Emerging, Converging Collaboration Solutions for K-12 Learning Communities

The Benefits of Conferencing, Collaboration, and Presence Through IP Technologies
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Alan D. Greenberg
Wainhouse Research
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Introduction

While the general concept of using technology for educational purposes has had its advocates and its opponents, research says when effectively leveraged, technology in an educational campus can be valuable for a wide variety of applications. This white paper is meant to explore the latest phase of multimedia communications technologies for education. It discusses the features and benefits of converged collaboration solutions, showing how they can be applied to improve communications among all stakeholders while also enhancing educational opportunities for both teachers and learners.

Today’s learning community involves a broad mix of stakeholders: teachers, administrators, parents, learners, and school boards; taxpayers, employers, and the community at large also benefit from the tangible and intangible results of the educational process. All of these stakeholders have a vested interest in ensuring that K-12 schools and school districts leverage their strengths to deliver the very highest quality educational services.

Traditional metrics to measure a school’s effectiveness (testing scores, evaluation by committee, attrition and graduation rates, and the like) will always be the “leading” methods of measurement. Yet no matter how sterling a school or district may be, in addition to traditional metrics, effective communications between administrators, teachers, and other stakeholders may be the single biggest differentiator between a flourishing school district and an underperforming one. School renewal (of accreditations and certifications) requires creation of feedback loops from all of these stakeholders. Take away the frequent interactions that grease the wheels of social interplay and the result is a frustrated, unhappy core constituency that may be more likely to stymie a school or district than support it. No group of people within a learning community is an island, and bridges within a learning community are a functional necessity.

Figure 1 demonstrates some of the complexities at play. Virtually every stakeholder can be segmented into key subgroups:

- Learners and parents
- Educators and administrators
- School board and taxpayers/citizenry

Yet each of these groups must be capable of regular, effective communications not only intra-group, but also inter-group. The degree of frequency and the focus may vary, but each has a need for effective communications with one another.

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1 We refer interested readers to our meta-study describing the general state of recent research into distance education: Navigating the Sea of Research into Videoconferencing-Based Distance Education.
As mirrors of their communities, schools and school districts are placed in a unique role whereby they are asked to both guide change, and to respond to change, e.g., societal, technological, healthcare, and the like. Effective methods of communications, however, can help them tackle the many challenges they face.

Some of the challenges facing today’s schools and school districts include:

- The rapid pace of modern life – As families juggle the fast pace of both workplace and home, new methods are needed to keep them engaged and involved with their children’s schools.
- Changing demographics – With ever increasing diverse populations to support, school districts are finding their core constituencies evolving rapidly.
- Disparate funding sources – Concerns over funding never disappear. Schools in less well funded districts need more, while other schools with sufficient funding are hard pressed to maintain quality of service.
• The talent shortage – Hiring new teachers gets harder and harder, especially in under-served or remote areas.

• The bottom line – The perpetual need to maintain fiscal responsibility means that schools must watch the bottom line like never before.

• Greater mobility than ever before – A highly mobile citizenry as well as mobile teacher workforce now brings new challenges and opportunities for parents, teachers, and administrators. In effect, people now expect to be able to be mobile – and technologies that support mobility can enhance, and not hinder, communications.

• Greater parental scrutiny and greater need to compete with other schools for student enrollments.

• Constituents are surrounded by and bombarded with technology in their everyday lives (PCs, iPods, web content and services e.g. MySpace, mobile phones, etc.) This has elevated the expectations of these stakeholders and is transforming how they engage with learning and with one another.

Phases of Multimedia Communications Technologies for Education

Multimedia communications technologies have enhanced education in distinct phases: a) chalk on chalkboard, b) the multimedia age; c) the PC age, and now d) the age of converged collaboration solutions.

Bricks and Mortar

Educators have used technology to enhance communications with students from the very beginning: along with the invention of pictographs on cave walls arrived the concept of the classroom. Chalk on chalkboard, pens on paper, books on print further enhanced the ability to teach. As the structure of the brick and mortar learning environment became more formalized, so did the need to communicate with others outside the classroom. The answer to crossing those walls came in the form of parent-teacher conferences, town meetings, mail, the PTA, and report cards.

Multimedia

Though writing and book printing could be called the next important technological advances, a major more recent phase of technology advancement arrived in the form of multimedia. This phase included classroom-based projectors, TVs on rolling carts, videotapes, whiteboards, and laser discs. Suddenly learners could do more than just read to absorb information, and educators could find new means of delivering concepts and content.

The PC

Phase three of the evolution of technology in the classroom was fueled by the introduction of modern technologies including PCs, PDAs, CD-ROMs, computer-based training, and the Web, which led to newly empowered teachers and learners. Few would argue that these tools have revolutionized student learning, and taken the educational process to new heights. Some 87% of teens use the Internet at home,
and 78% of teens use it at school. In fact, 1 in 5 teens spends more time online while at school than at home.⁲

Yet for all of the advances in technology, the actual picture “in the trenches” is far messier. Today’s schools are living, breathing entities that typically rely on various layers of technology that have been introduced in fits and starts, under various types of initiatives, to varying degrees of success. In the ‘80s and ‘90s, schools began to network their PCs and computer labs, introduced sophisticated phone systems for administrators, and incorporated interactive voice response and autodialers for delivering messages to parents and teachers. Yet only recently have educators even been permitted to place voice services into the classroom, and then only after other communications technologies had been added. And in the U.S., it has taken ten years since the federal government began to support the Internet in the classroom (in the mid 1990s) for it to begin to reach most classrooms. Thus, the bottom line on technology in the classroom is that it still varies widely from school to school based on happenstance, funding resources, technology initiatives, and other factors.

**Converged Collaboration Solutions**

With the ubiquity of the PC in the classroom, in the home, and in the hands of learners, the stage for the next phase of collaborative learning has finally arrived. This phase includes voice, data, and sometimes video, and blends real-time with on-demand access to content and information. This phase ushers in the day of high-impact, Internet-based instructional programs distributed to learners using electronic resources. Such sessions also can include advanced web features (e.g., synchronous and asynchronous hypermedia and e-searching), course management systems, and interactive tools such as Blackboard/WebCT and eCollege learning management systems (LMS’s).

⁲ Pew / Internet, Teens, Technology & Schools, August 2005.
Converged collaboration technology goes beyond Web-based, individual-oriented tools by adding new levels of interactivity and collaboration within the classroom and throughout the entire K-12 learning community. In fact, converged collaboration technology over time will leverage the exponential increased amounts of networked content and numbers of connected people.

The basic functionality of today’s emerging collaboration solutions includes:

- **Presentation and applications sharing.** This aspect of multi-party collaboration includes opening up one’s PC to allowing another person to literally work on the same software application, or simply presenting materials such as PowerPoint to viewers of the materials.

- **Presence awareness,** whereby servers can identify an individual’s availability status, and device status. (Is this person on his PC? Is she on the phone, and is that phone a fixed or mobile phone?) Presence awareness features can get quite sophisticated. For instance, presence is not simply about making oneself available to others, but about controlling that availability. A superintendent can select which direct reports and principals can see his or her status – and manage this by **individual** or by **group** to ensure that only those with the “need” get access to the superintendent’s status. Those who wish to not be disturbed can communicate that desire, when working on projects that require deadlines or when in the middle of delivering course content or holding meetings – in effect turning on a privacy mode. Presence also can extend to video device availability for those environments wishing to include video-based participants. Figure 2 demonstrates one approach to providing presence awareness.
Secure, on-network (behind-the-firewall) instant messaging (IM) that is archived and made available if necessary for record keeping. This lets people not just act on the availability of others, but then contact them to initiate interactions. Secure, on-network IM is important because off-network IM solutions pose higher security risks. Figure 3 shows IM and collaboration together.

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3 While rare, viruses can pass through some commercial IM services if users accept file transfers from senders with infected files.
Dial-in/Dial-out audio conferencing that is scheduled or reservationless. Today’s collaboration solutions allow pre-scheduled or ad hoc conference calls and allow individuals to participate either by dialing into an audio bridge or waiting for the bridge to call them. Typically, these work over any network (public switched telephony network as well as IP) and to any device (a PBX, mobile phone, or PC-based software phone, also known as a softphone). In some instances, they leverage existing PBX functionality, thus extending the value of a school’s existing assets.
• **Videoconferencing.** Many of today’s collaboration solutions support the existing ITU-T H.323 group videoconferencing systems found in many classrooms and school offices, as well as the newer Session Initiation Protocol (SIP) standard. This means that calls can be initiated using standards-based videoconferencing systems, such as Alcatel’s (sponsor of this white paper) Intellivice, Polycom’s VSX and PVX systems, Windows Messenger 5.1, and most of the major standards-based multipoint control units\(^4\). Video can be added from within a single audio or web conference session, and even bridged together so that those on the audio/web-based portion of the call receive video from all participants, and those on the video portion of the call receive all audio through their group or desktop systems. Some solutions may not be standards-based but still include their own voice- and video-over IP capabilities, making it easy for anyone with a webcam to deliver their video as a component within a presentation window. Figure 4 illustrates a typical multimedia conferencing environment including presence, IM, audio- and videoconferencing.

![Figure 4 Web Collaboration Session with Video Added](image)

- **Multi-party collaboration** via PCs, tablet PCs, and PDAs. Today’s solutions allow educators to team in a wide variety of ways by enabling them to share materials on their PCs. This can include co-browsing the Web.

\(^4\) Often custom development work must be performed to support integration between a web conferencing server and a video MCU.
• **Recording.** Anything that includes audio and/or presentation material can be recorded, with synching of audio to the actual presentation materials, for viewing at a later time. Typically, such materials can be stored securely on servers or downloaded to local PCs, and can be accessed via a web URL – with optional password protection to limit viewing or to ensure a particular clip was actually viewed.

• **Automated message delivery.** Just as voice autodialers can deliver prerecorded messages with announcements of special meetings, weather cancellations, and the like, today’s collaboration solutions can deliver invitations and reminders to meetings – often including attachments such as material to be reviewed prior to a class or meeting.

• **Security.** In the past, data security held a secondary role for educational institutions; recent intrusions and thefts of data have led to a new emphasis on data security. Typically, collaboration solutions include secure account authentication, with authentication via Lightweight Directory Access Protocol (LDAP), ensuring that only those with access to a conference or archive get that access. Data encryption using secure socket layers (SSL) protects the privacy of presentations, application sharing, and IM sessions. And many extra tools exist that enable session leaders to “lock” conferences or “drop” callers from a session. Even password policy management and inter-organizational access tools exist for an added degree of security.

Prior to converged collaboration solutions, educators have relied upon “work-arounds” (such as emailing files, or using team-based software meant more for asynchronous than real-time communications) or have “gone without.” As they begin to discover the possibilities inherent in converged collaboration solutions, they will no doubt create many new applications.

**Applications and Benefits**

Though some early fears existed that the Web would “corrupt” learning because of concerns about the quality of information, most educators were quick to grasp the value of the Web because of its vast repository of information and tools. More recently, videoconferencing has experienced a “burst” of activity in K-12 as content providers have moved quickly to extend their reach and use the technology to deliver materials to the classroom. For K-12 collaboration solutions, schools and school districts are now primed to begin valuing the extra capabilities offered by today’s emerging collaboration solutions.

At a basic level, collaboration includes the ability to securely hold audio and data conferences with anyone, inside or outside the school or school district, without the need for software downloads or for a virtual private network (VPN). (This technology does not replace live classroom interactions, but supplements and enhances them.)

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5 The exception to this statement might include some virtual schools and other distance education-specific programs.
The value of collaboration solutions – at a high level – is represented by a variety of economic, educational, and social benefits. From a pedagogical perspective, collaborative technologies are ideal for individual and social constructivist approaches to education.\(^6\)

Applications and benefits of this technology affect different participants in various ways.

For teachers, collaboration tools support:

- Professional development via virtual training sessions
- The ability to bring alternative content into the classroom to enrich and enhance learning objectives, and the ability to deliver content outside the classroom, thus extending reach both intra- and inter-district.
- The ability to network with peers, stepping outside the island of the classroom and creating community with other teachers
- The reinforcement and support of constructivist learning approaches via student collaboration, group projects, and shared classrooms
- Hosting virtual parent-teacher conferences, whereby an educator can share his or her desktop materials with a parent to show grades, current project progress, or other information on the parent’s home or office PC without having to visit face-to-face in the classroom.
- Recording sessions for later repurposing of curricula, including the ability to enable makeup sessions
- Greater control over schedules and time, and ultimately greater productivity by having control over availability status. A teacher can use collaboration tools to hold scheduled office hours “remotely,” and use the presence tools to determine when and how he or she is contacted. If in the middle of a conference with parents and a student, he or she can place a “do not disturb” indicator to ensure no interruptions occur.
- Accelerated, more productive interactions with administrators, fellow teachers, parents, or students on an ad hoc or scheduled basis – which ultimately lead to faster decision making and consensus

For administrators, collaboration tools support:

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\(^6\) Constructivism is a model for enabling knowledge to be constructed from personal experience by the individual and through collaboration, with learning gathered from encounters with multiple perspectives. It is a dominant pedagogical learning model in many K-12 educational environments.
• Greater control over schedules and time, and ultimately greater productivity by having control over availability status. Like teachers, administrators can use collaboration tools to hold scheduled meetings “remotely,” and use the presence tools to determine when and how they are contacted.

• More effective meetings through the use of audio and web technologies that offer a rich context for enhanced communications.

• The ability to have high impact sessions with teachers, staff, parents, and other stakeholders ad hoc.

• The ability to release consistent, important messages to large dispersed groups in a timely fashion.

• Scheduled, recorded sessions for later retrieval, which can be invaluable to the planning, budgeting, and implementation process of a variety of school and district initiatives.

• The ability to adapt as a district evolves – in essence, the ability to expand capabilities based on growth and shifts in population – through system or service scalability.

• The ability to budget and plan for growth. Collaboration tools are sold in an understandable licensing scenario that can support growth over time.

• Easy management on the part of technology coordinators, who already are accustomed to many of the PC-based technologies underlying collaboration tools.

• In selected school populations, multi-disciplinary meetings with individualized education plans for special-ed and at risk children.

For learners, collaboration tools provide:

• Access. Put simply, learners gain newfound, *more timely* access to “real-time” resources and tools that are outside the classroom.

• Interactive shared classrooms and group projects. Learners find ways to team in the “brick-and-mortar” classroom, and in the same way, they learn to collaborate with others online. Thus learners can use collaboration tools for formal and semi-structured teaming with others on a wide variety of outcome-oriented projects. This can include increased access to external subject matter experts.

• Home access and ad hoc access to missed class work or assignments. As stated earlier, makeup sessions or access to resources can be maintained from home, or wherever a learner is located. One of the valuable aspects of collaboration tools that archive content is that those archives can be made available to students on an ad hoc, as needed basis. They also can be made “time-sensitive,” and deleted as educators and policy dictate.
• Distance education and virtual schools. Though many of the applications of collaboration discussed in this paper relate to local communities of interest, Web-based collaboration tools are increasingly being used for distance education and virtual school programs, providing an entire program of learning and new choices to learners. For example, one school district in Tennessee is using web collaboration to ensure that learners incarcerated in juvenile detention facilities are able to continue their schooling.

• Technology literacy. Students now need to begin to develop technology literacy quickly; classroom collaboration tools help them do so in an intuitive fashion.

• Ownership of learning activities. Collaboration tools are meant for interactivity, not passivity. Thus they help promote ownership of learning activities from start to finish.

Items to Seek in a Platform for K-12

Schools and school districts are only beginning to adopt emerging collaborative technologies; its state of acceptance to K-12 in 2006 matches the state of acceptance videoconferencing held in K-12 five years earlier. If it follows the same trajectory, it could grow even faster because of the ubiquity of the PC and its very viral nature.

Some useful aspects to consider when evaluating collaborative technologies include:

• Do they provide open, SIP-based and standards-based application programming interfaces (APIs) to support additional capabilities? Can they be integrated at minimal cost? Do they support technology standards, allowing a district to “mix-and-match” technologies as necessary and protecting investments in other technologies?

• Do they support any industry-standard PBXs or softswitches, which can extend their value by working with existing telephony systems?

• Do they provide support for mixed IP and PSTN voice environments in districts with legacy equipment?

• Do they provide secure IM with archival capabilities? Can those IM sessions be archived on one server alongside other content (e.g. voice, presentations material), instead of requiring multiple servers and multiple software platforms (voice, web, IM)?

• Do they provide robust presence-awareness features, allowing for control over one’s availability and one’s preferences for presence visibility (which results in true improvements in productivity and privacy)?

• Are self-service capabilities (e.g., scheduling, archiving) feature-rich, so teachers and staff can adapt the tools to their own preferences?

• Do they provide meet me, ad hoc, and scheduled voice, and web conferencing sessions?
• Does the solution bridge the gap between being a learning tool and an administrative tool, supporting operations (when appropriate) on both sides of a K-12 organization?

• Do they provide multi tenancy, which involves support for multiple groups on one server but with protected content and organizations within that server? Multi-tenancy means school administrator functions can reside on the same server as student or instructor activities but be totally secure, meanwhile, features and functions custom or specific to each department can be supported.

• Do they support optional guest accounts or the ability for outside users such as parents, contributors, and suppliers to take advantage of the services for special projects and events?

Many educators will remember the days when Microsoft’s NetMeeting collaboration program (a simple tool allowing screen / audio / video / application sharing between two computers) represented the cutting edge of collaboration. Many of the newer collaboration solutions for K-12 learning communities have taken the “first generation” capabilities of a NetMeeting several steps further, and now provide feature-rich, robust capabilities ripe for deployment in schools and school districts in a scalable, cost-effective way. Collaboration products from companies like Alcatel, IBM Lotus, Microsoft, Nortel, Saba Centra, and WebEx are all poised to provide collaboration solutions as the K-12 community begins to discover the value of their products and services.

Conclusion

Emerging collaboration solutions represent the convergence of a number of historically distinct tools: voice telephony, PCs, PBXs, PDAs and smartphones, and web conferencing. They take a server approach that means they are built on software that can be rapidly adapted to support new features. Yet they offer device and endpoint independence that can be enabled from any telephone, location, and browser, making them especially flexible for today’s K-12 learning communities.

The many stakeholders in today’s learning communities have a vested interest in ensuring that K-12 schools and school districts maintain the best possible communications tools. When applied well, converged collaboration solutions for K-12 learning communities offer a wide variety of applications for learners, teachers, and administrators, and are likely to enable new applications over time. Most notably the ability to share content in real-time, the ability to understand presence and status, and the ability to archive are three major capabilities of converged collaboration technologies likely to be here to stay. Those features designed to improve one-to-one and one-to-many collaboration sessions (and thus reuse real-time content) opens up many possible usage scenarios for collaboration solutions.

All converged collaboration solutions are not created equal, and care and attention should be paid to the selection criteria. The many solutions available today make it incumbent upon a technology purchaser to examine a wide array of criteria during the decision making and implementation process.
About Wainhouse Research

Wainhouse Research ([http://www.wainhouse.com](http://www.wainhouse.com)) is an independent market research firm that focuses on critical issues in rich media communications, videoconferencing, teleconferencing, and streaming media. The company conducts multi-client and custom research studies, consults with end users on key implementation issues, publishes white papers and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings. Wainhouse Research publishes Conferencing Markets & Strategies, a three-volume study that details the current market trends and major vendor strategies in the multimedia networking infrastructure, endpoints, and services markets, as well as a variety of segment reports, the free newsletter, The Wainhouse Research Bulletin, and the PLATINUM ([www.wrplatinum.com](http://www.wrplatinum.com)) content website.

About the Author

Alan D. Greenberg is a Senior Analyst & Partner at Wainhouse Research. As consultant, analyst, communicator, and strategist, Alan has worked in the telecommunications, videoconferencing, software and services, and multimedia arenas for 20 years, holding positions with VTEL, Texas Instruments, and several Austin, Texas-based startups, and consulting to many organizations. He has conducted research into dozens of distance learning networks, was product marketing manager for a set of turnkey classroom packages, and led a number of educational and training initiatives, including serving on the Keystone Conference Steering Committee. Most recently he co-authored the segment report, *Personal Mobile Video Communications at the Launchpad*, and authored the white papers *Best Practices in Live Content Acquisition for Distance Learning Networks*, *Navigating the Sea of Research into Videoconferencing-Based Distance Education*, and *Super-Size Bandwidth and Two-Way Video in the Classroom*. He also has authored reports on conferencing endpoints & bridges, streaming video, web conferencing, and voice/fax services. He specializes in primary end user research and is a trained focus group moderator and interviewer. Alan holds an M.A. from the University of Texas at Austin and a B.A. from Hampshire College. He can be reached at agreenberg@wainhouse.com.

About Alcatel

Alcatel provides communications solutions to service providers, commercial enterprises, and the public sector for delivery of voice, data, and video applications. As a global leader in converged broadband networking, Alcatel supports 21st-century teaching and learning with advanced technologies and services for students, teachers, staff, and administrators. With sales of EURO 13.1 billion in 2005, Alcatel has 58,000 employees in more than 130 countries.

For more information about Alcatel's K-12 solutions, visit: [http://www.usa.alcatel.com/industries/education/k12/](http://www.usa.alcatel.com/industries/education/k12/).