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Multimedia

How Educators Made Sense of New Media Multiplicity

Abstract: The term "multimedia" is associated with the proliferation of audiovisual and computational media technologies in the second half of the twentieth century, but visions of orchestrating a plurality of media devices, particularly for educational purposes, appeared earlier than this. This chapter traces the emergence of a multimedia sensibility in U.S. education in the interwar years. Offering the concept of media litanies, it describes how educators made sense of the multiplicity of new media and resisted commercial claims about the transformative teaching power of singular technologies by calling into focus the wide variety of devices that teachers could use and combine according to their pedagogical needs. The chapter also discusses early "multimedia" experiments in schools, such as illustrated radio, in which educators synchronized radio broadcasts, lantern slides, and filmstrips to produce audiovisual lessons. Together, these early educational discourses and efforts helped pave the way for corporate and cultural visions of multimedia to gain valence later in the century.

Keywords: multimedia, education, educational technology, new media, audiovisual media, twentieth century, pedagogy, users

The term "multimedia" is already a historical artifact, its usage bound up with the proliferation of new media technologies in the second half of the twentieth century. In the United States in the 1960s, the word "multimedia" (variously written as "multi-media" and "multi media" and used as a noun and an adjective) took root in the fields of education, advertising, and the arts to describe new media texts, experiences and installations that intentionally deployed more than one medium of communication. Amid rapid advancements in consumer technology and America's growing preoccupation with demonstrating its technological prowess in the context of the Cold War, "multimedia" became a flexible and futuristic descriptor for a range of efforts to make formerly discrete media apparatuses both more ubiquitous and fluidly integrated into various spaces, processes, and sectors of society (Olivero 1962; Anonymous 1969a; 1969b; 1970a; 1970b).

In a 1960s classroom, for example, multimedia might refer to a "transmission center" or an "integrated materials center" of multiple instructional A-V devices, such as an overhead projector, portable screen, tape recorder, and record player, that a teacher could use in various combinations in her lessons (Rurark 1961;

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Olivero 1962). In advertising, "multi-media" described the "multichannel sound and light shows" and multi-screen projections that became fashionable at international expositions and sales expos. Developed by young creatives and inspired by emerging theories from artists and academics, particularly Marshall McLuhan, that equated the era's new "electric media" of television, movies, radio, and computers with heightened perception and expanded consciousness, such expositions celebrated technological innovation and media proliferation while tethering notions of multi-mediated living to Western ideals of individualism, liberalism and free-market capitalism (Glueck 1967; Turner 2013).

While the use of the term "multimedia" remained somewhat stagnant in the 1970s and 80s, it surged in popular discourse in the 1990s along with the rise of personal computing, taking on new meaning to describe the "new types of media made for computers" (Rockwell and Macktavish 2004, 108). By then, "multimedia" had largely shed its early associations with panoplies of media hardware and discrete devices and was more commonly used as a synonym for "new media," or the converged, mixed-media texts and software, such as interactive encyclopedias, games, digital journalism and works of digital art that were being created and consumed with computers (Lombreglia 1997). But remarkably, around 1997, multimedia's upward trajectory made an about-face, and by the early 2000s, its usage in popular discourse plummeted (Google 2020). Perhaps multimedia had an "old-media" tinge to it in the new millennium, as an emerging class of born-digital media, including websites, blogs, digital news platforms and social media, combining sound, images, videos, and text, became ever easier to access, create, and share on the Internet and personal digital devices. By the 2010s, as single media devices, such as smartphones or digital tablets, became capable of accomplishing what multiple devices, such as television, video audio players, telephones, and typewriters, used to do separately, the multiplicity of new media and the distinctions between them no longer seemed as noteworthy as they once were.

But while the word "multimedia" is thus associated with the advent of computing, the explosion of postwar consumer technologies, and the arrival of the information age, the ideas and cultural visions that it indexes are significantly older than that. As early as the 1910s and 20s, conversations about the changing technological environment often focused as much on the plurality of new media of communication, and their points of potential connection and integration, as on the novelty or social implications of individual devices (Popp 2011). This chapter will focus on U.S. educational literature in the 1910s-1940s to trace how a multimedia sensibility emerged in schools and the educational field. It argues that the ability to acquire and marshal together various types of media and machines to accomplish a single communicative objective; to think of such devices as potentially

more useful in combination than in isolation from each other, and to imagine the user as a commanding orchestrator rather than a passive consumer of the sensory stimuli produced by multiple media, can be traced to the proliferation and cultural adoption of popular media technologies in the first decades of the twentieth century. Back then, the multiplicity and variability of emerging media forms, and the possibilities they offered to ordinary people, were a source of both wonder and anxiety for many observers (Czitrom 1982).

These sentiments were particularly salient and well-documented in the world of education. In the first decades of the twentieth century, educators in North America and Europe grappled with how to incorporate a variety of new and popular technologies, from electricity to film projectors to record players and radio, into a range of educational settings, including adult education, universities, and domestic and colonial schools (Moser 2019; Goodman 2016; Gregory 2016; Orgeron, Orgeron and Streible 2012). In the U.S. in particular, rising immigration and urbanization led the public educational system to rapidly expand and become more bureaucratized, prompting many in the educational field to rethink how schools delivered instruction. This period also saw the implementation of progressive reforms aimed at rejecting the rote, verbalistic and "passive" approaches to instruction that had predominated in the nineteenth century in favor of more engaging techniques that would educate the "whole child" through activating her interests and senses.

Beginning in earnest in the 1910s and 20s, the emerging media industries in the US attempted to woo educators by deploying a techno-utopian promotional rhetoric that aligned with the concerns of progressive reformers. Each argued that their respective devices could modernize instruction, "bring the world" into the classroom, make teaching more engaging and efficient, and deliver the kinds of virtual or "vicarious experiences" (of world travel, scientific, and industrial processes and the workings of government) that would mold youngsters into good citizens and future workers. Newspapers largely reproduced this industrial narrative that new media technologies would soon revolutionize education (Good 2020).

But educators reacted to these claims with ambivalence, at various turns enticed by the prospect of making their work more efficient and effective, and in other moments concerned that new media gadgets could render their profession obsolete. Educational researchers and teachers were also concerned that teaching with new media gadgets—then largely associated with leisure and entertainment—would make the classroom into a space of amusement or "passive" reception, rendering it a "substitute for the theater" (Knowlton 1930, 195; Crumly 1919). Drawing on their professional expertise and the burgeoning field of progressive educational theory, some educators began to criticize the notion

that any single commercial device would transform education. Instead, they developed a uniquely broadened, user-centric and "active" vision of mediated instruction where teachers and learners would mindfully make use of multiple devices, including high- and low-tech aids, according to their curricular needs.

I suggest that this amounted to the beginnings of a multimedia orientation in U.S. educational discourse and practice, one that helped to legitimize multiple new technologies for mass educational use and open the way for the notion of multimedia to gain wider academic, cultural and commercial valence by midcentury (Turner 2013). Importantly, this integrated and cross-media sensibility in education was forged by the early educational adopters and users, rather than (and often in subtle opposition to) commercial producers of new media technologies. As such, it complicates prevailing notions of multimedia as an innovation of technology industries, engineers, theorists, artists and experts (Packer and Jordan 2002).

This orientation both asserted the importance of teachers and learners in determining the proper uses of media in education and, somewhat ironically, created a pedagogical rationale for a flood of consumer media technologies to enter schools in the latter half of the century under the banner of multimedia learning (Acland 2017). In the first decades of the century, schoolteachers, administrators, and researchers began to recast emerging media devices not as standalone, authoritative aids to be passively relied upon for teaching and learning, but rather as complementary, individually inadequate tools that should be marshaled together, combined and steered by discerning users according to their communicative objectives. In this formulation, no single form of commercially-prepared media could be pedagogically superior or even sufficient in its own right. Rather, each would need to be balanced with an array of other sensory engagements and experiences for their educative benefits to be fully realized.

1 Media Litanies

Historically, users have played a critical role in defining the uses and meanings of technologies, and have often done so in ways that diverged from the use values imagined by their inventors or promoters (Gitelman 2003). This was certainly true of educational technology in the US, as representatives of the early motion picture, phonograph, stereoscope, and lantern slide industries made bold claims about how their products' visual or auditory features made them uniquely fit to transform the work of teaching (Ives and Clark 1912; Willson 1919; Victrola Talking Machine Company 1920a; Fitzpatrick and McElroy 1919, 1920). "Let

the pictures teach the lesson," urged a typical print advertisement for educational motion pictures and projectors in 1920. Claiming that "teaching from books, maps, or charts is dull at best" and consumed "too much brain energy" from pupils, the advertisement contended that "children are more enthused, give closer attention, learn more rapidly and retain more thoroughly without exertion through the medium of motion pictures" (The American Projecting Company 1921). A few years earlier, the inventor Thomas Edison, an early producer of educational motion pictures, made headlines with even bolder claims that the "schoolhouse will be the screen," and that movies would soon "revolutionize" education, lessen the workload of teachers, supplant textbooks, erase prejudice, and even prevent future wars (Anonymous 1919). For their part, producers of record players were keen to highlight the instructional versatility of recorded sound, a sensory engagement that motion picture technology was not yet capable of providing. Publishing frequently in educational journals, the Victrola Talking Machine Company (1920b) described the phonograph as "the supreme instrument" and the "teacher's staunchest ally, ready for use in every hour of the day and every branch of school work," from foreign languages to music appreciation and physical education.

But while inventors and promoters proposed singular technologies as the solution for myriad educational challenges, few educators accepted this idea or put it into practice on the ground. For starters, the uptake of mechanical devices in schools was much slower and more lackluster than industries hoped, due to a combination of school budgetary constraints, logistical challenges in acquiring and adopting new equipment, a lack of electricity in the majority of schools and educators' general skepticism toward teaching with new technology (Hodas 1996; Cuban 1986; Good 2016). Moreover, some educators were alarmed by the encroachment of commercial interests into the educational field, and in the mid-1910s began to assert their own pedagogical vision for incorporating new devices into instruction. At the 1916 meeting of the National Education Association (NEA), the nation's largest organization of public schoolteachers and administrators, a Committee on Visual Instruction convened to discuss how new visual aids could be applied to "serious educational ends." This group of nine educators and administrators was a predecessor the NEA's Department of Visual Instruction (DVI), which would form in 1923 and grow into the nation's largest organization of A-V educators, changing its name to the Department of Audio-Visual Instruction (DAVI) in 1947 (National Education Association 1915, 93; Saettler 2004, 167–168).

Key to the committee's inaugural discussion in 1916 was its rejection of the notion, made popular by the nascent educational technology industry and the press, that any single commercial innovation would soon be radically reconfiguring education. Edward Stitt, the district superintendent of the New York

schools, delivered prepared remarks in which he praised "the modern methods of visualization" such as the stereoscope and motion picture, but argued that the time had come for educators to broaden the definition of visual instruction beyond the most talked-about technologies of the day and bring it into line with progressive educational principles.

Stitt took aim at two popular devices in particular—the motion picture and the phonograph—as examples of how the era's new media posed the danger of fostering "passive" and mono-sensory learning, the kind of old-fashioned, one-way information transfer and rote instruction that the progressive educational movement was mobilizing to supersede. He criticized the "traditional tendency" of teachers "to make instruction a pouring-in process, in which the teacher becomes a sort of personal phonograph," where "the child is forst [*sic*] to listen, and so his instruction becomes entirely too ear-minded." He levied similar criticisms against the visual medium of motion pictures, calling for a "release from the passive reception of the wonders of film reproductions, by enlisting the active energies of the pupils so as to awaken their self-activity." Evident in Stitt's speech was a disdain for the "mechanical" and mono-sensory nature of education that was believed to have predominated in earlier years and an apprehension that new media machines, if used as their promoters suggested, would simply reproduce that failed approach. Their work as a committee, he concluded, should be to establish a more dynamic, "active" model of visual instruction that engaged children via multiple senses, so that "in the future the province of the teacher shall include the realm of the eye as well as that of the ear."

So how might teachers forge such an active and multisensory approach to teaching with technology? Stitt's suggestion was not to reject new technologies altogether, but rather to offer an alternative to the industry's vision of how they might be incorporated into schools. He offered what I'll call a media litany, an enumeration of a long list of available media technologies that teachers and students could variously draw upon, mix, and incorporate into their lessons according to their pedagogical needs. Media litanies not only foregrounded the plurality of media at the user's disposal, but also situated high-profile commercial innovations, such as motion pictures and slide projectors, within an educational milieu of humbler, older and homegrown devices. "The following are suggested as useful ways to enlarge the plan and scope of the work," Stitt remarked, going on to define visual aids as:

> (1) lantern slides for instruction purposes; (2) educational motion pictures; (3) stereographs [. . .]; (4) display of maps, charts, and models in classroom; (5) greater use of the blackboard by both pupils and teachers; (6) illustrations in reading-books and textbooks generally; (7) souvenir post-cards and pictures from magazines and newspapers; (8) school exhibits [. . .]; (9) educational museum [. . .] and distribution of visual aids by municipal or state bureaus; (10) clay-modeling, molding in sand trays, etc.; (11) homemade apparatus in elementary science work; (12) visits to museums, art galleries, libraries, etc. (Stitt 1916)

These sorts of media litanies appeared frequently in the new professional literature for visual education that proliferated in the interwar years (Pennsylvania Department of Public Instruction 1930, 9–10; Dorris 1928, 60). In a series of 1924 essays titled, "Aeroplane View of Visual Aids," Joseph Weber, an early university researcher of visual education methods, echoed Stitt's call by urging teachers to resist dependency on any single device and make creative use, instead, of a broadened mix of mechanical and non-mechanical media and materials in the classroom. Weber defined visual aids here as "artificial objects, models, and exhibits; globes, maps, and charts; graphs, diagrams, and cartoons; paintings, picture prints, and book illustrations; photographs, stereographs, lantern slides, and motion pictures; and last, but not least, the time-honored blackboard" (Weber 1924, 338). A few years later, Weber would write again to make the case for auditory and other sensory aids, criticizing the visual education movement for "placing the sense of vision on a pedestal and worshipping it as the golden calf." He urged practitioners to remember that "all the senses, more or less and in diverse combinations, co-operate in the steady accumulation of learning" (Weber 1928). Emphasizing that making interactions with new media "educational" required an active role for users and a fuller engagement of their sensoria, these statements knocked motion pictures and other high-profile visual technologies down from the pedestal to which the industry had elevated them, and afforded them same educational status as simpler, more homemade, and other sensory aids.

Media litanies also appeared in the writings of schoolteachers, who chronicled in educational journals their own experiments with teaching with diverse combinations of sensory devices. Reflecting on how far they had come since the olden days of rote, book-based instruction, a Massachusetts geography teacher named Pauline Powers exclaimed in 1938, "No Victrola, no radio, no motion picture, few newspaper or magazine articles of genuine interest in those days! But how many aids there are [at] the disposal of the geography teacher of today! Let us mention just a few of these many agents." Powers went on to list a variety of visual and audio and mechanical and non-mechanical media that she had incorporated with success into her geography lessons, including not only movies, record players, radio, newspapers, and newsreels, but also student-made scrapbooks, letters to newspaper editors, stamp collections and pen pal correspondences between students (Powers 1938, 275).

Further indicating this shift toward privileging users and a plurality of media in the classroom, a number of influential educational researchers authored

teacher-training textbooks in the late 1920s-40s that called for a more pedagogically-informed praxis of visual education in which teachers, students, and the curriculum would drive the use of devices, not the other way around. Importantly, these formulations made room for the new medium of film in instruction but emphasized that any screenings in school should be anchored in a range of auxiliary media uses, discussions and activities to promote "active" learning and critical thought. Anna Verona Dorris, a California educator who served as president of the DVI between 1927–29, wrote in *Visual Instruction in the Public Schools* that educators must "control and regulate visual education," particularly the use of movies, to promote a "more pedagogical use of all visual aids." Offering a media litany of her own, she wrote: "Visual aids—photographs, models, exhibits, charts, graphs, maps, stereographs, slides, and motion pictures—are merely educational tools to be used at the psychological time." She warned against "the misuse and abuse of certain types of visual aids, particularly the film [. . .] [that] must be attributed largely to the lack of knowledge of modern pedagogy and an overenthusiasm regarding the possibilities of new and novel devices" (1928, 38–39; see also Hoban, Hoban Jr. and Zisman 1937; Dale 1946).

Published in educational journals and declared in speeches at educational conferences, media litanies were discursive constructs that allowed media-minded educators to assert their professional agency over emerging technologies in a time of broad technological change. Such utterances may have been acts of not only pedagogical theorization but also professional self-preservation: a way of highlighting the indispensable role of the human teacher in a time when popular narratives commonly predicted that new technology would render them "obsolete." Describing mediated instruction as a field of endless possibilities achievable only through the conscious choices and creative actions of teachers and learners, media litanies allowed educators to push back against characterizations, common in the press, that they were old-fashioned, change-resistant technophobes while obliquely staking claims that no single device could handle the work of instruction on its own.

The contrast between commercial and educational visions of technology in the classroom was evident in the images of visual education-in-action that these groups submitted to educational publications. Commercial advertisements for educational technologies, such as film and slide projectors, unsurprisingly focused on the devices for sale, highlighting their authoritative, visualizing power and sleek, mechanical design. Where pictured in these advertisements, the student users of such devices were often depicted sitting neatly in rows, viewing images on an illuminated screen in rapt attention like spectators in a theater (Bell & Howell 1929). In contrast, educators' and school administrators' images of visual education-in-practice commonly portrayed classrooms and school libraries as chock-a-block

with heterogeneous mixes of visual and tactile technologies—including wall pictures, charts, maps, projectors, stereoscopes, and collected artifacts—being actively handled and used by students in a single moment (Dorris 1928, 151, 224; Burrall 1919, 500; Ramsey 1922, 285). These photos have a staged quality to them and may simply represent an attempt by educators to showcase, in the economy of a single frame, the variety of items in a school's collection or on loan from educational museums. But whether organic or staged, such images celebrating the arrival of technology into the schoolroom were nonetheless visual analogues of the media litanies that so often appeared in educators' writings. They called into focus the plurality of "devices" available for teaching and ways that users might mobilize them. Rather than figuring singular new media devices as authoritative solutions to an array of teaching problems, these images foregrounded the multiple uses and combinations of an array of high- and low-tech media, and human users as the commanding orchestrators of their instructive potential.

2 Illustrated Radio, Multimedia Experiments, and the Promise of "Eye and Ear Instruction"

At the same time that educators were beginning to articulate a multimodal vision for education, some took part in ambitious efforts to combine and synchronize audio and visual media in their classrooms. In most schools in the 1920s and 30s, electric audio and visual media were rare, used infrequently and transmitted through separate devices, making it difficult for teachers to apply new technologies to the vaunted ideal of multisensory learning. The first major technologies to synchronize visuals with sound—sound films, or "talkies," and television—did not develop until the late 1920s and early 1930s, and both of these remained out of reach for most schools until after World War II.

Yet some educators made resourceful attempts in the interwar years to mix sounds, visuals, texts, and other sensory experiences in the pursuit of multisensory instruction, using newly acquired media or devices they already had on hand. A teacher at a school in Washington, D.C., for example, wrote in 1925 of an eight-grade class's project of dramatizing a work of literature by projecting still images on a screen with their new stereopticon (a two-lens slide projector) while playing phonograph recordings of classical music in the background and performing verbal recitations for an audience of their peers (Moore 1925). On the other side of the country that year, the Oakland Public Schools of California experimented with improving art instruction through the new medium of radio, having children draw Christmas cards in their classrooms while listening to a

"radio teacher" deliver instructions remotely from local station KGO. Reporting in *Radio Digest*, an observer of the experiment marveled at how the sounds over the airwaves conjured up new images in the classroom, created by the young listeners as they drew: "By radio lessons the children received suggestions through their ears and sent out the response through eager busy fingers. [. . .] In the child's heart and mind alone took place that transmutation which makes out of spoken word the created image" (Anonymous 1925).

A notable attempt to synchronize mechanically-transmitted sounds and visuals for educational purposes came in the form of "illustrated radio" broadcasts carried out by city school systems, universities, museums and newspapers in the 1920s-40s. In 1924, the Chicago-based radio station WMAQ, owned by the *Chicago Daily News* newspaper, produced a number of educational programs as a "public service" to listeners, and developed a novel approach to delivering remote illustrated lectures to area schools. Partnering with the Art Institute of Chicago, the radio station broadcast 30-minute lectures on art history while teachers in multiple public schools, stationed in their classrooms and auditoriums across the city, screened identical sets of lantern slide images for their students to view. Students of different schools were thus able to share in a synchronous, illustrated, and remote lecture by listening to a single radio broadcast and viewing a common set of projected images at a coordinated time. The same method would be used again to transmit illustrated talks on geography to children in the Chicago and surrounding suburban schools in 1927 (Ramsey 1938; Myers 1927).

Illustrated radio techniques were further developed by university radio stations and extension service educators in the 1930s to provide agricultural education to students in rural communities (U.S. Department of Agriculture 1932). In 1932, the Ohio State University extension service developed a new illustrated radio lecture format resembling a call-in radio show, utilizing a mix of radio, filmstrips and the telephone. At a coordinated time, groups of students in rural classrooms in five different counties viewed identical filmstrips, screened by local agricultural agents, while tuning into the university radio station, where an educator delivered a lecture and an assistant operated a filmstrip projector with the corresponding images. When the lecturer wished to move from one image to the next, he sounded a gong, signaling both to his projection assistant in the studio and to the agricultural agents in the five different locations to move to the next picture in their filmstrips. At the end of the illustrated radio lecture, each class held a discussion and phoned their questions into the radio station, where the lecturer answered the questions, for the benefit of all the groups, over the radio (Hoffman 1932).

Education by illustrated radio represented a promising development in audiovisual pedagogy, or what one educational observer called "eye and ear instruction." One former high school teacher was so enticed by the prospect of teaching with illustrated radio that he developed special filmstrips to accompany the popular educational radio program, *The World Is Yours* (NBC) in 1938, calling the format "Radiovision" (Myers 1927; Hoffman 1938). By synchronizing the aural medium of radio broadcasting with the visual medium of illuminated lantern slide images and filmstrips, educators, newspapers, and museums produced a technologically-mediated version of the progressive ideal of multi-sensory instruction envisioned by Stitt and the Committee on Visual Instruction two decades earlier. The Chicago lectures arguably lacked the "active" approach to multi-mediated learning that Stitt and his contemporaries had imagined, as it relegated teachers the role of projectionists, students to the role of spectators and the distant radio lecturer to the authoritative role of "master teacher." But the Ohio lectures included an element of interactivity and user participation through the incorporation of group discussions and the telephone, which allowed students to call in with their questions and interact, to a degree, with their remote instructor and peers. Despite these differences, illustrated radio experiments comprised ambitious attempts by educators to combine and synchronize multiple new media technologies to promote a more engaging and audiovisual learning experience than any single commercial medium could yet provide on its own.

While illustrated radio would soon be eclipsed by educational television after World War II, at least one urban school system continued to use it as late as 1946. In Cleveland, Ohio, the public school district-owned radio station, WBOE, broadcast art talks by an art teacher while teachers and their students screened accompanying sets of colored Kodachrome slides in 64 schools across the city. The postwar A-V journal *See and Hear* chronicled this feat of local audiovisual broadcasting, describing it as "just short of television." "Television has been called the ultimate in extending the word and the graphic image into the classroom," the editors explained. "Rather than wait [for television], here is a point from which we can start" (Horton 1946, 48). While it is not entirely clear whether the authors saw television as a technology to be desired or avoided in the classroom, what is apparent is that the multimedia sensibility that led to the experimental use of illustrated radio in schools, and that had been developing in the educational field since the 1910s, emerged at the edges of commercial and mass media development, and through educators' and other institutions' enterprising attempts to mix emerging and extant media in pursuit of multisensory learning. By midcentury, the idea of synchronizing, mixing, and teaching with multiple media at once would be taken up by the technology industries themselves, and "multimedia" would move into the mainstream.

3 From the Schoolroom to the Living Room

In the late 1950s and 1960s, the interest in coordinating multiple media for instruction that had been steadily building in the educational field for half a century was subsumed by a "wave of industrial-electronic futurism" in American industry, government, and culture, ushered in by Cold War techno-panics, a booming postwar economy and school-age population, and the popularization of television (Fletcher 2017). The Soviet launch of Sputnik in 1957 prompted the US Congress to pass the National Defense Education Act in 1958, which sought to help Americans "catch up" with the Soviet Union in science and technology by allocating significant funds to schools and educational research. The law, which constituted the largest federal attempt to shape American education to date (Strain 2005), prioritized research and development in educational technology and enshrined a distinctively multi-medial vision of it, defining the "new educational media" as a media litany of "motion pictures, video tapes and other audio-visual aids, film strips, slides and other visual aids, recordings (including magnetic tapes) and other auditory aids, and radio or television program scripts" ("National Defense Education Act of 1958" 1958). The technologization of American education now had the full backing of the federal government and the moral urgency of staving off nuclear war and ensuring the triumph of the free world over communism.

One researcher who benefited from the influx of federal support for educational media was the Canadian communication scholar Marshall McLuhan. Shortly after the law's passage, the U.S. Office of Education and the National Association of Educational Broadcasters commissioned McLuhan to write a report on the state of new media in education. Working out ideas that would later appear in his classic *Understanding Media* (1964) and other works, McLuhan's "Report on Project in Understanding New Media" (1960) heralded the arrival of a "multi-media electric age" and warned that schools needed to adapt to a variety of new media or risk becoming irrelevant. The spread of television, movies, radio, and computers was obliterating the divide between formal and informal education, he argued, and transforming the world into an interconnected "global village" and a "classroom without walls." Students should therefore be taught to adopt a "mosaic approach" to utilizing media and information throughout their everyday lives, learning to "deal with all media at once in their daily-interaction" (McLuhan and National Association of Educational Broadcasters 1960; McLuhan and Leonard 1967). Though McLuhan would popularize this multimedia view of education in his later books and media appearances, his "Report" reveals how he developed them in dialogue with an educational sector that had already been grappling the implications of multiple media in education and society for decades.

The notion that new technology was obliterating the divide between formal and informal education was attractive to corporate electronics producers and technology companies, who mobilized in the post-Sputnik era to develop an array of new educational products for not only schools, but also homes and workplaces (Cain 2017). As Curtis Fletcher writes, in the early-to-mid 1960s, virtually every major electronics manufacturer in the U.S., including Xerox, R.C.A., General Electric, I.B.M., Honeywell, Westinghouse and Philco-Ford, began to invest in the research and development of educational technologies, with a focus on "multimedia systems" that incorporated multiple media devices and had multiple instructional uses. Futuristic advertisements for "homes of tomorrow" and "schools of tomorrow," showcasing technologies envisioned but not yet available for sale, depicted children and parents effortlessly engaging with multi-screen consoles and audio-visual "education centers" in their everyday activities, including homework, child-rearing, reading the news, retrieving recipes, watching television and gardening (Fletcher 2017).

Now, multi-modal and interactive educational technologies were no longer marginal, relegated to teachers' grassroots experiments in schoolrooms and auditoriums, but a "prominent futurological trope" in American corporate culture, encouraging consumers to imagine how a web of new, interconnected technologies and information flows could enhance multiple domains of their lives. As many Americans saw it, in contrast to the "closed" societies of the Soviet Union, where citizens encountered their media through single, state-approved propaganda apparatuses, the expansive, multi-media, and multi-channel landscape of the U.S. stood for information freedom, self-directed learning, individualism, enlightenment and the creation of "free, self-governing individuals." Liberal media use had come to be equated with liberalism itself. As Fletcher (2017) and Turner (2013) note, these techno-utopian visions laid the groundwork for dominant thinking about the World Wide Web and the vigorous governmental and corporate promotion of digital technologies, in and outside of schools, in the late 1980s and 1990s. Multimedia thinking, or the idea that many media, mixed, and controlled by individual users and for purposes of teaching and learning, had long ago been articulated by educators who wished to push back against the notion of undue commercial influence and single-medium hegemony in education. But it now provided a pedagogical, social, and political rationale for a range of consumer devices to flood into schools and homes.

Conclusion

Vestiges of educators' early twentieth-century multimedia visions can still be seen in the products peddled by the most powerful producers in the digital economy. At the time of writing, advertisements for computers and mobile digital devices, such Apple's iPad and MacBook Air, frequently draw on the idea of technology conveniently blending together multiple, formerly separate media functions (e.g., television and movies, music, games, word processing, reading, correspondence, photos, telephone calls), and assisting users in their ongoing education, information retrieval, communication and overall empowerment. It is common now for ads to bring neither the hardware nor the software into focus but, instead, to render the devices so thin and lightweight (almost like "air"), their uses (or "applications") so limitless and the borders between them so insignificant that they can be effortlessly transcended with a single "swipe" of a finger or keystroke.[1] Now, the user is truly in full command of a fluidly integrated, multisensory mediated experience, with no pesky cords, consoles, reels, discs, slides, or keyboards to manage. So while the term "multimedia" may not be as common as it once was, corresponding to a half-century of growth and consolidation of audio, visual, and digital media industries and products, the concept is now seamlessly embedded into the idealized uses of our popular media machines.

The sociotechnical visions that "multimedia" represents exceed the use of the word itself. Taking root in a historical moment of multiple-media emergence in the 1910s and 20s, and within an informational institution—the school—that has long grappled with the threat and promise of technological change, we continue to feel, see, and hear its effects a century later, absorbed and amplified by an industry that benefits from the assumption that engaging with a multiplicity of media in daily life is essential to being an educated citizen.

1 For examples bookending the 2010s, see Apple's advertisement for the first-generation iPad at the 2010 Academy Awards "iPad 1 Commercial" (available at: https://www.youtube.com/watch?v=U_LceLUFl0U0) and its 2020 advertisement for the iPad Air, "Introducing iPad Air" (available at: https://www.youtube.com/watch?v=r_VSll0WLZE).

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