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1. Introduction

Probably as far back as people can remember, education has drawn on communication technologies, either to teach students how to use them effectively or to make use of those technologies in the educational process itself. In the former instance, the educational sector typically follows a cultural valuation that regards a given technology as so essential that people cannot leave its use or teaching to chance—reading and writing provide the clearest examples here, with schools teaching both the mechanics of writing and reading (forming or deciphering letters, spelling properly, adhering to a common grammar, and so on) and the composition of texts, arguments, expositions, explanations, essays, etc. In the latter instance, schools use communication technology to provide information or to connect with their students: again, books provide an historical example as does educational television more recently.

A great deal of existing research in pedagogy, learning theory, and classroom management examines how learning with technology occurs and how to measure its impact (Jonassen, 2004). Similarly, a great deal of writing addresses the practical issues of making the best use of communication in or for the classroom. This review will not address the learning theory or the pedagogy, except indirectly as it appears in other studies; it will focus instead specifically on the communication technology—a very wide field—and how educators incorporate the various means of communication in the schooling of a younger generation. These typically occur in two ways: distance education and supplemental education. Distance education refers to the use of communication technology to reach students who cannot or do not physically attend a school. Supplemental education refers to the use of communication technology to supplement face-to-face or in-school programs. Looking at the recent past (the last 10 years or so), this review will examine published studies discussing communication in or for

schools as well as some more accessible online materials describing current work.

Bypassing the old technologies of writing, printing, art, and film, this review will report on work in five main areas: education by radio, educational television, educational telephony, computer-based communication technologies, and games for education. The older technologies, of course, played significant roles in education. Even in classical Greece and Rome, those children (predominantly boys) who did attend schools or who had tutors learned the skills of reading and writing (Marrou, 1956, pp. 150-155). The printing press, as Eisenstein (1979) has amply demonstrated, revolutionized education by providing cheaper materials in abundance. Here, the communication technology functioned both to facilitate "distance education," as people far from established schools could read on their own, and to supplement the traditional university lectures with printed resources. The printed books also reshaped the presentation of information to students by arranging materials on a page, printing diagrams, and calling attention to visual information (Ong, 1958, 1982), all working as supplements to in-class material. In a similar way but in a much more recent development, shortly after the rise of the film industry in the United States, companies produced educational films for supplementary use in schools, providing illustrations of scientific, artistic, and even historical materials (Cassidy, 2004, Ch. 2).

A. Some history

Cassidy (2004) offers a broad historical look at how schools across the United States incorporated communication technology in their educational projects. She begins the story in the 19th century as communities moved towards universal education. But even simple technologies met resistance. She recounts, for example—in a story foreshadowing much of the history of communication innovation in education—how a

New York school inspector reported that parents resisted paying for and teachers declined learning how to use a new display technology in 1843: the chalkboard (p. 49). Setting up a framework of schools and communication, Cassidy sketches the history of the educational uses of communication technology, starting with film and including the radio, educational television (that is, on-air broadcasts to a general audience) and instructional television (that is, material for classroom use), automated instruction, typically using computers, and the variety of new communication media. Of these, only automated instruction does not qualify as a communication technology, as early computers did not provide networked communication but only the ability to take the students through a series of programmed instructions or drills.

Cassidy places the use of communication technology in education into a number of contexts: the growth of public schooling in the United States, the history of technology, the growth of educational and psychological theories, the push of commercial and business interests, and the wider fears and hopes that shaped educational practice. In the chapter on film mentioned above, she notes that the early 20th century witnessed a debate about learning and the rise of various "progressive" camps that rejected rote methods and encouraged experiential education, with John Dewey stressing, for example, the need to connect school learning to a student's experiences outside the classroom. Film with its visual nature fit into this progressive approach. The fact that a "visual instruction movement" (started in 1895) developed an influential theoretical framework added support, as did the formation of The National Academy of Visual Instruction in 1920. This latter group aided in distributing films to schools and helped to set standards for the use of film in education. Fitting into the "supplemental education" category, visual instruction stressed both sensory experience and film's augmentation of that experience through, for example, time-lapse photography and close-up images. The motion picture industry as well as companies such as Eastman (later Eastman-Kodak) and others in the photography business saw education as a wide-open market for their products and moved quickly to produce both educational films and learning studies whose research supported their use. Universities also moved into the educational film business with schools such as "Harvard, Yale, MIT, and the universities of Chicago, Indiana, Iowa, Oklahoma, Michigan, Nebraska, Wisconsin, and Utah" all producing films as

early as the 1910s (Cassidy, 2004, pp. 90-91). As would happen with every other educational use of communication technology, state and federal governments also participated in the educational film business, with states setting standards and the federal government, especially the military, commissioning training films to socialize soldiers, to teach specific skills such as construction techniques or the use of weapons, or to provide health instruction. Cassidy ends her chapter, as she will every other, with a look at negative factors—things that prevented the adoption of the particular communication technology or research that questioned the educational value of the practices associated with the communication technology. In the case of film, Cassidy mentions technical problems with film projectors in the classroom, the rising costs of the medium, an incompatibility of films with teachers' instructional needs or interests, the sometimes blatant commercial sponsorship of educational films, and research studies that indicated various negative effects of film viewing on children (pp. 96-106).

While this review will not include film in education, it will borrow from Cassidy's work on radio, television, and new media in the following sections as appropriate. Lee and Winzenried (2009) refer to these later technologies as "the second revolution" (p. 48), "the new savior" (p. 61), and "the great revolution" (p. 74), respectively, in educational communication since each transformed how teachers and students interacted.

Many countries around the world have integrated communication into their education systems, often following paths similar to those taken in the United States. Other researchers offer additional historical data on their countries. Katz (2002) sketches a history of communication technologies in the Israeli educational system. In the decades after the founding of Israel, university students living too far from traditional learning centers participated in distance learning programs through communication technologies. "The first generation of Distance Learning approaches, which utilized traditional printed material and communication by mail and telephone, served essentially as a one-way communication technology that, while providing students with content matter, inhibited interaction between teachers and learners" (p. 147). By the late 1960s, newer communication approaches surpassed these methods: the use of audio recordings, television, and radio broadcasts. Terming these "second generation" educational technologies, Katz notes that these still lacked any real-time inter-

action, functioning as one-way communication channels. Only by the later 1980s and 1990s did a set of third generation communication technology solve the problem of interaction. These, including "interactive video, e-mail, and Internet, and intranet technologies" (p. 148), allow real-time interaction between teacher and student and among students. The use of such technologies has spread to every level of Israeli education—primary, secondary, and tertiary—as teachers can work with students in real time.

As in Israel, countries, particularly larger ones, have turned to communication technology to solve the "travel gap"—the separation of teacher and student by long distances. Given its size, Australia not surprisingly has a long history of distance education. "Until the 1950s, children living in remote communities would either have to attend a boarding school, or complete their lessons by mail" (Australian Government, 2007, ¶5).

Those who chose to remain in their local communities often had no interaction with teachers or other students; poor mail delivery meant falling behind with school lessons. Turning to the second generation communication technologies, Australia introduced lessons by radio in 1946. That year, Adelaide Miethke, of the Royal Flying Doctor Service and former schools inspector, noticed "how outback children were all taught to use the RFDS radio service" (¶4). Her idea to use the existing service for schooling led to the founding of a national School of the Air (SOA) program in the early 1950s. In 2005 the SOA comprised 16 schools in a network covering "more than 1.5 million square kilometers" (¶7), with such schools located in all but two Australian states. The SOA program offers secondary and adult education courses in distance education and combines with community schools (often those teaching the primary grades) in supplementary education.

2. Radio

A. Distance education

Radio seems tailor made for distance education, able to broadcast a variety of content over great distances. As indicated in the example of Australia, rural or isolated students could receive regular lessons and follow a central curriculum. This present form of distance education developed gradually and forms only one model of how education by radio might work. Schools, states, school districts, and commercial broadcasters in the United States experimented with many forms of education by radio, as Bianchi in his detailed history points out (2008b). That work reviews each of the main programs and provides information on curricula, people, evaluation data, and history.

Education played a role in the development of radio in the United States. During the early years of the 20th century universities across the country experimented with radio, usually in their physics departments. A number set up radio broadcasting stations and by the mid-1920s, 124 schools held licenses for college stations (Rinks, 2002, p. 308). A number of these, especially in rural states, developed educational programming for farming communities. "The State University of Iowa designed programs in 1934 that were meant to be 'an integral part of the Iowa State High School

Course of Study'" (Cassidy, 2004, p. 132). Similarly Ohio State, in conjunction with teachers and the Payne Fund, organized the Ohio School of the Air in 1928 reaching over 100,000 students with "lessons in such areas as history, literature, health, and art" (p. 132). Few measured effectiveness. Unfortunately for many of these stations, changes in broadcast licensing by the federal government led to the sharing or outright loss of broadcast frequencies (see McChesney, 1993, for a history of the licensing debates and policies). Rising costs during the Depression also brought about station closures so that by 1935 only a handful of university-operated stations remained. Those that did typically allied themselves with state departments of education for agricultural extension courses (Rinks, 2002, pp. 301-312). Often the educational programming consisted of lectures by university professors.

During World War II, the U.S. military, in response to Congressional urging, recruited commercial broadcasters to provide educational programming on the Armed Forces Radio Network. This marked a change in U.S. distance education, since the educational content came not via lectures but from regular radio programming re-packaged from network fare—music, news or discussion programs, and some science pro-

grams. Later the unit in charge of the military educational programming produced its own original material and began to experiment with edutainment: educational material presented in an entertainment format (Culbert, 2002).

The military's use of existing radio programs highlights the fact that commercial broadcasters did take their licensing requirements to provide educational material seriously. Both the National Broadcasting Company (NBC) and the Columbia Broadcasting System (CBS) offered educational fare, the most notably being NBC's Music Appreciation Hour, begun in 1928 (Bianchi, 2008a, p. 37). The networks, together with state universities, worked to develop the "School of the Air" movement, an educational approach that had many of the trappings of a regular school, in that the School of the Air:

> • Presented courses of study (series) in a subject that was parallel to or integrated with either a specific or typical school curricula,
> • Arranged programs in a series to assist in cumulative learning
> • Designed individual program series for specific grade levels
> • Developed broadcast schedules that coincided with the school year
> • Distributed learning support materials such as teacher and student guides
> • Designed series for students between kindergarten and 12th grades . . . (Bianchi, 2008a, p. 36).

As we will note later in this review, the School of the Air merged distance education (a curriculum presented to those too far removed from the actual classroom) and supplemental education (educational content used in a regular class environment by a teacher to supplement in-class instruction).

As the U.S. broadcasters discovered that their programming could serve educational ends, particularly outside the classroom, they may well have followed the example of broadcasting authorities in other countries. European public service broadcasters, for example, consciously took on this role almost from the beginning. Grummell (2009) reports on the experience in Ireland of education provided by the public service radio and television. The educational charter and the challenges broadcasters faced in fulfilling it would seem to apply as well to other similar systems.

Operations separate from the national broadcasters seem more typical in other parts of the world. The Australian system, already mentioned, has government support but operates through the schools authority, independently of the national broadcaster. These Schools of the Air conduct regular classes for far-flung students. The students

> use high frequency (HF) radio transceivers to receive their lessons. . . This means that students can talk to each other as well as the teacher during classes. . . . A SOA covers all the same curriculum as any other school in the state, so SOA students are not disadvantaged. In fact, teachers try to tailor each package to the individual needs of the student so gifted students or those with learning difficulties are specially catered for and given individual learning programs. (Australian Government, 2007, ¶9-11)

The distance education model in this program mirrors regular classroom instruction.

Nigeria has experimented with indirect distance education for indigenous language learning. Such mother tongue programs make use of radio broadcasts by the national service which repeat the English-language news program. According to Adegoju's summary of previous research, "listening to news items in an indigenous language after the English version had been rendered would achieve the following: (I) word identification; (ii) limitation of possibilities of occurrence of words and ideas; and (iii) the prediction of upcoming words which will help the individual with comprehension processes" (2009, p. 252).

A South African initiative in the post-apartheid era turned to "interactive radio instruction" to help meet the nation's development goals. Interactive radio instruction seeks to engage students through "carefully designed audio programs" and draws heavily on the model developed and tested by researchers at Stanford University and the USAID (Potter & Naidoo, 2006, p. 65). The South African implementation drew on this approach; Potter and Naidoo comment that it is well grounded, introduced first in Nicaragua in 1974. "In the 1980s, 11 additional IRI projects were implemented, in Thailand, Kenya, Nepal, the Dominican Republic, Papua New Guinea, Honduras, Bolivia, Lesotho, Costa Rica, Ecuador, and Belize" (p. 65). Since then a number of African countries have also employed this model. In their review of the South African experience, Potter and Naidoo discuss the initial implementation of the distance education models and its later closer integration with regular classroom instruction. (Much of the research on interactive radio instruction, particularly as widely

implemented in Central and South America in the radio schools program was published in the 1970s and 1980s and so falls outside the scope of this review. However, see McAnany, 1975; Jamison & McAnany, 1978; Jamison, Searle, Galda, & Heyneman, 1981; Schmelkes de Sotelo, 1973; White, 1972, 1983 for more information.)

Naidoo and Potter (2007) offer further discussion of the South Africa project, identifying various ethical issues raised during its implementation. They describe a key issue from the very beginning:

> A central issue facing the project team was whether distance education by such radio could provide a feasible strategy for teacher in-service training and support while, at the same time, providing for learner needs through low-cost delivery of audio and print programs that ultimately could be provided at large scale. Using radio programs as a delivery medium had potential cost and breadth of outreach advantages, but they had the limitation of being broadcast at one time of day and without the possibility of being switched off and supported by direct instruction in the vernacular (where it was evident that learners had not understood the content). Ultimately the team decided on a multi-channel strategy . . . using radio, audio cassettes, print, video, workshops and school-based face-to-face teacher training, with ongoing external and internal evaluation based on participatory evaluation techniques . . . (p. 160)

The South African team faced significant questions in trying to improve education across the country: focus on urban or rural schools? Begin with a small implementation or a nation-wide program? In addition to curriculum development and program planning, the team also had to arrange for equipment in the participating schools, for teacher training for the best use of the distance education materials, and for ongoing donor support.

A different approach to distance education relies on informal or indirect education, often incorporating educational messages or the behaviors to be taught within entertainment formats, particularly popular soap operas. In reporting on an educational campaign in Tanzania, Mohammed (2001) explains that entertainment-education places key messages in mass media programming to inform the target audiences about, in this instance, family planning and HIV prevention. Mohammad notes:

> This direct information provision to the audience is followed by subsequent discussions among listeners or viewers and their peers. The two complementary processes of direct media information and peer discussion have been found to foster knowledge, attitude, and behavior changes in target populations. The entertainment- education approach has been used in diverse social and cultural settings, ranging from Latin America, to Asia, and Africa. (p. 138)

In reporting on the study of Tanzanian audiences, Mohammed found that listeners to the radio education program did indeed talk about its topics more among their interpersonal groups than did non-listeners or than with people outside their interpersonal networks. Such peer discussions did in fact increase knowledge of family planning and contraceptive use.

Two studies from India also offer evaluations of distance education campaigns. Sasidhar, Suvedi, Vijayaraghavan, Singh, and Babu (2011) looked at a traditional distance education program—a radio farm school providing instruction to rural poultry farmers. "Overall, the evaluation found that the farm school on radio with registered participants had a major impact on developing awareness, knowledge, and changes in attitude and in involving end-users in outreach activities" (p. 89). Prathap and Ponnusamy (2009) compared educational media for instructing women in villages of Tamil Nadu on rabbit farming. In this instance, radio education proved less effective in influencing knowledge retention than did new media or the Internet. On the basis of these results, they argue for a multi-pronged approach with a priority in setting up Internet kiosks in villages.

The use of multi-media approaches has gained ground in many places. José Perona (2009) reports how groups in Spain have coupled radio education with the interactive potential offered by the Internet. Various radio schools use the "edu-Web" to compensate for the one way, sequential nature of the traditional education offered by radio. Using a variety of Web tools, many of the Spanish radio schools (many of them associated with universities) now stream their audio content online as well as broadcast it (see José Perona, 2009, p. 109 for a list).

Although a number of projects add other, especially new, media tools to it, distance education by radio remains a viable method. Where older implementations coupled radio with written materials delivered by the post, the more contemporary ones seeks two-

way interaction, either through high frequency radio or through Internet connections. The more recent histories of Schools of the Air provide good reference material for future planning as well as provide important backgrounds on implementations. Well established organizations, such as the Asociación Latinamericana de Educación Radiofónica (ALER) provide a wealth a material, from research studies to curriculum planning on their websites. ALER is particularly important since it links and supports many of the first generation of radio schools and provides the models for many of the radio distance education programs throughout the world (ALER, 2011).

B. Supplementary education

As briefly noted in the prior section, schools have used radio as a supplement to regular classroom instruction, often to provide content that a local school cannot. One of the earliest and longest lasting, the NBC *Music Appreciation Hour*, hosted by Walter Damrosch, aired from 1928 to 1942 to schools in the U.S. and Canada. The program actually consisted of four series of programs, aimed at different levels of students: grades 3 and 4; grades 5 and 6; grades 7 through 9; and high school and college classes. Each series consisted of 12 weekly half-hour programs of musical performance and commentary each year (Howe, 2003, p. 67). "Damrosch never envisioned that his programs would substitute for local instruction. Though his lectures and teacher manuals provided good instruction, he said that they would not fulfill their proper mission unless supported by the classroom teachers' instruction and encouragement" (Bianchi, 2008a, p. 38). Some contemporary research did attempt to gauge the success of the Damrosch program:

> In terms of the stated objectives of the series, learning was small and about equal for those who did and did not hear the broadcasts. According to the authors, the series' major contribution appeared to lay in "certain long term values such as dispelling the concept of a symphony orchestra as [being] a formidable institution, [that] students find certain classical selections to be enjoyable, [and] looking forward to hear Dr. Damrosch's upbeat voice." (Bianchi, 2008b, p. 50, insertions in original)

During the same period, CBS offered the "American School of the Air," with classes such as "Frontiers of Democracy." The model, like that of NBC, sought to involve local classroom teachers in the radio education, not to replace them. Such schools of the air proved highly popular. "At their peak, they reached a combined weekly audience of approximately two million students, about 7% of the nation's K- 12 school children" (Bianchi, 2008a, p. 37). The CBS American School of the Air alone regularly reached students in 50,000 classrooms (Bianchi, 2008b, p. 74). Bianchi reports that many of these programs showed only modest learning gains over classroom-only learning.

As with most things in U.S. broadcasting, the Schools of the Air originated with mixed motives: an interest in technology, a desire to improve education led by newer educational theories, the desire to sell radio equipment, an attempt to gain public trust by the broadcast networks, a competition between NBC and CBS, and a move to counter Congressional pressure to set aside a portion of the broadcast spectrum for education (Cassidy, 2004, Ch. 3; Bianchi, 2008a, p. 38, 2008b, p. 75; McChesney, 1993). Ultimately, according to Bianchi's (2008b) comprehensive history of th schools of the air, the networks' pulled back from this educational programming due to a combination of factors: lessened competition, the FCC decision to split NBC into two networks and the consequent financial pressures on the new ABC (which inherited the educational programming), and the rise of television.

These early years also featured non-school educational programs about science and medicine. "Initially packaged in formats common to educational settings, such as talks by individual scientists" (Lafollette, 2002, p. 4), the shows eventually shifted to more palatable approaches, "adapting to the American listeners' expressed preference for drama and fast-paced entertainment, although the scientific community often hesitated to participate in such efforts to reach mass audiences" (p. 4). The broadcast networks offered such science programming from the 1920s to the 1940s, usually featuring popular individuals, and finding corporate underwriters for their popular science approaches.

In addition to the commercial broadcasters' efforts in the United States, a number of states, including New York, Ohio, Wisconsin, Texas, Oregon, and Minnesota, offered supplementary school programming. Emergency situations forced some school districts to radio schools—where the supplementary programming became temporary distance education schools: a polio epidemic in Chicago in 1937, an outbreak of scarlet fever in Milwaukee in 1937, an earthquake in Long Beach in 1935, a funding crisis in Dayton in 1938 (Cassidy, 2004, pp. 126-

127). In more normal circumstances, the radio programming, often prepared at state universities, presented courses that smaller schools could not: for example, the Wisconsin School of the Air offered curricula in "music, art, science, literature, current events, social studies, government, and conservation." This approach "succeeded because it 1) used radio in innovative ways to serve unmet educational needs, 2) focused on supporting classroom teachers, 3) built communities of learners, and 4) became part of a powerful statewide broadcasting network dedicated to education" (Bianchi, 2008a, p. 39). Many of these programs continued for almost 40 years, with some merged into educational television offerings.

The typical state-based school of the air offered a fairly set curriculum. In Ohio, the broadcasts occurred between 2 and 3 pm, in 15-minute program segments (Bianchi, 2008b, pp. 87-92), estimated to reach 50,000 students in the state (p. 96). Different states took different approaches, usually informed by one or another educational theory. Wisconsin's programs incorporated the experiential learning advocated by John Dewey (p. 114) while the Texas programs adapted the practice and extended the learner-centered approach, trying to connect education with vocational skills.

Finally, as indicated by Cassidy, a number of local school districts also offered their versions of educational broadcasting. Significant among these were Cleveland, Chicago, Rochester, Portland in Oregon, New York, Detroit, Alameda in California, and Akron. Each typically depended on the enthusiasm of a key leader and remained on the air between 16 and 62 years (Cassidy, 2004, Ch. 3; Bianchi, 2008b, pp. 285-290).

The overall radio education movement in the United States received significant impetus from the interest and support of a number of foundations. The Rockefeller Foundation, the Carnegie Foundation, and the Payne Fund all promoted radio education, funding both research into its effectiveness, curriculum planning and implementation, and experimentation with various models. The foundations did not limit their support to any one model. The Payne Fund preferred non-commercial educational radio and worked with the National Educational Association and the National Congress of Parents and Teachers for a publicly supported educational radio network (Richardson & Johanningmeier, 2006, p. 8). On the other hand, the Carnegie Corporation established the American Association for the Education of Adults, which supported commercial radio participation. The Rockefeller Foundation also supported this model and explored ways to disseminate research results about education via the radio. Its emphasis included both adult education through commercial programming and school education through partnerships with state and local school boards. It provided, for example, early financial support for the Wisconsin and Ohio Schools of the Air (pp. 12-13). Ultimately the Rockefeller Foundation supported education in the humanities and social sciences as well as investigations into how radio "could be used for public edification, control, and pacification" (p. 14), eventually supporting the beginnings of communication research as a separate social science field within the university curriculum.

Schools and school districts in the United States were not the only ones to employ radio education in the classroom. The South African program described above for its distance learning approach also targeted existing classrooms as a supplement, particularly for English-language learning (Potter & Naidoo, 2006). "The program's instructional system was both multimedia (involving linked audio, visual, and print materials) and multichannel (involving both support from a radio teacher as well as personal contact with program staff and other teachers)" (p. 68).

Language instruction appeared as a goal in many of the supplemental radio education programs. Boily (2004) describes the evolution of radio education in Montreal, with the Montreal Catholic School Board taking the lead in the 1930s, with courses in music, literature, and language. A few years later the Société Radio-Canada (the French language arm of the Canadian Broadcasting Corporation) joined the efforts. Responding to parental demand in the 1950s, the Montreal Catholic School Board, the largest French language school board in Canada, introduced language programming. "The board created school broadcasting designed to improve everyday language in students from grades 1 to 12. After the first series of programs proved a success, the board repeated the project the following year, broadcasting twice as many lessons" (p. 212). With the success of these classes, the government extended radio schools, especially for French language studies, across Quebec. Cultural and technological factors supported the rise of these supplementary programs in the schools—the demand for French language in Quebec, a growing vocal role of parents in school board discussions, and the availability of cheap transistor radios. In the long run, however, radio education fell out of favor, losing the support of teachers and pressed by rising costs for school equipment.

Some of the published research supports the use of radio for language learning. As part of a longer meta-analysis of material on the use of technology in foreign language study published in the *Modern Language Journal*, Salaberry (2001) considers the supplementary use of radio. After summarizing the pros and cons mentioned in early published studies from the 1930s (radio as an audio supplement vs. students not completing distance education assignments), he cites studies from the 1970s that acknowledge the "concrete" nature of radio in providing proper sounds of foreign languages. This worked as part of a pedagogical strategy: "the implementation of a canonical two-step sequence for the use of radio broadcasts: Students wrote down all or part of the material presented orally and, subsequently, selected written portions of the material were shown with an overhead projector" (p. 40). By the 1980s researchers had identified "13 major benefits such as access to an extended range of L2 expressions and a variety of dialects, contextualized teaching of grammar, listening to the target language spoken at normal speed, increased motivation by listening to original broadcasts, and development of an international perspective on topics selected for classroom discussion,

as well as increased levels of independent learning" (p. 40). With proper classroom support, the radio did indeed offer benefits for language learning.

The formal use of radio for in-classroom or at-home supplements to learning peaked in the United States and Canada in the 1940s and 1950s, though it continued in a number of states well into the 1960s, when educational television replaced it. The challenges to its success in the United States included problems with equipment, which lessened as time went on; incompatibility with teachers' needs and classroom schedules—the broadcasters determined the schedules for the programs; and a perceived conflict with the goals of the broadcast authorities. Where commercial broadcasters seldom developed or offered educational fare after the 1940s, the U.S. Public Broadcasting Service (PBS) continues to offer educational materials by radio, for both home and school use. In other parts of the world, radio programs developed for distance education services also find uses as classroom supplements, though some of the same problems with incompatibility with classroom schedules exist in other parts of the world as well.

3. Educational Television

Educational television in the United States and around the world largely built on existing radio school models with one exception: the possibility of closed-circuit television and, later, of videotaped materials. Led in the U.S. by funding from philanthropic organizations, especially the Ford Foundation and the Carnegie Corporation, educational television began in the 1950s (Cassidy, 2004, p. 157). Since that time, educational television in its various forms has become the subject of a great deal of research into its effectiveness and into the comparative advantage of various pedagogical approaches (Fisch, 2004; Pecora, Murray, & Wartella, 2007). As a general combination of communication technology in the educational field, educational television addresses all levels of instruction: preschool children, school age children, teens, college students, and adult learners. Initial efforts focused on adults, with attention to younger learners following.

As with almost every new technology, theorists and researchers greeted television optimistically, hoping that it would solve a multitude of teaching prob-

lems, from a shortage of teachers to a failing of schools (Cassidy, 2004, p. 159). The U.S. military had already made use of filmed instruction in training troops for World War II and by the 1950s had begun to experiment with instructional television. It found that instructional television hewed closer to standardized presentations and yet allowed quick changes in content, by having instructors use a prompter. "Military research also suggested, on a whole, that televised instruction was as effective, and sometimes more effective, than conventional instruction. Moreover, television had advantages that other forms of instruction did not, such as closeups, split screens, animation, and superimposition of images" (Cassidy, 2004, p. 163). School districts and universities quickly joined the research efforts, often with adult education as the target. The Federal Communication Commission supported the overall move for education by television by awarding a percentage of channel allocations to educational efforts in the 1950s. This helped provide an infrastructure for education; at

the same time some school districts built their own in-district or closed- circuit systems.

Perlman (2010) reports on one of the more unusual and interesting experiments to provide in-school instruction. The Midwest Program on Airborne Television Instruction began in 1959 and ran from 1961 to 1968, broadcasting educational material to schools across six states. Recognizing the limitations of terrestrial television broadcasting and seeking greater efficiency, the Program used two airplanes equipped with UHF transmitters to cover a wide geographic territory. Based at Purdue University (which had its own airfield), "from 1961–1968, the MPATI telecast five hours a day, four days a week, over two UHF channels (72 and 76) and served schools in Indiana, Illinois, Ohio, Michigan, Wisconsin, and Kentucky. During its experimental phase, the MPATI offered courses in college chemistry; elementary-level science, art, music, French, and arithmetic, as well as world history and American government for high school students" (p. 482). The system later added other courses, even for at-home adult education.

Consistent with their work in educational radio, the major commercial broadcast networks also provided some educational material. In the 1950s the Fund for the Advancement of Education worked with NBC to produce "Continental Classroom," with university-level courses intended for on-going education of high school teachers (Cassidy, 2004, p. 173). CBS offered "Sunrise Semester," produced by New York University with courses in literature, "classics, government, mathematics, Western civilization, physical science, and sociology. These programs generally had audiences of approximately 150 viewers enrolled for credit, and another 90,000 viewers watching for their own enjoyment or enrichment" (p. 174).

In 1967 educational broadcasting in the United States changed significantly with the government decision to establish a Corporation for Public Broadcasting to provide financial support for educational and cultural programming through government grants. "CPB also makes available some of the most entertaining, informative, educational, and culturally-relevant programming—including *Sesame Street*, *PBS NewsHour*, *Frontline*, *Great Performances*, *All Things Considered*, *Morning Edition*, and *Marketplace*—through the Public Broadcasting Service (PBS), NPR, American Public Media, and Public Radio International (PRI)" (Corporation for Public Broadcasting, n.d., ¶6). This decision both fostered the use of television for educa-

tional content, which the CPB-funded Public Broadcasting Service (PBS) provided through its network of stations, and relieved the pressure on the commercial networks to offer such programming. The PBS strategy encouraged local affiliate stations to produce educational programming and then share it across the network. "PBS and our member stations are America's largest classroom, the nation's largest stage for the arts and a trusted window to the world. In addition, PBS's educational media helps prepare children for success in school and opens up the world to them in an age-appropriate way" (PBS, 2011a). PBS programs serve both distance education purposes, with on-air programs available to every age group, and classroom supplementary purposes, with much of its material re-packaged for teachers to adopt in their individual lesson plans. Donlevy (2004) offers a discussion of one such effort, involving the PBS series, *Innovation*, in which the network prepared resources, websites, and teachers' guides.

The regulatory ground shifted again in the 1990s when the Federal Communication Commission instituted "the Three-Hour Rule, which mandates that broadcasters air a minimum of three hours per week of educational television for children to be guaranteed an expedited renewal of their license" (Jordan, 2004, p. 103). Many commercial broadcasters took advantage of this (though, as Jordan notes, some abused it by claiming cartoon shows as educational) and added educational or prosocial programming to their schedules. Often the network strategy combined education and entertainment, using their shows to indirectly teach values and behaviors to children. A long-running example (pre-dating the Three-Hour Rule) appeared on the ABC network. The network's "After School Specials" targeted teen viewers, teaching interpersonal and social skills through narratives. The "After School Specials (1972-95) employed a 'rehabilitative approach' in representing teen problems and addressing teen viewers. . . . This rehabilitative approach united television's 'turn toward relevance' with educational and sexually themed programming strategies from the era to create hybridized television content and a narrative structure that addressed teen viewers and teen sexuality proactively rather than protectively' (Elman, 2010, p. 260). The ABC programs, however, proved the exception; most educational fare on the commercial channels looked to younger children, but did tend towards an entertainment format.

Writing from Chile, Fuenzalida (2011) argues that both educators and television professionals should take the informal education aspect of television more seriously. Analyzing different Latin American television genres, he notes that they informally and probably unconsciously conceptualize education as affective rather than cognitive (p. 15). Paying attention to the audience, he notes:

> Research indicates that the audience does not value programs that are construed in an academic and harsh emotional tone of "teaching ignorant people"; on the other hand, the audience appreciates communication with a caring, inspirational and energetic tone when talking about housework and difficulties at home. Moreover, they highlight brief segments with useful information to help resolve the various needs at home. When the audience feels appreciated and accompanied by the program, this also translates into acceptance and confidence in the professional content. (p. 18)

Fuenzalida goes on to examine the indirect educational content of shows across the Latin American region: news programming, docudramas, service programs (for example, those focused on health, relationships, or conflict resolution), soap operas, and children's programs. Joining this data to the audience studies, he offers a model for the "reconceptualization" of education in the region.

A. Distance education

The strict division between communication technology used for distance education and the same technology used as a classroom supplement breaks down somewhat with television, at least televised education aimed at children, since much of children's educational programming, while viewed at home in the distance education model, actually works as a supplement to classroom instruction. At home, the children receive educational television under the supervision of parents rather than teachers. As noted above, in the United States, the Public Television System makes use of the same distance-education programming broadcast directly to the home in its re-packaged schools material. In the case of the adult viewers, these typically view educational television at home, with only a few formally enrolled in a for-credit course.

In the United States, the largest provider of educational material to the home is the PBS network. It depends as well on its member stations and independent producers for content, which it distributes to stations and schools. Its mission statement reads:

> PBS' mission is to create content that educates, informs, and inspires. To do this, PBS offers programming that expands the minds of children, documentaries that open up new worlds, noncommercialized news programs that keep citizens informed on world events and cultures, and programs that expose America to the worlds of music, theater, dance, and art. . . .
>
> PBS reaches more than 124 million people through television and more than 20 million people online each month.
>
> PBS is a private, nonprofit corporation, founded in 1969, whose members are America's public TV stations—noncommercial, educational licensees that operate nearly 360 PBS member stations and serve all 50 states, Puerto Rico, U.S. Virgin Islands, Guam, and American Samoa. (PBS, 2011c)

The PBS network has done extensive pre-testing of its children's programming. It offers 48 different programs through its PBS Kids area (PBSKids, 2009). Some other national television networks (all available as cable television networks) also offer children's fare. The largest of these are National Geographic Kids, Discovery Kids, Disney, and Nickelodeon (PBS, 2010, p. 4).

The children's programs have experimented with ways to reinforce learning. Akerman, Bryant, and Diaz-Wionczek (2011) "attempt[ed] to explain the present state of educational preschool programming in the context of an ecological and evolutionary model" by examining three key shows (*Sesame Street*, *Blue's Clues*, and *Dora the Explorer*), noting "their innovative approach to format, curriculum, and research" (p. 204). Jennings, Hooker, and Linebarger (2009) look specifically at literacy, particularly as presented on the PBS *Between the Lions* program. They note that "research on children's television suggests that preschool programs can facilitate literacy and language development" with content and screen time as key variables (p. 229). Comparing two models of literacy learning, "inside-out" (decoding print skills) and "outside-in" ("placing written language into context through oral language"), they closely studied both program episodes and child learners (pp. 230-231). They conclude that a carefully designed children's program, such as *Between the Lions*, can indeed teach both sets of literacy skills.

The United States, of course, is not the only country to employ educational television broadcast to the home. Both the success of children's television in the U.S. and its relatively low-cost availability prompted other countries to follow this model. Moran (2006) provides a brief run-down of the export policies of a number of U.S.-based producers and networks, including Nickelodeon and Disney (pp. 289-290).

In other instances, national broadcasters had already begun educational programming. In a lengthy review of material published in several incarnations of a British educational television journal, Moss (2006) recounts how the distance education or direct-to-home model succeeded in Britain more than an in-class educational supplement model. As this became more apparent, the BBC put more resources into the home delivery of educational content. One of the key successes connected with this service is Britain's "most remarkable educational innovation of the post-war era, the Open University (OU), relying for its distance education work initially on broadcasting through a close relationship with the BBC" (Moss, 2006, p. 69). Love and Banks (2001) find that newer, digital television, with its capacity for two-way interaction provides a better learning environment for adults with basic skills needs. They report on the success of a pilot project in Great Britain aimed at testing these kinds of basic skills interactive instruction. Briggs (2009) examines a particular BBC preschool channel, Cbeebies. Its programming promotes "the notion of 'learning through play'" and makes "connections between this and citizenship." At the same time, such children's fare also "construct a version of the 'responsible parent'" (p. 23), educating both child and parent in the preschool years.

The PBS affiliated Sesame Workshop (formerly Children's Television Workshop), the producer of the children's program, *Sesame Street*, partners with producers in other countries. "Through licensing agreements, Sesame Workshop provides—in fact mandates—other countries the opportunity to create a quality children's program using the *Sesame Street* concept" (Moran, 2006, p. 291). Moran offers a fairly detailed case study of the localized version, *Barrio Sésamo/Barri Sésam*, produced in and for Spain in association with Radio Televisión Española (RTVE). Aspects of the children's program changed, according to one of the Spanish producers:

> The characters are from here [Spain] with the incorporation of some characters of different ethnic backgrounds, reflecting a bit the differ-

ent people that coexist in Spain. For example, we have a gypsy family since we have a very prominent gypsy population here in Spain. We have a character that is black, originally from Egypt, to represent the different ethnic groups, and we also have a character from Morocco who is a waiter in the hotel and he is a student paying his way by being a waiter. Also to reflect Spanish life, since there is a rise in immigration, we are trying to promote good relations between different races and cultures. (Moran, 2003, pp. 295-296)

However, the educational concepts and the key ideas remained the same in the Spanish version of the show (p. 297).

Guerra Liaño, (2008) provides a more general overview of the possibilities of educational television used within the family in Spain. Offering a case study of the program, "Del Cole a Casa" ["Home from School"] in Cantabria, Spain, she shows how parents use the program with their children to continue their school learning. Marín Montín (2008) takes a very different approach to the educational value of television in Spain by arguing that televised sports programs expand the scope of education. "From the educational viewpoint, video replays allow the analysis of gesture and action in sports" (p. 517), something which parents and coaches can use in physical education training.

The Flemish public service broadcasting authority in Belgium set a number of educational goals for its regular service: to provide "nation formation and cultural education" (Van den Bulck, 2009, p. 323). Van den Bulck (2009) argues that, with the emphasis on Flemish culture and identity, the broadcaster engaged in a broadly educational enterprise through its scheduling policies, creating a kind of national curriculum throughout the broadcast year, with certain expectations at different times of the year.

Katz (2002) regards television as a second generation distance education platform in Israel. Introduced in the 1960s, television "provided students with an improved delivery platform. Both first- and second- generation distance learning delivery systems were designed primarily to produce and distribute learning materials as efficiently as the technology of the day permitted (p. 148). Oren (2003) places the development of these systems into a larger cultural context, seeing the establishment of the Israeli educational television service as negotiating "cultural pressures, political anxieties, public speculations, and industry marketing campaigns" (p. 167).

In the early days after independence, Nigeria quickly established television broadcasting, with one stated aim as the provision of distance education. Some educational content, particularly for the primary and secondary levels, directly addressed students in classrooms that lacked qualified teachers. However, most such enterprises failed due to a "disappointingly small audience, faulty receivers, inadequate publicity for the service and inconvenient time table, and the high proportion of untrained teachers in the primary schools, secondary schools, and teacher training colleges" (Adegoju, 2009, p. 255). As part of a renewed effort, the government has set up a dedicated educational television channel, which can provide both in-class supplemental education and, Adegoju recommends, "general educational programming which involves providing non-formal educational opportunities" (p. 256), particularly in mother-tongue literacy.

South Africa has also aggressively pursued the development of distance education. Ivala (2005) reports on such education as a tool for national development education as well as "the production, distribution, and consumption of the television program 'Liberty Learning Channel Programme'" (p. 147). Unfortunately, according to Berger (2009), the South African Broadcasting authority still suffers from the politicization begun during the apartheid era, thus hindering its educational potential as public service broadcaster and provider of educational content.

In Ethiopia, the independent group Whiz Kids Workshop has produced several series of children's and early childhood television shows, featuring animations and puppets. The first series focused on health and hygiene while the more recent one addresses literacy training, helping children learn the complexities of the Amharic alphabet (Africa, 2009, ¶9; Whiz Kids, 2011).

Indonesia has witnessed an "exponential growth" in children's television over 40 years, with an increase in programming corresponding to an increase in the number of commercial stations licensed by the government. However, Hendriyani, Hollander, D'Haenens, and Beentjes (2011) report that the trend is not necessarily beneficial: "In the early days, local production outnumbered imported programs, and most of the programs were educational in scope. Nowadays, the majority of children's television programs in Indonesia are cartoons imported from the U.S." (p. 86).

As its name implies, the Shanghai Television University provides distance education, primarily to the people in its region. "SHTVU educates working and mature students, some for full degree courses, and many for 'just-in-time' training and vocational upgrades, and short courses" (Donald, 2009, p. 26). In 2001-2002 the University moved the programs with the "most popularity, including some educational shows, and therefore the greatest share of the target audience, to a pay TV system, and away from the free-to-air channel" in an attempt to increase revenues (p. 27). At that time the station had existed for almost 30 years and had an established reputation. Donald describes its situation:

> Open-learning courses with a BA option were introduced in 1996, and the first full graduation from that initiative took place in 2004. By the late 1990s, the University had developed a sophisticated distance learning approach to its work, where interaction between learners, teachers, and technology was valued. Under the direction of the Ministry of Education, the University in 2000 became part of the Shanghai Distance Education Group—comprising Shanghai Television University, the Shanghai Education Television Station (Green Leaf), the Audio-Visual Education Institute, and the Shanghai TV Secondary Specialized School—a technical facility with 10,000 registered students. There were, in 2004, 26 areas of specialization, with the most highly subscribed currently in Business, Administration and Logistics. Law, Economics, Foreign Languages, Chinese Literature and Culture, and General Sciences are also available. (p. 30)

This distance education program, aimed at adult learners rather than children, is well established and supported by both the educational establishment and the regional government (p. 33).

Distance education programming exists throughout the world, in many instances directed at children. Faced with rising populations desiring additional education, many countries have also fostered distance programming for adult learners. The models vary according to the educational systems and the broadcast models in each country. The educational approaches described here—based on research published in the last 10 years—represent only a fraction of those available, but do give a sense of how educators have employed this one communication technology.

B. Supplemental education

In addition to distance education, television also provides supplementary education in classrooms,

either in its broadcast form or through broadcast materials made available in videotape or DVD formats. Lee and Winzenried (2009) offer a summary of these materials and how teachers use them (pp. 61-73). They do note, however, that only a small percentage of teachers in the groups they studied used such materials extensively and that even fewer use them "as envisaged by the advocates of educational television" (p. 73).

As with distance education by television, the supplemental use of television in the classroom has a long history. Cassidy's history indicates that instructional television in the classroom began first in the United States, with universities such as Iowa State leading the way (2004, p. 157). In addition to statewide projects, other experiments took place, one in Hagerstown, Maryland in 1956 aimed at elementary school teachers in need of teaching credentials, "with 35 telecasts being aired each day across a wide range of subjects. By the end of the decade, 122 lessons a week in all major subjects were being transmitted live, plus another 19 filmed or taped lessons" (p. 167). By the mid-1960s, much of the glamor and hype of classroom instruction by television had worn off. Cassidy cites a number of problems: poor quality, poor pacing of instruction, too much of talking-heads program style, too little attention to the students as active learners (p. 179). In addition, some teachers feared for their jobs, thinking that the televised classes would replace them.

Some of these problems persist to this day. Hobbs (2006) examined various classroom practices with television and visual content. More publicized complaints often address inappropriate content shown to younger students. However, Hobbs calls attention to a failure of in-classroom television or video due to structural issues: "no clearly identified instructional purpose," "no use of pause, rewind, or review," "large group viewing" to "give teachers a break," teacher disengagement from the material, teachers using viewing as a reward, teachers using television only as an attention getter, and teachers using "video to control student behavior" (pp. 41-43). She stresses, as have many instructional technology specialists, the need for appropriate use if television or other visual will prove successful teaching aids. In an attempt to address these kinds of issues, PBS has created a number of resources for in-class use, together with ideas on how to integrate them into classroom lessons (PBS, 2011b).

Kelley (2009) reports on the use of television in the classroom to teach journalism and learning theory. In this study, children and adolescents produced news-type shows in a kind of experiential education. The researchers remarked on differences between the younger and older student productions in category, form, pace, and length, with the younger students hewing closer to learning theory models and the older students to what they see on television (p. 33). The experiment holds added interest in that it returns to a common practice in the 1930s with students producing radio shows as a way to study a particular subject matter (Cassidy, 2004, p. 124; Bianchi, 2008b, p. 165).

Other countries have made use of in-class television. British journals wrote about a number of projects in the 1950s-1960s to provide university lecturers from a central site to lecture theaters around various cities (Moss, 2006, p. 69). The journals reported less success at other levels and even fewer studies about the use of television in Commonwealth countries' schools. Adegoju (2009) reports some more recent attempts to bring television again (after some initial failures) as supplements into classrooms in Nigeria, though he admits that an effective program would prove quite costly (p. 256). South Africa, as seen above, has tried to integrate televised instruction in a number of ways. Evans (2004) reports on an attempt in Pretoria "to assist Grade 12 learners prepare for their final examinations via interactive, televised lessons in key subjects" (p. 7). Surprisingly, student interaction remained low; when asked, students explained that the presentations were so clear that they had no questions, that they felt too shy to ask questions, or that they lacked confidence in their English speaking abilities (pp. 14-15). None reported problems with the communication technology itself, providing at least an indirect indicator that successful implementation of communication technology in education depends less on the technology than on the teacher-student relationship and design of the class materials.

The last 10 years have seen relatively few studies or reports on the use of television as a classroom supplement, most likely because digital technology and ICT (Information and Communication Technology) has supplanted television and visual content as standalone formats. Even the large content providers, such as the PBS in the United States, have shifted most of their in-class materials to web-based delivery.

4. Telephony and Mobile Learning

Telephony may seem an unusual communication technology for education, but the advent of smart phones and various kinds of conferencing (including videoconferencing) have led a number of teachers and educational programs to look more carefully at its possibilities. Generally referred to as mobile learning, "the use of mobile or wireless devices for the purpose of learning while on the move," (Park, 2011, p. 79), telephone-supported learning can appear either as distance education or as a classroom supplement. Park (2011) proposes a classification of different kinds of mobile learning, based on the technological affordances of the devices employed and on "transactional distance." The former refers to whether the devices easily support productivity (calendars, grading), physical access (interactive prompting), data access, or full communication and collaboration. These depend in some measure on the size of the device, the kind of screen, built-in functions, integrated video, and so on (pp. 81-82). The latter "presents a definition of distance education which implies the separation of teachers and learners" (p. 84); Park's classification depends on how much the educational function depends on real or virtual presence of students and teachers to one another. His typology offers four possibilities based on low versus high transactional distance and individualized versus group activities. In each, a telephonic device plays a different role (p. 89). Park offers the model as a guide to designing educational programs and choosing appropriate communication devices.

Decuypere, Simons, and Masschelein (2011) take a different theoretical approach, proposing actor-network theory as a way to understand the effectiveness of mobile education. Drawing from Science and Technology Studies, actor-network theory (see COMMUNICATION RESEARCH TRENDS, Vol. 30, no. 2 for more on how this relates to communication study) focuses on the social construction of technology. Decuypere, Simons, and Masschelein propose a research focus on the mobile devices, how people use them, how teachers and students adapt them to learning, and the communication or network connections among these ideas.

Kukulska-Hulme (2010) offers a slightly different theoretical model, but one also based on how adult learners actually use mobile telephones in their learning. The research discovered a number of things—

innovations in learning by the learner—that the teachers did not necessarily anticipate. These include

> • *Collectively there are countless ways to use a personal mobile device to support learning.* This may seem self-evident, yet there is an important point here. Owners of personal technologies do not normally receive training in their use; instead, they learn informally from friends, work colleagues, and family. A more complete picture of possible uses of mobile technologies to support learning would perhaps enable learners to make better purchasing decisions and to take greater advantage of the devices already in their pockets.
> • *Photo-sharing could be a route to informal learning and then formal learning with others.* Taking photographs and sharing them with others is a highly popular activity which is facilitated by camera phones, photo sharing sites, and the relative ease with which photos may be posted on blogs. Users report liking the supportive feedback obtained by having others comment on posted photos. It may be a relatively nonthreatening way to begin to turn an informal interest into more formal study.
> • *Usability of mobile devices is learner- and context-dependent.* Many learners are perfectly happy to read on a tiny screen, whilst for others this is a major barrier. User experience also depends on lighting, ambient noise, environment of use. Learners want free and reliable wireless access to the Internet; this is often a major factor in continued use of a mobile device or its rejection. (pp. 7-8)

She and her team also found differences in the uses to which students put mobile telephones in the different countries they studied. For example, Australians sent photos and recorded videos for use in presentations; those in Hong Kong used dictionaries to practice English and downloaded books; the Portuguese participants took quizzes and listened to podcasts; those in Sweden listened to educational radio, learned songs, or conferred with more expert friends; and those in the U.K. sent texts to the Moblog community and read blogs (p. 8). After tracking changing uses over the years of the study Kukulska-Hulme urges a learner-centric design of using communication technology. "Mobility, awareness of con-

text, and learners' specific needs become genuinely important stimuli for adoption of mobile technologies and innovative design for learning" she concludes (p. 11).

A. Distance education

As part of a wider review sponsored by the International Development Research Center, Rashid and Elder (2009) note that research on the potential of mobile telephony for distance education remains at the very early stages. However, they find several noteworthy projects. The PANdora network in Asia surveyed users and looked at "the socioeconomic and gender based factors that motivate or hinder cell-phone subscribers to use SMS for non-formal education. . . . The majority of the respondents [in Manila] are open to the idea of learning through SMS and are willing to set aside a portion of their load credits to learn through SMS." Based on other research projects in the region, they conclude that "SMS could be a viable technology for delivering distance education courses" (p. 11). Mifsud (2002) also sees potential, particularly since "mobile technology can be used as a bridge between the formal and informal learning arenas" (p. 112). Lim, Fadzil, and Mansor (2011) report on how Open University Malaysia "embarked on a Mobile Learning via SMS initiative in an effort to support distance learners, who are mostly working adults, and to make learning more flexible and ubiquitous for them. The initiative may be considered the first and only one of its kind that has successfully been implemented on a large scale (to date involving an approximate total of 13,200 learners) by a Malaysian higher education institution" (p. 123). The SMS project, began in 2009, incorporated five categories of SMS contact: class content, class forums or discussion, tips or strategies to help the learners succeed, motivational messages to urge perseverance, and course management, reminders, or assessment (p. 126).

Similarly, Stone, Briggs, and Smith (2002) tested the effectiveness of different kinds of SMS during a youth-oriented campaign in the U.K. Based on the results from this non-educational use, they recognize a strong potential for mobile learning. "These results demonstrate that it is possible to take mobile phone users on a complex 'journey'; i.e., where a series of interactive SMS exchanges may be required to achieve completion of a task or goal. . . . The results of this experiment also show that such m-learning applications can have depth and complexity" (p. 150). Leander (2011) did a similar exploratory study in Senegal, where mobile communication and texting have quickly become staples among the young. She looks to see how texting can function in African language literacy. "The analysis shows that African languages are given different roles and values in texting, being used in monolingual messages, in functional code switching, and in mixed code messages" (p. 427). De Jong, Specht, and Koper (2010) also examine the use of mobile telephony in language learning. Reviewing the literature on the different practices, they divide them into passive (receiving course content) and active (speaking and hearing the language), noting too some studies that used location, where students learned vocabulary according to their place in a city, for example (p. 111). With this basis, they designed an experiment to test different methods based on context of material and available user interfaces (p. 112). Even with a small sample, they found differences in preferences and knowledge gain, with location-based learning scoring more highly (p. 116).

This use could be adapted for distance education. Gómez and Martínez (2008) comment on the situation in Spain, offering observations on how mobile telephones have changed the whole situation of distribution of educational and other materials. Beyond finding ways to more effectively use this new system for education, they also call for educators to help students understand the new media world.

Shohel, Mahruf, and Power (2010) present a case study from Bangladesh, where English-language teachers worked on professional development and certification using iPod technology as the mobile learning platform. This distance education format became vital in districts where teachers lacked qualifications but remained too far removed from university centers. Participants received text messages, podcasts, video of classroom practice, and audio recordings of readings, songs, poetry, and discussions (p. 201). The teaching model employed with the technology highlighted four activities: "communicate, connect, create, and community" (p. 203).

Three studies examine, not mobile telephony, but fixed line applications. Ko (2006) investigates the potential of telephone conferences (both audio and video) to provide distance education training for interpreters. Because interpreting involves both visual and verbal interaction, most schools require a classroom setting. However, he reports pilot projects in the United States, Canada, South Africa, Australia, and China to prepare interpreters via distance education programs. Looking at a number of these programs in detail, Ko analyzes teaching methods and technologies, highlighting pros and cons. He concludes:

Currently, the availability, reliability and afford-ability of any single medium to adequately meet the requirements of synchronous verbal and visual interaction in teaching interpreting are limited. Compromises will need to be made, whether in terms of cost, traveling distance, lack of visual interaction, unsatisfactory verbal and visual interaction, or increased self-study, depending on the technologies and pedagogies to be used. However, these constraints do not necessarily mean that teaching interpreting by distance mode, using one or a combination of the available technologies, is impossible or ineffec-tive. (Ko, 2006, p. 91)

Zdenek (2004) offers a brief demonstration of an assignment to show the possibilities of teaching some-thing as concrete as web design over a distance learn-ing telecommunications link up. By breaking it down into discrete steps, he maintains that even relative beginners can succeed. Finally, Horton-Salway, Montague, Wiggins, and Seymour-Smith (2008) pres-ent research results on actual student and tutor verbal behaviors during telephone conferences. They identi-fied "four common sequences of TTCs [telephone tuto-rial conferences] as 'calling in,' 'agenda-setting,' 'tuto-rial proper,' and 'closing down'" (p. 737), sequences they find similar to face-to-face interactions. Based on these results they see great potential for more use of telephone conferences.

Others have investigated the challenges that the communication hardware and practices face in order to make this kind of distance education viable. Trifonova and Ronchetti (2006) examine data handling for mobile learning since educational applications typically require more data storage than single text messages. Carrington (2005) comes at the issue from a different direction—the orthography of texting and how students have created their own spellings and usages, a difficulty that follows any potential distance education into the traditional classroom. An impact on the classroom also comes from students texting instead of attending to class activities.

B. Supplemental education

A variety of telephone technologies have also entered the classroom, used in a number of supplemen-tary roles. Audio- and video-conferencing lead the list, but some places have also experimented with texting and other mobile devices.

Eaton (2003) offers some early examples of confer-encing for business classes, the simplest employing a speakerphone to have guest lecturers address the class.

She also mentions using mobile devices to access online classroom learning systems and student portfolios. Though somewhat dated, her report serves well to show the state of classroom telephony only eight years ago. Salvati (2001) focuses on the use of conferencing in the K-12 school system, reporting on a 10-year project in New York city schools. Terming the use of such confer-encing a challenge, due to everything from class sched-uling to different pedagogical models, he recounts a num-ber of successful class programs. In addition the system also worked in linking schools outside of class hours: "interschool student leadership meetings, district wide PTA councils, college orientations, and interschool debating competitions. lt never ceases to amaze those who witness it that students from the Bronx view their Brooklyn counterparts as foreigners" (p. 279). Salvati ends the review by suggesting eight key factors for a suc-cessful program, ranging from support of school admin-istrators, having a local champion, and good working equipment to adequate funding and outside learning groups (pp. 280-281). Engel and Green (2011) report on a pilot project to use cell phones in a high school pre-cal-culus class. They began by explaining the project to the students and letting the students themselves set the guide-lines. The students chose "a few simple rules: (a) students should only use SMS texts for class work, (b) texts should be respectful and relevant to the discussion, and (c) cell phones should only be visible when needed to complete classroom activities" (p. 40). Faculty then taught the course, incorporating the phones in three ways: "1) as an audience response system, 2) as a research tool, and 3) as a tool for collecting evidence of student work through photographs and video recordings" (p. 40). During the course of the year, faculty noticed a number of successes: increased student participation, more reflec-tion on the assignments, and better assessment.

At the other end of the educational spectrum, Valaitis, Akhtar-Danesh, Eva, Levinson, and Wainman (2007) report on using conferencing in health sciences education at McMaster University in Canada. Using stan-dard research methodologies, they identified three types of users: positive communicators who enjoyed using the technology, shy enthusiasts who preferred the technology to face-to-face interaction, and pragmatists who saw its value but also its difficulties. Ertl, Reiserer, and Mandl (2005) also report on finding the best ways to use these technologies in the classroom. They summarize the results of a research program in Germany in which they varied the collaborative styles in a videoconferencing environment. They found that having a clear content

scheme—that is, specific units of meaning or evidence—helped the collaborative learning more than having a scripted approach with which to cover the material.

Language teachers have also found telephony helpful in the classroom. Fox and Fraser (2009) discuss assessment tests to measure language proficiency prepared by commercial vendors and administered over the telephone. Holtzer (2002) describes a much more ambitious program in which language students in Scotland and France paired up in native–non-native speaker telephone interactions. This allowed them to practice expression, conversation, topic control, and sociolcultural competencies (pp. 236-238). Holtzer concludes that the program

> program is based on an active and interactive perspective: the user-learner of a foreign language is a social player who uses her receptive and productive L2 [second language] communication skills in interactive situations with another social player who is a native speaker of the target language. In this exercise, using real language in real time, an interaction is built up by both players. One consequence is that the development of the linguistic competence of the user-learner depends to some degree on the contribution of the native speaker participant. (p. 241)

This means, of course, that the telephone links puts the students into both roles: that of the native speaker and that of the language learner.

Faculty have also explored integrating text messaging and SMS into classroom instruction. Holley and Dobson (2008) describe both a class project and the evaluation of its effectiveness in which they worked with non-traditional students enrolled at a British university. Introductory classes, with 1,000 students enrolled across two geographic locations, blended in-class work and discussions with out-of-class assignments. In one, for example, "the students visited the Tate Modern and then facilitated their discussions by sending each other SMS text messages; they bonded very quickly in the seminar groups, where weekly online tasks that had been prepared individually 'outside' the classroom were the focus of group discussion and debate 'inside the classroom'" (p. 139). Holley and Dobson conclude that the student use of texting helped to bridge their personal work habits with those of the class.

Just as with telephony in distance education, the use of telephone services in classroom education presents some problems. Apart from the technical ones, others emerge in classroom management. Wei and Wang (2010) examine the challenge of students using texting in class for non-class purposes. This distractor behavior relates more to students "daily texting usage" rather than to their class motivations or to the teacher's immediacy and dynamism (p. 475).

Finally two studies examine the benefits of mobile telephony not for the classroom but for university and school administration. Ghini, Pan, and Salomoni (2000) examine current practices and propose a management architecture that could handle administrative tasks, such as "exam registration or communication of exam results, meeting call, remote evaluation of test results, [and] delivering of e-mail and fax" (p. 1). Writing several years later, Naismith (2007) reports on a trial of a telephone text messaging system, with generally positive results: "Students reported high satisfaction with the quantity and content of the text messages and tutors reported changes in behavior that were directly attributable to the use of text messaging. Administrative staff members were able to integrate this service into their current means of communicating with students, though there were some difficulties in composing appropriate text messages" (p. 155).

A number of corporations and institutes offer support for mobile learning. Apple Computer's education pages offer suggestions for using its technology in schools, particularly the iPhone and the iTunes site (http://www.apple.com/education/resources/). The Pearson Foundation, the non-profit arm of the Pearson media group, has set up the Mobile Learning Institute to explore how digital media, mobile devices, social media, and always-on Internet access has changed education (http://www.pearsonfoundation.org/education-leadership/programs/mobile-learning-institute.html). The U.S. Smithsonian Museum, through its education division sponsors a series of mobile education workshops for educators and teens (http://www.smithsonianeducation.org/educators/professional_development/mobile_learning_2010.html). Athabasca University in Canada sponsors a Mobile Learning portal to provide information and research on mobile learning (http://adlib.athabascau.ca/index.htm).

As a simple, ubiquitous communication technology that requires little infrastructure investment by schools, telephony has found more and more educational applications. Existing equipment easily supports audio- and videoconferencing and features such as SMS texts allow students to make school use of communication approaches they practice daily.

5. Computer-based Technologies

The use of computer-based technologies in education has grown rapidly in the last 10 years, fueled by commercial interests and parents as much as, if not more than, by schools. The widespread adoption of the home computer has resulted in a different kind of distance education: an early childhood education practiced in the home using a variety of software and web-based products. Other software and websites target teen and adult learners in informal education. Because of its focus on communication, this review will not consider computer-assisted instruction proper, that is, instruction in which the student interacts with a computer for subject matter drills or to learn a specific computer skill. Cassidy reviews some of these under the heading of "automated instruction" (2004, Ch. 5) and Lee and Winzenried consider a number of related computer technologies as a "digital toolkit" (2009, Ch. 14).

The blossoming of computers as communication tools in education has also triggered a number of books offering both research results and practical guidance for making effective use of these new tools. Among those published in just the last five years, we find some focused on specific technologies or technological applications—wireless (Warschauer, 2006), tablet PCs (Reed, Berque, & Prey, 2008), web-based materials (O'Neil & Perez, 2006), and social media (Wankel, Marovich, & Stanaityte, 2010)—best practices for university teaching (Rosen, 2009; Lytras, Gaševíc, Ordóñez de Pablos, & Huang, 2008), help for the secondary school curriculum (Ameis, 2006; Berson et al., 2007), and global uses and curricula (Kinuthia & Marshall, 2010; Kamenetz, 2010; Mendes Neto & Vilar Brasileiro, 2007).

The fact that computers can simulate any kind of communication activity—print-based, music, other audio formats, images, animations, video, network connections, and so on—makes many of the educational applications variations on what existed before (as seen in some of the media already reviewed). However, the newness and growing availability of computers have given educators the chance to more carefully design how to teach. A number of researchers have argued that educators should not simply re-create the traditional classroom, but take advantage of what new communication and information technologies

offer. Bransford, Vye, Bateman, Brophy, and Roseli (2004), for example, propose a learning system that begins with the specific learning goals and then creates a learning environment that is knowledge centered and responsive to how people learn. On the other hand, at least at the beginning of the period under review, some found that people did not take advantage of this opportunity. Clark, Bewley, and O'Neil (2006) reaffirm findings from a few years before about educators' selecting distance education communication: "most gave an illusion of rationality and scientific precision to what were, at best, decisions driven by practical and economic considerations, and at worst, by invalid assumptions about learning, learners, and the effects of media upon these" (pp. 133-134, quoting Sugrue & Clark, 2000). Clark and his colleagues are among the few who urge educators to take the capacity and characteristics of the different media into account in planning educational uses. In reviewing a number of studies and proposals, they found that people showed "little consideration of media nor of media influences on learning or content" (p. 134). As a corrective—one sensitive to media ecology concerns—they argue that learning models require different media according to the goal of teaching. For example, sensory mode learning (a cooking class is such a case) requires face-to-face contact and physical manipulation of materials; conditional mode learning benefits from simulations that allow the student to try out different initial conditions; learning that requires real-time, synchronous feed-back needs face-to-face or videoconferencing (p. 137).

Educators at every level (adult or university learning, secondary school, primary school, and preschool) make use of communication and information systems in both distance education and supplementary education formats, though some e-learning tries to merge the two in blended education systems.

A. Distance education

A great deal of online and computer-based distance education (now often termed "e-learning") has its origins in corporate training programs (cf. O'Brien, 2009) that allowed workers to complete online tutorials and other job-enhancement programs. Waldeck (2008) describes one such program (for landscape architects

and workers) and the contributions that specific communication theories made to its more effective implementation. Ahmed, Coughlan, Edwards, and Morar (2009) provide a very different example of the use of multimedia programs for ongoing medical education. Similarly, Noordman, Verhaak, and van Dulmen (2011) describe how a web-based system helped improve physician's communication skills. From these kinds of origins, school administrators faced with growing pressures on enrollments and finances have tried to extend the model to tertiary education. Bejerano (2008) provides a detailed background and history of online education systems, particularly those leading to a degree. With a grounding in communication study, she expresses some concerns about such programs: "However, the widespread adoption of this type of instruction has led critics to question whether students who take online courses and programs are getting the same caliber of education as their face-to-face counterparts, or if they are missing out on important variables that will help them succeed" (p. 411). Among her concerns are the quality of interaction with faculty and other students, the level of attentiveness students bring to such programs, and difficulties in matching technology to learning goals (pp. 412-413). A detailed meta-analysis of research comparing distance learning with face-to-face learning urges a more nuanced conclusion. Allen, Bourhis, Mabry, Burrell, and Timmerman (2006) reviewed prior work on student performance, satisfaction, and learning styles across the two methods of communicating educational content. They conclude:

> The essential conclusions of the current meta-analyses demonstrate that there exists little difference in outcome when one considers the level of student satisfaction or performance between either courses taught in traditional F2f formats or by DL procedures. The outcomes of these two meta-analyses demonstrate that the expectation that DL is somehow different from traditional education appears unwarranted.
>
> The most interesting finding comes to the issues of dealing with learning styles and the association with the particular method of instruction. There does exist a relationship between the learning style of the student and the satisfaction and performance in the course. . . .
>
> The findings indicate that rather than a broad argument in favor of or against distance education, the issue is the relationship of how the student learns to the particular structure of the educational material. (pp. 240-241)

Allen and his colleagues go on to suggest that both methods have a place in higher education; and that, because higher education involves not just a single course but a coordinated program over several years, it is unlikely that students will favor the same learning styles in all courses. In other words, students will shift preferences depending on subject matter, thus making distance learning (and e-learning more generally) inappropriate for some students in some courses.

Hamilton and Cherniavsky (2006) approach a related question—the choice of synchronous versus asynchronous learning—from a slightly different perspective. While face-to-face interaction always remains synchronous, distance education can cover both situations, with online connections allowing either. In examining the comparative advantages of each style, they look at, among other things, the communication characteristics of both, the representational forms used in the media, technical matters such as bandwidth, and learner preferences (control of activities, persistence of information in the setting). They urge teachers to take each of these factors into account in choosing a pedagogical framework (pp. 87-88).

The awareness of communication variables in designing online or e-learning emerges as a theme in a number of studies. Lucera, Fuks, Raposo, Gerosa, and Pimentel (2007) report on a project that highlighted communication in designing a web-based distance education course. A critical factor emerged in the course's ability to bridge students and faculty, which led to significant outcomes in how the students actually used the site. Wallace and Mundell (2003) describe how they incorporated various communication modalities into a web-based course. Students could make use of "voice, video, text chat, file transfer, and data sharing" (p. 103). At the time of the study (in 2002) students preferred e-mail and text-messaging as communication channels (pp. 104-105). Mayor and Ivars (2007) judge the communication aspect essential for teaching translation and interpretation in online settings. Among the advantages of a fully-interactive environment they list the expansion of the student population to those unable to travel to the university, the responsibility taken by the students for their own learning, and the transformation of the faculty member to a learning facilitator (p. 296). In a collection highlighting "best practices," Fong and Hui (2005) review various technological solutions for improving communication and lecture delivery, including video. In the same collection, Steinbronn and Merideth (2005) examine the connec-

tivity needs for students and faculty in e-learning. Highlighting the issues of isolation—students feeling alone, faculty feeling without support—they review solutions based on three levels of support, ranging from the most basic (clear information) to sophisticated technical support systems (pp. 67-69). The University of Illinois Online Network (ION) has aggregated a number of articles and case studies that focus on communication in e-learning. These articles and tutorials provide a good introduction to the use of distance education technology (ION, 2011).

The concern for better communication across e-learning contexts extends beyond U.S. universities. Rozina and Tuzlukova (2008) who teach in Russia and Oman, respectively, highlight the need for social communication and cultural awareness in designing courses.

> In the whole the factors that have substantial influence on e-learning in Russia are associated with both common and country-specific types of relationships and interactions of individuals, groups, and society. They originate, firstly, from the interactions in a medium based upon the use of information and communication technologies and secondly on cultural and social portrait of the subjects of interactions. (p. 40)

By regarding e-learning as a kind of "communicative activity," they develop a theoretical model based on dialogue and encourage faculty to help create virtual communities.

Stewart and Adlington (2010) recount a similar challenge in Australia as the country shifted to online education from earlier, traditional models based on correspondence courses. Baron and Steele (2010) offer a case study of fostering communication in a health sciences curricula in the United Arab Emirates. The overall collection, edited by Kinuthia and Marshall (2010), includes accounts of e-learning integration in Jamaica, Canada, Egypt, Malaysia, and the West Indies. The Malaysian case (Alias, 2010) is interesting in that it examines not college students but older adult learners, who had to wrestle with both subject matter and with the e-learning approach.

Chao and Wu (2008) offer a glimpse at China as they propose "an environment for mobile e-learning that includes an interactive course, virtual online labs, an interactive online test, and lab-exercise training platform on the fourth generation mobile communication system." They go on to describe their vision as "The learning mode in the future will be an interna-

tional, immediate, virtual, and interactive classroom that enables learners to learn and interact" (p. 1). In Spain, Rodríguez (2007) reviews work done by universities in Galicia to meet European Union proposals for e-learning. After reviewing the theoretical grounding of such work, he offers a number of cases studies of the e-learning network established to promote online education, paying attention to the communication variables tested in different projects (Díaz, 2008, p. 198).

A variation on the distance education model has emerged with "blended learning," which Lee, Frenzelas, and Anders (2008) describe as "the 'blending' and 'balancing' of all the aspects of the two major modalities: face-to-face, instructor-led instruction and e-learning" (p. 363). True to the historical use of technologies in corporate training, they review the value of blended learning to employee training programs. Garrison and Vaughan (2008), on the other hand, examine blended learning in higher education. Beginning with a pedagogical model, they ground this combination of online distance education and classroom interaction in a framework of a community of inquiry (p. 9).The use of real and virtual communities in this learning increases social presence of student to student, "cognitive presence" of engagement with learning experiences and theories, and teaching presence (pp. 19-26). After presenting guidelines for developing a blended class, they present a number of strategies and tools for the most effective use of both face-to-face communication and on-line communication (pp. 105-141). Latchem and Jung (2010) offer a very helpful review of distance and blended learning in Asia, providing case studies of work in Japan, Sri Lanka, Mongolia, Turkey, etc. Asia has become the region with the world's greatest concentration of adult distance learning.

While most formal online distance education programs address the needs of adult learners, a number focus informally on the other end of the educational spectrum: pre-school children. Little published research has appeared in the communication literature on what appears to be a flourishing online industry. A number of well established entities in children's television have ported their content to online venues in addition to creating new content. For example, the Public Broadcasting Service (PBS) in the United States has created the PBS Kids site (http://pbskids.org/) with links to educational videos, games, characters, activities, and so on. It also has companion sites PBS Parents (http://www.pbs.org/parents) and PBS Teachers

(http://www.pbs.org/teachers) that offer additional resources. Not surprisingly the site features its connections with the Sesame Workshop, the creators of Sesame Street (http://www.pbskids.org/sesame); the Sesame Workshop has its own site (http://www.sesameworkshop.org/). The Workshop allows access to its own material and also features links to its international partners in Australia, Bangladesh, Brazil, China, Egypt, France, Germany, India, Indonesia, Israel, Japan, Jordan, Kosovo, Mexico, The Netherlands, Nigeria, Northern Ireland, Pakistan, Palestine, Russia, and South Africa. The Sesame Workshop site seems less directed to children than the PBS Kids site and more to parents who could help children find particular learning assistance.

In the U.K., the BBC offers much of its educational content on line (http://www.bbe.co.uk/schools) with links to primary and secondary school content, language study, and online learning resources. The site also features links to podcasts, and children's learning games for math, English, science, and history.

In addition to these media sites, a number of commercial enterprises offer web-based learning materials for pre-school and primary school children. Some, like Scholastic Publishers (http://www2.scholastic.com/), have a long history of producing school materials. Others have worked to re-package existing materials for children at home, as for example National Geographic (http://education.nationalgeographic.com/education/). Still other groups represent parent- or teacher-led groups, some charging membership fees and some freely available. These include the K-12 instructional media center (http://www.k12imc.org/), Education City (http://us.educationcity.com/), Apples for the Teacher (http://www.apples4theteacher.com/), and Times 4 Learning (http://www.time4learning.com/preschool-games.shtml).

B. Supplemental education

Much of the published research on computer-based communication technologies in education addresses the use of in-classroom materials. Both the blended learning model and some of the home-use children's educational games and online content reviewed in the last section overlap with this category. Cassidy's (2004) history, focusing on the secondary level, situates both skills learning, that is, how to use the new digital tools (pp. 247ff.), and what she terms "critical literacy"—the understanding of new media and how to negotiate it skillfully as well as the use of collaborative learning tools (p. 245)—as part of classroom supplements. Warschauer (2006) also argues for the need of "literacy" with the new digital technology at the secondary school level; to support his call, he presents summaries of research and describes classroom examples of how teachers might approach this new kind of literacy. In their review of instructional technology for K-12 schools, Lee and Winzenried (2009) regard access to the Internet (pp. 145ff), network resources such as online conferencing (p. 149), and electronic library resources (pp. 113ff) as key developments in the contemporary classroom. They by and large simply describe the new situation, though they do conclude their book with a series of case studies as well as a discussion of key lessons schools, teachers, and administrators must take to heart for a successful implementation—including proper teacher training, appropriate content, infrastructure, and financing (pp. 229ff).

Lloyd (2005) offers a list of "best technology practices" in higher education. His listing proves informative in two ways: first as a guide to what individuals have accomplished, and second, as an index of how much and how quickly digital technologies have changed. What appeared new in 2005 now seems fully integrated in many university programs. For example, Corwin (2005) gives a detailed introduction to electronic portfolios for student work while Dear (2005) offers an introduction to online course registration systems. Shapiro, Kerssen-Griep, Gayle, and Allen (2006) indicate the relative maturity of one in-class communication technique as they present a meta-analysis of the educational effects of PowerPoint. The results at that stage showed a small statistical effect, "suggesting the PowerPoint presentations do have a slight effect on student learning" (p. 69). They conclude that this effect appears primarily in science courses. They also report research that indicates students thought they learned more from such presentations even though test scores did not show any difference in achievement (p. 71). Coffey (2007) also accepts the maturity of this communication technology as he suggests ways in which faculty can integrate visual representations into a yet-newer technology: learning management systems.

Kamenetz (2010) argues that newer communication technologies and the computer have dramatically changed higher education, perhaps more than faculty and administrators may realize. Her title sums up her view: *DIY U*. Framed as a review of communication and computer technologies in U.S. higher education, the book encourages access to tertiary education for all.

Kamenetz suggests that such a goal is within reach due to things like open courseware movements (pp. 85ff.), the use of smart phones to deliver content, the use of social media, and the availability of YouTube and iTunes to deliver content (pp. 89ff). These and open access journals, she argues, will allow people to craft their own educational paths. Within the classroom, she highlights learning management systems like Blackboard or Moodle as well as the next generation 2Tor. ("2tor Inc. partners with preeminent institutions of higher education to deliver rigorous, selective degree programs online to students globally," 21Tor, 2011.) These, together with other learning options, including gaming (p. 97), will redefine how universities deliver education and how students will learn in the digital world. While Kamenetz sketches out this possible future for education, others, including Inan and Lowther (2007) show more caution. They accept that the future holds a greater focus on learning activities, the learning environment, and digital distribution, but they argue that such learning must fit student needs; effective communication demands different formats. Reed, Berque, and Prey (2008) present a collection that examines some of these formats. Focusing on secondary and tertiary education, their collection of case studies gives examples of different communication media as learning tools. Some of the formats that they find helpful across the board include visual materials, digital notes, and, in particular, collaboration tools. These tools facilitate both student-to-student communication and student-teacher interactions, both of which have strongly positive effects on learning. In another collection of "best practices," Lytras, Gašević, Ordóñez de Pablos, and Huang (2008) also report strong support of the benefits of collaborative learning, at almost all levels. They provide cases drawn from pre-school through secondary and tertiary education to military training.

Other helpful ways to augment learning have emerged from the commercial online world. Virtual worlds and virtual learning environments have delivered content for some years; more recently, social virtual worlds "facilitate more social interaction, efficient visual communication, integration of rich media, and sharing of student-generated content. They offer the prospect of lively interactive virtual communities in which users interact through their emotional avatars in a 3D virtual world" (Jin, Wen, & Gough, 2010, p. 139). Virtual worlds create a more realistic environment for learning and move students from passive to active roles. Many of today's college students have already experienced such worlds, either though gaming or through e-commerce sites such as those run by Toyota, Dell, or IBM (p. 140). In addition, the U.S. government agencies NASA (National Aeronautics and Space Administration) and NOAA (National Oceanographic and Atmospheric Administration) have set up educational sites, while Second Life, one of the earliest virtual worlds, has actively recruited universities to offer content, with "the University of Florida, Princeton, Harvard, Edinburgh University, and Ohio University" currently offering courses (p. 143). Jin, Wen, and Gough propose an extended virtual world to foster greater learning though greater student communication. "As a result, learning on this augmented platform can be supported by exchange of knowledge, expertise, and information through coupling with social networking services such as writing blogs, co-editing *wikis*, uploading videos on *YouTube*, joining *MySpace* and *Facebook,* and sharing images on *Flickr*. Furthermore, an online library service can be linked into the system to enrich learning resources in the collaborative learning environment" (p. 146).

Even a partial use of collaborative media has positive learning results. Yeh (2009) reports an experiment with university students preparing for teaching careers in which the instructional design featured more collaboration though online technology. Yeh found that the students preferred this to traditional models of instruction, that it improved their critical thinking skills, and that "the mechanisms contributing to the effectiveness of the experimental instruction mainly included discussing and sharing, observational learning, self-reflection, guided practice, and the learning community" (p. 185). Marcos, Tamez, and Lozano (2009) report on an experiment in Mexico, where students had the opportunity to work in a virtual classroom, but with different communication channels. Students showed mixed results, with some preferring the podcast channel; however, no significant differences appeared in student performance in the class (p. 98). Others have reported cultural differences, a not altogether surprising result. Keller, Lindh, Hrastinski, Casanovas, and Fernandez (2009), reporting on a comparative study of online techniques in Sweden and Argentina, found that the Argentines valued the interactive aspects more, though both groups had favorable opinions (pp. 76-77). Both groups, however, found the administrative aspects initially more helpful—distributing course materials, receiving student assignments, providing links to online work—than collaborative learning (p. 74).

Among other things, Keller, Lindh, Hrastinski, Casanovas, and Fernandez's participants found it difficult to learn or keep up with developments in online education. An effective use of the technologies demands a change in teaching styles and methods, which teachers reported burdensome while learning technologies. Tait (2010), writing from a more technical position, recognizes those problems from the perspective of support staff. He puts the challenge in this way:

> Practicing academics have to maintain expertise in three dimensions of their work, namely, their subject area, the relevant pedagogy, and the delivery technology. With the increasing use of online methods of teaching all three may have to be re-examined. Whereas existing approaches emphasize the subject expertise by relying on established teaching methods and traditional technologies, the addition of e-learning to the practitioner's repertoire has changed the situation to one that is both less comfortable and more powerful. However, to take full advantage of the new e-opportunities, tutors and course designers have to understand both the pedagogy and the technology being used and, especially, they have to appreciate the relationship between these two dimensions and the subject area. (p. 197)

As a solution, he proposes the development of "learning objects," or reusable components that allow teachers to focus on subject matter rather than having to master a technology. He offers examples of such objects as well as a model for their development and implementation.

Most of the recent studies published on supplementary material addresses university level work. A few researchers examine the secondary school classroom. Berson and his colleagues (2007) focuses on social science materials and offers teachers a guide to incorporating web-based materials into their existing courses in history, government, political science, geography, economics, anthropology, sociology, and psychology. Reed, Berque, and Prey (2008) include cases drawn from the secondary classroom in their examination of the role tablet computers can play in education. In addition to fostering collaboration, they also mention the benefit of allowing students to examine and manipulate visual information.

In his review of educational and communication technology in Israeli schools, Katz (2002) focuses first on stand-alone computer systems; only in the 1990s, he notes, do networked computers appear, with the possi-bility of collaboration and linking the classroom to resources beyond its walls (p. 147). Turning to forecasting, Katz suggests that the ultimate value of instructional and communication technology falls into several categories, among them increased knowledge, the development of an autonomous learner, and the social aspects of linking students together.

Many of the same organizations listed earlier as providers of in-home or distance education for primary and secondary age children also offer classroom supplementary materials. Some, in fact, make no distinction among their products. PBS, Sesame Workshop, National Geographic, and Scholastic provide abundant materials. The Advanced Learning Technologies project at the University of Kansas Center for Research on Learning (ALTEC) promotes "the development of new technologies to empower learners of all types and ages, and will continue to redefine the learning experience through innovative resources. ALTEC seeks to partner with those who recognizes the tremendous capabilities available through electronic strategies for dissemination, communication, and collaboration" (ALTEC, 2008, ¶3). One of its projects, 4Teachers.org, supports classroom learning: "4Teachers.org works to help you integrate technology into your classroom by offering online tools and resources. This site helps teachers locate and create ready-to-use Web lessons, quizzes, rubrics, and classroom calendars. There are also tools for student use" (4Teachers.org, 2011). TeAch-nology.com also aggregates classroom materials for K-12 teachers.

> As a web portal, TeAch-nology.com offers a wide variety of free resources intended to bring educators into the world of teaching with technology. It provides links to valuable and useful information relative to current and best practices in the field of education. A large variety of free classroom materials and support tools are also available. (2010, ¶3)

Their home page gives an indication of the volume of materials: "We feature 46,000+ lesson plans, 9,600 free printable worksheets, rubrics, teaching tips, worksheet makers, web quests, math worksheets, and thousands of other great teacher resources" (2011, ¶1). Its "best on the web" offers a rank ordered list of links to 400 teacher resource sites (http://teachers.teach-nology .com/index.html). Another site, prepared by teachers, AtoZTeacherstuff.com offers lesson plans, worksheets, teacher tips, teacher tools, and a store for buying books and supplies.

Thompson (2011) provides a journalistic introduction to one of the fastest growing educational sites for primary, middle, and high school students: Khan Academy. Begun as a set of tutorials posted on YouTube for family members by Salman Khan, the site offers mini-lectures on a variety of math and science topics, along with drills and other learning aids. The lectures, delivered in video format, feature visual illustrations of concepts and problems along with a voice-over narration. Teachers have incorporated these into classes so that students can learn at their own pace, often reversing typical class time, with the students viewing the lectures at home and doing the drills ("homework") at school with the classroom teacher as a resource. Students prefer the format, since it allows them to review the material as often as they want without appearing to learn at a slower pace than their classmates; those who wish can work faster, even above their grade level (www.khanacademy.org). A number of other online lecture and educational sites address older students, including Engineerguy.com, iTunes-U (featuring recordings from universities across the U.S.), code.google.com/edu (specializing in computer programming), moma.org/modernteachers (from the Museum of Modern Art in New York), and YouTube.com/edu, with a wide variety of topics for the entire educational specturm.

The U.S. Federal Resources for Educational Excellence (FREE) provides a database and links to over 1,500 government teaching and learning resources for all levels. The materials, prepared by a number of different agencies, include primary documents, photographs, art from the National Gallery, music from the Library of Congress collection, documents on U.S. history, materials from NASA and other scientific agencies, and so on. All of the material comes at no cost to the teacher or classroom (http://free.ed.gov/).

At the university level, MERLOT (Multimedia Educational Resources for Learning and Online Teaching), a project of the California State University, provides over 30,000 peer reviewed and faculty submitted class support materials in over 20 different disciplines (http://www.merlot.org/merlot/index.htm). A number of other state universities offer support materials as well, notably the University of Minnesota (http://www1.umn.edu/ohr/teachlearn/resources/index.html) and the University of Illinois (http://www.ion.illinois.edu/resources/).

In addition to groups and agencies supplying materials for classroom work, a number of associations also provide support. The Association for Educational Communications and Technology (AECT) "is a professional association of thousands of educators and others whose activities are directed toward improving instruction through technology" (AECT, 20, ¶1). Its publications page links to the several journals published by the association and offers yearbooks and research publications that provide theory and assessment of educational communication. Another group, "The New Media Consortium (NMC) is an international not-for-profit consortium of learning-focused organizations dedicated to the exploration and use of new media and new technologies. Its hundreds of member institutions constitute an elite list of the most highly regarded colleges and universities in the world, as well as leading museums, key research centers, and some of the world's most forward-thinking companies" (NMC, 2006, ¶1). The group offers regular research reports on communication and computer technology across a variety of settings, from schools to museums, and regions, from the U.S. to Europe and Australia. Educause, another non-profit organization, seeks to promote technology in higher education. Among its major initiatives it lists

- The Advanced Core Technologies Initiative (ACTI) enables members who are tackling technological progress in core technologies to network and collaborate with each other and those who are contemplating similar progress.
- The EDUCAUSE Center for Applied Research (ECAR) promotes informed decision-making and a culture of evidence in higher education IT through a program of research publications and symposia.
- The EDUCAUSE Learning Initiative (ELI) is a community of institutions, organizations, and corporations committed to advancing learning through IT innovation. ELI achieves this mission through a strategic focus on learners, learning principles and practices, and learning technologies. (Educause, 2011, ¶2)

Educause has published over 20 reports in 2011, a number of them focused on mobile learning. The association also offers professional development, mentoring, and other kinds of support.

The use of computer communication technologies to support education has grown dramatically in the last decade, with more resources added each year. As several studies point out, this challenges teachers to keep pace with the technology, much of which the students may have adopted well before any classroom introduction.

6. Gaming

Clearly related to computer-based communication and learning, games and game playing have emerged as one of the most popular kinds of online education. Students from pre-school to adult non-traditional learners engage in games, either at home, with mobile media, or in classrooms. Starting perhaps with early computer games like *Flight Simulator*, educational games run the gamut from complex simulations and virtual worlds to simple drills. Some require game consoles while others run on smart phones. Some focus on traditional academic subjects and others on questions of global social concern. The communication literature has not caught up with the phenomenon, but a few descriptions and studies have appeared.

De Freitas and Griffiths (2008) provide a literature review that investigates, among other things, the potential of games for learning, starting with the convergence of games with other media forms. Acknowledging the rapid growth of commercial games, they see an important convergence between games and simulations. In these, "the motivation of games is combined with the well-established training pedagogies used with simulations. Notably, multi player online role-play training games, such as *America's Army* . . . which draw from both gaming metaphors and military simulation pedagogies, represent probably the fastest growing area of educational gaming" (p. 12). They find that the flexibility of the game format and the immersive and interactive qualities make games a powerful educational force. Newer games, running on more powerful platforms, also converge with the cinema, drawing both story lines and more realistic visual settings, again strengthening the learning potential. Another area of media convergence that has increased the appeal of games for education comes with the Internet. "It could be argued that the most revolutionary development with converging media forms has involved the Internet as a gaming medium. While online games undoubtedly date back to the MUDs (Multi-user Dimensions/Dungeons, i.e., text-based non-graphical virtual worlds) and MOOs (Multi-Object-orientated MUDs, MUDs with objects) of the 1980s, new online games offer the player 3D interactive environments in which to explore and play online"

(pp. 13-14). A further development here is virtual worlds, such as Second Life, which also offer educational environments.

The U.S. military has long played a leading role in exploring computer-assisted learning (Cassidy, 2004, pp. 188ff). Not surprisingly, then, the military has also worked on educational games.

> *Pulse!!!* —The Virtual Clinical Learning Lab—is a virtual training environment designed to support a range of the training needs required by nurses and medical professionals. The U.S. Department of the Navy's Office of Naval Research is funding the immersive virtual learning space, being developed by *BreakAway Ltd*, for the Texas A&M University-Corpus Christi. The aim of the *Pulse!!!* project is to provide an environment in which civilian and military medical professionals can practice their clinical skills aiding response mechanisms for large-scale incidents (Johnston, 2007; see also www.sp.tar-nucc.edu/pulse/index.shtml). Virtual patients, using artificial intelligence (AI), will respond in lifelike ways to environmental changes and medical techniques and skills used by the trainees. (de Freitas & Griffiths, 2008, p. 14)

Other games require less infrastructure and have found their way into the classroom (p. 15).

The media convergence and the wide availability of games has shifted learning to a learner-centric model in which the learner designs the experience (p. 16). This also encourages greater innovation in education and by the game producers. At the same time, this poses challenges to educators:

> While convergent gaming forms may be of potential interest to many academic stakeholder groups including educationalists, psychologists, anthropologists, and sociologists, research needs to be undertaken to identify the potential advantages for education, training, and therapy. Currently particular challenges exist for tutors, as it is at present unclear which pedagogic strategies are most effective, how peer interactions can be best supported in practice contexts, and how the tutor might best support the design of activities. These challenges are made more difficult due to the relative newness and fast-chang-

ing nature of the convergent forms, and the time lag between technologies and applications emerging and the time for rigorous studies to be carried out and published. (p. 18)

By beginning with media convergence, de Freitas and Griffiths highlight both the engine driving creativity across delivery systems and the role of communication research.

Peng (2009) reports on a particular game aimed at young adult learners, focusing on healthy diet. Highlighting the characteristics of the medium chosen (interactivity, immersion, role playing, enjoyment), Peng hypothesized that game players would gain more knowledge than a control group; the hypothesis was supported not only for short-term knowledge but also for longer-term recall. Based on similar evidence from game design, Sandvik and Thorhauge (2008) proposed a game-based way to communicate academic research results.

> *Professor Nukem* was an experiment on the use of computer games in communication of academic knowledge, and in this particular project academic research about the social and cultural impact of computer games. The project consists of two synergistically linked parts or two communication structures—a game-shaped part that should be played and a database-shaped part from which the user can get different kinds of information (about the project, research reports, etc.). The game-part of the project is designed in a relatively simple way by combining elements from two classical (computer) game genres: The quiz and the first-person shooter. In the game, the player is put in the role of a researcher—Professor Nukem—who in his studies on computer games is confronted with opponents in the form of prejudiced statements about computer games (like "computer games are addictive") and graphically displayed as monsters. To beat these opponents, the player has to choose a weapon in the form of a counter-argument. There are more counter-arguments to choose between, and the player has to select the right one, that is, the one based on scientific inquiries and reports. (p. 178)

The researchers created this game to explore the potential of fitting academic studying to students' out-of-school experiences. By using existing training (in game-playing) and logical structures built up to navigate complex puzzles, the researchers tried to emulate what the students did. They discovered, though, that teachers and students played the game differently. They found, for example, that because the game "does not integrate the factual, situational, and systemic knowledge forms involved in the game sufficiently" (p. 190), the students could bypass the written content (which teachers valued) and only play the situational part of the game. A successful educational game, they conclude, must take into account age- and context- related learning patterns.

El Sayed, Zayed, and Sharawy (2011) offer a more technical description of game design for education. They propose a low-cost way to add virtual objects to real scenes in order to help "students to visualize different learning objects, interact with theories, and deal with the information in a totally new, effective, and interactive way" (p. 1045).

In many ways the academic world falls far behind the reality of gaming. As noted already, simulations like *Flight Simulator* gained popularity over 25 years ago. Games, both stand alone and online, single-player and multi-player, account for a huge business. In addition to the paid games, a large educational games establishment has emerged, providing materials for every level. The number of educational games sites runs into the hundreds, so this review will indicate just a few of the major ones.

Just as with educational computer materials, some of the key producers of educational games emerge from those groups with experience in educational television. In the U.S., PBS Kids, the Sesame Workshop, and Scholastic all produce educational games, available online. Another important producer has affiliation with the Disney Corporation: Funschool, a part of Kaboose (http://funschool.kaboose.com/) offers a range of games and activities. The games include Bird Watcher; Bug Bait; Homerun Derby; Whomp!; Fun in the Garden; Michael, Go Recycle!; Bowling; Puke the Pirate; Super Hyper Spider Typer; and Bubble Ball. The site also features videos, often connected with Disney products.

An international site that ties its educational games to science, the Nobel Prize organization (http://nobelprize.org/educational/) offers games based on Nobel prize-winning ideas. The current top 10 list features the following games: 1. The Blood Typing Game; 2. The Laser Challenge Game; 3. The DNA—the Double Helix Game; 4. The Pavlov's Dog Game; 5. The Diabetic Dog Game; 6. The Lord of the Flies Game; 7. The Electrocardiogram Game; 8. The Immune System Game; 9. The Control of the Cell Cycle Game; and 10. The Split Brain Experiments Game.

Games for Change (http://www.gamesfor-change.org/) focuses on social impact. "Founded in 2004, Games for Change is the leading global advocate for supporting and making games for social impact. We bring together organizations and individuals from the social impact sector, government, media, academia, the gaming industry and the arts to grow the field, incubate new projects and provide an open platform for the exchange of ideas and resources" (Games for Change, 2011, ¶2).

Other groups offer more traditional academic fare. Academic Skills Builder, originally a resource site developed by the University of Kansas School of Education (http://www.arcademicskillbuilders.com/) has a variety of "academic skill builders," online educational video games that offer younger students an approach to learning basic math, language arts, vocabulary, and thinking skills. Knowledge Adventure (http://www.knowledgeadventure.com/), a commercial educational game manufacturer, offers 100 free games for pre-school through Grade 6. Games categories include reading, phonics, math, spelling, animals, and science. Primary Games (http://www.primarygames.com/), an award-winning web site begun by a primary grade teacher for her own students, now presents a variety of educational games in language arts, math, science, and social studies.

Funbrain (http://www.funbrain.com/) offers educational games for K-8. The Family Education Network that sponsors the Funbrain site is part of Pearson publishing:

Since 1997, kids, teachers, librarians, and parents have enthusiastically turned to Funbrain for its free educational games, online books, and comics. Funbrain, created for kids age preschool through grade 8, offers more than 100 fun, interactive games that develop skills in math, reading, and literacy. Plus, kids can read a variety of popular books and comics on the site, including *Diary of a Wimpy Kid, Amelia Writes Again,* and *Brewster Rocket*. (Funbrain, 2011, ¶1)

In addition to the games, Funbrain also offers homework help, a reference site, advice for parents, and resources for teachers. The site aims to act as a single source for all educational support a student needs.

Online game sites (represented here by this small sample), commercially available educational games, simulations, and networked games have blurred the lines between distance education and classroom supplementary education. Some games do function as distance educators, mostly providing informal education, but some in more formal educational structures; other games appear in classrooms, adding something extra to the class. Many games teach collaboration; some, different degrees of strategic thinking. At the same time, researchers have only begun to explore the effectiveness of games within the traditional goals of attaining qualifications. Few have explored any negative consequences or social costs of games. But the connection between educational games and communication media—film, television, networked communication, cellular telephony, and so on—indicates a long future for this kind of education.

7. Conclusion

Communication technologies have intertwined with education for so long that most people take them for granted and only become aware of a new communication technology when it somehow threatens an older, established way of doing things, either negatively or positively. Communication research has long known of the various panics caused by new media—films or radio or television or popular music or whatever would cause harm to children. Therefore, educators treated them with suspicion or devised ways to teach children how to avoid their dangers. Or teachers feared communication technology in schools because it threatened their jobs or redefined their daily work.

Or parents feared communication technology in education because of its costs. On the other hand, new communication technologies offered more efficient ways to teach and educators (or more often businesses or the military) embraced radio or television or computers as the solutions to various crises in education. The communication media brought improved ways of seeing or hearing to the classroom; these media also brought the classroom to people too far removed in time or space from traditional education.

A focus on the worries or even on the instrumental benefits of communication is to miss the point. Communication research should help provide a broad-

er picture. The communication research tradition needs more historical work: how has communication interacted with education? Cassidy (2004) and Bianchi (2008b) have begun that work, but only for the United States. Some others, cited in this review, include briefer histories as they discuss telephony or computers in education, but these are only the start. The history will help us understand how communication and education and society define and reinforce each other. It will also shed some light on something absent from this review: the economic forces that have affected both education and communication. Similarly, because governments by and large have taken on responsibility for education, one should investigate the nexus between communication and government.

Communication research should also provide more empirical evidence about how teachers and students use communication technology. As noted above Kukulska-Hulme (2010) reports on some of this in terms of the cell or mobile phone. She and her colleagues are among the few to look at the communication in education process from the bottom up: how people actually make use of communication (Kukulska-Hulme & Pettit, 2006, 2007, 2008; Kukulska-Hulme, Pettit, Bradley, Carvalho, Herrington, Kennedy, & Walker, 2009). The possibilities for communication in education would open up tremendously with more knowledge of how learners use radio, television, computers, telephone, and games for both direct and indirect learning.

Third, as Fuenzalida (2011) has argued, more and more "education" occurs informally through media sources. His investigation of television in Latin America shows one way of seeing the lessons taught—more affective than cognitive, he argues. But what of the lessons taught in video or computer games: many of these require complex cognitive mapping in order to navigate the virtual world of the game. Here, too, we find another rich realm for future research.

Fourth, researchers could also more closely examine the role of teachers as they work with writers, designers, programmers, and others in creating educational materials. Well established groups like the Sesame Workshop have had long associations with teachers and with both formative and evaluative research. A similar research collaboration would benefit the other new technologies.

Finally, only a few studies reported here have focused specifically on the characteristics of the communication media themselves and what those media promote, allow, or hinder in terms of education. Yet these choices matter in terms of the learner's overall experience. They also matter because a learner's prior experience with a given technology will also shape how that person, as a student, will use the technology. As long as the communication media appear transparent, taken-for-granted, or somehow neutral, teachers and students, parents and administrators, evaluators and businesses will fail to see what communication technology can bring to or take away from education.

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Online Resources

Academic Skills Builder (originally from University of Kansas School of Education). http://www.arcademic-skillbuilders.com/

Apples for the Teacher. http://www.apples4theteacher.com/

Association for Educational Communications and Technology. http://www.aect.org

AtoZ Teacher stuff. http://atozteacherstuff.com/

BBC Schools. http://www.bbc.co.uk/schools/

Education City. http://us.educationcity.com/

Educause. http://www.educause.edu

Engineer Guy. http://www.engineerguy.com/

Federal Resources for Educational Excellence (FREE). http://free.ed.gov/

Funbrain. http://www.funbrain.com/

Games for Change. http://www.gamesforchange.org/

Google Code University. http://code.google.com/edu/

Funschool, Kaboose.com, A Disney site. http://funschool.kaboose.com/

iTunes U. http://www.apple.com/education/itunes-u

Khan Academy. http://www.khanacademy.org/

Knowledge Adventure. http://www.knowledgeadventure.com/

K-12 Instructional Media Center. http://www.k12imc.org/

MERLOT. http://www.merlot.org/merlot/index.htm

Mobile Learning. http://adlib.athabascau.ca/index.htm

Mobile Learning Institute. http://www.pearsonfoundation.org/education-leadership/programs/mobile-learning-institute.html

Museum of Modern Art Modern Teachers. http://moma.org/modernteachers/

National Geographic Education. http://education.national-geographic.com/education/?ar_a=1&ar_r=1

New Media Consortium. http://www.nmc.org

Nobel Prize. http://nobelprize.org/educational/

PBS Kids. http://pbskids.org/

PBS Kids, Sesame. http://pbskids.org/sesame/

PBS Parents. http://www.pbs.org/parents

PBS Teachers. http://www.pbs.org/teachers

Primary Games. http://www.primarygames.com/

Scholastic Publishers. http://www2.scholastic.com/browse/home.jsp

Sesame Workshop. http://www.sesameworkshop.org/

Smithsonian Museum Education. http://www.smithsonianeducation.org

TeAch-nology.com. http://www.teach-nology.com

Times 4 Learning. http://www.time4learning.com/preschool-games.shtml

University of Illinois Illinois Online Network. http://www.ion.illinois.edu/resources/

University of Minnesota Center for Teaching and Learning. http://www1.umn.edu/ohr/teachlearn/resources/index.html

YouTube Edu. http://www.youtube.com/education?b=400

Book Reviews

Cowan, Douglas E. *Sacred Space: The Quest for Transcendence in Science Fiction Film and Television*. Waco, TX: Baylor University Press, 2010. Pp. 314. ISBN 978-1-60258-23815 (paper) $24.95.

I can vividly remember watching *Star Wars* in the 70s in a cinema house in Bombay with my youngest brother. At the interval he asked me, "what the hell is happening?" I replied in his own terms, "It is all hell let loose." Reading through Cowan's *Sacred Space*, I realize it could as well have been all about heaven.

When science fiction movies began to be made in rapid succession after the success of Kubrick's *2001: A Space Odyssey*, many thought these were just figments of people's over-hyped imagination. Slowly it dawned on many that directors are trying to explore the spiritual, metaphysical, and the transcendental sphere with whatever imagination they can have.

As academicians and popular commentators have noted, science fiction is the genre of possibility, a principle cultural canvas on which writers, artists, and filmmakers have sketched their visions of transcendent potential. Drawing on popular examples like *Star Wars*, *Star Trek*, *Battlestar Galactica*, *Babylon 5*, *Stargate SG1*, and other lesser knows films and tv shows, the book reveals the multivalent religious concepts present in these productions. Are these really speaking of a spiritual reality? Is there a relationship between outer space and our own spiritual quest? These questions are rather eloquently answered, relying very much on our own cultural perceptions of reality and spirituality.

The author contends that unlike science fiction story books, films and television programs being of shorter duration raise more questions than answers about transcendence. To understand the religious elements treated in these films and tv shows it is essential to have a broad understanding of religion. The reality is that the human quest for transcendence takes an astonishing variety of forms and often electronic media become a means for exploring it. The author insightfully reveals how these films and tv shows reinforce culturally constructed conceptions of transcendental hope. In the process these succeed to outline the beliefs, world views, fears, and hopes of today's media culture.

Cowan begins the book by exploring Carl Sagan's concept of God in *Contact* (directed by Robert Zemekis, 1997). He seems to agree fully with Sagan's statement that the concept of theology and God in the western world is too small as it hardly considers the god of the galaxies. The route upward, on a wing or on a prayer, he argues, signifies the basic question of science fiction films.

Talking of different rituals introduced in some science fiction films, the author notes their religious significance and argues that just as in rituals the presence

of God is realized through faith, so also a lot of experiences in science fiction film may be faith based. That is, one who has no faith at all may not see the things that a faith filled person tends to see in science fiction films, because faith is actually a manner of perceiving.

The book works on three levels: the analytic, the pedagogic, and the invitational. The author uses science fiction cinema and television to explore what people believe about the transcendent and to show how his particular cultural form reveals aspects of the human quest for transcendence. This type of analysis may open up some of the basic, historical, sociological, and psychological theories of religious belief, practice, and evolution, and finally how these are influenced by society at large.

Recognizing the long history of transcendent potential in science fiction's penchant for robotic, clonal, cybernetic, and other artificially created or enhanced life forms, the author explores the question of transcendence from three particular directions in Chapter 2: the evolution of robotic consciousness in films such as *AI: Artificial Intelligence*, *Short Circuit*, and *I, Robot*, along with the emotional bond that develops between humans and robots. Second, the question of humanity itself using the most influential artificial human film to date, *Blade Runner*, and finally the trans humanist or post humanist potential in the *X-Files* episode "Kill Switch."

After having established the possibility of extraterrestrial life, Chapter 3 discusses the ramifications of extra-terrestrial intelligence. Clearly it is a major challenge to those who believe that humans alone inhabit this earth. Chapter 4 is a study of the film version and the later TV version of H. G. Wells' novel *War of the Worlds*. Interestingly if the novel was anti-religious, the film is most religious, and no secularists have objected to it.

The next chapters analyze the deep religious significances in films like *Star Trek: Deep Space Nine*, *Stargate SG-1*, *Babylon 5*, and *Battlestar Galactica*. In the final chapter after dwelling briefly on the *Matrix* series, the author discusses how a number of Christian commentators have dealt with the *Star Wars* saga, the most successful science fiction series of all time. The author challenges the readers to map their own visions of transcendence onto the cultural products with which they are presented. He concludes by suggesting that science fiction films have served much more than the purpose of entertainment and have helped humans realize the meaning of their spiritual angst and hence these

may be continued to be looked upon as fiction that can give hope in life.

The book features a filmography, bibliography, and index.

—Jacob Srampickal, S.J.
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Graf, Heike (Ed.). *Diversity in Theory and Practice: News Journalism in Sweden and Germany*. Göteborg, Sweden: Nordicom/University of Gothenburg:, 2011. ISBN 978-91-86523-12-1 (paper) SEK 280 or €30.

In early 2011, the British Prime Minister, David Cameron, caused some furor when he announced that, in his opinion, multiculturalism had failed as a project in the United Kingdom. There is a strong feeling, according to BBC Radio 4's *World at One* program (14th March, 2011), that there is a need for immigrants to the United Kingdom to adapt to the British way of life and to the British culture. We from the UK, particularly in the cities, are a very diverse population from many countries. In my own London Borough it is estimated that children in our primary schools have around 120 mother tongues between them. In other parts of the country, the actualities of life are considerably different, despite a developed tourism industry. In addition, there has been continual discussion around whether ethnic minorities are sufficiently represented in our media. It seems, however, that when the media try to assist in appointing those from ethnic minority backgrounds, they may then be castigated.

This new book from the Nordicom series comes from an idea first mooted in 2005 which actually began when funding was obtained from the Baltic Sea Foundation in January 2007. The project was entitled, "Lines of Diversity: Multicultural Perspectives on Journalistic Production in Stockholm and Berlin," thus focusing on two countries, Sweden and Germany, that are seen both as liberal and as having a free media industry. The research was carried out in newsrooms and centered on how journalists from ethnic backgrounds experienced working conditions, career possibilities, and their possibilities of changing media coverage. The research was mainly carried out through semi-structured interviews with editorial staff who worked on permanent or fixed term contracts, but also with freelancers in Swedish and German newsrooms. In addition, material was taken from reports, policy documents, enquiries, and "other doc-

uments" (p. 9) so that their findings could be contextualized. In all, 48 interviews were conducted, 35 with people from immigrant backgrounds, and 21 from the total lived in Germany. It was decided to focus on Berlin and Stockholm because multicultural ideals were entrenched in the two capital cities, thus enabling researchers to compare and contrast aspects of the industry that might normally have been taken for granted.

The researchers found that, in general, media faced similar challenges. In both countries journalists pointed to similar experiences, but there were differences because Sweden has had a longer experience of multiculturalism than its neighbor, Berlin. The book outlines some of these similarities and differences. Heike Graf and Jan Inge Jönhill give a brief outline of previous research and discuss normative and descriptive approaches to research and what it is that they mean by the concepts of ethnic or national backgrounds and social identity. They note that, in the field of media diversity, Sweden is a forerunner. Their exploration of media diversity in the two countries follows.

The second chapter, by Jönhill, explores the possibilities and opportunities, as well as the limitations, offered to media organizations by diversity. It takes as its theoretical basis work based on observation and systems theory. In the third chapter, Gunilla Hultén presents findings from interviews with 14 journalists with foreign backgrounds working in Swedish newsrooms. Hultén's work aims to discern the differences between Sweden's declared policies on ethnic and cultural diversity and the journalists' lived experiences. Graf's fourth chapter, based on interviews with 21 journalists from ethnic minority backgrounds, uses a theoretical background taken from inclusion/exclusion work to unravel these interviews' results and to comprehend how inclusion and exclusion mechanisms become interdependent in these major national newsrooms.

Leonor Camauër, in her fifth chapter, looks at the topic from what is perhaps the opposite viewpoint, by interviewing 12 media workers from non-immigrant backgrounds on their perceptions of how working with immigrant media workers has encroaches on their working practice and experience.

There is an appendix which gives a survey on diversity in media companies, undertaken in June 2008 and a brief introduction to each of the authors.

This is an interesting book that would be useful to anyone teaching on, or interested in, issues around multiculturalism, diversity, the media, and journalism. It would widen the world view of those in countries with other journalistic cultures, particularly since the Scandinavian countries have some of the highest readership levels of newspapers in the world, although even there readerships are falling. This book, of course, focuses not only on newspapers, but also on other media. Once again, it is an excellent book from our colleagues at Nordicom, who are to be highly commended on their continuing good work in publishing research on communication and the media.

—Maria Way
University of Westminster

Howard, Robert Glenn. *Digital Jesus: The Making of a New Christian Fundamentalist Community on the Internet*. New York and London: New York University Press, 2011. Pp. x, 213. ISBN 978-08147-7308-6 (cloth) $75.00; 978-08147-7310-9 (paper) $24.00.

The United States has shown itself fertile ground for new religious movements and for the use of communication to support those movements, beginning with camp meetings supported by newspaper advertisements in the 19th century through Aimee Semple McPherson's Foursquare Gospel Church and radio broadcasts in the 1920s to the rise of the televangelists in the 1980s. Robert Glenn Howard traces a yet newer embrace of technology: that of what he terms a "virtual ekklesia," a online Fundamentalist group with beliefs in the "End Times." The history of the group weaves through the history of the Internet and so the book reviews this dual history. Howard carefully provides background on both for those readers who need it. While many may know the various developments of the Internet—email, usegroups, listservs, static webpages, Web 2.0—more will most likely not know the history and background of this particular branch of American Evangelical and Fundamentalist Protestantism.

While he structures the book more or less chronologically, he also builds it around individual leaders in the community, though he acknowledges that "leader" may not really describe their role. "Facilitator," in the sense of one who fosters group interaction, may come closer, as these individuals provide websites or, earlier, common reference points for the discussions which define the virtual ekklesia. Following an ethnographic method of interviewing individuals and a content

analysis of the websites or other online writing, Howard provides a rich look at this community. In introducing the work, he comments on two of his key interview subjects, who define different approaches in the virtual ekklesia:

> These individuals made and followed Internet links that subsumed individual differences into something larger. What was the nature of this larger entity? How could it incorporate these two fundamentally different conceptions of the same God? The research resulting in this book began in an attempt to answer these questions. (pp. 2-3)

Equally valuable is his theoretical work in describing the groups because he found that they did not easily fit into existing categories. In addition to the comprehensive term "virtual ekklesia," a borrowing from Campbell (2005), he argues that the groups create a "vernacular Christian Fundamentalism" (pp. 4-10). This describes a non-institutional, popular, leaderless Christian group whose theology comes from the reflections of the members who align themselves with the group through self-selection and common interest in the topic, in this instance in a Christianity with a main focus on the End Times.

After showing this vernacular Christian Fundamentalism at work through an analysis of web archives of a key site's discussions of the September 11, 2001 attacks on the United States, Howard suggests that the groups frequenting such websites engage in ritual discourse rather than goal-seeking debate. Members—all of whom subscribe to Biblical Fundamentalist readings of the Scriptures—sought information or offered interpretations to fit the attacks into their understanding of the End Time prophecies. The online conversation matters more than a correct answer, as shown when predictions that the September 11 attacks were a "seven-day warning" of the first woe described in the Book of Revelation failed. When that woe did not occur as predicted on September 18, the group moved on to another topic.

To help the reader understand this discourse, Howard steps back 150 years to trace the history of American Evangelicalism and its millenarian or dispensationalist branches. The identity of the groups Howard studies grows from a belief in the Second Coming, much as the *Left Behind* book series has described it. More crucially, though, is a commitment to Fundamentalism:

> The movement can be recognized when individuals express its four definitive beliefs: first, a belief in biblical literalism; second, a belief in the experience of spiritual rebirth; third, a belief in the need to evangelize; and fourth, the most distinctive, a belief in the End Times interpretation of biblical prophecy. . . . The movement is distinct from historical Christian fundamentalism, however, because it has emerged alongside but apart from institutional religion. (p. 171)

Within historic Christianity, the End Times beliefs emerged relatively late, in the second half of the 19th century. As on online group, the virtual ekklesia Howard describes emerged earlier in Internet time, in the 1990s, with public Internet discussion in 1992 and the creation of the "alt.bible.prophecy" Usenet newsgroup in 1995. Email lists and websites came later and now websites form the chief presence of the group..

Howard then traces the group through three stages of its online life: the newsgroups and email lists of the early 1990s, the formative World Wide Web of 1996 to 2000, and the beginning of the current century and the interactive Web 2.0. In each period, he introduces the group through descriptions of online materials and through personal face-to-face interviews he conducted with key people. The heart of the book, these chapters contain a wealth of data—almost too much in fact. For example, Howard's tendency to describe the path through the hyperlinks from one Christian website to another until one finally comes to the site in question becomes confusing and does not really add to the data. More valuable is his categorization of the discourse on each website along two dimensions: authoritative to deliberative. The former includes closed or apodictic statements while the latter welcomes discussion and debate.

Because this group has a sense of persecution and an expectation of divine deliverance, it faces on ongoing temptation of cutting itself off. "Because they subscribe to a self-sealing ideology that is driven by an intense sense of certainty, we have seen them sometimes be dogmatic and insensitive," Howard comments (p. 148). Defended from outsiders, they become an enclave and use their communication to reinforce that isolation. This has at least one important implication. While digital communication has linked individuals and offered a diversity beyond a geographical locality, it has also isolated them from institutional churches and any external critique.

Howard does a good job in introducing the overall practices of this brand of online Christianity. He also gives the reader a good sense of the group and many of

the key members, although since they do share similar beliefs, his descriptions of websites become repetitive.

The book has an extensive bibliography and an index.

—Paul A. Soukup, S.J.
Santa Clara University

Reference
Campbell, H. (2005). *Exploring religious community online: We are one in the network*. New York: Peter Lang.

Nohrstedt, Stig A. (Ed.). *Communicating Risks: Towards the Threat Society.* Göteborg, Sweden: Nordicom/University of Gothenburg, 2010. ISBN 978-91-86523-13-8 (paper) SFK 280 or €30.

"Risk," as a friend of mine who teaches risk management always tells me, does not mean "health and safety." This book addresses the task faced in communicating risk in today's society. Recent conversations with elderly relatives have demonstrated one of these problems, that some in society think we are living in an increasingly risky society, where our very safety is in peril. These conversations have shown that they believe that the weather is getting worse, there are more problems relating to natural disaster, crime is becoming more prevalent, and so on. Their anxiety levels have become heightened and no statistic that I can put before them reduces these levels. It is perhaps for this reason that Nohrstedt's book focuses on the consequences that arise from the construction of mediatized risk as threat. The book results from a research project "Threat Images and Identity." All of the articles but one, that written by Mats Eriksson on "Conceptions of Emergency Calls: Emergency Communication in an Age of Mobile Communication and Prevalence of Anxiety," which was previously published in the *Journal of Contingencies and Crisis Management*, are new.

In his introduction, Nohrstedt notes that communicating risks is becoming more and more complicated due to the wider spectrum of media, both old and new, now available and, following Beck's (1996/2004) writings, to the technical production and distribution processes that Beck believes are central to the notion of the risk society and the dangers associated with globalized media. He gives some examples: problems associated with industrial production, disease, natural disaster, migration, travel, trade, and politics—all of which are now more reported than ever due to the global

nature of the media industries. Not only does the book cover the mediatized construction of risk as a threat, but also threat and risk construction within organizational settings.

Nohrstedt's first chapter, following his introduction, presents a theoretical background to risk, following a historical change which he believes has altered the way we live so that we now live, or think we live, in what he describes as "a threat society" (p. 11). He notes that the media have built a world full of dangers and risks and the political world, culture, and economics have, in his opinion, moved from distributing such risk to spreading and promoting messages full of fear and dangerous scenarios that encourage the feeling that we are being threatened by the "other." This form of promotion of the "other" is a very important part of the construction of such messages. He builds on Beck's theorization of the risk society and world risk, noting that with the media's increasing importance and the mediatization of messages, the audience has an increased sense of uncertainty and unease about the "Others"—a mythic variety of groups who may come from many disparate places, such as those of a different religion, race, country, or civilization. All of this has become more and more the topic of political and media discourse. A good example might be the Hutu-Tutsi conflicts in Rwanda, which were encouraged by both politicians and the media.

Birgitte Mral, Helena Hansson, and Orla Vigsø, in the second chapter, consider risk rhetoric. Rhetoric is seen by many today as something relating only to the ancients and their rhetors, but the authors use analytical tools, described as both "sophisticated" and "modern" to consider this ancient discipline, whose "rhetoricity" they believe is used to persuade the modern media audience. Their case study focuses on the siting of nuclear waste in Sweden. They conclude, by utilizing Habermas's work, that this discourse, formed of dialogical and deliberative promises, was based on a preformed plan with a disguised agenda and was put in place to underpin commercial nuclear interests.

Chapter 3, written by Johanna Jääsaari and Eva-Karin Olsson, uses a theoretical approach based more closely on crisis management situations—or their failure—by media companies. Rather than using these organizations' routines and structures when dealing with crisis management, they use the ways that the identities of companies/organizations interact with

rules in such situations. As a case study they consider how Finnish and Swedish public service television managed reporting on the 9/11 attacks on the U.S. Whereas public service broadcasters in the United Kingdom, Italy, and elsewhere immediately went over to live, on-the-ground reporting (easy to do because such companies have reporters both in Washington and New York as a standard), both Finnish and Swedish public service broadcasting companies kept to their normal rules. There was a felt need to retain their own values, norms, and the identities they had themselves constructed, while also considering the audiences' expectations. This event had repercussions for the companies. They needed to reconsider both their public service remit and their program quality, but the conclusions to which each company came in the aftermath differed slightly.

The following chapter, by Ulrika Olausson, considers climate change and the way this has been treated by Swedish media. The need to discuss this issue is a global, rather than a national, one and the requirement to discuss the associated problematics has sometimes conflicted with the logic which is incorporated into Swedish media's own logic. While Swedish media are obviously more focused on a Swedish audience, they must also think about climate change with a European slant. Meanwhile, national cultures worldwide are in the process of change. Olausson considers how these conflicting demands interact in relation to the topic. They do have an effect, including the author's perception that the U.S. is seen as blameworthy in producing the causes of climate change in the production of what she sees as a culture of "otherism" that is developing in Swedish media.

Anna Roosvall's chapter returns to the theme of the ways in which "otherness" is demonstrated. In this case, she does this through the interworking of different cultures and identities in media discourses around the notions of "world threat." In order to undertake her analysis, she completed a longitudinal study of more than 1,200 media articles taken from 1987, 1995, and 2002. She takes up four themes which she sees as relevant to inter-cultural communication and the media. These are the transformations experienced by the former Soviet Union and Eastern bloc after 1989; that Islam has replaced Communism as the greatest enemy; the clash of civilizations which it is alleged occurs between Muslim countries and the West, and her idea that religion and politics should be kept separate. She concludes, not surprisingly per-

haps, that 1989 was a time of change which has affected many of the ways in which news has since been narrated to us. She writes about this with some interesting nuances.

Leonor Camauër's Chapter 6, rather than looking at the Danish cartoon fiasco, looks at the Mohammed cartoon, published in *Nerikes Allebanda*. In this regional newspaper, a cartoon showed the Prophet in the guise of a dog on a carousel, a figure from Swedish folklore. This didn't cause such a problematic rift between ethnic groups or between Sweden and Muslim countries as the Danish ones had two years earlier. Camauër suggests this was because the two countries handled things differently in that they differentiated between distant Muslims and domestic ones. Otherness was, in Sweden, constructed in a totally different way. Muslims in Sweden were shown to be partners in dialogue with those writing in the newspaper and so became part of the problem's solution.

In Chapter 7, Lisa Villadsen looks at the Danish cartoon case, noting that the focus of the public debate and of communication means was on Danish foreign policy discussions, rather than on intercultural exchange. Her study casts a spotlight on the June 2, 2008 attack on the Danish Embassy in Islamabad; Villadsen considers rhetorical citizenship norms in the Danish public sphere and how these are affected in a such a crisis. She uses deliberated democratic and rhetorical agency theories to analyze the ensuing crisis and finds that a crisis may affect the space available for debate. This is done in the name of the "national interest." A perceived terrorist threat can also be used to play into this general discourse, which feeds into the citizens' general feeling of terror.

Matts Eriksson takes a different tack in Chapter 8, focusing his research on mobile phones and calls to the emergency number, 112. Those who run this service believe that there is increased anxiety amongst the public. Through focus group interviews with 36 people, Eriksson came to understand that there were many complex reasons for this increased fear and anxiety. The cell phone is available at all times, so long as there is signal availability, and so it is more often available in situations where there is an emergency. Unsurprisingly, he found that younger people use mobile telephony more than older people. What is considered important enough to make it worthwhile calling the emergency number has also changed, as has the possibility of discussing a situation with an

operator. The conjunction of these factors has meant that the system is coming under strain due to increased call volume, and he notes that this strain is also related to the establishment of public trust. His research looks not at analysis of discourses around perceived threat, but at risk perception, self image and one's relationship with authorities, which have been changed, both at individual and mental levels.

Joel Rasmussen, in the final chapter, considers how risk management works in industrial situations, including information and communication systems, which include discourses that surround different groups' changes in power and responsibilities in these industrial settings. He focuses on three industries in which safety is particularly important. Rasmussen looked at safety incident reporting and the different ways in which this is done and interviewed employees at variety of levels in the industries. He also studied the use of risk experts, thereafter using discourse analysis to answer his research questions, finding that the construction of companies' identities relates to the risks and accidents which are part of these companies' normal day to day work. There is also evidence of a type of "otherness"—which is here called "otherism." This is demonstrated, he suggests, by the way that people in an organization will talk about others at different levels as being part of the safety systems rather than solving problems.

Risk is an area of communication which is receiving more analysis and has been demonstrated in the media through the discourses around terrorism, disease (such as AIDS, malaria, tuberculosis), climate change, ecological disasters, and so on. This book will be useful for those considering work in this area in order to gain knowledge and to see how different analytical tools can be used to address such problems. This is a very worthwhile and useful addition to the publications on risk, coming as it does from a Nordic background.

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Reference

Beck, U. (2004) *Risk society: Towards a new modernity.* London: Sage Publications. (Original work published 1996)

Olsson, Tobias and **Dahlgren, Peter** (Eds.)**.** *Young People, ICTs, and Democracy: Theories, Policies, Identities, and Websites.* Göteborg, Sweden: Nordicom, 2010. Pp. 250. ISBN 978-91-89471-87-0 (paper) SEK 280 or €30.

On December 17, 2010, a Tunisian street vendor set himself on fire to protest the confiscation of his goods and harassment and humiliation by municipal officials. His desperate act sparked protests and riots by Tunisians fed up with the social, economic, and political injustices in their country. Cell phone videos of those early protests appeared on YouTube, Facebook, and other social networking sites and were subsequently broadcast across the Arab world by satellite news channels like Al Jazeera. The images of the protests became a catalyst for the Tunisian Revolution, which led to the ousting of President Zine El Abidine Ben Ali after 23 years in power.

The success of the Tunisian Revolution sparked the Arab Spring, a series of demonstrations in other Arab countries, most notably a revolution in Egypt that led to the resignation of President Hosni Mubarak, who had been in power for nearly 30 years. The Egyptian Revolution's success relied on coupling techniques of civil unrest with the organizing power of the Internet. A Facebook page set up by a young Google executive became the driving force behind the protests, and tweets by activists on the ground helped protestors prepare for and react to violent responses from authorities.

In October 2010, Malcolm Gladwell had argued in *The New Yorker* that "the revolution will not be tweeted." Four months later, activists in Tunisia and Egypt proved him wrong. Their revolutions indicated a sea change in the relationship between young people, social media and democracy.

The essays in Tobias Olsson and Peter Dahlgren's *Young People, ICTs and Democracy* were all written well before the advent of the Arab Spring; and while its title might imply a discussion of the Internet's power in organizing young people, the book does not offer such reflections. As the editors write in their introduction, "The reader expecting discussions about how the Web 2.0 will turn the world around will be disappointed. What this book offers instead is a set of theoretically and empirically well grounded analyses of questions concerning the ways in which the Internet . . . interplays (or not) with young people's civic engagement and participation, and the implications of this more generally for democracy."

As a member of the so-called "net generation," I often hear how people my age and younger are disen-

franchised from political processes. The contributions in *Young People, ICTs and Democracy* offer research analyses that both contradict and confirm this notion. While I believe you cannot discuss young people's civic engagement on the Web without referring to major events like the Arab Spring or Barack Obama's presidential campaign (the book refers to it only in the introduction), and while one might argue that the volume has been overtaken by major events since its publication, it does offer valuable insights.

The volume is neatly organized in four major sections: theories, policies, identities, and websites. Each section contains three research papers of about 15 pages in length that grew out of presentations at a symposium the editors organized in Malmö, Sweden, in April 2007.

In the opening chapter, Natalie Fenton acknowledges the Internet as a tool for social change and challenges the notion that young people are politically disengaged. She characterizes the nature of politics exhibited online by new social movements (NSMs) as "marked by protest rather than political project," transnational and high-speed, "resulting in ever more complex networks of oppositional activism." She cites the WTO protests in Seattle in 1999 as an example. (The revolutions in the Arab world in 2011 embodied these characteristics even more.) Fenton says online participation is about engaging people offline. Barack Obama's 2008 campaign, which I have studied, comes to mind, but is not referenced. Fenton argues that we need "to move away from the notion of participative, deliberative democracy being realizable only through the traditional political structures of the nation state," and argues for a re-imagination of democracy where we need to "take on board anti-essentialist, antagonistic, radical plurality."

Janelle Ward, in Chapter 2, picks up on the notion that it's not young people who are disconnected from politics, but political institutions that are disconnected from young people. She argues that expanding the definition of the political reveals new forms of civic engagement. She does so by studying young people as "citizen-consumers" who, in the age of globalization, view purchasing as a political act. She defines three types of citizen-consumers and evaluates their level of political engagement by studying three commercial/activist websites that target such youth. Ward comes to the conclusion that new social movements don't make traditional politics

irrelevant. Instead, she argues NSMs need to find a way to work in the established system.

Addressing those youth who are disengaged from traditional politics, Stephen Coleman, in Chapter 4, asks how the Internet can lead to their re-engagement. He argues that there exists a dichotomy between increasing citizens' autonomy and the urge of political parties to manage their constituents. He finds that few governments show interest in promoting peer-to-peer interactivity online and, rather, promote managed feedback. This sort of managed e-participation leads to vertical rather than horizontal communication, a major turn-off for young citizens. "Whereas e-participation enables people to act in accordance with policies that have already been determined by others," Coleman says, "the function of meaningful e-democracy is to engage people in the framing of policies and the determination of outcomes."

The three chapters mentioned above are among the most enriching in the volume. Others that spark curiosity include Maria Bakardjieva's attempt in Chapter 7 to illustrate how young citizenship may be cultivated in everyday usages of the Internet; Ingegerd Rydin and Ulrika Sjöberg's study of how Swedish immigrant girls use the Internet to manage and shape their identities and citizenship (Chapter 8); Asli Telli Aydemir and Bilge Selen Apak's study of the 2007 elections in Turkey, where a youth ICT campaign helped lower the age one can be elected to parliament to 25 (Chapter 9); and Ulf Buskqvist's study of how media, political, and social websites addressed young citizens during the 2004 Swedish parliamentary elections (Chapter 10).

Barack Obama's 2008 presidential campaign and the events of the Arab Spring have shown (1) that youth are not disengaged from the political sphere, (2) that they are dissatisfied with traditional politics, and (3) that information and communication technologies have the power to engage young people, organize them on the ground, and shape democracy. While the research in *Young People, ICTs and Democracy* doesn't refer to these events, it offers some fundamental principles that can help understand them.

The book, part of the "Research, Anthologies, and Monographs" series, is published by NORDICOM, the Nordic Information Centre for for Media and Communication Research.

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