Elementary Language Education in Digital Multimodal and Multiliteracy Contexts

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Abstract

Early childhood education is intrinsically multimodal. The kindergarten discovery orientation to learning emphasizes play and embodied multisensory learning, but this is traditionally retracted as children gain control of alphabetic print in the early grades. The introduction of digital tools and networks is more recent in elementary education. Digital mediation affords a powerful lens on hands-on learning, augmenting, expanding, and complicating multimodal learning and introducing new tools, textual products, and spaces for reflection and communication. Digital multimodal literacies also challenge fundamental assumptions about the starting point of emergent literacy, which is assumed to be the ABCs.

Keywords

Coding • Digital literacies • ECE • Emergent literacy • Game learning • Inquiry-based learning • Multiliteracy/multiliteracies • Multimodality • Multi-semiotic • Play-based learning

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Early studies of elementary multiliteracies and multimodal learning included research conducted internationally in schools, communities, online learning sites, and homes. Research illustrated the transformative potential of digital multimodal learning by transferring agency to the learner, facilitating collaborative inquiry-based projects, and encouraging learning through play. Curricula espousing twenty-first century competencies are emerging in forward-thinking nations, but political trends in elementary education are neither widespread nor universal. Pedagogical innovations include maker schools and game-based programs. A number of challenges remain in instituting multimodal literacies in elementary learning contexts, including vague notions of what multimodality comprises; a lack of alignment in educational policy, practice and assessment; and difficulties in keeping up with the rapid pace of digital change. Contemporary issues pertaining to the future of elementary literacy education include the place and salience of alphabetic literacy, spelling and conventional grammatical usage in a climate of merging human-digital memory, and the increasing importance of coding as a fundamental literacy skill.

Introduction

Elementary educators are steeped in multimodal practices, which are foundational to early childhood education (ECE). The tried and true routes for developing children's sensory capacities and communicative repertoire are informed by early twentieth century theories of human development that argue for socially engaged, hands-on learning. Consider the child's multisensory engagement in activities such as tracing a sandpaper alphabet, finger painting, playing with puppets, choral singing, and rhythmic clapping. ECE invites embodied learning through play in the service of language development and alphabetic awareness.

Kindergarten is a paradigm of multimodal learning. However, as Robinson (2006) stresses, embodied learning experiences are educationally constricted as children progress toward independence in abstract learning. He posits a universally evident hierarchy of subjects in schools, stemming from the needs of the nineteenth century industrialization that prioritize mathematics and language and relegate least importance to fine and performing arts, commenting, "truthfully what happens is as

children grow up we start to educate them progressively from the waist up, and then we focus on their heads, and slightly to one side" (Robinson 2006, 9:15–9:25).

Contemporary attention to multimodality speaks to rapid digitization, which has dramatically reshaped how we communicate, beginning with the fundamental tools. Powerful, portable networked digital devices enable novel connections, interactions, and modes of expression. Though there is a clear push for digital tools in the school, the incorporation of digital communication in elementary education comes up against the centuries-held notion that learning the ABCs is the starting point for literacy learning. Does this still hold true?

Early Developments

The changing face of literacy was a topic of fertile discussion and debate at the close of the twentieth century. New literacy studies, working from an anthropological perspective, theorized literacy as social practice, opposing the position that literacy was an autonomous cognitive skill (Street 1984). Critical scholars argued identity politics and social justice perspectives in literacy and education (Lankshear 1997; Muspratt et al. 1997). Cultural theorists and media literacy scholars were engaging with the rising tide of pop culture and the onset of the digital revolution (Buckingham and Sefton-Green 1994), and concurrently, ECE researchers were documenting the yawning gap between children's preschool literacy socialization in pop culture worlds and the agenda of emergent literacy instruction (Dyson 1997; Marsh and Millard 2000).

The galvanizing call to action was the New London Group's 1996 manifesto on *multiliteracies*, written collaboratively by a collective of eminent scholars to alert educators to the disconnect between the monolingual print-based literacy education of tradition, the culturally diversifying school population given increasing global mobility, and the onslaught of the digital revolution. The New London Group plaintively posed the question of what it meant to be literate at the dawn of the twenty-first century. Their manifesto catalyzed scholars in language arts, critical theory, cultural studies, second language learning, and new media literacies who resounded the alert, pointing to particular and varied aspects of how globalization and the digital revolution were radically changing communication and work patterns.

By 2000, the members of the New London Group had revisited the conceptual terrain and extrapolated the *why*, *what*, and *how* of multiliteracies (Cope and Kalantzis 2000), moving toward an actionable agenda for changing educational practice. Design elements were described in terms of linguistic, visual, audio, gestural, and spatial meaning-making processes and interrelating multimodal patterns; these constituted an elemental framework of multimodality. Scholars, researchers, and educators were actively thinking and writing about how literacy, learning environments, semiotic resources, discourses, and texts were changing. Following Kress and Van Leeuwen's (1996) foundational theorizing of visual

design, for instance, Unsworth (2001) extrapolated semiotic links between alphabetic print and image in the study of English literature for children in Australia.

It is important to remember that technological development at this time was Web 1.0: basically a searchable, self-publishing bulletin board in a networked world that connected developed nations via wired computers. Documents at the turn of the century could be searched, self-posted, and retrieved but not collaboratively authored or interactively engaged with. Digital civilization had not yet reached the development of Web 2.0 with its dynamic texts, shared authorship, multimodal interaction, and machine-enabled translation, let alone the near future of ubiquitous wireless access on wearable mobile devices. Thus, early theorizing of multiliteracies and multimodality occurred in a climate of whirlwind technological change when the greatest part of the upheaval had not yet hit.

But what was actually happening in school classrooms? When I walked into an elementary classroom in Toronto, Canada, in the fall of 2002, with a research agenda to document where and how trendsetting writing on multiliteracies was affecting educational policy and teaching practice, I discovered that not much had changed, despite the mushrooming professional and research literature. I had had the good fortune to survey two public schools located in communities characterized by immense cultural and linguistic diversity and low socioeconomic status in different corners of Toronto for a comparative international study documenting schools at the forefront of digital technology in 1999–2000 (Granger et al. 2002). Both schools had been at the beginning of impressive journeys into digital literacies, and the administrators, teachers, and children had hugely impressed the researchers, who candidly admitted to each other that the university needed to take a few lessons from kindergarten on emerging digital literacies. Returning later (2002) to conduct ethnographic research in one of these digitally ahead-of-the-curve schools on how the literature on multiliteracies was reshaping instructional practices in the classroom, I realized that governing educational policy (in Ontario) had been moving in a contrary direction, instituting standardized tests, and looking back to basics. The digital literacies the school had been surging ahead with earlier were now being shoehorned into the standards of print literacies.

The term *multiliteracies* had ignited scholarly zeal, but the concept was logistically problematic. The centrality of multiliteracies was appealing to researchers, looking at patterns and crosscurrents in sociocultural communication, but confusing to put into teaching practice, and antithetical to the *back to basics* lobby behind the standardized testing movement that was sweeping across North America. Precisely what *multiliteracies* indexed was vague: one could aspire to a multiliteracy approach doing almost anything that was not traditional monolingual print literacy.

Major Contributions

The fieldwork in multimodal pedagogies grew out of research projects, small and large, that were conducted in schools, communities, online sites, and homes around the globe. The term *multiliteracies* inspired practical questions about how

multiliteracies looked, sounded, and felt in practice and how multiliterate practices could be taught and learned. Fieldwork informing educational practice emerged from studies designed to develop multiliteracy pedagogies in school; studies whose pedagogical trajectory led organically to a multimodal stance; studies based in disciplines that informed multiliteracies, such as digital pop culture and multilingual education; and explorations of digital trends and practices in online communities.

Changing Literacies in Elementary School

A number of early studies of changing literacies in elementary school were motivated by social justice concerns in contexts of cultural diversity. Stein's (2008) formative research and writing about multimodal teaching and learning was pedagogically exploratory, culturally sensitive, plurilingual in its incorporation of multiple languages, and geared to the development of learners' voices for political empowerment. Her teaching of English to young black children in a South African township during the politically repressive apartheid era was the doorway to her foray into multimodal communication. Stein worked educationally to change the record of violence and oppression by inviting children's culturally rich forms of expression into classroom sharing, working with drama, song, music, poetry, and, later, oral histories and storytelling. Spaces opened up to other languages so stories could be told as they were first heard. She describes, "What began as a fairly loose, unstructured language activity was transformed over a year into a sustained project in a narrative across multiple semiotic modes in which students drew heavily on cultural forms and resources familiar to them" (p. 8). Stein and colleagues honed their exploratory, culturally responsive pedagogy toward critical multimodal pedagogy in post-apartheid years.

Jim Cummins' influential work on *identity texts* in education is rooted in activist research in culturally diverse schools. Schecter and Cummins (2003) conducted action research with children, teachers, and community members in two elementary schools in Greater Toronto, working to change the character of interactions and identity negotiations with linguistically diverse populations. The concept of the identity text as a multilingual and multimodal textual vehicle in which emergent bilingual students positively invest in their complex identities was theorized during Cummins' and Early's (2011) explorations of "the instructional spaces that opened up when the definition of literacy was expanded beyond its traditional focus on linear print-based reading and writing skills in the dominant language" (p. 3). The research reported in their 2011 volume includes case studies with young children in schools in demographically diverse Vancouver and Toronto and in a wide variety of international contexts, from orphanages to primary classrooms.

Whereas in Cummins and Early's (2011) and Stein's (2008) studies, the incorporation of digital technologies was marginal to the larger aims of the research, digital exploration was centrally featured in other researchers' agendas. Mills (2011) explored multiliteracies by focusing on digital moviemaking in an elementary school

classroom in a culturally diverse suburb of low socioeconomic status in Queensland, Australia. She noted a significant shift in classroom power dynamics as "students [were] positioned to think and design collaboratively and creatively within a community of practice" (p. 2).

Lotherington (2011) and her colleagues began co-developing multiliteracy pedagogies in 2002, forming a learning community comprising teachers, researchers, and community members. The collaborative action research was conducted in a public elementary school in northwest Toronto. Researchers redefined and rebuilt elementary education using experimental across-the-curriculum, cross-age, team taught projects that connected diverse curriculum threads in plurilingual, multimodal, digitally supported texts. Their momentum to understand, design, and refine pedagogies of multiliteracies for primary and junior learners continued for a decade.

Healey's edited (2008) volume expounded research on multiliteracy pedagogies in Australia and Singapore that included elementary education contexts. The case studies illuminate interesting fissures accruing to the changing balance of knowledge and agency in the classroom. Sticky problems identified in the volume persist in contemporary practice: teachers fearing their lack of digital know-how restricted the introduction of digital technologies to students who were observed to be technically proficient, and creative teaching and learning being curtailed to prepare students for high stakes testing.

Pahl and Rowsell's (2006) edited collection merged multimodal and new literacy perspectives to report on a wide-angled view of the expanding field of literacy, welcoming research from different social contexts that included studies with young children. The studies provide multifaceted evidence of the transformative power of multiliteracies that reposition the learner at the center of learning.

Exploring Digital Worlds

Lankshear and Knobel's (2006) forward-thinking work plunged headlong into burgeoning social media practices, proposing digital epistemologies for classroom learning. They identified the growing wedge between school literacies and children's after-school social literacy activities, illuminating practices confronting to school literacies, such as remixing, and identifying and exemplifying (then) new practices of blogging and podcasting that have, a decade later, become production modes used in elementary schools. Their book posed tough questions about how wireless and mobile access would change schooling and challenged teachers to acknowledge the churning pace of digital innovation deeply affecting how students communicate in and out of school.

Jewitt (2006) interrogated "*what* resources new technologies make available and *how* these mediate the complex relationship between the learner and 'what is to be learnt'" (p. 76) in examining how digital resources remediate learner practices. She researched game design and play in the elementary English classroom, where she found that multimodal resources changed not only how learners represented learning but also how they interpreted it.

Gee (2003) began extolling the virtues of video games for learning well over a decade ago when he began to play them with his young son. Gee, a member of the New London Group, brought a distinguished record of discourse analysis research to his focus on gaming as literacy. He applied his conceptualization of the *affinity group* (p. 27) to video gamers' identification as insiders to games and groups and described the sophistication and value of the knowledge bases activated in gaming lifeworlds, listing 36 learning principles of video games, including the multimodal principle.

New Literacies, New Competencies

This brief summary only skims the surface of important and detailed research undertaken in the first decade of the twenty-first century that has led to better educational understanding of multiliteracies and multimodality. What common threads emerge in these studies?

Incorporating multimodal literacy projects in elementary school contexts is transformative: multiliteracy projects encourage collaborative inquiry and transfer agency to the learner. Multimodality enables textual hybridity that accommodates multiple languages in the array of semiotic choice, thus supporting plurilingual designs that positively support language learners and invite a global audience. Digital technologies and social media platforms are sophisticated tools that require knowledge of multiple semiotic resources and invite creative design. Multimodal literacies support play-based learning, both on- and offline. Multimodal literacies, in short, call for new competencies in elementary learning.

Though multimodality is not new in elementary education, it has traditionally been corralled in early childhood education, with the apex of play centered in kindergarten. The play-based orientation of kindergarten is increasingly being held up as a model for learning more generally (de Castell and Jenson 2003). This includes the growing recognition of the salience of creativity in formal education and serves as a clarion call for approaches to learning that encourage innovation.

Work in Progress

In the manifesto *A pedagogy of multiliteracies: Designing social futures* (New London Group 1996), the authors proposed the maxim, "curriculum is a design for social futures" (p. 73, original emphasis). As Robinson (2006) points out, "nobody has a clue . . . what the world will look like in 5 years time, and yet we are meant to be educating [children] for it" (2:12–2:22). Designing pedagogies for an unknown and swiftly moving future is a significant challenge.

The research base amassed since the turn of the century has contributed useful knowledge and perspectives on identifying and understanding multimodal literacies in social context. An important educational outcome of the research on digital multimodal literacies includes the emergence of policy-embedded approaches to multimodal learning in elementary education. Policy, though, is not practice.

A strong movement toward do-it-yourself (DIY) learning is evident in play-based pedagogical approaches, such as *maker schools*, game-based learning, and in online social media networks.

Multimodality in Elementary Curricular Learning

Goals and characteristics of multimodal learning, together with statements of twenty-first century competencies, can be viewed in the elementary curriculum documents of top-performing Programme for International Student Assessment (PISA) scorers. Finland is well known for its devolution of classroom authority to schools and classroom teachers, who utilize curriculum guidelines as advisory rather than a set of specifications to be completed. In its 2016 revised curricula, the Finnish National Board of Education sets out reforms to basic education that include the identification of seven transversal competence areas, a push on formative assessment emphasizing learners' development of critical self-assessment, and a move toward collaborative practices (Halinen 2015, 5). Søby (2015) lists Finland's competencies aimed toward twenty-first century learning as:

C1. Thinking and learning to learn
C2. Cultural literacy, interaction, and expression
C3. Taking care of oneself, everyday life skills, safety
C4. Multi-literacy
C5. Digital competence
C6. Working life skills and entrepreneurship
C7. Participation, influence, and responsibility for a sustainable future (p. 65)

To offer another example, Singapore promotes a three-ring model of twenty-first century competencies, emerging from a central core of values to a middle ring espousing "Social and Emotional Competencies" (Ministry of Education, Singapore 2015, 5) to an outer ring, representing:

> the emerging 21st Century Competencies necessary for the globalised world we live in. . . .

- Civic literacy, global awareness and cross-cultural skills
- Critical and inventive thinking
- Communication, collaboration and information skills (Ministry of Education, Singapore 2015, 6)

Policy is an important indicator of motivation to effect systemic change in education, though the translation of policy into practice is a complex and involved process. Political adoption of multimodal perspectives and twenty-first century competencies in early literacy education is still an emergent trend showing uneven progress: whereas some political jurisdictions are embracing the diffusion of literacy learning across the curriculum (Ontario, Canada), others are prioritizing basic content knowledge in English, mathematics, and science in elementary education (England).

Multisensory, Play-Based Learning

Early childhood education has historically been a bastion of multimodality in the sense that it encourages and creates spaces for multisensory, multi-semiotic play-based learning. In traditional K-grade 6 education, play-based learning spaces were physically and educationally withdrawn, and children were increasingly relegated to desks as their capacity for independence in abstract thinking grew. The linchpin was alphabetic literacy. The traditional thinking went: first children learn to read; then they read to learn.

Learning, however, has changed and so has reading. The design orientation has inspired active, embodied inquiry in settings utilizing maker pedagogies and game learning. Of primary note is the learner's multisensory involvement. Whereas traditional literacy concentrates on visual identification of abstract symbols, maker spaces are inextricably haptic and play based. Indeed, the design manuals for maker groups are called *playbooks* (cf: Makerspace team 2013).

The maker movement has its roots in educational research in the American creative industry sector. Maker spaces are philosophically open and untethered to specified topics, products, or tools. A similar movement is game simulation learning in elementary school, using *Minecraft* as a learning platform. *MinecraftEdu* is "a school-ready remix of the original smash hit game Minecraft,"[1] which must be purchased, though educational discounts for licensed use are offered. An extensive sandbox approach to hands-on simulation learning in the classroom is offered in conjunction with licensed educational use.

DIY Learning and Social Media Sharing

Online DIY forums have transformed how teachers are learning, teaching and connecting with learners, teachers, parents, and community members. Online social media sites that offer teachers advice; invite them into conversations; and connect them with ideas, resources, and people run the spectrum from creative industry affiliated educational blogs, such as *Edutopia*,[2] to state online learning sites, to individual teacher's blogs. Crowd-sourced, cloud-based learning resources and solutions offer a cornucopia of ideas for learning designs.

John Andrews[3] is a teacher in the Greater Toronto area with 26 years of experience across the K-grade 8 elementary panel. He began tweeting his grade 2 class's work in 2008 for paperless communication with parents and as a time-saver on the class newsletter. Teaching ECE, he took sole responsibility for the class Twitter handle for privacy reasons but also to avoid young children's confusion in learning to write, given the syntax of a 140 character tweet. In junior and intermediate

[1] http://minecraftedu.com/software

[2] http://www.edutopia.org/

[3] Pseudonym

teaching, he devolves responsibility for class tweeting to students, though he strictly polices followers.

There are school board limitations on what the school is permitted to share on social media, and parental approval forms are needed for media release, but John now has close to 100% of parents on board. In addition to tweeting classwork to parents, John has a class YouTube channel, which offers hands-on involvement for young children who can post videos of their school projects (with assistance). Young children learn to use approved software for photo capture and audio-video recording, which assist them in communicating their schoolwork to their networked publics. John lauds the benefits of YouTube posting for learning: children record, post, reflect on, and revise their work for (controlled) public sharing with an authentic audience. Communication and language learning are intrinsically multimodal.

With junior and intermediate grade students, John teaches basic coding. He began with the programming language, *Python*, and then moved to the object coding language built for elementary school learners, *Scratch,*[4] which the junior/intermediate students taught to primary grade children. Learning to code he sees as part of the changing face of assessment: students cannot code what they do not understand and their coding projects graphically illustrate what they are capable of doing. Kids' minds are very big places, he states, and pedagogies that release students from overly prescriptive models, standards and basics, foster learning through action and creative problem-solving.

Problems and Difficulties

Three significant hurdles to the adoption of digital multimodal perspectives in elementary education can be identified: (1) the concept of *multimodality* is amorphous, so *multimodal literacies* programs cover a broad range of ideas and activities; (2) educational policy, practice, and assessment often do not line up; and (3) the pace of digital innovation outstrips the capacity of formal educational institutions to formulate and institute pedagogical aims, learning processes, literacy tools, and products appropriate to current (much less future) needs.

Conceptualizing Multimodality

The definition of *multimodality* varies considerably with intellectual tradition. The predominant voices in literacy studies are grounded in the social semiotics theorizing of eminent linguist Michael Halliday. Work in this vein has carefully delineated changes in textual communication from alphabetic print on paper to multi-semiotic genres, focusing on the growing importance of image and visual communication in

[4]Scratch: https://scratch.mit.edu/

the move from page to screen (Kress 2010; Kress and Van Leeuwen 1996; Jewitt 2006).

The definition of a *mode,* though, is left to cultural agreement. As Kress (2010, p. 79) explains, "Mode is a socially shaped and culturally given semiotic resource for making meaning. *Image, writing, layout, music, gesture, speech, moving image, soundtrack and 3D objects* are examples of modes used in representation and communication." While this exemplification is intuitively useful, there is crossover and inconsistency in identification of modes, e.g., music and soundtrack overlap, moving images contain still images. Virtually everything is complexly multimodal in this view, including traditional print, which utilizes font, layout, print size, and, in the case of school texts, pictures, charts, graphs, maps, tables, and similar nonalphabetic visual data.

Concepts of multimodality based in linguistic communication are generalized to still and moving images, auditory, and performance arts from language. Elleström (2010) focuses on fine and performing arts in his *intermediality* paradigm and defines four modes that describe all basic media: material, sensorial, spatiotemporal, and semiotic. In the intermediality paradigm, the semiotic category, wherein linguistic meaning is largely contained, is but one of the categories that must be considered.

Norris (2012), who conceptualizes multimodality from a perspective of mediated discourse theory, maintains that modes do not in fact exist but they are heuristic devices that "are not separate units. All communication is based on perception and the embodied senso-motory [sic] processes, making it impossible in practical terms to dismantle them into isolated parts" (p. 4). Despite their inseparability, Norris discusses modes, identified as visual and touch, which are sense data. Indeed, involvement of the senses looms large in the identification of multimodal literacy practices. The sensory alphabet is an analytical tool that Marcus (2009) offers to describe new media from a design perspective. This tool provides a means of analyzing what she calls "pattern language," (p. 1934) invoking "line, color, texture, movement, sound, rhythm, space, light, shape" (p. 1934).

Modality and multimodality are thus slippery concepts, and multimodal literacies subsume a range of projects, interfaces, and approaches. Nonetheless, varied multiple approaches constitute a monumental step forward from the traditional portrait of monolingual, alphabetic print literacy that continues to feature in much of language testing.

Cohesion in Educational Policy, Practice, and Assessment

Educational policy documents began to incorporate the conceptual arguments and emerging approaches to multiliteracies and multimodality in the first decade of this century. However, conflicting forces affect formal education, including, prominently, the results of the influential Programme for International Student Assessment (PISA) test, which "assesses the extent to which 15-year-old students have acquired key knowledge and skills that are essential for full participation in modern societies"

(OECD 2014, p. 3). The PISA results in mathematics, science, reading, and problem-solving rank 65 participating countries according to performance.

The latest published PISA results are from 2012; the ten top scorers in reading were Shanghai, China; Hong Kong, China; Singapore; Japan; Korea; Finland; Chinese Taipei, Canada; Ireland; and Poland (OECD 2014). These top-billed nations have different educational histories, curricular approaches, and assessment paradigms, spanning education systems that are highly centralized and standardized with strong examination cultures (e.g., China, Singapore, Japan), to those who devolve authority to teachers and schools (e.g., Finland). Analyzed OECD results indicate "schools with more autonomy over curricula and assessments tend to perform better than schools with less autonomy when they are part of school systems with more accountability arrangements and/or greater teacher-principal collaboration in school management" (2014, p. 24). Nonetheless, strong testing lobbies persist, and the disjuncture between inquiry-based curricula facilitating collaborative, across-the-curriculum projects that invite creative textual products, and standardized testing of discrete language items and grammatical usage creates a significant tension.

The Pace of Digital Innovation

There is no doubt that a culture of innovation pervades the high-tech industrial sector. The pace of change in the products available for consumption on portable personal digital devices is staggering, and the modest price of downloads for apps and cloud-based services has encouraged a proliferation of digital products, accompanied by crowd-sourced app reviews. How are schools to determine what children need to know to function in a climate of such rapid change? And how do institutions plan for, budget, and purchase in a timely fashion the digital technologies needed to facilitate learning, given the grinding political machinery of public education oversight?

A first observation is that emergent literacy is deeply affected by the digital revolution. Where once control of a pencil and knowledge of the alphabet allowed a child to begin to write herself into the world, now children need to learn how to operate complex hardware, navigate operating systems, select and use appropriate applications, search and evaluate the legitimacy of information on the Internet, and produce and customize machine-mediated text and code, all in addition to learning to read and write alphabetically. Moreover, children are being socialized into digital literacies before they reach school. Young children in strollers and supermarket carts are seen to be operating smartphones, while their parents shop and do errands with them in tow. These children are essentially learning online navigation as they are learning to walk and talk. As preschoolers, they are engaging in video games that utilize screen navigation tools and multimodal menus that are far more interactive and complex than the static pages of the basal readers they encounter on school entry. The rapidly changing engagement with multiliteracies in the current era suggests the need for an openness to multimodality and an emphasis on creating conditions for learning to learn as primary goals of elementary education.

Future Directions

Multimodality is not new in elementary education, but digitization is (relatively speaking), and digital innovation is perennially and swiftly moving. Digital mediation augments, expands, and complicates multimodal learning; it facilitates multimodal text building and sharing. Portable digital technologies, such as tablets and smart phones, are sophisticated devices that embed multiple, complex programs that enable young children to access, read (with assistance), record, photograph, draw, animate, combine, and remix material that may or may not contain alphabetic text. Using a digital tool to record a child's multimodal production provides a novel lens on abstraction from that envisaged in alphabetic independence in that it permits the child to reflect on his or her own production, as well as to edit or augment it. Children can build iconic texts with the help of a teacher, and then insert alphabetic text, or use other modes of meaning to assist in interpreting letters, so that learning the ABCs need not necessarily precede producing and reading multimodal text. The alphabet is now but one of the available textual building blocks: traditional graphic literacy is essential to school-based learning but is no longer itself sufficient.

The future of responsible and adaptive elementary school education elicits challenging questions regarding the place of physical printing and handwriting, as well as expectations of spelling, grammar, and punctuation as these elements change across the many genres and communicative modalities currently available. The mere suggestion of expanding the focus of elementary education beyond prescriptivist conventions of traditional grammar, spelling, and punctuation is often seen as heretical. But while conventional print literacy skills remain important in many contexts, formal education needs to be much more inclusive and ecologically adaptive to human cognition and contemporary social practices as they become increasingly interwoven with networked computer memory.

Digital literacy tools are immeasurably more complex than pencil and paper in that they are massively mediated. If learning control of the mediating processes in textual access and composition is the primary focus of basic literacy education, then basic literacy should now include coding and programming. Children will have to routinely learn to use machine language if they are to graduate from being capable of consuming digital multimodal products to being capable of creating them from anything other than a template. Maker schools, snap-together coding languages such as Scratch and Snap!,[5] and game-based learning workshops encourage productive, active multimodal literacies. However, much of elementary learning today is analogous to the nineteenth-century mass education, which aimed to produce workers who could listen, read, and understand directions, but not to write eloquently and analytically of the political and economic bondage such literacy skills enabled. Today's learners are skilled digital consumers. Creating an emancipatory future through education requires not only that students gain the ability to write themselves into the world but also that they gain the ability to code the world.

[5]Snap!: http://snap.berkeley.edu/

Cross-References

- ► Ecologies of Digital Literacies: Implications for Education
- ► Multilingualism and Multimodality in Language Use and Literacies in Digital Environments
- ► Multimodal Discourses Across the Curriculum

References

Buckingham, D., & Sefton-Green, J. (1994). *Cultural studies goes to school: Reading and teaching popular media*. London: Taylor & Francis.

Cope, B., & Kalantzis, M. (Eds.). (2000). *Multiliteracies: Literacy learning and the design of social futures*. London: Routledge.

Cummins, J., & Early, M. (Eds.). (2011). *Identity texts: The collaborative creation of power in multilingual schools*. Stoke on Trent: Trentham.

De Castell, S., & Jenson, J. (2003). Serious play: Curriculum for a post-talk era. *Journal of the Canadian Association for Curriculum Studies, 1*(1), 47–52.

Dyson, A. H. (1997). *Writing superheroes: Contemporary childhood, popular culture, and classroom literacy*. New York: Teachers College Press.

Elleström, L. (2010). The modalities of media: A model for understanding intermedial relations. In L. Elleström (Ed.), *Media borders, multimodality and intermediality* (pp. 11–48). Basingstoke: Palgrave Macmillan.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave MacMillan.

Granger, C. A., Morbey, M. L., Lotherington, H., Owston, R. D., & Wideman, H. H. (2002). Factors contributing to teachers' successful implementation of IT. *Journal of Computer Assisted Learning, 18*(4), 480–488.

Halinen, I. (2015). *What is going on in Finland? – Curriculum reform 2016*. Finnish National Board of Education. Retrieved from http://www.oph.fi/english/current_issues/101/0/what_is_going_on_in_finland_curriculum_reform_2016

Healy, A. (Ed.). (2008). *Multiliteracies and diversity in education: New pedagogies for expanding landscapes*. Melbourne: Oxford University Press.

Jewitt, C. (2006). *Technology, literacy and learning: A multimodal approach*. Abingdon: Routledge.

Kress, G. R. (2010). *Multimodality: A social semiotic approach to contemporary communication*. Abingdon: Routledge.

Kress, G. R., & van Leeuwen, T. (1996). *Reading images: The grammar of visual design*. London: Routledge.

Lankshear, C. (1997). *Changing literacies*. Buckingham: Open University Press.

Lankshear, C., & Knobel, M. (2006). *New literacies: Everyday practices and classroom learning* (2nd ed.). Maidenhead: Open University Press/McGraw Hill Education.

Lotherington, H. (2011). *Pedagogy of multiliteracies: Rewriting Goldilocks*. New York: Routledge.

Makerspace. (2013). *Makerspace playbook: School edition*. Makermedia. Retrieved from: http://makered.org/wp-content/uploads/2014/09/Makerspace-Playbook-Feb-2013.pdf

Marcus, S. (2009). New basics for new literacies. *Journal of the American Society for Information Science and Technology, 60*(9), 1933–1938.

Marsh, J., & Millard, E. (2000). *Literacy and popular culture: Using children's culture in the classroom*. London: Sage.

Mills, K. A. (2011). *The multiliteracies classroom*. Bristol: Multilingual Matters.

Ministry of Education, Singapore. (2015). *21st century competencies*. Retrieved from: http://www.moe.gov.sg/education/21cc/

Muspratt, S., Luke, A., & Freebody, P. (1997). *Constructing critical literacies: Teaching and learning textual practice*. St Leonards: Allen & Unwin.

New London Group. (1996). A pedagogy of multiliteracies: Designing social factors. *Harvard Educational Review, 66*(1), 60–92.

Norris, S. (2012). Introduction to part 1: Primary focus—social actors and their actions. In S. Norris (Ed.), *Multimodality in practice: Investigating theory-in-practice-through-methodology* (pp. 3–6). New York: Routledge.

OECD. (2014). *PISA 2012 results in focus: What 15-year-olds know and what they can do with what they know*. PISA: OECD Publishing.

Pahl, K., & Rowsell, J. (Eds.). (2006). *Travel notes from the new literacy studies: Instances of practice*. Clevedon: Multilingual Matters.

Robinson, K. (2006). Do schools kill creativity? *TED Talk*. Retrieved from: http://www.ted.com/talks/ken_robinson_says_schools_kill_creativity?language=en#t-742793

Schecter, S. R., & Cummins, J. (Eds.). (2003). *Multilingual education in practice: Using diversity as a resource*. Portsmouth: Heinemann.

Søby, M. (2015). Finnish education system. *Nordic Journal of Digital Literacy, 10*(2), 64–68.

Stein, P. (2008). *Multimodal pedagogies in diverse classrooms: Representation, rights and resources*. Abingdon: Routledge.

Street, B. V. (1984). *Literacy in theory and practice*. New York: Cambridge University Press.

Unsworth, L. (2001). *Teaching multiliteracies across the curriculum: Changing contexts of text and image in classroom practice*. Buckingham: Open University Press.