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Children and Computers: New Technology–Old Concerns

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Abstract

Computer technology has ushered in a new era of mass media, bringing with it great promise and great concerns about the effect on children's development and well-being. Although we tend to see these issues as being new, similar promises and concerns have accompanied each new wave of media technology throughout the past century: films in the early 1900s, radio in the 1920s, and television in the 1940s. With the introduction of each of these technologies, proponents touted the educational benefits for children, while opponents voiced fears about exposure to inappropriate commercial, sexual, and violent content.

This article places current studies on children and computers in a historical context, noting the recurrent themes and patterns in media research during the twentieth century. Initial research concerning each innovation has tended to focus on issues of access and the amount of time children were spending with the new medium. As use of the technology became more prevalent, research shifted to issues related to content and its effects on children. Current research on children's use of computers is again following this pattern. But the increased level of interactivity now possible with computer games and with the communication features of the Internet has heightened both the promise of greatly enriched learning and the concerns related to increased risk of harm. As a result, research on the effects of exposure to various types of content has taken on a new sense of urgency. The authors conclude that to help inform and sustain the creation of more quality content for children, further research is needed on the effects of media on children, and new partnerships must be forged between industry, academia, and advocacy groups.

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With the introduction of each new wave of innovation in mass media throughout the twentieth century—film, radio, television—debates on the effects of new technology have recurred, especially with regard to the effect on young people.[1] Each new media technology brought with it great promise for social and educational benefits, and great concern for children's exposure to inappropriate and harmful content.

The wired computer provides today's new mass media—and computer games, CD-ROMs, and the Web are the focus of today's media debates. Sixty percent of American homes with children ages 8 to 17 have computers, and most of these computers are connected to the Internet.[2] Supporters of computer technology point to the social and educational benefits of interactivity, while others warn of its potential harms. Concerns about children's use of computers are being raised in the press, by parents, and increasingly, in public policy forums. In many ways, these debates echo those surrounding the introduction of other new media throughout the past century.

This article places the current controversy and research on children and computers in a historical context. As a new era of research on children's use of computers begins, a look back at public controversy and research studies documenting the effects of older media is useful both to point out where we have been, and to determine how we might proceed in the future.[1] The first section describes the debates surrounding the introduction of earlier media, noting the similar promises and objections and trends in research that have emerged each time. The second section provides a more detailed discussion of how the controversy and research surrounding the introduction of computer technology and new media reflect these same themes. The article concludes with a few brief observations about directions for the future.

Early Media: Recurrent Patterns in Controversy and Research

Debates surrounding the introduction of earlier media have highlighted the novel attributes of each technology, but the promises and concerns have been fundamentally similar. In general, proponents of media innovation argue that the new technology benefits children by opening up new worlds to them, while opponents argue that new media might be used to substitute for real life in learning ethical principles, undermining children's morality and causing them to engage in illicit sexual and criminal behavior.[3] Research on children and media also has followed a recurrent pattern, reflecting the shifting focus of public concerns. In each case, initial studies have tended to examine which demographic groups of children were gaining access most quickly, how much time they spent with the new technology, and their preferences for different genres or types of use. Then, as the technology became more pervasive, research has tended to shift toward a greater emphasis on how the content of media exposure may be affecting children.[1] In fact, the overwhelming similarity in the research studies from epoch to epoch—across movies, radio, and television—is quite striking.

Children and Movies

When films were first introduced into American society in the early 1900s, proponents described them not only as a form of entertainment, but as "a means for education, a business, an adjunct to the stage, a resource for religion, and a great new social force."[4] Through film, they argued, people could see for themselves "the majestic tumult of Niagara . . . a locomotive with rods and wheels in full swing of motion . . . and the animated presence of far-off peoples."[5] Meanwhile, opponents soon labeled movies as immoral for exposing children to scenes of violence and debauchery. They argued that movies were the cause of crime, delinquency, and sexual misconduct among teens.[3]

Early studies about children and the movies cataloged their attendance and the type of pictures that appealed to them.[1] One noted study conducted in 1929 documented in great detail the moviegoing habits of 10,052 children in the Chicago area. The study's author found that nearly all the children attended the movies and that they were often exposed to screen experiences far beyond their years.[6] Concerns over movie

content soon gave rise to calls for censorship and for restricting the distribution of films that might "corrupt the morals of children or adults or incite to crime."[7] By 1931, some 40 national religious and educational groups had adopted resolutions calling for federal regulation of motion pictures.[3] The film industry responded by embarking on a public relations campaign promising better pictures and admonishing parents to supervise their children's trips to the movie theater.

Alice M. Mitchell, about the movies, 1929:

"The sweetness, the hopefulness, the joyousness, the crude, the morbid, the grotesque of life are mixed in a huge bowl, sometimes not proportioned to reality but convincing, nevertheless, and tasty. Youth does not know the difference. Youth, because of youth, does not have the wisdom of years to weigh the real with the unreal, the usual with the occasional. To him, it is all life. And if it does not fit within his own life, then his life is not real."

During the 1930s, the research community shifted its focus to studies on the effects of film on children. The 1933 Payne Fund studies—12 volumes of research conducted by the most prominent psychologists, sociologists, and educators of the time—provided a detailed look at the effects of film on such diverse topics as sleep patterns, knowledge about foreign cultures, attitudes about violence, and delinquent behavior.[8] For the most part, these studies concluded that a film would affect individual children differently depending on the child's age, sex, predispositions, perceptions, social environment, past experiences, and parental influences.

Children and Radio

As with movies, the introduction of broadcast radio in the 1920s was accompanied by proponents' promises of a vast potential to bring a variety of information and entertainment into homes, schools, and churches, ending isolation and unifying the nation.[3] Yet opponents feared that radio would undermine activities such as reading and going to church, and they expressed concerns about advertising and poor program quality. Newspapers reported parents' complaints about children gulping their meals so as not to miss a favorite radio show and waking with nightmares from listening to "lurid radio bedtime stories."[9]

Azriel L. Eisenberg, about radio, 1936:

"The popularity of this new pastime among children has increased rapidly . . . This new invader of the privacy of the home has brought many a disturbing influence in its wake. Parents have become aware of a puzzling change in the behavior patterns of their children. They are bewildered by a host of new problems, and find themselves unprepared, frightened, resentful, helpless. They cannot lock out this intruder because it has gained an invincible hold of their children."

Unlike the movie industry, radio was regulated from the beginning by the federal government, which granted licenses to broadcasters and assigned frequencies. And radio avoided the kind of sex themes that had brought about frequent calls for censorship of movies.[3] Nevertheless, during the 1930s and 1940s, radio was attacked for its treatment of crime and violence, particularly in children's programs, and was charged with contributing to juvenile delinquency, providing youngsters with both method and inspiration for criminal acts. Complaints about the quality of radio programming for children resulted in parent letter-writing campaigns to program sponsors. During the 1940s, the networks responded by suspending programs that were most objectionable, and the National Association of Broadcasters promised to air such children's classics as *Treasure Island, Robin Hood,* and *The Wizard of Oz.*[9]

The earliest studies of radio once again examined children's listening habits and preferences. For example, an early review of research on children's radio-listening habits documented age differences in children's attraction to and preferences for certain radio programs.[10] Later radio studies in the 1940s examined a wide range of effects on children, including their emotional reactions, ability to distinguish between reality and fantasy, school performance, and responses to advertising as reflected by their product requests. These studies revealed that the effects of media use could be powerful, but that other factors, such as the child's developmental level and family circumstances, could modify the impact.[11]

Children and Television

Television emerged as a mass medium in 1948, and speculation about its impact on

other amusements, business, social life, education, health, and society's institutions and values soon became a national pastime.[3] Proponents once again touted the potential to bring not only sound, but a wide range of images into the home—from opera, theater, and sports, to political events, educational talks, and demonstrations. Television was described as "the biggest classroom the world has ever seen."[12] At the same time, questions were raised about how it would affect children: Would it debase their tastes? Distort their values? Teach violence and crime? Cause withdrawn and addictive behavior?[13]

Opponents voiced concerns about how television might hurt radio, conversation, reading, and the patterns of family living and result in the further vulgarization of American culture.[3] Similar to concerns about previous media technology, accusations that television was a prime mover in juvenile misconduct and delinquency soon followed. Detractors to the new technology charged that crime and violence were television's mainstays and children its victims. Even if not harmful, the quality of television entertainment was described as plodding and dull, its culture nonexistent, its service to religion and education negligible, and its influence on politics damaging.[14,15]

Wilbur Schramm, et al., about television, 1961:

"It brought the world to everyone's living room, but most particularly it gave children an earlier look at far places and adult behavior. It became the greatest and loudest salesman of goods, and sent children clamoring to their parents for box tops. It created heroes and villains, fads, fashions, and stereotypes, and nowhere so successfully, apparently, as with the pliable minds of children."

The television literature, as with earlier media literature, began with studies of children's use of the medium and preference for different types of programming, but soon turned to questions of impact.[1] As early as 1955, Congress was holding hearings on the effects of televised crime and violence on juvenile delinquency, and by the 1970s, several initiatives had been introduced to change the nature of children's programming and severely restrict the amount and type of television advertising directed to children.[16] The broadcast industry and network producers responded, for the most part, by resisting regulation and discounting the idea that television viewing caused negative behavior.[17] Meanwhile, the research community responded with an avalanche of studies examining the effects of program content on children's attitudes, values, and behavior. Reaching a peak in the late 1970s, these studies most often focused on evaluations of the relationship between televised violence and children's aggression.

In 1980, Boys Town published an exhaustive review of nearly 3,000 studies of television's impact on children conducted over the previous 25 years, concluding that television can exert a powerful influence independent of the particular content portrayed on the screen.[16] The simple availability of television was associated with delayed development in a child's verbal skills and in the amount of effort applied to academic tasks. In addition, however, the viewing of particular content was linked to more specific effects. For example, some studies indicated that children who viewed more cartoons and action-oriented programming were more impulsive and less analytic in their cognitive tempo and style (that is, how they processed information), whereas children who viewed other types of programming improved their cognitive skills and academic performance. The review directed several recommendations to researchers, broadcasters, and legislators, but pointed to parents as having an important role to play and a vital stake in the outcome, and developed a separate publication summarizing the study's findings for parents in particular.

In sum, controversy and research on each previous wave of new technology—from movies to radio to television—focused initially on children's time spent using the new medium, followed by assessments of how use of the new medium affected children's knowledge of the world, attitudes, values, and moral conduct. In addition, for the most part, society has relied on parents as the primary gatekeepers for safeguarding children from media's potentially harmful effects. In the following section, a more detailed discussion is provided of how these recurrent themes are manifesting, once again, with the advent of computer technology.

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New Media: Interactivity Accentuates Similar Promises and Concerns

Current debates surrounding the emergence of computer technology and new media echo the promises and concerns of the past. In a recent survey of more than 1,000 parents in households with at least one working computer and at least one child between ages 8 to 17, some 70% of parents said the Internet is a place for children to discover "fascinating, useful things," while more than 75% were concerned that their children might give out personal information or view sexually explicit images on the Internet.[2] Much as television critic Robert Lewis Shayon referred to television as the "New Pied Piper" in a series of newspaper articles in 1952, public commentaries in the 1980s gave voice to concerns that children were becoming "addicted" to interactive computer products.[18]

Following the pattern of earlier media research, initial studies about children and computers have centered on how much time children are spending with computers, their preferences for types of use, and the impact on other activities and playtime.[19] And similarly, over time, the debate has shifted away from effects on children's use of time and preferences to issues of content. The interactive nature of new media offers the potential for enhanced socialization and learning for children, but also heightens the risk of exposure to inappropriate content. The promise of and concerns with children's use of computer technology, rooted in the history of media research, are explored further below.

The Promise of New Media as an Agent of Socialization and Learning

In today's society, children are exposed to media from a very young age. Even with respect to computer technology, surveys have found that children between ages two and five are using the computer for an average of 27 minutes per day.[20] In addition, children begin demonstrating program and content preferences very early, almost as soon as they are exposed to media, although these preferences change over time as children grow older.[21]

Studies of media effects on children must be grounded in an understanding of the dramatic development that occurs during childhood, encompassing phenomenal biological, physiological, psychological, and social growth. By about age 12, children have acquired the major life skills of walking, talking, reading, caring for themselves, and understanding the world around them. Research has shown that media—along with

family, peers, and school—can be a major agent of socialization and learning during this time, but that it is through a convergence of a child's developmental level and preferences, media content, and surrounding circumstances that the effects of media unfold.

Media Use and Social Development

Social development is the process by which children develop role-taking skills, learn to comprehend the motivations and consequences of behaviors, and come to understand human relationships in the social world.[21] Major markers in a child's social development include the ability to see perspectives other than one's own, make moral judgments, and demonstrate a command of basic social skills. By the age of about seven, a child's interactions with family, peers, school, community networks, and media all play an important role in the development of interpersonal skills and social competence.[22]

Clearly, e-mail and chat rooms have changed how young people communicate with each other, and computer and video games are a source of conversation and interaction among many children today.

Research on earlier media suggests that the impact of media on a child's social development depends on all of these factors. For example, a landmark study examining the links between movies, delinquency, and crime, published in 1933, concluded that motion pictures could play an important role in developing conceptions of life and transmitting patterns of conduct, but that the nature and direction of the effects on children's behavior were determined by two conditions: (1) the diversity and wide range of themes depicted on the screen; and (2) the social environment, attitudes, and interests of the boys and girls studied.[23] About 30 years later, a similar conclusion was reached in a widely noted study on the effects of television—that the relationship is always between a kind of television and a kind of child in a kind of situation. When children have unsatisfactory relationships with their family members or peer groups, they are more likely to retreat to television and to fantasize about what they see. Children who come to television full of aggression tend to seek out violence in television, and to remember and resurrect the violence later in real life.

Similarly, the research being conducted today indicates that computer use can contribute to a child's self-perception and affect a child's socialization in a variety of ways in school and at home. In the school environment, shared computers often have been found to lead to group interaction and cooperation rather than social isolation.[24] Young children's social interactions in a computer center were found to resemble their interactions in other play areas, and various studies have shown that computers can facilitate social interaction and cooperation, friendship formation, and constructive group play.[25]

The role of computers in fostering social relationships is further supported by observations that children usually turn to each other, rather than to an adult, for computing advice, even if an adult is available.[26] In settings such as computer camps and clubs, children exchange ideas, swap software and games, and build relationships. Studies have shown that computer expertise gained at such camps helps children gain social status among their peers[27] and enhance their self-esteem, especially among those who are not as successful in regular classroom settings.[25]

In the home setting, placement of the computer may play a somewhat stronger role in determining with whom the child uses technology. In a qualitative study of 70 families with home computers, more than half of the families placed the computer in an individual's bedroom or study rather than in a common family area, which might indicate computer use would be socially isolating.[28] However, the type of activities a child engages in when using the computer is also important. Some studies have indicated that home Internet use may result in increased loneliness and depression, but the research in this area is ambiguous.[29] Clearly, e-mail and chat rooms have changed how young people communicate with each other, and computer and video games are a source of conversation and interaction among many children today.

Media Use and Cognitive Development

As children's interest, understanding, and use of media messages develops, so do their cognitive and logical thinking abilities. Research on children's learning shows that the extent of interactivity involved in an experience with media may affect the learning process. Interactivity is a natural element of face-to-face conversation, but it is also an element of communication via media. Because new media involves much greater potential for interactivity compared with earlier media, it also holds more promise for enriched learning experiences. (See the articles by Roschelle and colleagues and by Subrahmanyam and colleagues in this journal issue.)

Responsiveness and engagement are key elements of interactivity, which has been defined as the exchange of ideas and thoughts that build on previous statements within a given context.[30] In earlier media contexts (film, radio, and television), one message is conveyed to many audience members. Yet even in these contexts, children—including very young children—have been found to respond.[31] For example, one study found that babies as young as 6 to 12 months visually and vocally responded to television an average of one to two hours per day.[32] Another study found that toddlers ages 18 to 24 months sang along with songs, pointed out characters and animals they knew, and generally showed involvement with and active processing of a television program.[33] Moreover, responsive behaviors have become an integral part of many educational and entertainment programs, with characters asking questions of their young audience members and then pausing to wait for the child to respond, or talking into the camera as if speaking directly to the viewer.[34]

Compared with new media, earlier media forms are quite limited in their responsiveness, however. In earlier media, the character generally provides a staged response that cannot build on exchanges with the media user. Such a response cannot be labeled as true interactivity. Seymour Papert, a noted expert in the field of computers and learning, has suggested that earlier media, whether educational or not, still puts the child in a passive mode, a situation of seeing or hearing rather than doing.[35] In contrast, computers can be programmed to respond to previous exchanges and give the user more control over the context of the exchange. And in turn, children have been found to be more responsive to computers than to earlier media, such as television. In a review of research on young children and computers, for example, one scholar reported that computer use produced far more active, positive, and emotionally varied facial expressions, and more vocalizations and smiling, compared with children's reactions when viewing television.[36]

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Children are drawn to computer technology that enables—even demands—more active engagement. Across the range of software programs,[37] studies indicate that children generally prefer more participatory forms of computer-assisted instruction.[30] Even young children (birth to age eight) prefer programs that are animated and oriented toward problem solving and that give them a sense of control.[26] The limited

research that examines various educational and "edutainment" software applications indicates that the nature of a computing experience can have an impact on a child's learning and sense of self-worth and that computers can give a child an opportunity to develop mastery over technology and be more self-directed.[38]

In addition, studies suggest that strong educational benefits can result from the use of quality interactive software.[39] Compared with more passive drill-and-practice software, more interactive software has been found to result in a higher degree of skill mastery and greater cooperation among users.[40] Children's software for computer programming (using child-friendly languages such as Logo), for example, can increase problem-solving abilities among kindergartners and increase young children's ability to monitor their own comprehension.[26] Moreover, use of computers to actively engage students in learning higher-order thinking skills has been linked to greater academic achievement in mathematics among fourth and eighth graders.[41] (See the articles by Becker and by Roschelle and colleagues in this journal issue for further discussion of this topic.)

One study that examined 668 news stories presented the Internet as a Jekyll-and-Hyde phenomenon: "Your children need the Internet. But if they do go online, be terrified."

The Concerns with New Media and Exposure to Inappropriate Content

As discussed earlier, exposure to inappropriate content—advertising, sex, and violence—are concerns that have been raised with each wave of new technology. With the advent of new media, however, such concerns have been renewed and heightened because of the level of interactivity possible when playing computer games and using the communication features of the Internet. Remedies focused on parents as the gatekeepers for safeguarding children from potential harm may not be sufficient. Therefore, in addition to providing support for parents, various groups are working to improve the quality of media content for children.

Public debate in the early 1990s focused on the potential harm of violent and sexually explicit computer games, leading to an industry ratings system beginning in 1994.[42,43] By the mid-1990s, public concern turned to the Internet and online environments, focusing on two key issues: (1) the possibility that children might interact with strangers and meet online pedophiles; and (2) the possibility that children might access objectionable content, including sex, violence, and hate sites.[44] One study examined 668 news stories about children and the Internet from 12 newspapers between October 1997 and October 1998 and found very mixed messages in reports about children online.[2] The stories presented the Internet as a Jekyll-and-Hyde phenomenon: "Your children need the Internet. But if they do go online, be terrified."[45] Although about half the articles mentioned positive aspects of Internet use for children, one-quarter featured sex crimes committed via the Internet, and two-thirds talked about problems such as pornography, pedophilia, and invasion of privacy.

As with previous waves of media technology, the challenge of dealing with children's use of the Internet has been largely left up to parents and children themselves, with little community help. Monitoring, using filters, and looking for safe and appropriate Web sites are all personal and private solutions by which parents can ward off the potentially harmful effects of their children's Internet use. To help parents concerned with their children's use of the Internet, various government and nonprofit groups now provide resources, both in print and online, with tips on how to use the Internet safely and productively.[46]

At the same time, several studies document that children, and young children especially, have difficulty differentiating reality from fantasy and regular programming from advertising.[47] Most children, and indeed many adults, have difficulty understanding the complex relationship between programming, advertising, and the basic economic structures underlying broadcast media. Media literacy campaigns, begun in

response to television advertising, have sought to strengthen children's awareness and understanding of the commercial interests underlying much of the content found on the Web. With training, children as young as five years old can become more critical media consumers, but the ability to comprehend media content and discern underlying messages and motives evolves slowly. In general, the burden of protecting children from exposure to harmful content continues to fall to parents.

Reminiscent of advocacy efforts with previous media, several groups have initiated efforts to combat the growing commercialism underlying children's media. The Center for Media Education, for example, has focused attention on advertising on the Internet and its implications for children today. Whereas advertising practices directed to children on television are regulated, no such regulations exist regarding Internet advertising (see the article by Montgomery in this journal issue). Other organizations such as the Children's Advertising Review Unit of the Council of Better Business Bureaus developed self-regulatory policies to promote responsible children's advertising.[48] Together, groups like these have been providing research on children's advertising and advancing the conversation on these issues to help create national policies for Internet advertising.

In addition, efforts to improve the quality of media content for children are being renewed—this time with attempts to build new partnerships between industry, researchers, and advocates. In July 2000, for example, a roundtable of media and high-technology executives, child advocates, academics, and federal government officials convened to rally support for developing quality, diverse, educational, and accessible content for children on the Internet, in computer games, and on digital television.[49] (See Box 1 for a summary of the criteria for developing quality children's content discussed at the conference.) Conference participants concluded that new incentives and a new research agenda may be needed to sustain the development of quality content for children.

In sum, the introduction of computer technology into children's lives parallels the introduction of previous waves of new media technology throughout the past century, and many lessons can be learned from the history of media research about the effects of computers on children. But the "interactivity" that is the hallmark of children's use of new media enables both greatly enriched learning as well as increased risk of harm. Thus, new computer technology also brings a greater sense of urgency about the need to monitor and improve the quality of media content.

A View Toward the Future

Children's actual experiences with previous media often have fallen short of the early visions of the promise of the technology when first introduced, and quality-of-content issues that have been raised across all media persist today. To help ensure that this latest wave of media technology is developed in ways that best serve the needs of children, further research is needed to examine the effects of children's media use, especially in out-of-school environments, and to help inform the creation of better-quality content. Better specification of the concept of "interactivity," for example, would enable content developers to create more targeted programming to support cognitive growth and learning for children of different ages.

We must challenge society to create cultural products that are entertaining as well as educationally beneficial, and to do so without further commercialization of our children.

In addition, efforts to improve content must address the structure of the media industry and the larger institutional arrangements that have given rise to the media culture in the United States—issues that have been largely ignored in the past.[50] The content of media is not likely to change unless the underlying economic incentives for producing media are addressed. To this end, new partnerships between academics, content providers, and government are needed to create new incentives for developing higher-quality media that builds on what has been learned about media effects on children. We must challenge society to create

Box 1

Criteria to Consider When Creating New Media Content for Children

DIVERSITY

- Is the content relevant to children from different racial groups?
- Does the content provide strong female role models?
- Does the content create or exploit stereotypes—ethnic, racial, or gender?

ACCESSIBILITY

- Does the technology take into account accessibility for children with special needs?

INTERACTIVITY

- Is the best medium used for this content (or would it be better used in a different way—as a book, magazine, radio or television show, CD-ROM, Web site)?
- Does it use its interactive potential to the best effect?
- Does it help to create a community of young people?
- Does it give children unique access to information, ideas, or people?
- Does the interactivity give children real choices, integral to the content and with real results or consequences?
- Does the child have an opportunity to create something?

EDUCATION

- Is the content educational or informational?
- Do the providers of this content seem to know their target audience and offer content appropriate for children of that age?

VALUE

- Is it fun?
- Is it engaging to children, so they will want to explore further?
- Does the content have something to tell, instead of just something to sell?

ARTISTRY

- Is the content's art design of the high quality that adults would expect?
- Do the design elements support the information or play value (as opposed to distracting or overwhelming it)?
- (For Web sites) Is the interface quickly understandable, so children can navigate it alone?

SAFETY

- (For Web sites) Are children asked for personal information, other than what is integral to use of the site? Is the site self-contained? If not, does it offer links only to carefully chosen, child-safe sites?
- Does the content employ gratuitous violence or sexual content?

Source: Children Now Web site (http://www.childrennow.org). Adapted from *Criteria for Online Excellence*, developed by David Kleeman, executive director, American Center for Children and Media, and Carla Seal Wanner, founder, @ccess 4 @ll.

cultural products that are entertaining as well as educationally beneficial, and to do so without further commercialization of our children. If we produce the very best content possible, perhaps we can move closer to harnessing the potential of new media to enhance children's emotional and cognitive lives in wonderful new ways.

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34. Program characters that use these techniques include Mr. Rogers in *Mr. Rogers' Neighborhood* (since the 1960s), Steve in *Blue's Clues* (the 1990s), *The Wonder Years* (the 1980s), and *Malcolm in the Middle* (2000).

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36. See note no. 26, Clements; Hyson, M.C. Emotions and the microcomputer: An exploratory study of young children's responses. *Computers in Human Behavior* (1985) 1:143–52.

37. Bangert-Drowns, R.L. The word processor as an instructional tool: A meta-analysis of word processing in writing instruction. *Review of Educational Research* (1993) 63:69–93. Bangert-Drowns describes software along a continuum involving the passivity or activity of the program. Active programs are tools that help users to accomplish goals and involve input from users to express their thoughts and ideas. Examples include Logo, HyperStudio, or Kid Pix—any type of software that the child uses as a tool to express ideas. Conversely, passive programs are those in which the child has little control and follows a specific set of preprogrammed instructions. Some examples of this type of software include drill-and-practice software and software designed for academic achievement testing.

38. See note no. 35, Papert, p. 5.

39. See note no. 18, Levin, pp. 50–51.

40. See note no. 30, Rafaeli; see also Borgh, K., and Dickson, W.P. Two preschoolers sharing one microcomputer: Creating prosocial behavior with hardware and software. In *Young children and microcomputers.* P.F. Campbell and G.G. Fein, eds. Englewood Cliffs, NJ: Prentice Hall, 1986, pp. 37–44.

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44. Furger, R. Fun, safe trips down the info highway. *PC World.* September 1995, p. 400; Teach your children well. *U.S. News and World Report.* January 23, 1995, p. 60; Peyser, M. Don't "chat" to strangers. *Newsweek.* June 19, 1995, p. 42; Okrent, D. Raising kids online: What can parents do? *Time.* May 10, 1999, p. 42. See also Hughes, D.R., and Campbell, P.T. *Kids online: Protecting*

your children in cyberspace. Grand Rapids, MI: Fleming H. Revell, 1998, which lists six areas as risks for children's online activities: (1) distribution of pornography, (2) sexual predators, (3) misinformation and hidden messages, (4) loss of privacy, (5) unscrupulous vendors, and (6) development of childhood behavior disorders, including social isolation and Internet Addiction Disorder. Further support for these concerns can be found in focus groups conducted with parents. See, for example, Strover, S., Wartella, E., Stout, P., et al. Children and the Internet: Parental concerns and Internet site data. Presentation to a meeting of the Federal Trade Commission's public workshop on consumer information policy. Washington, DC, June 10–13, 1997.

45. See note no. 2, Turow, p. 34.
46. See, for example, the Web sites of parent resources provided by the U.S. Department of Education at http://www.ed.gov/pubs/parents/internet; The Children's Partnership at http://www.childrenspartnership.org; and Children Now at http://www.childrennow.org.
47. Wartella, E. *Children and television: The development of the child's understanding of the medium*. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, 1979.
48. Such policies include the following: (1) Advertisers should encourage the child to use an alias (for example, "Bookworm" or "Skater"), first name, nickname, initials, or other alternative to full names or screen names that correspond with an e-mail address for any activities that will involve public posting. (2) If information is collected from children through passive means (for example, navigational tracking tools, browser files), this should be disclosed to the child and the parent along with what information is being collected. Available online at http://www.bbb.org/advertising/caruguid.asp#media, 2000.
49. The conference, titled "Supporting Children in the Digital Village: A New Media Industry Roundtable," was convened in Stanford, CA, on July 5, 2000. For more information about the conference, see the Children Now Web site at http://www.childrennow.org.
50. See note no. 1, Wartella and Reeves, pp. 128–29.