CHAPTER 15

Children's Learning in a Mobile Media Environment: Policies, Practices, and Possibilities

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Societal opinions regarding the role of digital media in the lives of youth are often polarized and impassioned. Many feel that children are growing up in a golden age of media, in which opportunities to learn, create, and communicate are abundant and unencumbered by time or geographical constraints (e.g., Ito et al., 2013; Lieberman, Bates, & So, 2009). Others contend that digital media are threatening childhood by dominating children's time and attention and exposing them to harmful content and other dangers (Christakis & Zimmerman, 2006). The unprecedented scope and complexity of today's mobile media in the lives of youth necessitate and complicate the development and implementation of effective public policy surrounding children's uses of new and emerging media.

There is no question that mobile media have become a part of children's lives. A 2015 Common Sense Media survey of over 2600 US youth between 8 and 18 years of age indicated that about two-thirds of teens (aged 13–18 years) and nearly a quarter (24%) of 8- to 12-year-old "tweens" had their own smartphone (Rideout, 2015). Many had their own tablet device (53% and 37%, respectively) or laptop computer (45% and 19%). Tweens aged 8–12 years in this study spent 4.6 h a day with screen media on average (outside of school), while teens aged 13–18 years spent 6.7 h. A sizeable portion of that screen media time consisted of mobile media use, specifically, 41% of time for tweens and 46% of time for teens on average. Younger children are also increasingly mobile media users. In a 2013 Common Sense Media poll of US parents with children aged birth through eight years, 72% of parents reported that children of age 8 years and younger had used mobile media devices, and that 17% did so daily. Most children

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begin using smartphones or tablets before their first birthday (Kabali et al., 2015). Common activities in which young children engage on mobile devices include watching television or video content and using games and other entertainment or educational apps (Kabali et al., 2015).

The mobility of these devices means they are often with children constantly. The size of many mobile technologies renders them personal devices, free from the prying eyes of parents who might wish to monitor or restrict their children's exposure to certain types of content or activities. These same features boost the potential for children's "anytime, anywhere" media-based learning and communication in ways that have not been possible from traditional media such as television sets or desktop computers.

Consider also the shift in the attention-grabbing features that have accompanied new digital media. While children actively seek out devices and particular content at times, their attention can also be recruited by media itself. Parents and child advocates have long worried about the time spent by children in viewing television (e.g., Hess & Goldman, 1962; Villani, 2001; Wartella & Jennings, 2000); yet to watch television a child (or someone else) must turn the TV set on and choose a program or channel. Contrast to that scenario with the buzz of a smartphone telling a teen that she was mentioned in a tweet, a pop-up urging her to resume play in her favorite game, or the ding that alerts her to an incoming text message. In short, mobile media are often vying actively for children's attention in ways that prior media have not.

Finally, the quantity and diversity of media available through mobile devices have increased dramatically. Given the development and growth of Internet-based services such as Netflix and Hulu and broadcast channel websites such as HBO Go, nearly any television content can now be accessed through Internet-connected mobile devices. Moreover, there are now literally thousands of children's apps for families to choose from. With regard to educational apps alone, the Apple Store boasts that, as of 2016, the store "features over 80,000 educational apps…that cover a wide range of subjects for every grade level and learning style" (apple.com, 2016). The 2015 Common Sense Media report on teens and tweens found that the activities in which youth engage using mobile technologies reflect a variety of purposes, including passive media consumption (such as watching TV content), communication (such as social media), interactive consumption (such as video games), and creation (such as blogging or editing videos).

The scope of content and program options available through mobile media is at once exciting and intimidating. Work by the Joan Ganz Cooney Center and New America has shown a lack of guidance available to parents

for directing them toward high quality, educational products and programs and away from lower quality or even harmful offerings (Guernsey, Levine, Chiong, & Severns, 2012; Vaala, Ly, & Levine, 2015). Yet, emerging research, including some studies described in this book (see Dore, Zosh, Hirsh-Pasek, & Golinkoff), indicates that well-designed mobile media with clear educational goals do exist and can be a boon for children's learning (e.g., Falloon, 2016; Falloon & Khoo, 2014; Homer et al., 2014; Neuman & Neuman, 2014).

Of primary concern, then, are policy efforts to harness mobile media resources for youth learning and positive development and to reduce potential negative effects on well-being. The body of research on this topic is nascent, the result of the relatively recent emergence of these media combined with their rapid proliferation. In this chapter, we chart current policies in the United States surrounding childrens' and adolescents' access to and use of mobile media, with a particular focus on educational media. We employ a broad definition of policy, including investment in research, guidance and outreach to families, and school- and community-based programs and initiatives, in addition to federal regulations. We begin by describing regulatory policies aimed at reducing the possible negative influence of mobile media on youth and then turn to highlighting policies oriented toward boosting or leveraging the positive potential of mobile media for childrens' and adolescents' learning and well-being.

REGULATORY POLICIES: REDUCING THE NEGATIVE IMPACT OF MOBILE MEDIA

Parental and societal concerns about children's media tend to fall into four broad domains. These include worries about: (1) the time youth spend with media, (2) exposure to inappropriate or harmful content, (3) privacy and safety, and (4) exposure to marketing content.

Time. The American Academy of Pediatrics (AAP) publishes research-based guidelines for parents regarding a number of child health and development topics, including media use. The 2013 AAP media policy recommended that parents discourage all screen media use for children under age 2 years and to limit screen media use among older youth to 2 h or less per day (AAP, 2013). Parents are also encouraged to keep media technologies out of children's bedrooms, to monitor children's media use, and coview TV and movies. The AAP has since acknowledged that the widespread use of mobile media by even very young children complicates their prior

guidelines, which "must evolve or become obsolete" (Brown, Shifrin, & Hill, 2015, p. 1). In 2015, they convened a symposium of experts in 2015 to advise them on "how to provide thoughtful, practical advice to parents based on the evidence" (p. 1). In May 2016, the AAP published an article subtitled, "When advising families on media, remember all screens not created equal" (Mendelson, 2016). Specifically, the AAP Council on Communications and Media Executive Committee reminds parents of the value of face-to-face communication, the importance of shared digital media use, and an acknowledgement that "It's OK for pre-teens and teens to form and participate in online relationships" (2016, n.p.)

Harmful/inappropriate content. Surveys of parents and youth suggest that many parents have greater concerns and rules about the content of the media their children use than the time children spend using them (e.g., Rideout, 2015; Rideout, Foehr, & Roberts, 2010). Notably, general parental concern regarding exposure to inappropriate or harmful Internet content (such as violence or sex) seems to have surpassed concerns over TV content for many, particularly among parents of older children and teenagers (Bleakley, Vaala, Jordan, & Romer, 2014).

With regard to older media, such as television programming and video games, an uptick in parental and societal concerns about children's exposure to negative content has often been followed by threats of regulation, followed in-turn by preemptive industry self-regulation (Jordan, 2013). For example, when the Federal Trade Commission (FTC) and Federal Communication Commission (FCC) began considering whether food marketing in media was contributing to childhood obesity, food marketers (including manufacturers and broadcast media) created voluntary guidelines under the auspices of the Children's Advertising Review Unit of the Better Business Bureau. Yet, follow-up studies on the effectiveness of the voluntary practices revealed virtually no change in children's exposure to unhealthy food products (Kunkel, Castonguay, & Filer, 2015).

The media industry has, over the years, created ratings systems for parents to use, which indicate the age appropriateness and content of their products. Currently, separate rating systems exist for motion pictures, television programming, music lyrics, and video games. The goal of these systems is to help parents easily identify and select educational or developmentally appropriate content, while avoiding inappropriate content. For television programs, sets manufactured after 2000 have a built-in blocking device (the "V-Chip"), which can be programmed to block shows with particular content ratings. For movies, the ratings are provided so that parents can judge

the appropriateness content for their children. However, it is up to the movie theaters to implement practices from keeping children out of PG-13 and R-rated films (Motion Picture Association of America). Similarly, although videogames may be labeled as inappropriate for children, they can still be sold to children under the Supreme Court decision, Brown v. Entertainment Merchants Association and 564 U.S. 08-1448 (2011).

No industry-wide ratings systems or blocking technologies yet exist for mobile media content aimed at children (e.g., apps). Such regulations are difficult to enact without sufficient public demand, and legislation mandating censorship or blocking technologies is particularly difficult given the media's right to free speech (Jordan, 2013). As described above, policies are typically considered and enacted platform by platform (e.g., regulations and ratings systems for television programming do not apply to video games). This system becomes more complicated and perhaps less useful for mobile devices, through which numerous types of content converge (e.g., children can play video games and watch television content on the same device; Jordan, 2013). Moreover, decades of research on the efficacy of ratings systems and blocking technologies have found that they are often not used or useful to parents (Vaala, Bleakley, Jordan, & Castonguay, 2017). The various content and age descriptors used between different media are not applied consistently by producers and become a confusing "alphabet soup" to parents (Greenberg, 2001). Many parents either do not know about blocking technologies such as the "V-chip" in television sets or find them too difficult to program (Scantlin & Jordan, 2006). Tech-savvy youth are also able to find ways around the V-chip and other blocking devices and strategies (Jordan, 2008).

Beyond ratings, there are resources to aid parents who wish to learn more about the mobile media content aimed at children. Several organizations (e.g., Common Sense Media; Children's Technology Review) issue their own independent ratings of children's media products, including apps and websites. These expert reviews can help guide parents toward educational and developmentally appropriate apps and other mobile media, while helping them to avoid negative content. However, the quantity of apps, websites, and other media for children means that these sites are able to rate only a relatively small proportion of what is available. App stores such as iTunes have created "family accounts" that enable parents to view, block, or delete apps on their children's devices. The AAP also advocates parental monitoring and mediation of children's Internet and mobile media use (AAP, 2013). Strategies such as monitoring what children are watching,

co-using media with children, and actively restricting children from using particular content have been linked to favorable outcomes for youth, such as mitigated impact of unhealthy food marketing, reduced negative influence of media aggression, and greater positive impact of prosocial content (Buijzen, 2009; Gentile, Reimer, Nathanson, Walsh, & Eisenmann, 2014).

In the early days of the Internet, particular concern over youth exposure to sexual content led to efforts to restrict Internet pornography through proposed legislation known as the Communications Decency Act of 1996 (Jordan, 2013; Levesque, 2007). However, the bulk of this legislation was soon struck down by the Supreme Court in Reno v. American Civil Liberties Union which ruled that the measures infringed on the rights of adults to access sexual content online and on the premise that other measures, such as media education and blocking technology, would be more effective for shielding children (Jordan, 2013; Levesque, 2007). One aspect of the legislation did remain, however. Today, it is "illegal to knowingly transmit obscene or indecent messages to any recipient under 18 years of age" (Jordan, 2013, p. 11). This statute has been applied recently in efforts to curb teenage "sexting" (sharing sexual photos via text message) (Jordan, 2013). Some argue that the measure is too harsh to handle a behavior occurring primarily among adolescents, although parents and child advocates agree that sending and sharing explicit photos are a risky phenomenon that may carry a variety of negative repercussions for youth (Jordan, 2013).

Privacy and consumer protections. Parents' concerns about youth privacy in digital media use have also been salient in the digital media era. In 1998, in an effort to give more control to parents over what information was collected from children online, the FTC enacted the Children's Online Privacy Protection Act (COPPA). COPPA stipulates that any website which knowingly has or targets users under age 13 must first obtain parental consent for the collection and use of all personal information before children can create an account (see Boyd et al., 2011). In 2013, the FTC clarified that the law applies to mobile apps in addition to websites. Moreover, the personal information covered by COPPA now includes photos, geolocation, and identifiers such as computer IP addresses, which are tracked across websites and services (Magid, 2013). To avoid the complications and legal implications of having to comply with these regulations, many producers of websites, services, and apps choose to restrict the use to individuals 13 years or older. A notable example is the social media platform Facebook.

However, the efficacy of COPPA in practice has been questioned. A study of Android apps conducted by Hong and colleagues at Carnegie

Mellon University (see Patel, 2014) found that apps varied considerably in how much their data collection and use behaviors differed from users' expectations. Moreover, they found that many free apps that target or appeal to children are among the worst offenders with regard to appropriate collection and use of personal data. For example, a game may state in the fine print of its policy statement that phone status information (such as phone number or device ID) will be collected, but parents would likely not notice or anticipate how that information is used (e.g., consumer analysis and ads). While website and app producers may largely follow the letter of the law, many do not seem to follow the spirit of the law. Hong and his colleagues have created a free site that analyzes apps and reports grades for how well each app's data collection and use procedures match people's expectations (privacygrade.org).

Research shows that children circumvent privacy policies fairly easily, specifically, by lying about their birth date. A survey by Boyd et al. (2011) found that many parents help their children lie about their age to gain entry to various sites and services. Research by Consumer Reports indicated that as of 2012, approximately 5.6 million Facebook users were under the age of 13 years (Consumer Reports, 2012).

Exposure to marketing. Beyond regulating what and how information can be collected from children under age 13, the U.S. government does not regulate advertising to youth through the Internet or mobile apps. Several studies have found that the characteristics of advertisements in newer digital media (e.g., Internet ads; product placement in videogames) are "fundamentally different from those of other media, including elements such as interactivity, immersion, viral messaging, user-generated content, and location-based targeting" (Rideout, 2014, p. 15). Moreover, these new techniques may interact with developmental status such that youth are particularly vulnerable to new, digital marketing. In the words of Montgomery (2013):

> *Because of adolescents' emotional volatility and their tendency to act impulsively, they are more vulnerable than adults to such techniques as real-time bidding, location targeting (especially when the user is near a point of purchase), and 'dynamic creative' ads tailored to their individual profile and behavioral patterns. (p. 771).*

In light of these new, stealth marketing practices and the particular vulnerability of youth, Montgomery and others have urged greater attention to research and policy development in this area (Montgomery, Chester, Grier, & Dorfman, 2012).

Children's media products and programs can carry seductive marketing statements that also appeal to parents. This trend has been observed particularly with regard to educational claims. For example, many children's app developers claim or suggest that their apps teach a variety of knowledge and skills to children, such as reading, math, and science (Vaala et al., 2015). Yet there is little research evidence or even expert educational development (e.g., education experts involved in development; specific curriculum) to defend developers' claims or further inform parents. In addition, app developers designate the app store category where their apps will appear, rather than the app store itself or any objective entity. Thus, there are no observable repercussions for misleading parents about educational value of children's mobile media content and no pressure for developers to confirm or back up their claims.

Ostensibly, the FTC regulates deceptive and misleading marketing practices, including of children's apps and other mobile media products. There is some precedent for the FTC to act in such cases. Academic research indicates that infants and toddlers do not readily learn from content presented via video, particularly commercially available baby videos such as Baby Einstein (DeLoache et al., 2010). Yet, producers of baby media content commonly tout educational benefits for infants and toddlers to market their products (Fenstermacher et al., 2010). After complaints were made to them in 2011 about deceptive marketing claims on infant/toddler videos/DVDs, the FTC eventually issued an injunction against the producer of the *Your Baby Can Read* video series (FTC, 2014). The lack of more widespread penalization of media companies who use misleading or unverifiable marketing claims may be due in part to the fact that the FTC relies largely on complaints by consumers and consumer-advocated organizations to investigate and penalize companies for deceptive marketing practices.

DEVELOPMENT AND ADVOCACY POLICIES: BOOSTING THE POSITIVE POTENTIAL OF MOBILE MEDIA

Increasing access to Internet and educational media. Although public discourse disproportionately emphasizes concerns about possible negative repercussions of children's media use, policies are also underway that are designed to promote the positive potential of mobile media for children's learning and development. Youth cannot learn from media to which they do not have access; thus, numerous policies are aimed at putting high-quality mobile media into children's hands. For many youth, particularly those from lower

income and racial/ethnic minority households, access to high-quality digital media is thwarted by the degree of access to broadband Internet more generally. Recently, the Joan Ganz Cooney Center conducted a nationally representative survey of nearly 1200 parents of school-age children (6–13 years) with household incomes below the national median level for families (Rideout & Katz, 2016). They found that 94% of lower income families had some access to the Internet, but many were "underconnected," as they did not have home broadband Internet (now defined as 25 megabits per second by the FCC, Singleton, 2015). A third of families below the poverty line had mobile-only Internet (i.e., through a smartphone or tablet plan), which for many, was not consistently active. This difference in the mode and quality of access to the Internet manifested in differences in whether and how children used the Internet. For example, those whose families had mobile-only access were less likely than peers with home Internet access to go online to look up information (35% vs. 52%). Access to and use of high-speed Internet reflects socio-economic privilege, while also incurring socio-economic benefits via enhanced access to enriching educational, employment, and entertainment opportunities. In the words of the US Council of Economic Advisors, "The digital divide is likely both a cause and a consequence of other demographic disparities, and sorting out the precise impact of closing the divide is more difficult than characterizing the current disparities" (2015, p. 9).

Numerous government and private organizations have sought to close the digital divide through a variety of national and local policies. The Connect2Compete initiative was introduced in 2011 with the goal of providing broadband Internet access to low-income families. Through a partnership between the US government and Internet service providers (ISPs), families who meet certain criteria can receive broadband Internet for $9.95 per month through the program (Everyoneon.org, 2016). To qualify for the Connect2Compete program, households must have at least one school-age child eligible for free or reduced lunch, have been without Internet service within the previous 90 days, and have no outstanding Internet service bills. However, research by Katz and colleagues has revealed that in practice the service is underutilized or does not fit the needs of many families who are eligible for the program (Katz & Gonzalez, 2016; Rideout & Katz, 2016). In interviews, Katz and colleagues found that many eligible families did not know about Connect2Compete. Others who did use the reduced cost service experienced slow Internet connections and found that it was only available for one device via an ethernet cord for a limited amount of data per

month. Because local schools were the purveyors of information about the program and the technologies themselves, the distribution of information and technology varied by school district (Katz & Gonzalez, 2016). Consequently, some eligible families had greater access to information and technology than others.

Despite the observed limitations of the Connect2Compete program, increasing equity of access to high-quality Internet service is a worthy goal given the integral role of Internet media in our daily lives. The FCC has identified additional avenues for pushing telecommunication companies to provide reduced-cost Internet services to low-income households. For example, the FCC stipulated for a merger deal with DirectTV that AT&T must provide $5 per month Internet service to homes in which at least one person receives food stamps (Kelly, 2016). Such efforts combined with the recent Net Neutrality order (2015) suggest a shift toward considering Internet access as more of a public resource, much like broadcast radio and television networks, than a luxury subscription, like cable or satellite television. The Net Neutrality legislation mandates that ISPs must provide equal access to all online content, and may not block or limit access (i.e., through slower speeds or higher costs) to any legal content or application (FCC, 2015).

There is a history of administrations working to address the digital divide through public policy. For example, in the early days of his first term, President Bill Clinton announced a strategy to build a national information infrastructure. Vice President Al Gore chaired an advisory council that focused on funding community-based institutions serving the public, such as schools and libraries, to provide Internet services and access. They proposed a system of discounted education rates, or "E-Rates," for supporting the infrastructures needed in the schools and libraries, which was passed into law with the Telecommunications Act of 1996. This legislation mandated discounts for high-speed connectivity for schools, libraries, and rural health care centers (Hudson, 2004). By January 1998, the first round of E-Rate applications was being received (Barone & Lombardo, 2015). By many accounts, it appeared successful. In 1994, only 35% of public schools had access to the Internet. By the fall of 2000, almost all public schools in the US (98%) had access (Cattagni & Farris, 2001), indicating that awarding subsidies did succeed in significantly increasing Internet investment, particularly among urban schools and schools with large black and Hispanic student populations (Goolsbee & Guryan, 2006). But the E-Rate program was not without its critics. Some argued that wealthier districts were using the

discounts to "gold plate" the media technologies they provided to their students, exacerbating the digital divide (Hudson, 2004). Others pointed out that the mandated filtering software that went along with accepting government funding meant that students were unable to access useful content given overprotective filters (Jaeger, McClure, & Bertot, 2005). In 2014, the Federal Communication Commission took the "next step" in modernizing the E-Rate program by, for example, expanding the budget, equalizing the costs of high-speed broadband between rural and urban areas, and providing an incentive for state support of "last-mile" broadband facilities through a match from E-rate of up to 10% of the cost of construction (FCC, 2014).

A similar example is President Obama's ConnectED initiative, which ensures that "99% of American students will have access to next-generation broadband by 2018" (WhiteHouse.gov, 2016). The initiative represents a public-private partnership between the FCC and telecommunications and computer hardware and software companies such as Apple, Microsoft, and Verizon aimed at providing Internet access to schools and libraries and connecting rural communities through updated infrastructure. The program also includes investment in technology-related curricula and teacher training around effective technology use in the classroom. As of Spring 2016, the Obama administration cited that more than $10 billion in private and public resources had been dedicated to the ConnectED initiative.

In addition to reduced rates of access to broadband Internet service, children from lower income families have disproportionately lower rates of access to media programs and products that have the highest potential to teach. In 2013 Common Sense Media conducted a national survey of over 1400 US parents regarding the home media environment of children between birth and age eight years. They found that only 35% of parents with an annual household income of less than $30,000 had ever downloaded an educational app for their children, compared to 75% of parents making more than $75,000 per year (Rideout, 2013). Common Sense Media have dubbed this disparity the "app gap," denoting a disparity in the nature of children's mobile media use based on socioeconomic characteristics, rather than the extent of access or use. Research by Vaala and colleagues indicate that the cost of high-quality apps may promote this gap (Vaala et al., 2015). They found that literacy-focused children's apps that had won awards from expert media review sites, such as Common Sense Media, tended to be more expensive than other popular literacy apps (i.e., those listed among the "Top 50 educational" in app stores).

Mirroring efforts to boost Internet connectivity among underserved families, various public and private sector efforts are currently focused on providing high-quality educational media to disadvantaged families. Recently, FirstBook, the Obama administration, the Digital Public Library of America, and the New York Public Library launched a program making ebooks and other educational apps available to low-income families and educators serving in-need students. The Open eBooks program allows low-income families to download up to 10 ebooks at a time through an app on their device. Books can be used for 56 days before they must be renewed again, much like a traditional library.

In 1994, the US Department of Education committed substantial resources to using public television programming to promote school readiness (i.e., Ready to Learn initiative). The Ready to Learn (RTL) initiative funded children's educational television programming, with a particular focus on literacy-focused programming, and research testing the programs' effectiveness (see PBSkids.org/readytolearn/). Today, more than a dozen years later, the investment has moved well beyond television and into innovative transmedia production. As Pasnik, Llorente, Hupert, and Moorthy (2016) write, "During the 2010-2015 grant period, change has been dramatic, if also intermittent and quixotic; touchscreens did not exist when the funding cycle began, much less had they found their way into many parents' pockets" (p. 229).

The experts behind the RTL initiative recognized the opportunities that media could present as another learning resource in children's lives. Just as the AAP has reexamined screen time in ways that acknowledged that not all screen media were created equal (Mendelson, 2016), they have also sought to develop consensus around what constituted the "developmental appropriateness" of a media experience. To this end, Pasnik et al. (2016) reviewed research conducted between 2010 and 2015 through the RTL initiative and conducted interviews with research staff to distill convergent lessons from the most recent RTL grant cycle. With regard to evaluating developmental appropriateness of media for children, the authors recommend a focus on the following four domains:

(a) the quality of the media content;
(b) the context in which the child's media experience unfolds;
(c) the opportunities it offers for rich social interactions; and,
(d) engaging and interactive features that enhance children's learning

As most would recognize, the challenge facing producers is finding the best ways to translate these principles into concrete experiences; that is,

integrating them into the experiences children have with educational media, including mobile media. For example, some researchers have found that media experiences are enriched when shared by children and caregivers. Under coviewing conditions, children both learn more effectively and adults can become more engaged with young children's learning (Takeuchi & Stevens, 2011; Strouse, O'Doherty, & Troseth, 2013). Other scholars have shown that combined use of multiple media can produce greater learning than a single media component—the "transmedia" experience (Fisch, Damashek, & Alade, 2016). Designing children's media experiences to reflect these domains (i.e., quality, context) and to leverage these opportunities (i.e., parent-child engagement, transmedia experience) requires a large financial commitment and a broad base of expertise. Funding for RTL has come from the U.S. Department of Education and has contributed to research and development of broadcast and online content including PBS favorites such as "Odd Squad," "Peg+Cat," and "Sesame Street" (Mook, 2015).

Leveraging mobile media for child health and development. The ubiquity and appeal of mobile technologies have spawned outreach efforts and educational interventions in the m-health (mobile health) arena. In 2014, Sesame Workshop, Too Small to Fail, and Text4Baby partnered to launch a freely available service for parents of babies which sends research-based tips via text message to help parents encourage young children's language development (Too Small to Fail, 2014). This national effort was preceded by similar local text-to-parent initiatives that evidenced success. For example, a study of families in San Francisco found that parents who received text messages with specific tips for encouraging children's language development engaged in more literacy-focused activities with their preschool-age children and were more involved in their children's schools (Too Small to Fail, 2014; York & Loeb, 2014). In addition, their children had higher scores on literacy tests than peers whose parents did not receive the text messages.

In 2015, Guernsey and Levine identified and described the efforts of numerous "pioneers" applying technology in the service of children's literacy development. The pioneers varied in scale from a forthcoming app from Sesame Workshop that used artificial intelligence to understand and respond to preschoolers to the small Comienza en Casa (It Starts at Home) program in rural Maine. Comienza en Casa provides Maine's migrant parents with an iPad, educational apps and activities, and training to help children prepare for kindergarten (see Guernsey & Levine, 2015). Program staff visits families to get feedback from parents, provide support, and discuss children's learning goals (Mano en Mano, 2015).

Academic researchers also design and test youth-focused apps, websites, and other mobile tools (e.g., SMS) that address various behaviors and domains, from curbing children's anxiety (Berry & Lai, 2014; Pramana, Parmanto, Kendall, & Silk, 2014) to boosting medical regimen adherence among teenagers with type 1 diabetes (Vaala et al., 2016) and helping children with autism develop communication skills (Fletcher-Watson et al., 2015). While the research base is still nascent on the general success of m-health tools for youth health and development and in specifying what are particularly effective design or implementation strategies, early evidence suggests that mobile media technologies can promote healthy behavior (e.g., Turner, Spruijt-Metz, Wen, & Hingle, 2015; Vandelanotte et al., 2015). Unfortunately, due in part to funding constraints and the pace of academic research, the apps designed and tested by academic researchers are often not publicly available. Rather, the health-focused apps that are commercially available to youth are often not evidence-based or subjected to rigorous research testing (e.g., Eng & Lee, 2013; Scott, Gome, Richards, & Caldwell, 2015; Spigner, Hinson, Escobar-Viera, & Hart, 2015).

RESOURCES FOR FAMILIES, EDUCATORS, AND OTHER STAKEHOLDERS

The field of research on the effects of mobile media is nascent and evolving, and more research is needed, but resources do exist to aid caregivers, health care providers, and educators maximize the potential benefits of children's mobile media use.

Guidance to families. **The American Academy of Pediatrics** publishes guidelines for healthy media use. Pediatricians are also encouraged to ask families about children's media use and provide guideline-based recommendations during well-child visits (AAP, 2013), although research indicates that more effort is needed to ensure pediatricians are trained to provide comprehensive information regarding children's use of digital media (e.g., covering topics such as social media, Internet safety, and cyberbullying; Christakis, Frintner, Mulligan, Fuld, & Olson, 2013). Notably, parents who do list the AAP as a source of guidance are more likely to follow the AAP guidelines (e.g., keep TV sets out of children's bedrooms, limit screen time; Lapierre, Piotrowski, & Linebarger, 2014).

Common Sense Media, Children's Technology Review, and **Parent's Choice** independently review children's media products and provide reviews and awards in searchable websites for parents and educators, as

noted elsewhere in this chapter. Other academic and non-academic institutions, including the **Technology in Early Childhood (TEC) Center** at Erickson Institute, **Joan Ganz Cooney Center** at Sesame Workshop, and the **Fred Rogers Center**, conduct, translate, and disseminate research for parents, educators, policymakers, producers, and other stakeholders interested in children's educational media.

Librarians are also stepping forward to guide families in healthy and educational use of media. The **Association for Library Service to Children (ALSC)** published a white paper in 2015 proposing that library staff nationwide become trained and serve as "media mentors" (Association for Library Service to Children, Campbell, Haines, Koester, & Stoltz, 2015; Guernsey, 2013). In their white paper, the ALSC urges "every library have librarians and other staff serving youth who embrace their role as media mentors for their community" (p. 7) and that formal training and professional development be offered to librarians to equip them for this role.

Engagement opportunities. **The National STEM Video Game Challenge** is held every year by E-Line Media, Entertainment Software Association, and the Joan Ganz Cooney Center and a host of partners. Middle and high school students submit video games that they have designed and created themselves, and winners are selected to receive cash awards and other prizes. Winners have also presented their work at the White House Science Fair (see stemchallenge.org). As youth produce or remix media content they become actively engaged with the underpinnings and culture of media (rather than merely media consumers), while also developing technical proficiencies as well as traditional, technical, and media literacies (Ito et al., 2009; Kafai & Peppler, 2011). The "affinity-driven" nature of creating media prompts children and adolescents to persist when they encounter obstacles and to apply academic skills, such as math, literacy, and critical thinking in an endeavor with real-life application and personal meaning.

The **Connected Educators** project is a collaboration of numerous partners including the American Institutes of Research and the US Department of Education. The initiative seeks to connect and inform educators regarding best practices for using technology in education. Various resources are freely available at **connectededucators.org**, including a blog, an online community for members, and various professional development opportunities. Each October is **Connected Educator Month**, during which additional thematic presentations, participation and discussion opportunities, and other resources are made available from industry, research, and advocacy partners.

CONCLUSION

In this chapter, we have outlined the challenges and opportunities of the new digital, mobile media context in several arenas, including policy, education, and health. We have shown that while the technology continues to rapidly develop, mobile media have become important in the lives of children and adolescents. Policymakers struggle to keep pace with the new ways in which children are gaining access to content, with older forms of regulation and self-regulation no longer particularly useful or adequate. Yet, we also observe that there is great potential for digital and mobile media to enrich children's learning and well-being, both through innovative development of media properties that span multiple platforms (transmedia) and through evidence-informed interventions aimed at parents and children. Numerous resources, of which we have outlined a few, have emerged to help families, educators, and other stakeholders encourage children's constructive uses of digital media while avoiding exposure and use that might be harmful. Yet, amidst the constantly evolving and proliferating media in children's lives, our collective efforts have merely scratched the surface of the knowledge we need to acquire, translate, and disseminate in order to spur and inform sufficient resources and policies within children's new digital environment.

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