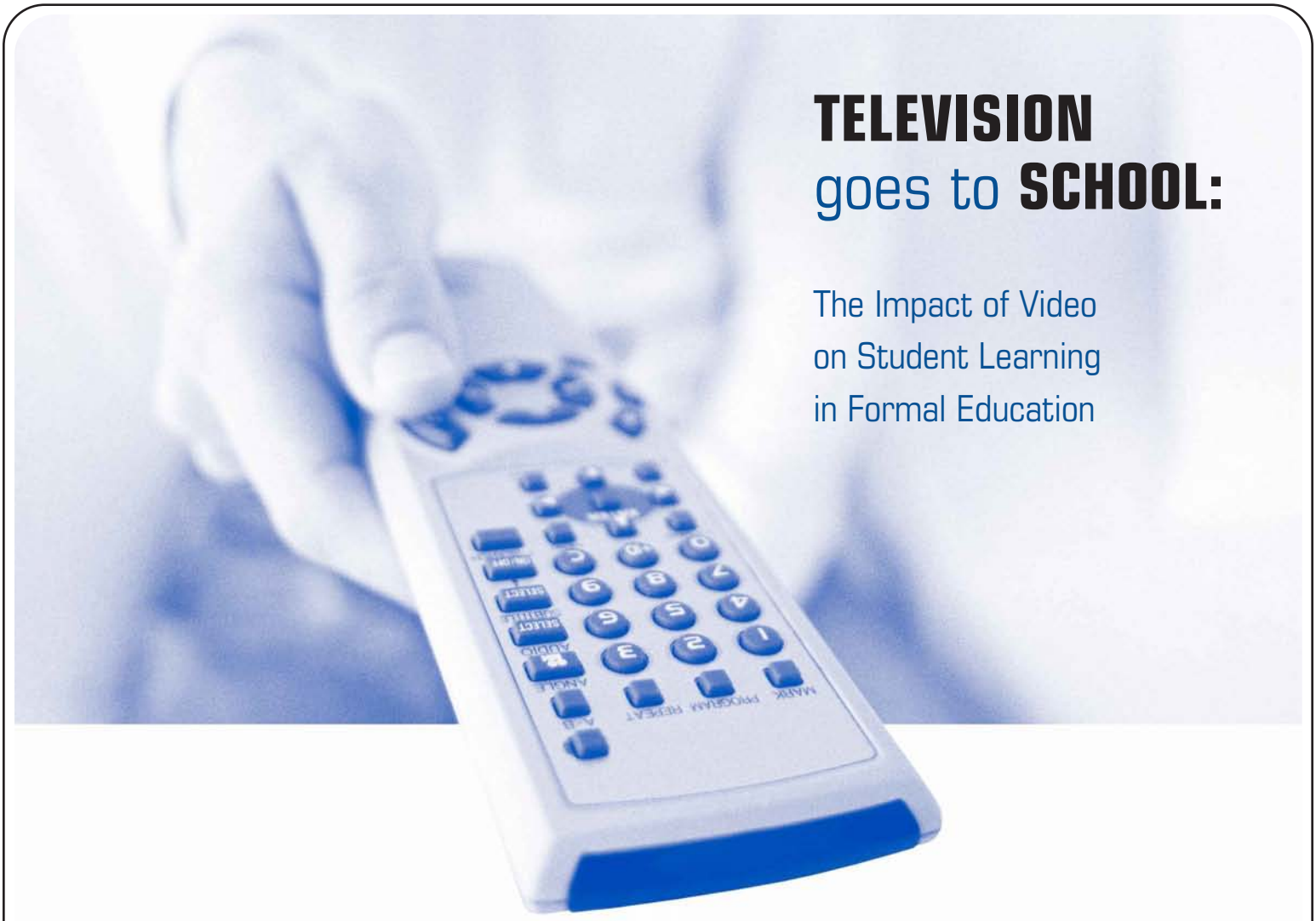

TELEVISION goes to SCHOOL:

The Impact of Video on Student Learning in Formal Education

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cpb

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CPB's Education Department
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Executive Summary

Today's children are growing up surrounded by television and video. Visual media is already an essential component of classroom instruction, with almost all teachers employing video in some form in their teaching. As the presence of broadband, digital media, and streaming video increases, the likelihood is that video will become an even more essential classroom resource. Classroom resources these days must be backed by research. The passage of the No Child Left Behind Act of 2001 requires that instructional resources must demonstrate evidence of effectiveness. As a result, scientifically-based research is more important in education than ever before.

This report focuses on key questions concerning the relationship of television to learning, and provides examples drawn from current television research to demonstrate television's positive effect on student achievement. A set of practical recommendations are also provided so that broadcasters and educators can maximize the effectiveness of video in the classroom.

What Happens, from A Learning Point of View, When We Watch TV?

One of television's most obvious characteristics is its visual aspect. Humans intuitively grasp the power of images to convey meaning, as can be seen in the old adage that values a picture at a thousand times the value of a word. Television, of course, offers information in multiple forms: not just images, but motion, sounds, and, at times, text. Research has shown that multiple tracks of audio and visual information convey powerful learning benefits, as each source complements the other.

Viewing is an active process, perhaps best thought of as an interactive experience between viewer and medium. In addition to responding to what they observe from the screen, viewers bring their own experiences and expectations to their viewing. Hence, studies show that what students think about television affects their ability to learn from it. In the context of casual effortless viewing, learning tends to be shallow and short-lived, but when viewing is more purposeful, then deeper and more sophisticated learning can occur.

How Does Television Promote Children's Learning?

We've all heard the proverb: "Seeing is believing." Research has shown that seeing is remembering, too. People generally remember about twice as much when they see and hear something, than when they only see or hear it. Thus, television's combination of sound and imagery renders it a powerful aid to learning. Further support for the learning benefits of television's "mixed message" can be found in Howard Gardner's theory of multiple intelligences. Television's several modes provide multiple entry points into content, and thus offer greater accommodation to the many intelligences found in a diverse group of students.

In examining a large body of research, several myths about television and learning are explored and debunked. This research provides clear evidence that the type of content children view may be a truer determinant of their future academic success than the amount of time they spend watching television. Thus children's viewing of educational television has been shown to support significant and lasting learning gains, while too much viewing of other types of programming may be associated with a lack of academic achievement. Furthermore, a positive relationship has been found between childhood viewing of educational television and cognitive performance at both preschooler and college levels.

How Can Teachers Use Television and Video to Promote Student Achievement?

Teachers have been highly creative in their use of television in the classroom, and perceive it to have contributed to significant learning gains in their students. According to educator surveys and research, educational television:

- Reinforces reading and lecture material
- Aids in the development of a common base of knowledge among students
- Enhances student comprehension and discussion
- Provides greater accommodation of diverse learning styles
- Increases student motivation and enthusiasm
- Promotes teacher effectiveness

How Might Teachers Enhance the Learning Value of Television?

- Teachers can make the most of classroom viewing by
- Planning ahead to consider instructional goals
- Preparing by previewing the program
- Determining the setting and length of the video
- Setting clear expectations for students
- Encouraging student participation through
  - setting the context before viewing
  - pausing during the program to ask key questions and flag priority topics
  - promoting reflection through post-viewing discussion and assignments
- Connecting post-viewing activities to hands-on or real-world experiences

How Can Broadcasters Support Teachers in Their Use of Classroom Television?

Busy teachers today can use all the help they can get. Broadcasters can facilitate teaching with television by making their program options more flexible, more aligned with core curricula, and more supported by other learning materials and resources. To achieve the greatest impact on student learning, broadcasters might consider providing high quality professional development for teachers in their region, through such programs such as Thirteen/WNET's National Teacher Training Institute, which provides comprehensive guidance for teachers on effective classroom integration of multimedia.

With the Advent of Computers and the Internet, What Is the Future of Television in the Classroom?

Where does classroom television go from here? Classrooms, of course, are becoming ever more technology enriched, as computers, the Internet, DVD players and a host of other digital technologies penetrate our nation's schools. Will video fade away in the face of these newer media? Evidence indicates that video, far from being supplanted, is becoming an increasingly essential part of classroom learning. As the long history of research clearly shows, the educational value of visual media is positive and significant. While the format, delivery channels, and storage options may change, video is now and will continue to be an effective, engaging, and essential tool in our nation's classrooms.

Report Rationale

Today's children are immersed in media. According to a recent Kaiser Family Foundation report, children under six spend an average of two hours a day with screen media, more than twice the amount of time they spend being read to or reading (Rideout, 2003). About 25% of children this age are already active computer users, while about the same percentage has a TV, VCR, or video game player in their bedroom. Having grown up with television themselves, their parents trust in the educational value of their children's media interactions, with 78% reporting that their children model prosocial behavior from their viewing (Rideout, 2003). As another researcher has noted "…because of the ubiquitous presence of television in children's daily lives, the medium has become a major socializer and educator of children" (Calvert, 2001).

These findings support the common observation that television is already an important and widely used instructional resource. [1]As the presence of broadband, digital media, and streaming video increases, the likelihood is that video will become an even more essential classroom resource. Now, too, with the passage of the No Child Left Behind Act of 2001, instructional resources must demonstrate evidence of effectiveness. As a result, scientifically-based research is more important in education than ever before. Therefore, this report will draw from the research literature to investigate the following questions:

- What happens, from a learning point of view, when we watch TV?
- How does television promote children's learning?
- How can teachers use television and video to promote student achievement?
- How might teachers enhance the learning value of television?
- How can broadcasters support teachers in their use of classroom television?
- With the advent of computers and the Internet, what is the future of television in the classroom?

The report will highlight examples of video and TV use in a variety of academic disciplines as drawn from the research literature, and will offer practical recommendations that broadcasters and educators can use to enhance the educational effectiveness of video in the schools. By demonstrating the substantial impact that television has had on the classroom, and providing an accessible set of tools and guidelines, we hope to offer a comprehensive overview of the educational potential of video in K-12 schools.

Research Sources

In addition to books and journals, a number of online databases that centered on educational, communications, and psychology topics were consulted (ERIC, PsycInfo, PsycLit, Education FullText, JSTOR, ProQuest). A number of leading television researcher and practitioners have also provided unpublished research or portions of their works-in-progress.

A Brief Overview of the History of TV Research

As one observer has noted, "Historically, each new medium of mass communication has, within a few years of its introduction, been condemned as a threat to the young people who use it most." Comic books, radio, movies, phones, and, of course, television in their time have all been blamed for "corrupting values," "wasting time," and "causing a decline in taste, morality, self-discipline, learning, and socialization" among children (Anderson, 2001). Today, we can see these same concerns surface in current debates over young peoples' use of video games and the Internet.

The research literature of television spans 50 years, and represents the work of hundreds of researchers and untold thousands of articles. It is worth noting that the medium itself has changed significantly over that period of time. The early years of research about television were characterized by what one might call the "reactive theory of viewing," that is, a notion in which the passive viewer, entranced by

[1] *Throughout this White Paper we use the terms "television" and "video" interchangeably as educators often make little if any distinction between the two.*

the moving images, was in essence a blank screen onto which the broadcast was played (Winn, 1977). In time, this theory came to be displaced by a body of research that portrayed the viewer in a more active role (Anderson, 1983). According to this "cognitively active theory," viewers are not mere receptacles, passively absorbing any and all content coming from the screen; instead they actively apply their experience and understanding to their viewing. From this strand of the literature has emerged a fairly complete view of how viewers process television.

Watching Television

What Happens, from a Learning Point of View, When We Watch TV?

One of television's most obvious characteristics is its visual aspect. Humans intuitively grasp the power of images to convey meaning, as can be seen in the old adage that values a picture at a thousand times the value of a word. Research in the past two decades has proven what we intuitively know: our brains deal with images differently than print (Merringoff, 1983). Words are processed in the neocortex where the higher thinking capability of the brain resides. Pictures, however, are handled in the limbic system, rapidly, and trigger instinct, emotion, and impulse (Bergsma, 2002). Because brains are programmed to remember experiences that have an emotional component, television has a powerful ability to relay experience through the emotions evoked by images (Noble, 1983).

Television, of course, offers information in multiple forms: images, motion, sound and, at times, text. The richness of these forms of information benefits learners, by enabling them "…to learn through both verbal and visual means, to view actual objects and realistic scenes, to see sequences in motion, and to view perspectives that are difficult or impossible to observe in real life" (Wetzel, 1994). Early fears that these multiple channels might overtax the viewer's capacity for comprehension seem to have been unfounded, and now most researchers agree that "…when presented together, each source provides additional complementary information," thus increasing the chances that comprehension will take place (Kozma, 1991).

Watching television may seem a very simple act, but it actually involves a rather complicated thinking process. Like any communications medium, the content of television is composed of symbols, in the form of discrete units of information. As literate humans our cognitive task is to decode those symbols. But with broadcast television, the symbols are more transient, more fleeting than with static media like books or pictures. Thus, television offers a "window of cognitive engagement." The degree of openness of that window is conditioned by the quality of interaction between viewer and the visual medium (Kozma, 1991). Viewers of television generally have less control over the flow of information than with more static media, their ability to "recall" or go back to passages that they may not have grasped the first time is more limited than with still media. While VCRs and other playback technologies have obviously made this less of a factor, in school settings, videos still tend to be a one-to-many broadcast.

Since viewers have limited control of the flow of information, comprehension is importantly linked to their ability to stay engaged with the medium. Researchers have accordingly devoted much attention to the subject of attention; that is, to how and why viewers stay attuned to the content flow from the screen. And because television draws on two sensory channels, comprehension also depends on the viewer's ability to simultaneously process both audio and visual tracks (Anderson, 1983). By adjusting the pacing, sequencing, and relative priority of the two information channels, and manipulating of the program's formal features, video producers are able to affect viewer attention, and can thereby affect the learning potential of the program (Anderson/Lorch, 1983; Huston/Wright, 1983).

What Viewers Bring to Their Viewing

As noted above, viewing is an active process, perhaps best thought of as an interactive experience between viewer and medium, rather than a process in which the former is "captured" by the latter. In addition to responding to what they observe from the screen, viewers bring their own experiences and expectations to their viewing. Anderson and Lorch (1983), among others, have shown that there is a "…progressive development of viewing behavior, reflecting a child's increasing understanding of the world." Thus, over time, children learn to watch television, as in turn, they learn from it.

While some popular conceptions portray TV viewing as a passive activity, research has actually shown that young viewers interact with television, not in continuous fashion, but instead shift their attention between the screen and alternative activities around them as often as 100-200 times an hour (Kozma, 1991). Their attention lags when the content is either too predictable (too easy) or too challenging. Thus, the comprehensibility of the content is a key factor in learning. Understanding occurs most frequently when content is pitched "just right", that is, at a middling level of difficulty that reflects an understanding of what a young viewer might be expected to know about the world (Houston, 1983; Collins, 1983; Krull, 1983).

The viewer's intention, too, is key to understanding. Salomon (1984) reported that schoolchildren tend to view television as an "easier" medium than books. When a sample group of sixth-graders was divided in two, half to watch an educational television program, and half to read a similar story in print, the TV watchers put less effort into the task. Interestingly, though, both groups scored the same on a test, which asked them to recall details from the story, but the readers were able to draw more inferences based on the story. Kozma (1991) cites other research (Krendl/Watkins, 1983) in which a group of fifth-graders told to watch a show for educational purposes responded to the content with deeper levels of understanding than a similar group that was not so instructed.

These studies indicate that what students think about television affects their ability to learn from it. In the context of casual effortless viewing, learning tends to be shallow and short-lived, but when viewing is more purposeful, then deeper and more sophisticated learning can occur (Kozma, 1991). Research further suggests that educators might look to influence children's ways of processing television so that they can more effectively acquire new information (Salomon, 1983; Christensen, 1983).

How Does Television Promote Children's Learning?

"After 40 years, the collective evidence that film and television can facilitate learning is overwhelming. This evidence is available for all forms of delivery, film, ITV [instructional television], ETV [educational television], and mass media." — Seels, et.al, 1996

We've all heard the proverb: "Seeing is believing." Research has shown that seeing is remembering, too. Marshall (2001) cites the conclusions of Wiman and Mierhenry (1969) who found that "…people will generally remember:

- 10% of what they read
- 20% of what they hear
- 30% of what they see
- 50% of what they see and hear."

Multiple Ways to Reach Multiple Intelligences

Television's combination of sound and imagery renders it a powerful aid to learning. A review of research by Wetzel, et al. (1994) shows that adding sound to still pictures results in greater learning than merely adding motion. That is, the combination of sound and either still or moving images is more effective than just making still images move. Kozma (1991) found that television's combination of multiple symbol systems — that is, its mix of spoken language, text, still images, and moving images — yields greater learning gains than media that rely primarily on one symbol system.

Further support for the learning benefits of television's "mixed message" can be found in one of the most widely cited learning theories of our time, that of multiple intelligences. Howard Gardner, the Harvard professor who developed the theory, has found that children (and adults, too) have various mental models of varying strengths and preferences (Gardner, 1993). These cognitive models, or "intelligences," shape the ways individuals perceive and process

information coming in from the world around them.[2] As a result, the multiple intelligences theory suggests that an individual's capacity for learning is influenced by the manner in which the subject matter is presented. Marshall (2001) points out that traditional textbooks tend to take a linguistic approach to learning. However, television's multiple modes can portray content through a variety of approaches, e.g., linguistic, aesthetic, logical, or narrational, thus more effectively matching viewers' various intelligence preferences (Gardner, 1999). These "multiple entry points" into the content are especially valuable in a formal educational setting, as they offer greater accommodation to the multiple intelligences of a diverse group of students.

Predictions and Myths About Learning from Television

Early in the last century, Thomas Edison famously predicted that motion pictures would soon replace textbooks (Marshall, 2002). Almost a hundred years later, textbooks are still very much with us, as are motion pictures. In making his forecast, Edison made the common error of believing a new technology would totally supplant those that came before it. In our media-saturated world of television, radio, films, magazines, newspaper, books, networked computers, and the World Wide Web, it's evident that media are additive, rather than substitutive. Educators today who seek to enhance learning find themselves with a dazzling array of choices among educational technologies.

It's undeniable that learning technologies, television among them, can be significant contributors to student achievement. To date, much research has focused on the role of television in promoting learning in early childhood (Fisch, 2001). Findings show that the positive academic and social lessons learned in early childhood from programs such as Sesame Street can lead to a "trajectory of success" that can carry through adolescence and beyond (Anderson, 2001). In a comprehensive survey of pre- and school-age educational TV programs, Bryant, Alexander, and Braun (1983) found that viewers of these shows demonstrated "improved reading skills, mathematics skills, PPVT scores (estimate IQ and readiness for school), visual processing skills, spatial perceptual skills, knowledge of health and human anatomy, attitudes toward people of different races, social functioning, cultural awareness, self-esteem, cultural pride, and much more." From this, it is clear that television can contribute to children's learning in many areas, including core academic subjects.

Despite the widely acknowledged positive impact of Sesame Street and similar programs, oversimplifications about television's effect on learning still abound while others have questioned the negative impact it can have on children's brain development and attention span. (Healy, 1990). In particular, some observers have advanced a theory that casts television in an inverse relationship to reading and language development. Here again, an analysis of the research by Flood and Lapp (1995) provides a more balanced view, as noted in the following:

Myth 1: Television displaces reading: there is general consensus that only in cases of heavy usage does a correlation exist between TV viewing and a decline in reading and vocabulary. Flood and Lapp cite a survey of the available literature (Williams, et al, 1982) that shows no overall effect of viewing on academic achievement, except for viewers of 40+ hours per week.

Myth 2: Television viewing negatively affects young readers: the argument here is that young children (ages 5-8) may be prone to "concentration deprivation" as a result of viewing television. While some studies do show some evidence of heavy viewers at this age being less able readers, these studies also fail to account for any number of other factors that may result in low reading ability.

Myth 3: Television inhibits language development: the argument has been advanced is that the passivity and rapidity of speech in the medium negatively affect language learning. However, it has been shown that children often "converse" with characters on TV, as well as with co-viewing adults and children. What's more, the redundancy of imagery which TV presents along with its "fast speech" actually promotes viewer's ability to comprehend the message. In fact, Flood and Lapp argue that "…television expands children's sociolinguistic experiences and understandings of a range of speech forms," thus promoting language learning, not detracting from it.

[2] Gardner has proposed that there are at least eight intelligences: linguistic, logical-mathematical, spatial, musical, bodily kinesthetic, interpersonal, intrapersonal, and naturalistic.

Hall, et al, (1996) cite the research of Wright and Husotn (1995) showing that the content of television may be more significant to academic achievement than the amount of viewing time. Wright & Huston (1995) studied 250 low-income families and found that a positive correlation existed between children's viewing of educational television and "time spent reading or being read to and time in educational activities," while "viewing of non-educational cartoons and adult entertainment programs was consistently negatively related to time spent reading and also negatively, but less strongly, to time spent in educational activities." Hall and his colleagues also cite the work of Stanovich and Cunningham (1993) with college students that suggests that the content one watches may be a truer determinant of future academic success than the amount of time one spends watching television. The researchers conclude by observing, "We believe that these findings are very important when one realizes that TV viewing has become a time-consuming pastime for much of the population and has probably replaced time formerly used for reading. At the same time, there are many who question the expenditure of tax funds for educational TV. It seems important to us that educators interested in having their students acquire cultural knowledge promote student watching of educational TV" (Hall, et al., 1996). A recent survey of the last 25 years of television research supports this claim: "If students are exposed to programs with high informational content (i.e., news programs or documentaries), students have a better opportunity to increase their knowledge and skills," on the other hand, "if most of the viewing is of the low informational content variety (i.e., shorter fast-action shows, cartoons, music videos, soap operas) an opportunity for detrimental academic impact is increased" (Thompson & Austin, 2003).

The Evolution of the Learning Uses of Television

> *"Education is not always somber or laborious. It is coextensive with the full range of human experience and includes joy and gaiety as well as hard intellectual endeavor. Educational television should be no less." — The Report and Recommendations of the Carnegie Commission on Educational Television, 1967*

From its earliest days, large-scale attempts have been made to harness the learning potential of television.

Broadcast TV

While not the focus of this report, it bears repeating that until quite recently the majority of programming watched by children has been broadcast by commercial and public stations for home consumption. PBS has long been a pioneer in the field of children's programming and has a tradition of award-winning educational fare, such as Nova and The Civil War documentary series. For example, its Sesame Street franchise has served as a "flagship" of innovative programming through its magazine format; special production techniques; mixture of animation, puppetry, and human characters; diverse racial and ethnic portrayals; formative and summative evaluation to guide production; and above all, its ethos of "learning can be fun" (Bryant, 1983).

Instructional TV

Instructional television (ITV) boomed in the 1950s and 1960s, fueled by funding from government and private foundations. Programming often took the form of taped lectures designed for replay to a classroom or by individual students. But by the mid-60s, interest had declined, largely due to "mediocrity in the instructional quality of these programs" (Marshall, 2001). Many reasons were cited for instructional TV's lack of impact in the schools, among them teacher resistance, equipment expense, and inflexibility of the content. As Marshall (2001) points out, "Rather than enhancing and extending the good things already happening in the traditional classroom, instructional television mirrored classroom teaching practices, replacing the classroom teacher with a televised version."

Educational TV

Fortunately, at about the same time that ITV was waning, programs like Sesame Street were coming into being, giving rise to a new category — educational television — which attempted to complement, not compete, with the classroom. As is often the case with new technologies, applications of the television medium emerged in ways that were unanticipated at its advent. As one noted educational economist comments, "…claims…have been made for every new instructional technology (motion pictures, radio, television, videocassettes, videodisks, and computers) which heralded them as having revolutionary implications for education. In every case their educational impacts fell short of that [early] promise… They simply did not evolve in the ways that were predicted" (Levin, 1988).

Indeed, television has evolved in ways that have actually made it a more useful learning tool than could have been predicted in its infancy. Instead of replacing the classroom, educational TV achieved its greatest renown in preparing young children for the classroom, most notably through Sesame Street (Fisch, 2001). The success of that program, though, should not overshadow the many other contributions educational television has made to and continues to make to children's educational development. Today, video content resides in multiple learning formats and a variety of distribution modes — ranging from closed circuit instructional programming, to one-way and two-way telecourses connecting teachers with distant learners, to "repackaged" broadcasts and program segments available via video cassettes, CD-ROMS, DVDs, and via the Internet.

Indeed, it is increasingly difficult to view educational video as an isolated instructional medium because video elements are so pervasively intertwined and interconnected with other communications media, from the latest computer technologies to print. These days what was once a somewhat rigid, one-to-many broadcast technology has increasingly become a flexible, user-controlled, and interactive medium. Such malleability obviously enhances video's instructional value.

Classroom Television: The Quiet Revolution

Our focus in the rest of this report will be on "classroom television," that is, the use of broadcast programming — largely from public television sources — for instructional purposes in the classroom. In most cases, this content was designed with a specifically educational intent, and provided to educators with supporting educational resources like teacher guides and student activities. Sometimes, the content has been customized into more manageable learning "chunks" to better accommodate the instructional schedule.

As video becomes digital, and as the tools and techniques of production become more available to the general public, teachers are enjoying greater flexibility in their use of the medium. Video playback and digitalization technologies provide unlimited options in the timing, sequencing, and pacing of video content, thus enabling greater control of instructional flow (CPB, 1997). In the following section, we take a closer look at how educators are actively using the medium in a variety of classroom settings and in a range of subject areas, creating what some have called a "quiet technological revolution" (Reider, 1984).

Classroom Uses of Video and Television

How Are Teachers Currently Using Television and Video to Promote Student Achievement?

> *"Public broadcasting and the nation's schools share a similar commitment to the education of all Americans ... Public television stations offer an impressive variety of services to the schools in their communities: distance learning, technology training for teachers, collaborative Internet projects, and curriculum-focused instructional television programming are only a few examples.*
> *— The Corporation for Public Broadcasting, "The Study of Schools Uses of Television and Video, 1996-1997 School Year, Summary Report"*

The vast majority of teachers in the U.S., according to a 2002 survey, "use video and television programming with students at least sometimes during the year making the media more popular than most other instructional technologies including the Internet" (Grunwald, 2002). Television has the added advantage of being used more often than these other learning media in "actual classroom instruction to reinforce and expand the curriculum — generally with the whole class at once." Other findings from the 2002 survey indicate that PBS is the most popular single source of content because of its high quality instructional programming and its age- and educationally appropriate content.

These results combined with those of an earlier nationwide 1997 Corporation for Public Broadcasting survey demonstrate that teachers are overwhelmingly positive about the use of television in the classroom (Grunwald, 2002; CPB, 1997). According to surveyed educators, television:

- stimulates class discussion
- reinforces lectures and reading,
- provides a common base of knowledge among students, and
- helps them teach more effectively.

Not surprisingly, these teachers feel that television's positive impact on their teaching leads to enhanced student outcomes. These educators indicated that their use of television in the classroom had resulted in:

- enhanced student comprehension and discussion of content,
- better accommodation of diverse learning styles,
- increased student motivation and enthusiasm for learning, and
- greater students benefits the more the medium is used.

Virtually all teachers report video equipment is available in their classroom, and virtually all have made use of it in their teaching. The report shows that teachers perceive TV and video to be effective with all types of students. In fact, more than half those surveyed reported that the medium was "very effective" with students who do not respond well to traditional methods of teaching. Commenting on the increase in positive perceptions compared to a similar 1991 survey, the report's authors conclude that teachers' greater familiarity with the medium over time has led to better integration into the curriculum, which in turn results in enhanced learning.

These positive findings are supported in the research literature as well. An ERIC Digest report (Aiex, 1988) summarizes research findings that show that video, film, and television are "…educational tools with high potential impact" and are especially useful in:

- linking disciplinary perspectives: video enables students to make cross-disciplinary connections across otherwise distinct course boundaries;
- serving a wide range of courses and topics: due to the pervasiveness of visual media in our society, video content is available for almost any subject area under study.

Choosing Appropriate Video Content

With teachers willing, students able, and the equipment in place, what then can be taught with television? Schools do more than teach academic subjects, of course. To better prepare children for higher education and the workforce, social skills, self-management skills, and cognitive skills, such as critical and creative thinking, are frequently part of the curriculum. To help students thrive in an interconnected world, educators also hope to impart values such as civic responsibility, cultural understanding, and global awareness. Television can play an important role in supporting these instructional goals.

Researchers have categorized a wealth of educational applications of television (Bryant, Alexander, & Braun, 1983; Hall, et al., 1996; Jordan, et al., 1996; Calvert, et al., 2001), and have shown its value as an instructional aid in social/moral development, cultural understanding, cognitive skills development, and academic content acquisition. As noted earlier, television can open the walls of the classroom by bringing in places, people, and events that students could not otherwise experience. An examination of the uses of television in a number of specific academic disciplines is below in the section of this report entitled, "Using Classroom Television to Support Specific Academic Disciplines."

Video Production and Educational Goals

A significant body of research has investigated the manipulation of the formal features of video to promote learning (Watt & Welch, 1983; Bryant, 1973; Kozma, 1991; Wetzel, 1994, and many others). Although this report does not focus on the technical aspects of this discussion, what is relevant is the demonstrable conclusion that because video production and education are both concerned with effectively imparting information, similar principles to guide clear communication apply to both. As Wetzel (1994) notes: "Instructional television and film research confirms that the general rules for good instruction also apply to video presentations." Hence, student learning from video is enhanced when common-sense principles are employed, that is, when the video message is purposeful, clear, and cogent.

Making Connections to the Curriculum

Not surprisingly, research has found that the value of video is highly correlated to its integration within the curriculum — in other words, how closely the content fits into the overall instructional sequence. Wetzel (1994) cites the work of Chu and Schram (1967, 1975) who conclude that instructional uses of television were most effective when "interwoven into an integrated teaching/learning system in the context of other learning activities."

Fisch (in press, 2004) notes, too, that in these days of accountability requirements and standardized curricula, the video connection must be obvious to the teacher: "By the same token, given the constraints of the classroom, materials are far more likely to be used if teachers can see easily how they connect to their existing classroom curriculum. If the materials (no matter how educationally rich they may be) do not map onto the curriculum that a teacher is obligated to meet, then the materials are likely to be treated as a nice "extra" to be used only if time permits."

Content Appropriateness

Which is better for classroom use — commercial versus public television? Observing that PBS materials are generally recognized as having high classroom value, Huston, et al., (1989) provide an explanation: "Because funding for public broadcasting is not dependent on program ratings or audience size, public broadcasters are able to pursue programming targeted at more narrowly defined segments of the population, such as children of specific age groups." As the next section illustrates, teachers have been creative in their use of commercial programming as well.

Using Classroom Television to Support Specific Academic Disciplines

What subjects does television support? The answer is just about all of them. Teacher surveys show that television is most commonly used for instruction in science, the language arts (reading and English), and social studies, with health/nutrition and math uses also widely reported (CPB, 1997). While less than half of math teachers reported using video, it was the most requested subject for new programming.

It's worth noting that some of the benefits of classroom television are difficult to quantify from a research perspective as they introduce educational experiences that would otherwise be impossible to reproduce in another medium. Thus, it can be difficult to create valid comparisons as "[t]hese media can take viewers to places in the world that they could not otherwise experience, bring distinguished experts into the classroom, and allow demonstrations not generally possible or too dangerous to perform within a classroom" (Wetzel, 1994). That said, the examples below are intended to show the wealth of applications that teachers of many disciplines and of elementary, middle, and high schools students have found for classroom television.

In Science

A CPB (1997) teacher survey reported that video was used more in science than in any other subject area. Barss (2002) reports on an innovative community program featuring Building Big, a PBS series that focused on engineering concepts as evidenced in civic structures. Gifted and talented students in the Nashville public schools, supported by their local PBS station, learned from short classroom videos and classroom activities developed in conjunction with the program. Engineers from the local chapter of the American Society of Civil Engineers worked with the students to expand their understanding of engineering principles. Students constructed straw bridges,

which were tested by engineers for load-bearing performance, and visited the ten "local wonders" selected by the engineers for their historical or social uniqueness.

Educational science shows (e.g., Mr. Wizard, Bill Nye the Science Guy) provide reinforcement and support for teachers, particularly at the elementary level, who may be uncomfortable with scientific topics (Education Digest, 1994). Dhingra (2003) finds that students were more involved in solving the problems presented in news and drama shows with scientific themes, and have more post-viewing questions and comments, than with magazine or documentary genres. Fisch, et al. (1997), in surveying children's viewing of science-themed cartoons of both educational and non-educational genres, find that a "false dichotomy" exists in broadcasters' arguments that children will not willingly watch educational television, and note that children do not "…necessarily find educational programs to be less appealing" and that "education and entertainment are not mutually exclusive."

Science teachers have discovered a number of innovative ways to bring popular TV and movies into their classroom, as follows:

- Herberman (2000) screens popular TV shows in his high school science class to uncover common scientific misconceptions and mistakes.
- Dubeck & Tatlow (1998) describe the use of Star Trek to motivate a physics class, and find that "it draws on an activity students find interesting… to teach physics, astronomy, and biology (which they often find unengaging subjects), and "[t]he illustrations of scientific principles in film help students make abstract ideas concrete."

In Social Studies

Social studies, not surprisingly, is virtually tied with the language arts, as the second most popular discipline for classroom television uses (POB 1997). Paris (1997) suggests four frameworks to guide teaching with video in social studies:

- the moving image as representation of history: video can help students develop a sense of place, time, and material culture for a subject
- the moving image as evidence for social and cultural history: "video often reflects the social and cultural environment of its times more accurately than it reveals its subject"
- actuality footage as evidence for historical fact: while seemingly indisputable, footage of real-life events should be examined for editing, framing, producer's intent, and other circumstances involving its creation and distribution
- the history of the moving image as industry and art form: the development of the entertainment and communications industries are both "progenitor and reflector of social change." Individual films and videos can be viewed as evidence of that dynamic.

In History

Bage (1997) calls for greater use of television in history instruction for elementary grades, citing interviews with teachers who find that video with historical themes contributes to student learning by:

- "bringing a subject to life, e.g. by 'recreating images from the past;'
- stimulating children's interest through the use of media techniques, and their attention and motivation;
- stimulating recall of factual information;
- enhancing skills and concepts (e.g., listening, demonstrating, questioning); [and]
- improving children's confidence and teachers' credibility."

Teachers value verisimilitude and accuracy in history television and films. Bage (1997) quotes a British teacher who praised one historical broadcast as "recreation so exact you can stop it and say, 'right, now tell me what it looks like in a street in Viking Yorvik. What do you think you're going to be able to smell?'" Bage also describes BBC-produced Teacher' Notes, which contain detailed historical information as well as explanations on how the program came to be made. He concludes with a call for more dialogue between teachers and television producers so they can mutually develop teacher training, update pedagogy, and improve programming.

An example of effective teacher training can be found in the work of Rabb (1994) who reports on the accomplishments of a series of workshops to aid history teachers in integrating the PBS telecourse, Renaissance, into their classroom teaching. The workshop covered the following subjects:

- The Problem of Student Attention: one participant noted that students tend to assume that video in the classroom is not a 'real' class, and "tune out accordingly." Various techniques — use of advance questions, viewing breaks for analytical discussion, assessment of content — were aired, with the general conclusion that deliberate efforts were needed to ensure the efficacy of the material.
- The Relative Merits of Film and Print: Rabb notes that at the outset every teacher believed in the inherent pedagogical superiority of print. By the end of the workshop, however, nearly all acknowledged that "film is able to convey certain kinds of information, atmosphere, and feeling that cannot be provided by written texts."
- Student Skills: a lively debate centered on the analytical capabilities of students. "Everyone agreed that it is effective, in classes with low literacy levels, to use non-written forms of communication and teaching, but many argued that students are as incapable of analytic viewing as they are of analytic reading. The general consensus was that careful guidance was as necessary with films as with books. … [and that] film could act as a leveler — offering opportunities for intellectual achievement to some students who struggle with the written word" (Rabb, 1994).
- Technology: the group was divided among those teachers who preferred to view video or film in its entirety so as to "enter into [its] emotional atmosphere" and those who preferred shorter excerpts. Both agreed that digital resources provided greater flexibility than tapes.
- Identification of Visual Resources: participants noted that there is far less information about documentaries than films, which is especially unfortunate in history, as "the former, in the view of many, are the equivalent of primary sources (and the latter were more like secondary sources)" (Rabb, 1994).

In Geography

Durbin (2000) observes that "…most people experience a limited range of place even today with modern travel and therefore visual media influence their 'geographical imaginations.'" He also cites a number of factors for the significant value of video in the geography curriculum, noting that the medium can:

- "enable pupils to 'encounter' images of places they wouldn't otherwise experience
- increase the sense of place by communicating local sight and sounds
- combine images with graphics to explain change over time and space in a visual way
- enable pupils to observe (and sometimes hear) real people from the places they are studying
- explain issues in ways which allow pupils to see a greater number of perspectives."

In Language Arts

Aiex (1988) in a survey of the literature has found wide use of video as a tool for motivating writing: language arts teachers have successfully used film, news stories, even soap operas to organize writing activities for students at a variety of levels — from elementary grades up through college, and in advanced through remedial levels. Williams (2001) observes that students bring deep experience in television to the classroom. He notes these literacies "…can be gateways to otherwise hidden student knowledge about the society and culture at large," and calls on teachers to "make students aware of how experience with any form of communication, be it television or print, leads to a deeper, critical enjoyment of that form and ability to use it more effectively for their own goals." Linebarger (2001), in a study of second-graders, has found increased word recognition, comprehension, and identification of critical story elements when television with captions is used as a supplement to print-based reading instruction.

Flood (1995) offers several ways to use television "texts" to enrich language arts instruction:

- to provide alternative interpretations of literary classics;
- as presentations of background information and context;
- to foster reader-response approaches to understanding literature, especially when video and print-based texts are compared; and
- to develop communication skills as students learn to interpret visual messages.

In ESL/Foreign Language

Flood (1995) has found that video can enhance the learning of foreign languages because its portrayal of "dramatized cultural context" and authentic materials can illustrate the intertwining of language and culture deemed essential to the mastery of another language. Minkel (2003) observes that the DVD format can accommodate up to seven different language tracks, and can be a valuable learning tool in schools with a variety of speakers of other languages.

Clovis (1997) writes of her experience in using video, particularly programs from PBS, with her K-5 ESL students. Her successful strategies include:

- pausing the video so students could copy down visual information;
- eliminating the sound track so students could practice their oral and written English skills by supplying the missing dialogue;
- using closed captioned programs to reinforce vocabulary and reading skills; and
- providing copies of video tapes to parents so that they, too, can improve their English, and become "active partners" with their children in the learning of English.

Students were so enthused about Clovis' teaching methods they instigated a peer tutoring program, also drawing on video resources, so that they could share this approach with younger students at their school.

In Mathematics

Fisch (in press, 2004) finds that mathematical educational TV fosters positive attitudes towards mathematics by:

- increasing student enjoyment
- demonstrating real-world applications
- motivating greater engagement with mathematical topics

He further notes that research on such programs as Sesame Street, Square One TV, and research in progress on Cyberchase, "…has demonstrated the potential for educational television to hold significant benefits for school-age viewers. Educational television series have been found to promote growth in children's knowledge of mathematics, their problem-solving skills, and their attitudes toward mathematics. These effects have been found to hold across gender, ethnicity, SES, and past performance on standardized tests of mathematics" (Fisch, in press, 2004).

In a study on the academic effectiveness of Cyberchase, Fisch summarizes his findings as follows: "Overall, the results of the study indicate that children learned from Cyberchase and enjoyed watching it as well. As one might expect — and in keeping with past research in the field of education — the strongest and most consistent effects were found in measures that were closest to the Cyberchase programs (in both content and time)."

Teaching with Television

How Might Teachers Enhance the Learning Value of Television?

Teachers throughout the country and across the globe are continuously finding innovative ways to incorporate the medium into their teaching, resulting in more motivated students and improved learning outcomes. The list of recommendations for educators below (Barnes, 2001; Fisch, 2004; Rogow, 1997; ITC, undated) is in no way intended to be comprehensive or definitive, but instead should be seen as a springboard for further innovation. The underlying research basis follows these recommendations.

- Plan Ahead: Think about what you are trying to accomplish (Rogow, 1997)
  - Spark interest or inspire
  - Demonstrate something you can't do any other way
  - Enrich curricular content
  - Practice a skill
  - Reinforce or review a topic

- Promote Active Viewing: Rogow (1997) suggests that teachers ask themselves the following: "Think of the TV as a teacher. Do you turn off the lights when you talk? Would you be satisfied with a class that sat and stared at you for 30 minutes without responding? Interactive viewing requires three simple steps:"
  - Prepare
    - Preview the program to be sure it meshes with your teaching approach and your class' learning goals
    - Determine the setting and length of the video — home viewing, in class, whole segment or clips
    - Set clear expectations for your students — be direct about what you want them to gain from viewing the program and what follow up activities will take place
    - Practice with the equipment and cue up the relevant portions you'll be viewing
  - Participate
    - Don't turn off the lights!
    - Preface the viewing with a few key questions and/or learning objectives
    - Use the pause button to flag to important topics, and allow for questions
    - Turn on closed captioning to reinforce narrated information
    - Consider a second viewing — especially for younger children. Alternatively, in some cases, tapes might be circulated for home viewing
    - Break students into small groups for discussion, and/or have them write down their thoughts, then share the results with the larger group
  - Connect
    - Choose follow up activities that connect to hands-on or real-world experience
    - Explain the connections you make, especially for early grade students

Setting Expectations

Research shows student learning from television is enhanced when teachers employ strategies for "clearly communicating the purpose" of the program and "providing viewers with appropriate expectations regarding the content and the level of effort they will be required to exert" (Wetzel, 1994). In this regard, television-enhanced learning is no different from other learning tasks — the benefit of communicating to learners what will be expected of them is a matter of common sense.

Mediating and Interpreting

Over twenty years ago, researchers determined that adult mediation was a key factor in the educational effectiveness of television for children. Singer & Singer (1983) find that adults play an important function in setting video material into an appropriate context, in cueing children to prioritized material, and in following up on questions children raise as a result of their viewing.

Bryce (1983) supports this view, stating that "[a]ctive verbal interaction between adult and child while viewing has been shown to increase the knowledge that the child gains from the program." In the classroom, the teacher carries out the vital role as adult mediator of the child's viewing experience. Valkenberg, et al. found an interesting limitation on the role of adults in children's attitudes towards visual content. A study involving Dutch children's viewing of an educational program on opera finds that "…in the case of unfamiliar content, such as opera, attitudes do not seem to be improved by adult mediation. Although the program itself improved attitudes towards opera, adult mediation only provided additional benefit to knowledge and not to attitude (Valkenberg, 1998). It may be in this case that more neutral medium of television, rather than the authority figure of the teacher, is a better mechanism for promoting attitude change.

Dhingra (2003) found that teacher-student dialog about television can open new channels of communication. "For students, talking about television in class with their teacher alters the usual relationship between them: the teacher is not necessarily the one who imparts knowledge and the student the one who receives it. They are more like peers discussing an experience they have in common."

Fisch (in press, 2004) devotes extensive attention to the topic of adult mediation, noting that it "…can facilitate and enhance the impact of educational television in several ways: by encouraging exposure, by tailoring the material to individual children, and by extending the experience beyond the television screen." To help children gain the greatest educational value from their viewing, he suggests teachers employ the following classroom strategies:

- Frame the learning with pre-viewing discussion: Like any mass medium, television is not designed to meet the needs, prior knowledge, developmental level, or demographic background of individual students. Teachers can provide a level of customization, however, through the use discussion before and around the program to "…elaborate on content that is difficult for a particular child to understand. They can tie televised content to children's own past experiences to build on existing knowledge. And they can expand on the material" (Fisch, in press, 2004).
- Extend the learning via post-viewing discussion: Televised content can be used as "…a springboard to introduce new subject matter and stimulate interest" (Fisch, in press, 2004). Follow-up activities that connect the televised content to the larger instructional context have been shown to further reinforce student learning.
- Adapt the viewing experience to the classroom: Television is highly adaptive to varied teaching styles. Teachers can tailor their use of the medium to accommodate the learning needs of their students and the content demands of the subject matter. A program can be used to launch a topic of study by engaging children's attention and interest; alternatively, discussion may be used to prepare children before viewing; or a program may be interrupted by the teacher to guide children to think critically about what they have seen, or imaginatively about what they expect they will see next. "There is no one 'right' way to use educational television in school; the best practice depends on the nature of the materials and subject matter, and on the style of the individual teacher." Fisch (in press, 2004).

Promoting Media Literacy

The role of the teacher is critical to the effective use of television in school settings. But the attitudes and frameworks that students bring to their viewing can matter just as much. Paris (1997) has identified the dual nature of student perceptions of television, observing that children's familiarity with video "can make film and video a powerful pedagogical tool." Yet, he also notes that same familiarity can lead to a casual attitude toward the visual content, and might "reinforce passive viewing and unquestioning acceptance" (Paris, 1997). The solution here, he advocates, is the development of critical viewing skills. (For more on his proposed frameworks, designed for use in the social studies curriculum, see the section below, "Using Classroom Television to Support Specific Academic Disciplines.")

Critical viewing skills are part of a larger framework known as media literacy, which has been defined as "…the ability to access, analyze, evaluate and communicate messages in a wide variety of forms" (Aspen Institute, 1993). For many educators, our notion of basic literacy expands beyond the reading and writing of print to accommodate the greater number and increased presence of media forms in our lives (Hobbs, 1998). Fisherkeller (2000) explains, "Media educators argue that people need to learn not just how to read and write, but also how to understand and use multiple forms of communications, including film, television, sound recordings, graphic arts, and computer programs and networks."

While a survey of the extensive body of media literacy research is beyond the scope of this report, we should note that research consistently supports the value of teaching not just with television but about television. A critical approach to viewing can promote the acquisition of subject matter as well as the development of cognitive skills. PBS and other educational television providers, such as Cable in the Classroom, should be commended for their leadership role in supporting research and publishing findings in this critical area.

Helping Teachers Teach with Television

How Can Broadcasters Support Teachers in Their Use of Classroom Television?

Busy teachers today can use all the help they can get. Broadcasters can facilitate teaching with television by making their program options more flexible, more aligned with core curricula, and more supported by other learning materials and resources. To achieve the greatest impact on student learning, broadcasters might consider providing professional development workshops for teachers in their region.

Fitting Into Tight Classroom Schedules

Teachers must manage their time carefully, and accordingly, prefer shorter clips of 10-15 minutes to longer video segments. As the CPB survey (1997) indicates, teachers at the secondary level who have their class time broken into shorter blocks are in particular need of "bite-sized pieces" of video. Fisch (in press, 2004) urges that broadcast programs be adapted to make them "more classroom-friendly." For example, magazine format shows can be re-edited so that each video focuses on a single topic, thus reducing the need for teachers to search through a whole program to find the material they need. Barss (2001) suggests that 10-15 minute clips are most effective, as they don't overtax children's concentration and allow time for focused discussion about the material. She also approved of re-packaged videos that are "…edited, re-narrated, and … include additional footage that is more closely aligned with …standards and curriculum objectives than the general audience series."

Teachers are encouraged also to assign television viewing as homework, which has the added advantage of promoting home-school connections, as well as bringing parents into their children's learning activities. Dhingra (2003) observes that in-class discussions of home viewing "…bring the students' home life to the school environment, and reciprocally what is learned at school throws light on what they see on television at home."

Integrating Video with Other Materials

Barss (2002), the director of outreach at a leading educational station, Boston's WGBH, provides a list of resources and strategies to enhance the instructional value of television:

- Teacher guides: these materials "…often feature hands-on activities and strategies for using the programs, which you can adapt to meet your specific educational objectives."
- Accompanying websites: websites can offer a wealth of resources, including hands-on activities, simulations, multimedia databanks, background articles, interviews with subject matter experts, and "online field trips."

While teachers obviously should screen videos ahead of time, and plan appropriate activities before and after, Fisch (in press, 2004) cautions that the preparation time should reflect the many demands on teachers' time. He recommends that "[p]rinted background material should be short and to the point, and the time required for physical preparation should be kept to a minimum." Given limited classroom budgets, Fisch also urges that supplementary activities not require expensive or hard-to-find materials.

Building Bridges in the Community

Television programming can serve as a bridge to community groups, cultural organizations, and professional and industry associations that can add a valuable real-world dimension to classroom learning. Such groups are often eager to support education but may lack concrete ideas on how to do so; a television series can help support and structure their relationship with the school. Barss (2002) comments, "These partnerships may link schools, public television stations, and museums, for example, to work together on collaborative projects that use a public television series as a springboard." (For more on such a partnership, see the section above on Using Classroom Television to Support Specific Academic Disciplines, In Science.)

Training Teachers

As the above section demonstrates, the literature is replete with suggestions to help teachers enhance the educational value of television. For teachers to use such strategies, though, they must be exposed to them. Further, because teachers exercise a great deal of autonomy in deciding how a curriculum will be taught, teacher training is key to effective instructional use of television. Indeed, a study by Eckenrod and Rockman (1988) demonstrated just how important training can be. In this study, teachers attended training sessions and were given a resource guide for instructional television. Results showed that when teachers subsequently returned to their classrooms, they tended to use the videos and activities that were demonstrated as examples during the training sessions. However, they were far less likely to use materials that were in the resource guide but had not been demonstrated during training. (Fisch, in press, 2004)

The CPB survey (1997) indicates that nearly half of the principals surveyed said that their districts provide in-service training on the instructional use of video and television, and 59% of teachers report having received such training at some point in their careers. One of the best models for educator professional development is Thirteen/WNET New York's National Teacher Training Institute, now offered in partnership with fifteen other stations across the United States. NTTI, sponsored by the GE Foundation and Cisco Systems, trains teachers to integrate the Internet, software applications, and television and video programs into hands-on learning activities in the classroom.

NTTI Workshops

- emphasize collaborative, technology-based learning through a "teachers teaching teachers" approach;
- adhere to local, state, and national standards in core-curriculum subject areas; and
- provide extensive year-round support via NTTI Online which offers tutorials, ideas and models, and hundreds of tried-and-true lesson plans.

During the 2003-2004 academic year, over 5000 teachers will participate in NTTI workshops from coast to coast. Since its inception in 1990, the program has had a positive effect on 170,000 teachers and millions of students nationwide. Results of NTTI's most recent evaluation show "86% [of participants] reported that their students are more engaged when electronic media are used in the classroom, 81% reported that their students learn more, and 75% reported that students retain more information" (Thirteen/WNET, 2002).

Looking Ahead

With the Advent of Computers and the Internet, What Is the Future of Television in the Classroom?

Where does classroom television go from here? Classrooms are becoming ever more technology enriched, as computers, the Internet, DVD players and a host of other digital technologies penetrate our nation's schools. Will video fade away in the face of these newer media? Evidence indicates that video, far from being supplanted, is becoming an increasingly essential part of classroom learning. CPB survey of teachers (1997) showed that the vast majority of teachers said that the presence of computers in their class had not affected their classroom use of TV and video, and in fact "nearly one quarter find that their use of TV and video has actually increased."

Shephard (2003) predicts that streaming video technology may soon afford teachers the opportunity to download clips to their computers where they can then be used in conjunction with other learning technologies to form a comprehensive educational experience. Minkle (2003) suggests that DVD is more likely in the short run to have a significant impact on the classroom, while noting the challenge school librarians face in accommodating yet another format change in their media purchasing plans.

A new control-group study by Cometrika however may drive faster adoption of streaming technology (Reed, 2003). The report, which was industry-funded and therefore invested in a favorable outcome, cites dramatic learning gains from the use of on-demand standards-based video clips, based on findings involving over 1400 students in three Virginia school districts (Boser, 2003). Third- and eighth-grade students using the video clips showed improvements of 12.6% greater than students in the control group in the two studied content areas of science and social studies.

As the long history of research clearly shows, the educational value of visual media is positive and significant. While the format, delivery channels, and storage options may change, video is now and will continue to be an effective, engaging, and essential tool in our nation's classrooms.

BIBLIOGRAPHY

Aiex, N.K. (1988). Using film, video, and TV in the classroom. ERIC Digest, No 11. Bloomington, IN: ERIC Clearinghouse on Reading and Communication Skills.

Anderson, D.R.; Huston, A.C.; Schmitt, K.L (2001). Early childhood television viewing and adolescent behavior: The recontact study. *Monographs of the Society for Research in Child Development*, vol.66, no.1, p. 1-147.

Anderson, D. R. & Lorch, E. P. (1983) Looking at television: action or reaction? In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's Understanding of Television: Research on attention and comprehension*. New York: Academic Press.

Anderson, D.R., and Bryant, J. (1983) Research on children's television viewing: the state of the art. In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's Understanding of Television: Research on attention and comprehension*. New York: Academic Press.

Anderson, J. A. (1983). Television literacy and the critical viewer. In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's Understanding of Television: Research on attention and comprehension.* New York: Academic Press.

Aspen Institute (1993). National leadership conference on media literacy. Conference report. Aspen Institute: Washington, D.C.

Barss, K. (2002). Putting public television to work for you. *Science Scope*. Vol. 25, No. 6, pg. 58.

Boser, F.J., Meyer, G.S., Roberto, A.J., & Inge, C.G. (2003). A report on the effect of the Unitedstreaming™ application on educational performance. United Learning, August 2003.

BrandonBarnes, B. ed. (1997.) The power of classroom TV: a marketing and advocacy document for the use of classroom television professionals. Columbia, SC: Center for Instructional Communication, National Educational Telecommunications Association. http://www.sectv.org/k12/classroom%20tv.htm

British Film Institute. (2000). *Moving images in the classroom: A secondary teachers' guide to using film & television*. London: British Film Institute.

Bryant, J., and Anderson, D. R. (Eds.) (1983). *Children's Understanding of Television: Research on Attention and Comprehension*. New York: Academic Press.

Bryant, J.; Alexander, A.F.; & Braun, D. (1983) Learning from educational television programs. In Howe, M.J.A.(Ed.) (1983). *Learning from Television: Psychological and Educational Research*. London: Academic Press.

Bryant, J., Dolf, Z., and Brown, D. (1983) Entertainment features in children's educational television: Effects on attention and information acquisition. In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's Understanding of Television: Research on attention and comprehension*. New York: Academic Press.

Bryce, J. W. & Leichter, H. J. (1983). The family and television: forms of mediation. Journal of Family Issues, Vol. 4, No. 2 (June 1983) pp. 309-328.

Calvert, S.; Kotler, J.; Kuhl, A.; Riboli, M. (2001). Impact of the children's television act on children's learning. Greensboro, NC, Smith Richardson Foundation. 2001.

Carnegie Commission on Educational Television. (1967). *Public Television: A Program for Action.* New York: Bantam Books.

Chu, G.C., & Schramm, W. (1975). Learning from television: What the research says. (ERIC Document Reproduction Service No ED 109 985).

Clovis, D.L. (1997). Lights, television, action! *Educational Leadership*, Vol. 55, pp 38-40, November 1997.

The Corporation for Public Broadcasting. *Study of school uses of television and video: 1996-1997 school year summary report.* http://stations.cpb.org/system/reports.97schoolusestudy/

Dhingra, K. (2003). Thinking about television science: How students understand the nature of science from different program genres. *Journal of Research in Science Teaching,* Vol. 40, No. 2, pp 234-256.

Dubeck, L.W. & Tatlow, R. (1998). Using Star Trek: The Next Generation television episodes to teach science: Investigating scientific topics through the medium of television. *Journal of College Science Teaching,* March/April 1998, Vol. 27, Iss. 5, p. 319-323.

Durbin, C. (2000). Moving images in geography, in *Moving images in the classroom: A secondary teachers' guide to using film and television*. London: British Film Institute.

Education Digest. Watch Mr. Wizard: Still crazy (for science) after all these years. Interview with Don Herbert. Ann Arbor: Oct 1994. Vol. 60, Iss. 2, pp. 68-71.

Fisch, S.M. (2004). *Children's learning from educational television: Sesame Street and beyond*. Mahwah, NJ: Lawrence Erlbaum Associates.

Fisch, S.M. & Truglio, R.T., eds. (2001). "G" is for growing: Thirty years of research on children and Sesame Street. Mahwah, NJ: Lawrence Erlbaum Associates.

Fisch, S.M., Yotive, W., McCann Brown, S.K., & Scott, M. (1997). Science on Saturday morning: Children's perceptions of science in educational and non-educational cartoons. *Journal of Educational Media*, Vol. 23, Iss. 2/3, pp. 157-168.

Fisherkeller, J. (2000). *"The writers are getting kind of desperate": Young adolescents, television, and literacy.* Journal of Adolescent & Adult Literacy. Vol 43, Iss. 7, pp. 596-607.

Flood, J. & Lapp, D. (1995). "Television and reading: Refocusing the debate. *The Reading Teacher*, Vol. 49, Iss. 2, pp. 160-164.

Gardner, H. (1999.) *Intelligence reframed: Multiple intelligences for the 21st century*. New York: Basic Books.

Gardner, H. (1993). *Multiple intelligences: The theory in practice.* New York: Basic Books.

Grunwald Associates (2002). *Video and television use among K-12 teachers*. Survey results in Powerpoint format prepared for CPB. November 2002.

Hall, V.C; Chiarello, K.S.; Edmondson, B. (1996). Deciding where knowledge come from depends on where you look. *Journal of Educational Psychology,* Vol 88, No.2, pp. 305-313.

Healy, Jane M. (1990). *Endangered Minds: Why Our Children Don't Think*. New York: Simon and Schuster.

Herberman, E. (2000). Sci-fi high school. *Current Science*, Vol. 85, Issu., 13, p. 4.

Hobbs, R. (1998). The seven great debates in the media literacy movement. *Journal of Communication*, Vol. 48, Iss. 1, pp. 16-32.

Howe, M.J.A.(Ed.) (1983). *Learning from Television: Psychological and Educational Research.* London: Academic Press.

Huston, A.L., Watkins, B.A., & Kinkel, D. (1989). Public policy and children's television. *American Psychologist*. February 1989, Vol. 44, No. 2, pp. 424-433.

Huston, A.L & Wright, J. (1983). Children's processing of television: the informative functions of formal features. In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's Understanding of Television: Research on attention and comprehension.* New York: Academic Press.

Independent TV Commission. (Undated). *The Future of Schools Television.* London: The Information Office, ITC.

Jordan, A.B., Schmitt, K.L., and Woodard, E.H. (2001). Developmental implications of commercial broadcasters' educational offerings. *Journal of Applied Developmental Psychology*. Vol. 22, Iss. 1, pp. 87-101.

Krull, R. (1983). Children learning to watch television. In Bryant, J. and Anderson, D.R. (Eds.) (1983). *Children's Understanding of Television: Research on Attention and Comprehension*. New York: Academic Press.

Kozma, R.B. (1991). Learning with media. *Review of Educational Research*. Vol. 61, No. 2, pp. 179-211.

Levin, H.M. (1988). Cost effectiveness and educational policy. *Educational Evaluation and Policy Analysis*. Vol. 10, No. 1, pp. 51-69, Spring 1988.

Liebert, R.M., Sprafkin, J.N., Davidson, E.S. (1982). *The Early Window: Effects of Television on Children and Youth*. New York: Pergamon.

Linebarger, D.L. (2001). Learning to read from television: The effects of using captions and narration. *Journal of Educational Psychology*. June 2001, Vol. 93, No. 2, 288-298.

Marshall, J.M. (2002). Learning with technology: Evidence that technology can, and does, support learning. White paper prepared for Cable in the Classroom.

Meringoff, L.K., Vibbert, M.M., Char, C.A., Fernie, D.E, Banker, G.S., Gardner, H. (1983). How is children's learning from television distinctive? Exploiting the medium methodologically. In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's understanding of television: Research on attention and comprehension*. New York: Academic Press.

Moeller, B. (1996). *Learning from Television: A Research Review*. New York: CCT Reports, (11).

Thirteen/WNET. (2002). *NTTI evaluation results: National teacher training institute:* 2001-2002 final report. New York: Thirteen/WNET. http://www.thirteen.org/edonline/ntti/index.html

Neuman, S.B. (1991). *Literacy in the Television Age: The Myth of the TV Effect*. Norwood, NJ: Ablex.

Paris, M. J. (1997). Integrating film and television into social studies instruction. Bloomington, IN: ERIC Clearinghouse for Social Studies/Social Science Education.

Rabb, T.K. (1994). *Integrating "Renaissance," a television film series into college classrooms.* Princeton, NJ: The Medici Foundation.

Reed, R. (2003). Streaming technology improves student achievement. *T.H.E. Journal*, February 2003.

Reider, W. (1984). Videocassette technology in education: A quiet revolution in progress. *Educational Technology*, Vol. 24, No. 10, pp. 16-18.

Rideout, V.J., Vendewater, E.A., Wartella, E. A., (2003). Zero to six: Electronic media in the lives of infants, toddlers, and preschoolers: A Kaiser family foundation report. Fall 2003.

Rogow, F. R. (1997). Don't turn off the lights! Tips for classroom use of ITV. Insighters Educational Consulting.

Salomon, G. (1983). Television watching and mental effort: a social psychological view. In Bryant, J. and Anderson, D.R. (Eds.) (1983). In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's Understanding of Television: Research on attention and comprehension*. New York: Academic Press.

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.

Singer, J.L. & Singer, D.G. (1983) Implications of childhood television viewing for cognition, imagination, and emotion. In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's Understanding of Television: Research on attention and comprehension*. New York: Academic Press.

Stipp, H. (2003). How children can learn from television. *Journal of Applied Developmental Psychology,* Vol. 24, Iss.3, August 2003, pp. 363-365.

Thompson, F.T. & Austin, W.P. (2003). Television viewing and academic achievement revisited. *Education*. Chula Vista, CA. Vol. 124, No. 1, pp. 194-202. Fall 2003.

Tiene, D. (1996). Educational television in the nineties: A global survey. *Journal of Educational Media,* Oct 1996. Vol. 22, Iss. 3, page 151-160.

Valkenburg, P.M., Krcmar, M., & de Roos, D. (1998). The impact of a cultural children's program and adult mediation on children's knowledge of and attitudes towards opera. *Journal of Broadcasting and Electronic Media,* Vol. 42, Iss. 3, pp 315-327.

Watt, J.M. & Welch, A.J. (1983). Effects of static and dynamic complexity on children's attention and recall of television instruction. In J. Bryant and D.R. Anderson, (Eds.) (1983). *Children's Understanding of Television: Research on attention and comprehension.* New York: Academic Press.

Wetzel, C. D. Radtke, P.H, Stern, H.W. (1994). *Instructional Effectiveness of Video Media*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Williams, B.T. (2001). Reflections on a Shimmering Screen: Television's relationship to writing pedagogies. *The Writing Instructor* [online journal]. 12/18/01. 16 pages. http://flansburgh.english.purdue.edu/twi/areas/englished/Williams.htm

Winn, M. (1985). The Plug-In Drug (rev. ed.). New York: Viking.

Wolfe, Pat. (2000). Brain-compatible teaching: What educators need to know about brain research and teaching, and why. *Cable in the Classroom,* March 2003. http://www.ciconline.com/Enrichment/Teaching/learningwithtechnology/magarticles/mag_0303_brain_compatible_teaching.htm

Wright, J. C. & Huston, A. C. (1995). *Effects of educational TV viewing of lower income preschoolers on academic skills, school readiness, and school adjustment one to three years later.* (A report to children's television workshop, Center for Research on the Influences of Television on Children, University of Kansas).

Zigerell, J. (1991). *The Uses of Television in American Higher Education*. New York: Praeger.

Web Resources

Eyes on the Prize Program, from San Francisco School Volunteers, assists teachers in developing and delivering a curriculum using the EYES ON THE PRIZE civil rights documentary as the focal point for classroom lessons; and increases the number of African American family and community volunteers participating in targeted schools. Viewed on 11/20/03 at http://www.sfusd.k12.ca.us/sfsv/eyes.html

Herndon, P.N. (1992). "Eyes on the Prize: The civil rights struggle, 1954 to 1965" (curriculum to accompany the PBS video series) Viewed on 11/20/03 at http://www.yale.edu/ynhti/curriculum/units/1992/1/92.01.03.x.html


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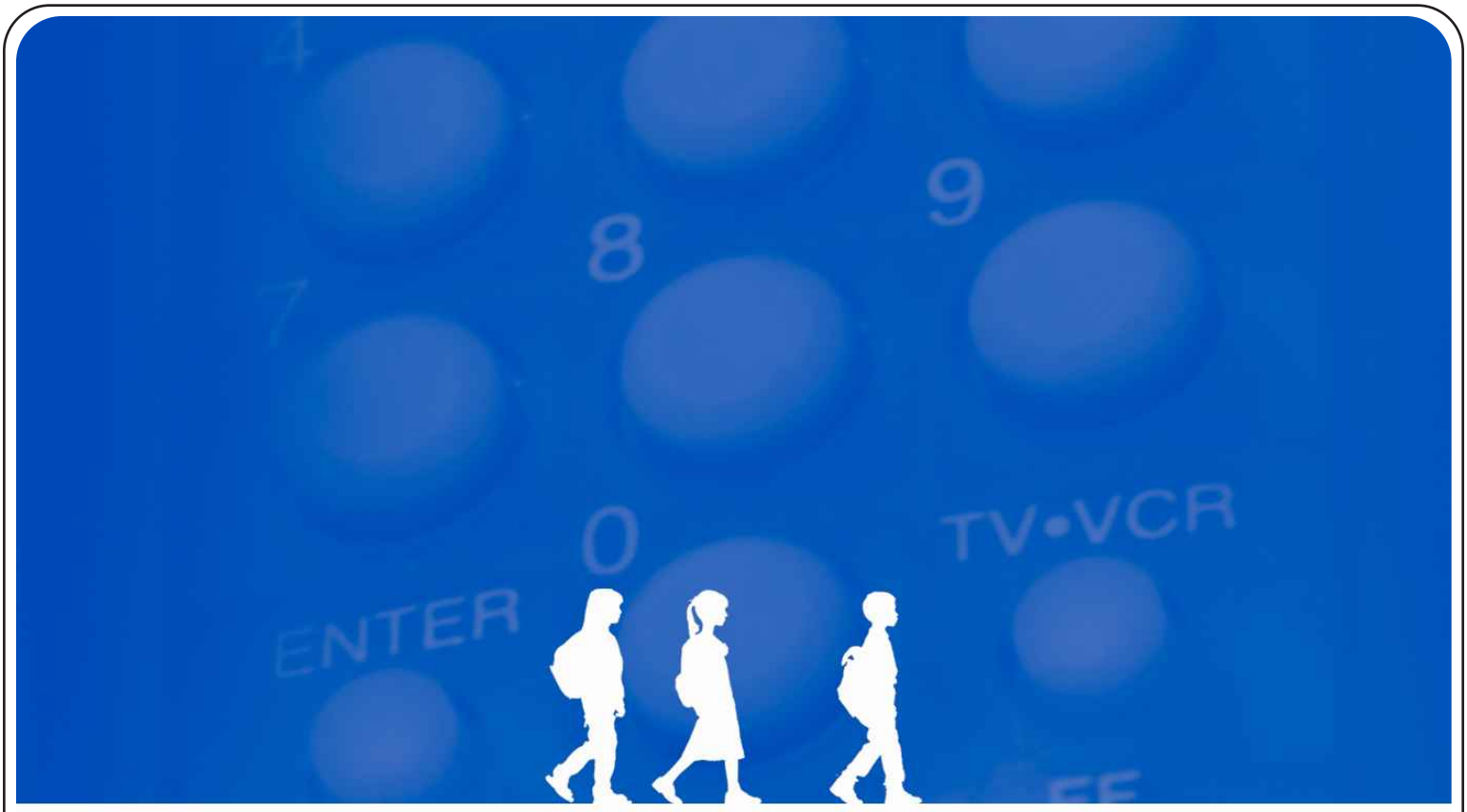

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