CHAPTER 2

Children and the Internet

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INTRODUCTION

The Internet is a vast virtual environment. Children can access a wealth of information on subjects ranging from acne to zebras. They can communicate with others from around the world, sharing their experiences and interests while breaking down cultural barriers. They can listen to music from around the world, watch awardwinning public service announcements, and play games that test their skill and coordination. Children can also access pornography, hate, and terrorism. In addition, children are vulnerable to sexual solicitation and predation and cyberbullying and harassment. How do we help them access the cognitively and culturally enhancing aspects of the Internet while, at the same time, protecting them from the dark side of the Internet?

Although the news media is quick to report on any situations where children are adversely affected by the Internet, we are only beginning to learn about children's use of the Internet, their exposure to unwanted or undesirable resources, and how these exposures affect their development. We need a principled approach to understanding this new environment and children's dynamic interactions with it. Critics of the Internet claim that children's social development is arrested through interactions with the Internet, that children are victimized by unwanted exposure to pornography and hate, and that they are easy targets for sexual predators and cyber-bullies. Although the most dire predictions of critics of the Internet have not been borne out by the research literature, there are risks for children online. Just as we empower our children with shrewd awareness of the possible dangers around

them as they explore the physical environment, we need to empower them with critical appraisal of information and opportunities they encounter as they explore the virtual environment of the Internet.

WHAT ARE CHILDREN DOING ON THE INTERNET?

The vast majority of children in the United States and Canada have accessed the Internet; over 95% had been online by 2003 (Kaiser Family Foundation, 2004; Environics Research Group, 2001) and close to 75% had Internet access in their homes (Kaiser Family Foundation, 2004; Statistics Canada, 2003). Internet use is comparable or slightly lower in other developed countries (e.g., Livingstone and Bober, 2005; Nielsen ratings). Many children access the Internet at least once a week from school, home, or libraries; surveys from the past few years indicate that up to one-half of children spend more than one hour on the Internet per day (Environics Research Group, 2001; Roberts *et al.*, 2005).

Moreover, children access the Internet from a very early age. In a 2001 Canadian survey for the Media Awareness Network (Environics Research Group, 2001), 15% of youth under the age of 18 years recalled learning to use the Internet at 7 years of age or younger. In a 2003 United States survey of parents, Rideout *et al.* (2003; see also Calvert *et al.*, 2005) found that children started looking for Web sites without parental supervision at 4 years of age and sent an e-mail by themselves as early as 3 years of age. Clearly, children are immersed in the Internet environment in increasing numbers for increasing lengths of time.

Children mainly access the Internet through the World Wide Web. Children use the Web to access information resources through Web searches and browsing preferred Web sites; communicate using e-mail, instant messaging, and discussion; and access music, video, and computer games (Environics Research Group, 2001; Rideout *et al.*, 2003; Roberts *et al.*, 2005). Children as young as second grade have an e-mail address through their classrooms. These e-mail accounts are used as part of the language arts curriculum for developing reading and writing skills and as part of the social studies curriculum for communication with children from other cultures. Young children may also have an e-mail account to communicate with family members. Children also use instant messaging to communicate with friends, often in parallel with playing computer games or doing homework (Shiu & Lenhart, 2004). Children most often surf the Web for games and music but they also search for information for school reports and personal interest (Environics Research Group, 2001; Lenhart *et al.*, 2001).

Specialized children's Internet resources have become increasingly popular—among parents and educators, at least—and are marketed as providing children with safe and secure access to the Internet. For example, although many children use

Hotmail (http://hotmail.com) or Yahoo (http://mail.yahoo.com) accounts available to everyone, specialized children's e-mail services such as KidMail (http://kidmail.net) and Surf Buddies (http://www.surfbuddies.com) provide spam-free, secure e-mail for a small fee. These resources allow parents to limit children's e-mail contacts and the programs automatically filter out questionable content and spam. Almost all other e-mail services allow setup of filters but these childsafe resources appeal to parents who do not feel confident modifying program preferences and options.

Child versions of search programs have also become popular. Yahooligans (http://yahooligans.com) and Ask Jeeves for Kids (http://www.ajkids.com/) are search directories designed specifically for children. All resources that can be searched or browsed from the home pages have been verified as appropriate for children by a team of educational consultants. These directories are quite limited, however, and don't include information on many topics children might be investigating for school or personal interest, such as specialized information on dinosaurs found in Canada or adoption resources for searching for biological parents.

Many entertainment resources have been developed specifically for children. A number of media companies, such as the Public Broadcasting Corporation (http://pbskids.org/), Warner Brothers (e.g., http://harrypotter.com), and Scholastic (e.g., http://scholastic.com/kids/) have developed information and game resources for their child audiences. Most of these resources are completely self-contained and contain no off-site links; those that do include off-site links provide a warning before the child clicks to an off-site link.

Finally, children's Internet access can be controlled through the use of filtering programs, such as Net Nanny (http://netnanny.com/) or Cyber Sitter (http://www.cybersitter.com/), and children's browsers, such as zExplorer (http://www.zxplorer.com/). These commercial programs limit children's access to the Internet, filtering spam, advertising, and content determined inappropriate for children. Because it is difficult to define spam and inappropriate content, these programs necessarily provide very restrictive access to the Internet.

Although these child-oriented Internet resources are increasing in number and popularity, given the unorganized and unregulated nature of the Internet, they are not foolproof and children may still be exposed inadvertently to objectionable content. Also, most of these resources are overly restrictive; for example, because of "adult" content of some encyclopedia articles, children are unable to access such ubiquitous resources as the World Book Encyclopedia through many of the resources. Finally, and possibly most importantly, by passively limiting children's access to possibly unseemly information and resources on the Internet, children may not learn to actively appraise and evaluate Internet information.

CONCERNS

Historically, parents, teachers, policymakers, and the press have been concerned about the adverse effects of new media on children (Gackenbach & Ellerman, 1998; Paik, 2001; Wartella & Jennings, 2000). Movies, radio, and television were all seen initially as potentially harmful for children's development. Computers are seen as depriving children of important social and physical development opportunities. Critics warn that important social contact and physical activities are displaced by time spent socially isolated in front of a computer screen—these are much the same concerns that were expressed when televisions began to appear in living rooms. Because the Internet is freely accessible, critics are also concerned about children being exposed to issues they cannot comprehend or cope with, such as pornography and hate. Finally, given the anonymity of the Internet, critics are now becoming increasingly concerned about children being victimized by sexual predators and cyber-bullies.

SOCIAL DEVELOPMENT

Children develop a sense of who they are and how they fit into their family, school, and community. They learn to critically evaluate the characteristics that define themselves and they learn to control their behavior to adapt to society's norms and values. These aspects of social development require children to interact with others in order to differentiate themselves from others, compare characteristics that define themselves with those that define others, and develop self-control.

Critics have complained that computer use leads to social isolation, which often leads to depression and other mental disorders. Given that many children have access to the Internet in their bedrooms (Kaiser Family Foundation, 2004), this concern may be valid. There is some evidence to suggest a correlation between social isolation and depression and computer use. Kraut *et al.* (1998) reported results of a survey of first time Internet users as part of the HomeNet longitudinal study conducted 1995–1998 regarding the impact of the Internet on social interactions. These first-time Internet users reported a decline in social interaction and an increase in depressive symptoms over their first months of Internet use; in addition, the correlations between Internet use and isolation and depression measures were slightly higher for the adolescents in the sample than those for adults. These effects were short-lived, however; Kraut *et al.* (2002) followed the HomeNet participants over a longer period of time (three years as opposed to 12–18 months) and the negative effects of Internet use had disappeared. In a second study, Kraut *et al.* (2002) found that extroverted children and adults reported greater increases in social interaction and self-esteem as a function of increased use of the Internet.

Gross (2004) argued that, as more children use the Internet, more of their friends will as well, and the Internet will simply become one more form of communication and interaction.

Other research indicates that the Internet may have positive effects on social development. Stern (2002) analyzed teenage girls' personal Web sites. She found that the girls' self-expressions were consistent with theories of social development. Stern argued that the Internet provides an excellent opportunity for children to express themselves as they develop socially and sexually.

Several studies have examined the relationships between social well-being and Internet instant message use. Instant messaging is becoming the most common form of communication on the Internet (Environics Research Group, 2001; Ipsos-Reid, 2004; Law, 2004). In a study of the relationship between self-concept and instant messaging use, Law surveyed adolescents between the ages of 11 and 19 years and found no correlation between self-concept and instant messaging use. However, consistent with the statistics on increasing use of instant messaging, over three-quarters of Law's adolescent participants used instant messaging daily. Similarly, Gross (2004) surveyed adolescents aged 11 to 16 years and found no relationship between amount of time spent online and measures of loneliness, social anxiety, depression, or daily life satisfaction.

Gross *et al.* (2002) examined relationships between well-being and closeness of instant message partners in adolescents aged 11–13 years. Among adolescents who used instant messaging, those who reported feeling comfortable in their social interactions reported communicating primarily with school friends whereas adolescents who reported feeling socially isolated also communicated with people they did not know well. Ybarra *et al.* (2005) found that children aged 10–17 who reported significant depressive symptoms (e.g., experiencing functional impairments in school, personal hygiene, and/or self-efficacy) spent more time on the Internet at school and used e-mail more often for social communications than those reporting fewer or no depressive symptoms. Their sample came from a large United States study, the Youth Internet Safety Survey, conducted in 1999–2000 with children aged 10 to 17 years (Finkelhor *et al.*, 2000). Wolak *et al.* (2002, 2003), using the same sample as Ybarra *et al.*, found that children who reported depressive symptoms and having been victimized in some way had more close personal relationships with people they had met on the Internet than did children who were not as troubled. Rather than remaining socially isolated and alone, troubled and depressed children and adolescents appear to reach out to online friends.

Indeed, online communication may help children develop a sense of self in an anonymous and supportive environment. Turkle (1995) argued that multi-user dungeon games provide an important opportunity for people to experiment with different selves and, in so doing, refine their own self-concept. Subrahmanyam *et al.*

(2004) analyzed a 30-minute transcript from a teen chat room which included 52 different participants. Topics discussed in the time period included sports, sex, and parental concerns. The participants openly discussed their feelings and, when a participant expressed a personal concern, the others quickly supported the participant. Subrahmanyam *et al.* concluded that the Internet can provide a socially safe environment in which adolescents can discuss embarrassing topics and practice social relationships.

Suzuki and Calzo (2004) examined postings to teen general issues and sexuality discussion boards over a one-month period and found postings similar to those found by Subrahmanyam *et al.* (2004). Postings to the general board predominately dealt with romantic issues and posting to the sexuality board predominately considered sexual health. As well, topics dealing with personally relevant issues, such as body image and working out, received more viewings by others than did basic factual topics, such as pregnancy prevention. Suzuki and Calzo argued that the boards allowed the children to candidly discuss and receive social support for embarrassing adolescent issues. Other researchers have similarly argued that the Internet can be an important source of information and support for embarrassing or social taboo topics (Boies *et al.*, 2004; Gray *et al.* 2005; Longo *et al.*, 2002).

Greenfield (2004a), however, cautioned that free expression in chat rooms may not always be developmentally positive. She explored children's use of various forms of Internet communication (e.g., unmoderated and moderated chat, instant messaging) and identified many communications promoting sexual infidelity, racism, and prejudice. Although acknowledging that none of her concerns was unique to the Internet, she argued that the anonymity of the Internet may lead children to engage in more degrading communications and therefore amplify the potentially negative effects of such communications.

Taken together, and recognizing the cautions expressed by Greenfield (2004a), the research on social development and the Internet conducted to date indicates that, rather than leading children into social isolation and deprivation, the Internet can provide a *positive* environment for social development. Children continue their face-to-face relationships when separated, possibly in much the same way as they would on a telephone. Indeed, Internet technologies provide children with more opportunities for social interaction than possible with a telephone; children can simultaneously communicate with a large number of peers on a large number of topics through e-mail, chat, and instant messaging. Children who feel socially isolated in a face-to-face setting, are depressed, and/or lack self-confidence are able to communicate in a socially safe environment rather than keeping their concerns to themselves. Furthermore, children are able to "try out" different personal identities, discuss personal concerns, and obtain personally relevant information without embarrassment or disclosure.

UNWANTED EXPOSURE TO PORNOGRAPHY AND HATE

Very little research has been conducted on the effect on children of pornography and hate sites on the Internet. Pornography is prevalent throughout the Internet; pornographic images are available on millions of Web sites and through hundreds of thousands of Internet sources. While pornographic material is generally quite obvious and easily agreed upon, hate is more insidious; hate can be difficult to find and define.

Children access pornography in many ways, some intentional and many unintentional. Children can intentionally access pornography though Web searches (e.g., searching for *sex* on Google) or typing in possible URLs (e.g. http://www.sex.com). Children are much more likely to access pornography unintentionally, however. This may occur through innocent combinations of multiple meaning keyword searches (e.g. *boy toy*) and through techniques used by pornographic distributors to recruit new customers. Pornographic distributors may send spam e-mails with pornographic content or inviting recipients to access pornography. Many times, the invitation is innocuous, such as an invitation to compete for a laptop computer or learn about livestock. Pornographers also acquire or use common-sounding Web domain names (http://whitehouse.com used to be a hard core pornography site—the correct URL for the White House is http://whitehouse.gov). Pornographers also manipulate spelling of URLs to introduce children to pornography (several common misspellings of http://Disney.com once led to pornographic Web sites). More recently, pornographic distributors have invaded peer-to-peer transfers so that a child downloading the latest Britney Spears audio file from a less than reputable peer-to-peer network might receive a hardcore pornographic video instead. Although many of these techniques are no longer used—regulators have shut down many distributors of pornography and other distributors have developed fee-based Web sites and peer-to-peer Internet downloads—children still can inadvertently access pornography.

Mitchell *et al*. (2003a) analyzed data from the Youth Internet Safety Survey (Finkelhor *et al*., 2000). Phone interview questions included inadvertent access to pornography on a Web site, in e-mail, or instant message as well as whether the child was distressed by the exposure. One-quarter of interviewed children indicated they had been inadvertently exposed to pornography, 75% through a Web site and 25% through e-mail or instant messaging. Older children were more likely to have been inadvertently exposed to pornography than were younger children; however, the older children engaged in more Internet activities, including entering chat rooms and engaging in risky Internet behavior, such as chatting with people they had never met offline. Although a quarter of children who had experienced inadvertent exposure indicated they were very or extremely upset by the exposure (this represented 6% of the total survey

sample), very few mentioned the incident to anyone and few revisited the offending material. Although some children were distressed by their exposure, most children simply dismissed the pornographic material.

Children are exposed to sexuality in other media, including music videos, movies, magazines, and television. A large body of research does suggest a relationship for adolescents and young adults between viewing pornography and engaging in risky and/or deviant behavior (cf. Greenfield, 2004b) but this research is correlational in nature. No causal link has been firmly established to indicate that viewing pornography—on or off the Internet—has adverse consequences on children or adolescents. Ultimately, concerns about adverse consequences of inadvertent or purposeful exposure to pornography on the Internet may be simply an urban myth (Potter & Potter, 2001).

Hate, possibly because it is so insidious, is more difficult to understand and investigate. Gerstenfeld *et al.* (2003) conducted a content analysis of Internet sites hosted by white nationalist, neo-Nazi, skinheads, Ku Klux Klan, Christian identity, Holocaust denial, and other hate groups. Only one-half of the sites included identifiable hate symbols such as swastikas or burning crosses. One-quarter of these extremist sites claimed their group did not espouse hate or racism and over 80% either made no mention of violence or claimed they were opposed to violence. Many of these sites had contradictory language, such as denying racism but exclaiming Whites as the "only" race. Although few sites included resources for children (one notable exception is http://martinlutherking.org/, which is designed expressly for children), the lack of identifiable symbols as well as claims of nonracism and nonviolence or contradictory language regarding racism and violence may lead to confusion among children.

Although Turpin-Petrosino (2002) found that very few high school students reported contact with a hate group through the Internet, Gerstenfeld *et al.* (2003) argued that the Internet presence of these groups is too subtle for most children and adolescents to understand. This premise is supported by Lee and Leets' (2002) research on the persuasiveness of hate sites with adolescents. Adolescents, aged 13–17 years, viewed Web pages modified from actual extremist Web resources, then completed a survey immediately following viewing the pages and two weeks later to examine the persuasiveness of the different pages. In some conditions, the Web page was presented as a narrative, with characters and a plot. Other Web pages had less of a narrative structure. In some conditions, the pages concluded with an explicit message and, in others, with an implicit message. Web pages presenting information in narrative form with an implicit message were initially perceived by adolescents as very persuasive. However, the persuasiveness dissipated over time, while pages with low narrative content and explicit messages remained relatively stable over time. In addition, the adolescents' receptivity interacted with the persuasiveness of the messages. Young people who were originally neutral with regard to the views expressed by the Web pages were initially more influenced by the implicit messages.

Lee and Leets' findings regarding the persuasive effects of implicit messages on naïve adolescents are particularly important considering that extremist groups use the Internet for recruiting new members (Turpin-Petrosino, 2002). Young adolescents, because they are seeking an in-group with which to identify but lack important critical appraisal skills, may be particularly influenced by the recruitment strategies used by extremist groups on the Internet.

PREDATION AND BULLYING

Increasingly, news reports of children being lured into cars seem to be replaced by reports of children being lured on the Internet. Similarly, schoolyard bullying seems to be moving into the Internet. Just as parents historically became concerned as their children began to venture further and further from home, they now become concerned as their children venture further and further into the Internet environment.

Finkelhor *et al.* (2000; Mitchell *et al.,* 2001) analyzed questions on sexual solicitation from the 1999–2000 Youth Internet Safety Survey. Almost 20% of the respondents aged 10–17 reported receiving an unwanted sexual solicitation through e-mail or chat. Almost all of the solicitations came from someone encountered only on the Internet. Few of the solicitations were direct requests for face-to-face meetings; the solicitations included asking a girl about her bra size, asking a boy to engage in cybersex, and sending sexually explicit drawings.

Older children, aged 14–17 years, in the Finkelhor *et al.* (2000; Mitchell *et al.*, 2001) study reported solicitation more often than younger children, aged 10–13 years, and twice as many girls reported solicitation than boys. Risk for receiving sexual solicitation was higher for "troubled" children (based on a composite reporting of depressive symptoms, victimization, and family instability). Risk was also higher for children reporting more frequent use of the Internet and engaging in potentially risky behaviors on the Internet, such as posting personal information, using sexually suggestive aliases in chat rooms, talking about sex with someone met solely online, and visiting pornographic Web sites. The characteristics of troubled family and personal life and risky behavior that Mitchell *et al.* found in relation to Internet predation also characterize children and adolescents targeted by offline sexual predators (cf. Dombrowski *et al.*, 2004). Although the Internet can bring predators into easier contact with children, it does not necessarily alter the children who are targeted.

Finkelhor *et al.* (2000; Mitchell *et al.*, 2001) also found that controls such as parental rules and filtering software were not related to reports of sexual solicitation. These tools may also not be sufficient to guard against approaches used by predators to monitor a victim. Commonly, Internet predators use a variety of sophisticated techniques to gather information about and eavesdrop on a potential

victim (Dombrowski *et al.*, 2004; McGrath & Casey, 2002). At the technologically simplest level, a predator may search the Web for information about the victim, reading personal Web pages and blogs to gather personal information on the potential victim. Increasingly technologically advanced approaches include using "sniffer" software to eavesdrop on a child's communications and infiltrating the child's computer through Trojan and worm viruses. Thus, even if a child attends to and obeys a parent's rules not to give out personal information, an ingenious Internet predator may be able to obtain that information through nefarious and clandestine means.

Only one-half of the children who reported sexual solicitation in the Finkelhor *et al.* (2000, Mitchell *et al.*, 2001) study reported the incident to someone and only half of these were reported to a parent. In part, the lack of reporting could have been due to few children being concerned about the solicitation; only 25% of the children reported being upset about the solicitation and these were mainly the younger children in the study. Although organizations such as CyberTipline and Cybertip.ca did not exist at the time of the Youth Internet Safety Survey, few parents or children reported knowing they should report upsetting Internet episodes to their Internet Service Provider or to a law enforcement agency.

Recently, law enforcers have begun masquerading on the Internet as children to combat sexual solicitation crimes. Wolak *et al.* (2003a) analyzed arrests made in the United States during 2000–2001 for Internet sex crimes involving children and found 508 cases in which an alleged predator used the Internet to lure the child and a further 644 undercover cases in which an alleged predator used the Internet to lure a law enforcement agent posing as a child. Mitchell *et al.* (2005) investigated a sample of these arrests and found many were successfully prosecuted or led to a guilty plea. Although the characteristics of actual cases and undercover cases differed slightly (e.g., the victim was stated to be slightly younger, more contacts were made in sexually oriented chat rooms, and less time elapsed before the "meeting" in undercover as opposed to actual cases) as did the characteristics of the alleged predator (e.g., the alleged perpetrator was slightly older, more likely to be employed full time, and had a slightly higher mean income in undercover as opposed to actual cases), Mitchell *et al.* (2005) concluded that the Internet has improved the ability of law enforcement agencies to detect and prevent crimes against children.

Particularly because of its anonymous nature, Internet harassment can be psychologically devastating. In 2002, Ghyslain Raza, an overweight adolescent, used school equipment to videotape himself acting out a *Star Wars* scene with a golf ball retriever as an imaginary light saber. Several months later, some students found the tape in a locked cabinet and uploaded the recording to a peer-to-peer network and encouraged viewers to post insulting comments about the youth. In 2004, Gary Brolsma created a Flash video while lip-syncing and dancing in his chair in front of his Web cam and posted it on the Web.

Although he originally meant only to share it with his friends, the clip quickly spread across the Web and he became embarrassed and upset by the widespread media attention and comparisons with "the *Star Wars* kid." These events focused attention on cyber-bullying and harassment.

The Youth Internet Safety Survey also asked children about online harassment and bullying. Finkelhor *et al*. (2000) reported that 6% of respondents indicated they had been harassed on the Internet, with older children being more likely targets of harassment. Episodes of harassment ranged from harassing instant messages, chat communications, and e-mails to posting a hate Web site about a 17-year-old. As with sexual solicitation, only half of the children told a parent about the incident.

Ybarra *et al*. (2004a) analyzed characteristics associated with victims of Internet harassment from the Youth Internet Safety Survey. One-third of the children who reported having been harassed indicated they were very or extremely upset by the harassing incident. Males who reported more depressive symptoms (e.g., decreased feelings of self-efficacy, difficulty completing schoolwork, difficulty engaging in personal hygiene) were more likely to report harassment than were males who reported few depressive symptoms—this relationship was not found with females who reported harassment. Ybarra argued that the relationship between depression and harassment makes Internet harassment an important mental health issues.

A number of children who reported being victims of Internet harassment also reported being perpetrators of harassment. Ybarra and Mitchell (2004b) analyzed characteristics of children from the Youth Internet Safety Survey who reported harassing another on the Internet. Ybarra and Mitchell found that 15% of respondents to the Youth Internet Safety Survey indicated they had made rude or nasty comments to another and 1% used the Internet to embarrass or harass someone in the past year. Consistent with offline bullies, Internet harassers tended to have poor family bonds and engage in risky behaviors such as substance abuse and delinquency—characteristics that, according to Ybarra and Mitchell, are common to offline bullying and harassment. Ybarra and Mitchell (2004a) found that while much Internet harassment may be an extension of schoolyard bullying, some aggressors appear to harass others only on the Internet. Based on their results, and consistent with Greenfield's (2004a) concern, Ybarra and Mitchell argued that the anonymity of the Internet may allow some children to adopt a more aggressive persona than they express in real life.

In summary, the research on Internet predation and bullying closely resembles that of offline predation and bullying. The Internet provides greater access to children and a larger environment in which to engage in bullying and harassment, however, so the effects of such events can be more devastating to the victimized child.

BECOMING "INTERNET-WISE"

Three approaches have been used to protect children from the damaging effects of the Internet. One approach is to legislate what materials can be distributed across the Internet. The Child Online Protection Act (COPA) was passed by the United States Congress in 1998, prohibiting commercial Internet service providers from distributing content objectionable to minors. Although this law has never taken effect due to court challenges that the law violates the First Amendment right to free speech, many states have enacted similar laws. In response to the potential law, many pornography sites shut down, only to reappear on other domains hosted outside the United States.

As noted earlier, another approach to protecting children from the dangers of the Internet has been the development of software to filter out or block children's access to offensive resources. In part, this comes from legislation. The Children's Internet Protection Act (CIPA), passed by the United States Congress in 2000, requires schools and public libraries to install filtering software on all computers in order to be eligible for federal funding. Although CIPA has been partially struck down by the Supreme Court, various states have enacted similar legislation. Many schools and libraries have installed filtering software and commercial companies such as Net Nanny and Cyber Sitter engage in extensive marketing of their filtering programs to parents.

Both of these approaches, legislating content and blocking content, do appear to protect children by attempting to prevent access to objectionable content. Neither is completely successful, however. The Internet is simply too vast to police all the objectionable resources; as one site shuts down another opens up, often in another country that is immune to legislation. Filtering software cannot block objectionable content without severely limiting accessible content. Richardson *et al*. (2002) found that filtering software significantly blocks access to many health topics important to children and adolescents, ranging from condoms and sexually transmitted diseases to dieting and depression. Similarly, a *Consumer Reports* ("Filtering Software," 2005) study of filtering software found that most software blocked pornography very well but also blocked sex education and gender issue sites. The software also blocked hate poorly, allowing results on terrorism, weapons-making, and violence, while blocking drug education resources. Use of filtering software also does not appear to prevent unwanted sexual solicitation (Mitchell *et al*., 2001). Furthermore, neither legislation nor filtering software credits children with the capacity to appraise and filter objectionable content on their own.

A third, and likely most successful, approach is to teach children to critically appraise on their own. Critical thinking skills underlie almost all decision making tasks and need to be taught and generalized across a wide range of domains,

from making healthy eating choices, to making appropriate decisions about sexual behavior, purchasing, and information gathering.

Children do become more critical of information they find on the Internet as they develop yet they still rely on the Internet as an important source of information. As part of a larger study (Varnhagen, unpublished data), we asked students in eighth and eleventh grade and first year of university which of three sources, an encyclopedia article, the newspaper, or the Web, was most likely to provide credible information. Almost three-quarters of the eighth-grade children indicated that the Web was the most credible source of information whereas fewer than half of the eleventh graders and one-fifth of the university students rated information from the Web to be most credible. Regardless of their beliefs about credibility, however, almost all students indicated they used information from the Web in writing school reports.

Critical appraisal as it regards the Internet requires children to appraise the author and host of the Internet resource; the purpose and target audience for the resource; the accuracy, objectivity, comprehensiveness, and currency of any information; and relevance of the Internet resource to their needs (Varnhagen, 2002). For example, an early adolescent seeking information on the Web about acne will need to appraise the author: is the author knowledgeable? If the author is knowledgeable, the information is likely overall to be more credible than if the author has limited knowledge of acne.

The adolescent will also need to determine the purpose and target of the resource: Is the resource a product advertisement? A source of medical information? An old wives' tale? Someone's personal belief? Product advertisements are biased toward influencing and purchasing decisions. A resource with a purpose of providing medical information is more likely to be credible than are resources designed to sell or persuade. Related to the purpose, the child will also need to appraise the authenticity of the information: How accurate is the advice? Is the information based on objective medical information? Is it complete? Is it up-to-date? Acne information has changed over the past several years; the latest medical research shows that drying agents are more likely to excoriate skin and lead to scarring. Also, the child must determine whether the resource is relevant to his or her needs.

Needless to say, children are very unlikely to perform such an extensive appraisal of many of the millions of resources resulting from a search for information about acne. Indeed, Brem *et al.*, (2001) found that adolescents evaluating scientifically valid and hoax Web sites were very uncritical of the information they found. For example, the students relied more on surface features, such as number of links to other sites, in their evaluation of the information. Even though they acknowledged that some authors had an ulterior motive, such as to sell or persuade, the authors' motives were unlikely to influence accurate reporting of information.

Children may be even less likely to consider critically appraising other types of Internet resources, such as games, chat, instant messaging, music, and videos. For example, children may be more likely to be drawn to an Internet game based on visual and auditory appeal than they are to appraise the host for potential to download viruses or accuracy of the feedback given on performance. They are unlikely to assume a new buddy met in a chat room who expresses shared interests is anyone other than a peer. They are likely to download immediately the latest bootlegged music video than consider what viruses that video might bring with it.

Children need to learn to critically appraise the resources and communications they encounter on the Internet. Librarians and schoolteachers have developed a number of information literacy resources to help children learn to critically appraise informational resources (Schrock, 2001). For example, "Kathy Schrock's Guide for Educators" (http://school.discovery.com/schrockguide/eval.html), one of the oldest and best known resources, provides a set of yes/no questions for children of different ages to use as they find and evaluate information Web resources. Younger, early elementary-aged children are encouraged to consider whether they agree or disagree with the information; older, high school-aged adolescents are encouraged to critically appraise the content and authority of the information.

Many child safety organizations provide guides and resources for parents and children. WebAware (http://www.bewebaware.ca/english/default.aspx) includes general Internet checklists for children of different ages. In addition to content appraisal, WebAware encourages children to consider whether they are writing rude messages or providing personal information on the Internet. WebAware also includes safety tips for parents of children of different ages, such as using child-friendly search engines with 5- to 7-year-old children and encouraging teens to enter only moderated chat rooms. SafeKids.com (http://safekids.com) and SafeTeens.com (http://www.safeteens.com) provide similar resources for children and parents. CyberAngels (http://www.cyberangels.org/) provides a wide range of resources on various Internet crimes (e.g., child pornography, identity theft) for parents and educators as well as an online form for reporting suspected cases of child pornography.

Some organizations include safety games and quizzes for children. In *ID the Creep* (http://www.idthecreep.com/), developed by the National Center for Missing and Exploited Children, children engage in simulated e-mail, chat, and instant messaging and identify potentially risky situations and predators. The Media Awareness Network (http://www.media-awareness.ca/english/special_initiatives/games/index.cfm) has developed a number of games available for children, ranging from *Privacy Playground: The First Adventure of the Three Little CyberPigs*, a game for children, aged 8–10 years, about marketing techniques and protection of privacy, to *Joe Cool/Joe Fool*, quizzes for adolescents about safe Web surfing.

NetSmartz (http://netsmartz.org), developed by a joint initiative of the National Center for Missing and Exploited Children and the Boys and Girls Clubs of America, is an online training resource that includes evaluation checklists, tips, parental resources, games, and quizzes. In an evaluation of the resource (Branch Associates, 2002), children from ages 6 to 18 improved their knowledge of Internet safety through interacting with the resource and over three-quarters of adolescents indicated they would change their behavior on the Internet as a result of what they had learned through NetSmartz.

The relationship between intentions and actual behavior is complex (cf. Ajzen, 2001), however, and children may not translate their new knowledge of and attitudes toward the Internet to safe behavior on the Internet. Software solutions may help children learn to control their behavior on the Internet by forcing them to critically appraise Internet resources before using them. Just as caregivers teach children to cross the street safely, intelligent software solutions could be created to help children navigate the Internet. Rather than simply blocking resources, new versions of filtering software could allow access to a portion of a resource and require the child to correctly answer a series of critical appraisal questions before continuing to the entire resource. An intelligent chat "buddy" application could point our hurtful posts or potentially unsafe communications. Until intelligent software solutions are developed, simple checklist applications can be created to float over an Internet browser and pose critical appraisal questions that help children stop and think as they explore the Internet. Tools such as these will help children learn to apply what they have learned from checklists, teaching resources, and Internet safety activities and games to the real virtual world of the Internet.

The Internet is a limitless virtual environment with many possibilities for positive child development and exploration. Children can visit many places, explore many cultures, try out many technologies, and communicate with many different people. These experiences help children develop cognitively and socially. The Internet also has a seamy side. Children can be exposed to pornography and hate, harassed, stalked, and kidnapped. By empowering our children to gain critical appraisal skills and to become Internet-wise, we can help them expand their minds and worlds safely through the Internet.

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