worked with students. These data are summarized in Table 2.

**Table 2**  
**Mode of Instruction Utilized by Providers**  
**in Support of Learning**

Mode of Instruction	%*
Lecture/Direct Instruction	67%
Structured Discussion/Socratic Method	39%
Constructivism/Inquiry-based Learning	39%
Teacher Demonstration	18%
Cooperative Learning	18%
Contextual Application/Synthesis	18%

\* Percentage was based on a maximum possibility of 33

Two-thirds of the providers (67%) were observed to use direct instruction as their primary mode of transferring factual knowledge; however, over one-third (39%) utilized a structured discussion with a question-answer format to reinforce that knowledge, and 39% encouraged students to solve problems and use critical thinking. In almost all settings, the content provider engaged students in a question-answer session in which students were encouraged to ask questions and, using guided inquiry, were encouraged to develop their own responses.

These findings are further supported by a series of studies reported by Newman (2006)<sup>8</sup> that investigated the impact of videoconferencing on student achievement via a series of quasi-experimental studies. In each of these studies similar curriculum was presented to two groups of students; however, one group received part of the material via videoconferencing with an external expert while the other group received parallel material from the teacher. All students in each study received the same assessment at the end of the unit. Results indicated that students who received information via videoconferencing with an expert had greater interest in the material, higher retention of core knowledge, and higher scores on the assessment than did students who received the material only from the teacher.

#### EVIDENCE OF BETTER INSTRUCTION

A second goal of the evaluation process is to document changes that will support better instructional practices, especially those that reflect teaching students to solve problems, participate in critical inquiry, and work collaboratively. The following data summarize survey, observation, and interview findings from a sub-sample of 141 teachers and administrators who have participated in Project VIEW over the six years of the grant.

#### Support for Educational Practices

Teachers reported that the use of videoconferencing supported major educational practices. As noted in Table 3, at least two thirds of the teachers who used videoconferencing on a regular basis reported that it helped their students to transfer knowledge and that it helped them to build life-long learning skills such as self-direction and responsibility for their own learning. Teachers also noted that the use of videoconferencing supported the development of a positive attitude toward learning and increased motivation. Almost three-fourths of the teachers reported that the use of videoconferencing allowed for differentiated instruction that supported the development of individual strengths, talents, and abilities. These perceptions were supported by evaluators' observations of the classrooms where it was noted that students of differing abilities were involved in all levels of the videoconferencing experience and that providers who were trained in videoconferencing readily adapted their curriculum and activities to different grade levels, abilities, and interests.

The support for differentiated instruction was especially true when videoconferencing was used to connect collaborating classrooms. In these setting, students in a classroom videoconferenced not only with a provider but also with another classroom that was geographically distanced. This process allowed students to obtain external expert input while working with other students who might have different ethnic, cultural, socioeconomic, and ability backgrounds.

**Table 3**  
**Support for Underlying Educational Practices**

Educational Principles	% Agree
Videoconferencing helps students build skills that transfer to multiple settings	80%
Videoconferencing helps students develop attitudes of self direction and responsibility	66%
Videoconferencing allows for the development of individual strengths, talents, and abilities	73%
Videoconferencing increases student motivation	87%

#### Support for Educational Reform

Evaluation further documented that four major educational reform movements are supported by videoconferencing. These include inquiry-based learning, alignment of curriculum and instruction with national and state standards, the development of expanded and innovative resources reflecting a global multi-disciplinary view, and the improvement of student achievement. (See Table 4.) When queried as to why they perceive videoconferencing to support reform movements, teachers, administrators, and providers noted the presence of specific outcomes related to student learning that resulted from the inclusion of external resources. They further noted that the use of these resources allowed them to objectively present students with multiple points of view, to provide students with direct access to archives and document based evidence, and allowed them to create and foster a culture among students and parents that expected higher levels of questioning and deeper understanding.

**Table 4**  
**Support for Educational Reform**

Reform Movement	% Agree
Inquiry based learning	80%
Alignment of curriculum and instruction with standards	75%
Expand available resources and their use	96%
Improve student achievement	79%

#### CONCLUSION

In sum, the goal of Project VIEW is to demonstrate that the delivery of instruction through interactive technologies produces evidence of higher-level student learning and academic performance. Preliminary evidence confirms that VIEW has developed models for instruction that use digital technology in a collaborative inquiry-based environment to transform educational practice. VIEW's methodology builds on the unique values of both primary human and digital resources to create curricula based on the seamless integration of video programming and web-based instructional resources. This approach to restructuring classroom pedagogy is charting the way to a more productive and effective educational environment and to higher student learning.

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