DIGITAL MINDSETS AND IDENTITIES: REFOCUSING LEARNING PRIORITIES FOR 21ST CENTURY LEARNERS

Kay Kimber

Griffith University and Brisbane Girls Grammar School, Australia

Claire Wyatt-Smith

Griffith University, Australia

Screen-based practices permeate the lives of today’s young people. From screen tots to screenagers, their engagement with multimedia, the internet and cell phones is reportedly high. Their technological capabilities are frequently understood to be substantial and easily adaptive to new media developments. Yet their mere attention to screens is no guarantee of conceptual understanding, perceptive interpretation, or creative production. Against this background, globally, educators are charged with preparing their students for increasingly complex life challenges and increasingly digitised futures. In many instances, the solution is said to lie in developing skills and attributes like digital proficiency, collaboration and problem-solving. In some cases, long lists of desired skills and learning goals are promoted, setting clear pedagogical targets for educators. When these lists combine across subject areas and with the demands of national curriculum and high-stakes testing, educators can feel pressured by time and a need to prioritise. In this paper, we draw on empirical research in education, cognitive science and psychology to suggest that shifting the focus from skills to identities has potential for equipping young people for their future citizenship. Our research base includes an Australian longitudinal study into secondary school students’ use and creation of online curricular knowledge, several European and American research projects involving children from the early years and new technologies, and theoretical perspectives on the influence of thinking on the quality of learning outcomes. From these perspectives, we offer the concept of digital mindsets with its core dimensions of critical inquirer, innovative designer, local/global citizen and ethical decision-maker as foundational for building robust identities and informed agency in the digital age.

Keywords: Digital, New media, Multimodal, Identity, Mindsets.

Introduction

We live in a digital world that is rapidly transforming how we work, communicate and interact in our daily lives. For most of the adult population, the digital transformation of the analogue world is a relatively recent phenomenon. For today’s children, it is just the way the world operates. Many teenagers live with the mobile or cell phone at their fingertips—consumed by the need to communicate, search, snap and share with their friends at any time, 24 hours a day. For them, multifunctional, mobile devices are absorbed into their very essence of being. The mobile phone and digital notebook phenomenon has revolutionised the scale and ease of people’s communication and information-seeking practices. In 1997,
Douglas Rushkoff coined the term “screenagers” to represent young people who seemingly spent inordinate amounts of time watching television and computer screens. Since then, researchers have interrogated the scale, frequency and manner of media usage (Ito et al., 2008; Kaiser Family Foundation, 2010; Project Tomorrow, 2009).

The third Generation M2: Media in the lives of 8- to 18-year-olds report (Rideout, Foehr & Roberts, 2010) presented statistical evidence from extensive surveys conducted in 1999, 2004 and 2009. Significantly, a steady increase in the amount of daily exposure to new media was noted: 7:29 (1999), 8:33 (2004) and 10:45 (2009), with higher levels for Black and Hispanic youth than white. Further insight into the nature of teenagers’ everyday activity with new media came with the identification of three key genres—“hanging out”, “messing around” and “geeking out” (Ito et al., 2008, p. 10). The first characterised purely social connectedness through new media; the second, more creative experimentation with digital modes and formats; and the third, more serious involvement in passion-based learning communities. The terms foreground how these digital activities have facilitated (a) social connectivity, (b) the development of a raft of technological skills essential to active participation in daily life, and (c) the building of communities of special interests. Similarly, communication, collaboration, creation and contribution were the four themes found by the SpeakUp survey (Project Tomorrow, 2009) as permeating American teenagers’ daily online activities. All these themes are interwoven in the online gaming phenomenon, where McGonigal (2010) has predicted that 99 per cent of teenage boys and 94 per cent of girls will have participated in 10,000 hours of online games before they turn 21. Screen-based practices permeate the lives of today’s young people—even the under-eight-year-olds. These are the children born into the digital world who have never known life without television, mobile phones or touch screens.

An American study on the screen exposure of children aged six and under (Rideout, Vanderbilt & Wartella, 2003) noted “a potentially revolutionary phenomenon in American society: the immersion of our very youngest children, from a few months to a few years old, in the world of electronic and interactive media” (p. 12). The researchers found that infants and preschoolers were spending approximately two hours a day before a television or computer screen, “not just passively consuming media chosen by other members of their homes”, but “actively asking for and helping themselves to what they want[ed]” (p. 4). A major British study (Marsh, Brooks, Hughes, Ritchie, Roberts & Wright, 2005) confirmed the multimedia immersion of children from birth, noting that they were “competent and confident navigators of digital worlds” (Marsh, 2009, p. 78). So for this age group, the Rushkoff metaphor could well be adapted to “screentots”.

From screentots to screenagers, young people’s engagement with multimedia, the internet and cell phones is reportedly high. This phenomenon has raised particular concerns for psychologist, Sherry Turkle (2012a), who has claimed that “those little devices in our pockets are so psychologically powerful that they don’t only change what we do, they change who we are” (ted.com/talks/lang/en/sherry_turkle_alone_together.html). Young people might relish the creation and re-creation of their online identities and avatars, but to what extent is their real-world identity formation, including manner of thinking, considered?

Walter Ong (1982) identified an almost psychological, transformative power in writing and technologies: “Technologies are not mere exterior aids but also interior transformations of consciousness, and never more than when they affect the word” (p. 82). Whether written, typed, spoken, blogged, texted or emoticon-ed, digitally enabled words have the potential to impact knowledge and relationships. Gorry (2009) has warned that “technology’s parade of fragmented lives may sap us of feeling” (p. 7), rendering the online participant incapable of empathy and hence, humanity, and it is unfortunately the case that cyberbullying has already claimed young lives. So, when young people’s vision of “knowing”, “being” and “acting” in the world is mediated by communication devices, often accessible at any time and in any place, the imperative for educators and parents alike needs to become more than knowledge or skill acquisition. The imperative becomes one of ensuring young people have greater consciousness of the power of words, whether their own or those of others, and their responsibility for ensuring critical, ethical, empathetic and just processes at all times.
While common perceptions of screenagers’ technological capabilities tend to be of their intuitive, effortless negotiating of any technology, some research studies have challenged these perceptions and basic assumptions. Drawing on research from several countries into young people’s everyday uses of technology, David Buckingham (2007) observed that banality and superficiality rather than critical discrimination characterised much of their technological usage. Other studies of curricular usage of online materials have also revealed low levels of critical thinking (Eshet-Alkali & Amichai-Hamburger, 2004; Kimber & Wyatt-Smith, 2010; MCEECDYA, 2010; UCL, 2008). Yet while the increasing importance of digital media literacy across all subject disciplines and professions has been noted (Horizon Report – US Edition 2011), the emphasis in education has tended to be on access, equity and skills acquisition with minimal research on the associated impact on identity formation.

Against this background, globally, educators seek to prepare their students for increasingly complex life challenges and increasingly digitised futures. In many instances, the solution is said to lie in developing skills like digital proficiency, collaboration and problem-solving. In some cases, long lists of desired skills and learning goals are promoted, setting clear pedagogical targets for educators (Belshaw, 2011; Kimber & Wyatt-Smith, 2010; Martin, 2002; Partnerships for 21st Skills, 2009; SCONUL, 2006). When these lists combine across subject areas and with the demands of national curriculum and high-stakes testing, educators can feel pressured by time and a need to prioritise. In this paper, we draw on empirical research in education, cognitive science and psychology to suggest that shifting the focus from skills to identities has potential for improving young people’s future citizenship.

In what follows, we first consider the changing demands of education in the digital world as more comes to be understood. In Digital age: Developing understanding, we draw primarily on an Australian longitudinal study into secondary school students’ use and creation of online curricular knowledge to present details of key concepts that emerged over a six year period from examination of the student work and theoretical exploration. The second section, Digital learning priorities: Skills to identities?, outlines different expectations for supporting individuals to become digitally literate yet empathetic. The final section introduces and explains our concept of digital mindsets with its four core dimensions of critical inquirer, innovative designer, ethical decision-maker and local/global citizen as foundational for building robust identities and informed agency in the digital age.

Digital age: Developing Understanding

In 1997, Ilana Snyder anticipated the need to rethink teaching attitudes and approaches to align more closely to the accelerating influence of technology and hypertext in particular, saying:

It will be interesting to see how teachers in the humanities and social sciences who are concerned with literacy issues respond to the possibilities and problems that hypertext presents. What we have at the moment is an intriguing technology whose operations compel us at the very least to revise our print-derived notions of reading, writing and text. But at the same time, perhaps the technology will also influence the cultures of teaching and learning in ways we cannot yet imagine. (p. 141)

Now some 15 years later, greater clarity has formed about this “intriguing technology”, and more particularly, about how teaching, learning and interacting in a digital world can be improved. As understanding of the digital phenomenon deepens, the nexus of technology, human agency and identity assumes a critical level. It is not just technology itself that has to be considered, or even the ease and practicality of its usage. Rather, it is the way in which individuals approach, use and reflect on their actions and interactions that is influencing the culture of teaching and learning, and society.

To explore the dilemmas and demands of education in the digital world discussion turns to an Australian Research Council (ARC) Discovery research project, undertaken by researchers from Griffith University during 2003 to 2008.
ARC Discovery Project: Using and Creating Knowledge in the High School Years

Using and creating knowledge in the high school years: Performance, production, process and value-adding in electronic curricular literacy sought to obtain a point-in-time capture of secondary school students’ digital capabilities in completing a curricular-related online task involving online research and the creation of a multimodal text. The study focused on how and how well secondary school students (a) used information and communication technologies to search for and read online texts, and (b) created and communicated new knowledge in “new” multimodal texts they generated in the absence of prior instruction.

Participants

Sixteen government and independent secondary schools across a range of socio-economic areas in Queensland, Australia, participated in this study. Participants included 736 students from Years 8 and 10 in 2004, and 248 from Years 10 and 12 in 2006, with 138 students common to both data collection rounds.

The tasks

Two separate online tasks were devised in consultation with a teacher advisory group, following a pilot study in 2003. The aim in devising both tasks was to embed them in curriculum requirements for Years 8, 10 and 12 in national priority areas (English, science, mathematics), while also taking account of the set curriculum in history, studies of society and the environment, and technology.

The 2004 task was designed as a cross-curricular, inquiry-based activity that focused on the environmental threats posed by plastic bags. The 2006 online task retained its inquiry-based framing but had a greater emphasis on web site evaluations. It focused on biometrics, global warming, or the participating school’s own curricular focus. Unlike the 2004 task where students were required to present a solution to a problem, the 2006 task required students to investigate alternative views on the topic and represent findings.

Data

A range of data types was collected in 2004 and 2006 including:

a) surveys (918 student and 272 adults) on out-of-school technology use
b) product data (841 student-created multimodal texts) – mostly PowerPoint, some Word documents, and a few web sites
c) process data (concept maps, decision-making matrix, web site evaluations – completed as students were using online knowledge and creating their own multimodal text – and their reflections of the process, their product and the experience) plus
d) screen capture recordings of students’ real time working online, searching the Internet, selecting relevant resources and constructing their texts), and
e) interaction data - recordings of talk as a sub-set of students as they worked in pairs to collaborate on the 2004 task.

All data were created, collected and archived electronically.

The discussion that follows focuses on the analysis of the product data described in b) above.

---

1 Students were supported in undertaking the task in that sample websites were built into task design, but there was no expectation that teachers would “teach” how to “do” the task. The intent was to track students’ progress from 2004 to 2006.
Methods of analysis of multimodal texts

In first considering how to evaluate the quality of the 2004 student-created multimodal texts, the research team drew on Sadler’s (1985) seminal work on assessment criteria and standards. Sadler argued that stated performance standards help to clarify and communicate expected features of quality, and inform the process of making judgments about the quality of work. In these ways, “a value claim is made easier to establish” (p. 289). The research team identified those features that could assist in talking about and determining quality in multimodal texts as e-proficiency, cohesion, content and design (Wyatt-Smith & Kimber, 2005). E-proficiency at that time was defined as basic technological operation and online activity, including use of software and various media: “the capabilities and repertoires of practice that students exercise in online environments, often on a daily basis” (Kimber & Wyatt-Smith, 2008, p. 335). In this framing, the notion of “e-credibility difficulties” (Haas & Wearden, 2003, p. 169) was raised as important for determining “qualities of trustworthiness, accuracy, completeness and timeliness” (p. 170). E-proficiency was considered to be (a) foundational in underpinning each of the other criteria and (b) reflected in the overall design of the texts students generated. It was subsumed into the other three criteria, ultimately shaped and developed into the Evaluative Criteria and Standards for Online Multimodal Texts.

Cohesion was defined as “unifying the structure, representation, organisation of ideas, links” (Wyatt-Smith & Kimber, 2005, p. 28), acknowledging the potential of interactive links to give structure, depth, explanation, and contrasting points of view. From this perspective, the integration and mobilisation of colours, images, language choices and movement via the affordances of the software all contributed to the effectiveness of the student’s multimodal design in engaging the audience and representing knowledge. Content concerned the quality of the selection and organisation of the research information—the effectiveness of the students’ ability to locate, use and create new knowledge online that went beyond cutting and pasting. Consideration was given to the thoughtfulness of resource usage, as well as the framing and structuring of information. The standards devised for Design, or “creating an aesthetic, artful design” (Wyatt-Smith & Kimber, 2005, p. 28), unpacked characteristics of quality at different levels, and focused in particular on how the linguistic, visual and technological choices were managed to create the multimodal text. Table 1 presents a summary of these descriptors for each criterion.

Two main points should be emphasised. First, throughout the process of formulating, trialling and finally applying the assessment criteria and standards, they were taken to be provisional (that is, not fixed). This stance recognised that students might present ‘surprises’ in their creations which could well call forth additional, previously unspecified criteria. For this reason, the rubric of criteria and standards had a space for what was referred to as the “X Factor”, recognising that assessors could take account of and reward innovation in the features of the actual work that went beyond or differed from the pre-set criteria.

Second, in the process of applying the criteria to a sample of student products, a necessary and new concept emerged—“Transmodal operation” (Wyatt-Smith & Kimber, 2005, p. 31). This term was intended to capture the dynamic involved in crossing among the visual, verbal and kinaesthetic modes of representation, as well as different software applications, as the student negotiated and constructed her digital representation of knowledge. Essentially, the concept served to describe the holistic intermingling of the nine performance features presented in Table 1.

In determining the quality of each multimodal text, based on the above criteria, descriptors were added on a four-point scale: Outstanding performance; Accomplished; Developing; and Limited. As there were many incomplete tasks, a fifth point was added—Lack of evidence of performance. Proficiency level was determined as midpoint in the scale (2.5), the boundary between Developing and Accomplished. All student-created multimodal texts (620 in 2004; 221 in 2006) were evaluated independently by six different researchers after validation checking exercises, according to this criteria and five-point scale.
Table 1. Criteria for evaluating student-created multimodal texts.

<table>
<thead>
<tr>
<th>Criteria for evaluating student-created multimodal texts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cohesion</strong> — <em>Overall cohesion</em></td>
</tr>
<tr>
<td>▪ Designing multimodally to engage audience and facilitate meaning-making</td>
</tr>
<tr>
<td>▪ Cohesion of ideas within the text</td>
</tr>
<tr>
<td>▪ Linking — technical proficiency</td>
</tr>
<tr>
<td><strong>Content</strong> — <em>What was said</em></td>
</tr>
<tr>
<td>▪ Quality of information</td>
</tr>
<tr>
<td>▪ Justification of solution</td>
</tr>
<tr>
<td>▪ Sequencing and organisation of information within a node</td>
</tr>
<tr>
<td><strong>Design</strong> — <em>How it was said</em></td>
</tr>
<tr>
<td>▪ Managing written language features</td>
</tr>
<tr>
<td>▪ Managing visual and spatial elements of written text</td>
</tr>
<tr>
<td>▪ Managing graphics and other web/screen elements</td>
</tr>
</tbody>
</table>

Evaluations revealed some interesting patterns. First, Outstanding performances were minimal, and approximately one-third of the cohort in both years attained the proficiency level (38 per cent in 2004; 25 per cent in 2006). The majority of the cohort scored below the proficiency level (62 per cent in 2004; 75 per cent in 2006). Second, Accomplished performers scored either higher Content than Design, or similarly high in both. Developing or Limited performances scored higher Design than Content. These findings suggested that effective transmodal operation tended to be associated more with Accomplished performances than with Developing or Limited performances, and was reflected in a seeming balance between Design and Content. Overall, these results indicated that across the two-year period, for this school-like curricular, multimodal knowledge creation, this cohort of young people had not demonstrated high levels of critical reflection, creative design or transmodal facility, even though new technologies had become more ubiquitous.

These findings resonated with other studies now discussed. A national Australian study (conducted in 2005) to determine the levels of technological proficiency of Years 6 and 10 students (MCEETYA, 2007) found that 61 per cent of the Year 10 sample and 49 per cent of the Year 6, (a) were able to attain their proficiency level, and (b) were using technology in limited ways. While improvements were evident two years later, similar concerns were raised in a MCEECDYA report (2010) about the need for more critical thinking with online work. In other research, Buckingham (2007) noted that banality and superficiality rather than “spectacular forms of innovation or creativity” (p. 92) characterised much of British and American young people’s everyday technological usage. In short, these findings challenge notions of young people as discriminating users of new technologies and point towards the need for more systematic approaches to pedagogy and assessment to increase critical and creative usage.

**Conceptual Reframing: Issues of Creativity, Connectivity and Credibility**

On reflecting on the criteria and descriptors used in 2004 (see Table 1) in preparation for 2006 data collection, the researchers considered print-dominant influence. That is, while attention was given to multimodality in terms of transmodal operation, or how the student operated across visual, verbal and even kinetic modes to create meaning, the focus in Content related purely to the information gathered and presented as evidence of learning. The major difference between the 2004 and 2006 criteria in this regard concerned the different task focus, from providing a solution to a problem (2004) to reconciling different

---

2 The researchers developed a six-level literacy scale and proficiency standards in consultation with teachers and IT experts in all states (p. x). Proficiency was determined as the boundary between levels 3 and 4 for Years 10, and between levels 2 and 3 for Year 6 students.
viewpoints on an issue (2006). While the Design section focused on visual display, from aesthetic colours to spatial layout and even movement, the first element concerned linguistic accuracy. Further, Design was placed fourth on the criteria list, suggesting lower hierarchical value, and e-proficiency was not accorded any specific criteria in its own right. All of these points indicate the print-influenced perspectives of the researchers and teacher advisory group. Ideas for reframing the goals for classroom learning, using and creating online materials, came from the researchers’ identification of key issues in the literature associated with digital learning, namely creativity and connectivity. They have flowed from the contemporary working environment into education, prompting calls for schools to build the creative capacities of their students and to use the connectedness of networks to their utmost advantage, both locally and globally.

Creativity has been claimed as a critical workforce capacity (Fleming, 2008; McWilliam & Haukka, 2008; Robinson, 2006) across the arts, sciences and society in general. Many countries have taken up the creativity challenge, including the United Kingdom (Robinson, et al., 1999), Singapore (Economic Review Committee, 2002), Australia (Prime Minister’s Science, Engineering and Innovation Council, 2005) and Canada (The Conference Board of Canada, 2008). McWilliam and Haukka (2008) characterised creativity as “human ingenuity and high-level problem-solving” (p. 652), defining it as the value-adding component to an individual’s capabilities and the economy more generally. Invariably, creativity is seen as the trigger for innovation, essential to economic growth.

Becker (2006) and McWilliam (2005) promoted “unlearning” as an essential skill for effective 21st century learning. “Unlearning” could be regarded as a prerequisite for creative thinking as it involves challenging accepted ways of doing something—and opening the mind to other ways of doing something, much as clearing a slate or hitting a delete button. It is part of the imaginative suspension of usual practice and the first step towards allowing creativity to break through. With this concept in mind, teachers and students alike could become more conditioned to finding new approaches to technology-mediated learning, fresh views on assessment and possibilities for co-creation of knowledge. This is important if we are to move beyond print-bound ways of thinking about how knowledge is used, created and shared. It is important for developing innovations that have appeal and sustainability.

Daniel Pink (2005) recommended linking “high concept” creativity with “high touch” (p. 49) or empathy-building capacities to forge better communication and understanding between individuals. These “high concept—high touch” aptitudes take on greater importance in the changes brought to business through globalisation. Former British Prime Minister, Gordon Brown (2008) argued that globalisation had resulted in a “global skills race” (Brown, 2008, p. 1) wherein a nation’s success would be measured by whether it had brought out the best in its people. A sense of urgency was raised in the notion of a “war for talent” (Teaching and Learning Research Programme, 2008, p. 13), caused by global, corporate competitiveness, and resulting in a destabilising of national and international patterns of skilled and professional employment. From these perspectives, connectivity in a global sense would appear to hold particular consequences for young people’s education in school and their future work choices. For Turkle (2012), connectivity in a personal and social sense is a major concern. For her, constant connectivity is changing how people think about themselves and is, as consequence, shaping a new way of being.

Connectivity has precipitated what some claim is the greatest challenge of our time—credibility or trust (Metzger & Flanagan, 2008). Early concerns for how the Internet raised credibility issues (Brown, 2000; Burbules, 1997, 2001) have been expanded through recent research into and theorising about the logistics and essentials of credibility evaluation in digital contexts, especially where young people are concerned. Digital media developments have magnified the need for more frequent and more astute use of credibility-evaluative skills. While people’s capacity to evaluate the credibility (or believability) of a source or person has always been integral to human relationships, it is not surprising to contemplate how the complexity of the Internet has compounded the difficulty of being able to discern indicators of trustworthiness.

Trustworthiness and expertise, the two key dimensions of credibility identified by Flanagan and Metzger (2008, p. 8), rely on the receiver’s ability to decode, discern or accept the reliability of the source in question. Harris (2008) argued that some young people’s level of cognitive development, naïveté, lack
of real world experience and tendency to “satisfice” (p. 162), or settle for “good enough” rather than optimise their decisions, sets them at a disadvantage when working with information on the Web. The reading and interpretation of informational cues in digital texts – “source information, dynamic presentation, advertising” – require the reader to locate, organise, consider logically and apply abstract reasoning, all of which are directly linked “to developmental changes in cognition” (Eastin, 2008, p. 39). Given the amount of erroneous, misleading and potentially harmful information that sits in the same virtual space as rich, accurate, powerful multimedia texts, young people need to be able to discriminate more easily. Educators can assist in developing young people’s capacities for finer discernment with meta-strategies for interrogating texts, sourcing corroboration and arriving at informed decisions. Explicit instruction can help improve the levels of young people’s skills in evaluation and reflection (Drotner, 2008). Consistent and appropriate use could help young people to add their own critical lens to offset reportedly current corroborative practice — almost instantaneous seeking of clarification and support from social networks and recommender sites (Harris, 2008). Flanagin and Metzger (2008) cast this kind of networked corroboration as the new “coin of credibility” that should be challenged by building young people’s personal evaluative skills to such a degree that they become “architects of credibility” (p. 18).

As the preceding discussion has demonstrated, the key priorities of creativity, connectivity and credibility pointed to a need for the researchers of the ARC Discovery research project to reconsider distinctive goals for teaching and learning in the digital age. To this end, the concepts of e-designing and e-credibility were envisaged, but imbued with the need to promote ethical, responsible citizenship. E-designing foregrounded the active construction of knowledge and attention to visual representation. It represented the visible process and instantiation of creativity. E-credibility was shaped to emphasise the need for careful discernment in locating and retrieving information, and ideally mining the sites to address issues of credibility and reliability, even ideology.

E-proficiency was taken to extend beyond basic technological competencies to more critical and applied usage. For example, being net-savvy might begin with the ability to search for and locate relevant information on the Internet, but being e-proficient will ensure that the user knows and can select from a variety of search engines and databases to suit different purposes and contexts, rather than automatic selection of solely one search engine. As well, the e-proficient user will have more advanced working knowledge of a range of software protocols and fine functions. From this perspective, an accomplished user has a wider choice of options in creating a quality digital knowledge product and in understanding how others’ digital texts have been created. All these skills enable production as distinct from consumption of digital products and are foundational to any creative design possibilities using digital media. In these ways, e-proficiency can extend the learner’s digital capabilities towards more purposeful, critical and ethical use and production of knowledge in online environments.

In using, creating and sharing knowledge in complex online environments, where multi-tasking and moving across different platforms and modalities are everyday actions, albeit with differing levels of competence, transmodal operation morphed into transmodal facility. Here ‘facility’ was synonymous with the highest of demonstrated high quality learning and performance in an online environment, rather than mere ‘operation’. It was defined as the:

ability to work with and across source texts, technology platforms and modes of representation to create a new digital text where critical thinking about content and concepts is balanced with the aesthetics of design (Kimber & Wyatt-Smith, 2010, p. 269)

In working towards building young people’s agency and greater discrimination in their learning and online actions, the concept of metalearning, or metacognitive reflection on actions/decisions as they occur, was proposed as the pinnacle towards which students and teachers aim (Kimber & Wyatt-Smith, 2009). In this reframing, the learner would exercise evaluative practices in making informed decisions along the way and operate with transmodal facility as she/he used, created and shared knowledge.

A detailed discussion of many of these ideas and a diagrammatic representation are available in Kimber and Wyatt-Smith (2009).
products online. If, for example, a learner operated with “transmodal facility”, she/he would have demonstrated a fine-tuned ability to work with and across source texts, technology platforms and modes of representations to create new digital texts, and her/his critical thinking about content and concepts would be balanced with the aesthetics of design (Wyatt-Smith & Kimber, 2010). The distinctive elements of each descriptor and its manifestation in (a) using existing knowledge and (b) creating new knowledge are elaborated next and shown in Table 2.

Table 2. Assessment framework for using, creating and sharing knowledge online.

<table>
<thead>
<tr>
<th>Use existing knowledge texts or materials</th>
<th>Create and share new knowledge texts or materials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmodal Facility</strong></td>
<td>Ability to select software and mode of display appropriate for selected audience, the medium and type of content</td>
</tr>
<tr>
<td>Ability to work with and across source texts, technology platforms and modes of representation to create a new digital text where critical thinking about content and concepts is balanced with the aesthetics of design</td>
<td>Ability to exploit the affordances of the software and achieve particular effects in accord with the intended audience/purposes</td>
</tr>
<tr>
<td><strong>e-proficiency</strong></td>
<td>Ability to establish accuracy, currency, reliability and trustworthiness of sources (sites and authors)</td>
</tr>
<tr>
<td>- Ability to locate and retrieve information in written, visual, auditory, digital modes, using a variety of search engines, data bases, and strategies</td>
<td>- Discriminating choice of material resources for display or communication</td>
</tr>
<tr>
<td>- Ability to use a range of software efficiently and fluently</td>
<td>- Discriminating use of selected sources</td>
</tr>
<tr>
<td>- Ability to keep efficient records of source texts for tracking purposes</td>
<td>- To formulate, communicate and defend as appropriate a position, distinguishing it from other possible positions</td>
</tr>
<tr>
<td><strong>e-credibility</strong></td>
<td>- Ethical/scholarly acknowledgment and use of all sources</td>
</tr>
<tr>
<td>- Ability to establish accuracy, currency, reliability and trustworthiness of sources (sites and authors)</td>
<td>-</td>
</tr>
<tr>
<td>- Ability to discern how values and ideologies are operating in source texts and how these work to represent people, cultures, places and eras</td>
<td>-</td>
</tr>
<tr>
<td>- Ability to make a discriminating selection of sources, balance viewpoints and find corroborating evidence</td>
<td>-</td>
</tr>
<tr>
<td>- Ability to formulate a position on a topic by informed use of a range of source materials</td>
<td>-</td>
</tr>
<tr>
<td>- Ability to identify and examine how elements of a text (verbal, visual/auditory channels) work to communicate and ‘normalise’ a position</td>
<td>-</td>
</tr>
<tr>
<td><strong>e-designing</strong></td>
<td>- Ability to assemble, compose or design an aesthetic, creative combination/transformation or treatment of existing sources and materials into new, cohesive representations or text (e.g., colours, fonts, spatial layout)</td>
</tr>
<tr>
<td>- Ability to identify/discrimin the potential of source material and to select for (a) new applications and (b) appropriate mode/s of display</td>
<td>-</td>
</tr>
<tr>
<td>- Ability to utilise sources ethically (e.g., with accurate representation and proper acknowledgements)</td>
<td>-</td>
</tr>
<tr>
<td>- Ability to be receptive to the contributions of others</td>
<td>-</td>
</tr>
</tbody>
</table>

(Source: Kimber & Wyatt-Smith, 2010, p. 618)
Digital Learning Priorities: Skills to Identities?

Returning focus to the ARC Discovery Project (2003–2008), Table 2 represents major conceptual outcomes. The Assessment framework for using, creating and sharing knowledge online outlines the raft of skills and abilities that are deemed desirable for digital learners to achieve quality learning products and performances. The framework offers points for consideration when thinking about what constitutes quality in multimodal work, presenting the cognitive, creative and aesthetic as focal considerations in composing or evaluating student work.

The two columns of the framework distinguish between (a) using and (b) creating knowledge online according to the three main categories of learning priorities identified through the research project: e-proficiency, e-credibility and e-designing. Although each of these is presented in its own row in the table, the arrangement does not represent a hierarchical relationship. Rather the categories are considered to be a dynamic, mutually informing and overlapping set of learning priorities. Hence, the dotted lines denote both the boundlessness and the opportunity for the intermingling and coalescence of the components. Transmodal facility is listed first to foreground its synthesising and integrative function of all other elements. “Ability” is used here not as an innate intelligence, but rather a capacity that can be taught, nurtured and developed over time.

The framework profiles e-credibility as a critical stance for online work. E-designing and e-proficiency promote reflection on quality in a much more focused way. These are understood to be dynamic elements for a holistic view of what counts as quality with the transmodal being the synthesising feature in terms of working within and across modes of representation. So the act of creation is anchored to the informed use of texts and platforms and modes, which can then be understood relative to the working of the other three. In short, it is looking in new ways for quality whereby there is potential for the cognitive, creative and the aesthetic to come into view and be focal considerations in how teachers and students think about qualities in learning and qualities in performance. Such elements are essential if learners are to develop their capacities for self-monitoring and improvement.

Research, theories and lists from other countries have added further understanding to desired capabilities for digital worlds, recognising that to be digitally literate, individuals should be well-positioned for coping with an increasing proliferation of information. Fisch, McLeod and Bronman (2008), for example, estimated the volume of new information on the Internet had doubled to four exabytes \((4 \times 10^{19})\) in just two years. According to research from the University College of London (UCL, 2008), information literacy processes need to become habituated from childhood, as “by university or college it is too late to reverse engineer deeply ingrained habits” (p. 32). In a similar vein, Eshet-Alkali and Amichai-Hamburger’s (2004) research found that secondary school students performed poorly with information and reproductive literacy tasks, prompting their conclusion that training in cognitive tasks was required in addition to digital skills.

Given the critical importance attached to credibility as previously outlined, a high priority is guaranteed for the acquisition of supportive strategies developed by advocates of information literacy. One highly regarded set of such process strategies is that developed by the Society of College, National, and University Libraries (SCONUL), the Seven Pillars for Information Literacy (SCONUL, 2006)—identify, scope, plan, gather, evaluate, manage and present. Developed for universities, the seven pillars include detailed explanations, defining the desired levels of understanding and presentation abilities deemed essential. They offer scope for secondary and primary school educators to adapt for their own purposes. Furthermore, these pillars are constantly updated, as with the “through a digital lens” version (SCONUL, 2012), to account for the latest in technological developments. Readers may also wish to consider the utility of Sundar’s (2008) MAIN (Modality, Agency, Interactivity and Navigability) model of heuristics to assist students to achieve greater evaluative skills in credibility discrimination when working with digital texts.

Also of note are several key frameworks that have influenced the development of curriculum and pedagogy to take account of multiliteracies (Cope & Kalantzis, 2000, 2010; The New London Group, 2000; Martin, 2002; Tyner, 1998) and changing digital contexts (Cole & Pullen, 2010; Partnerships for
21st Skills, 2009; Tyner, 2008). The Design Curriculum (The New London Group, 2000) addressed the complexity and interrelatedness of different modes of meaning in multimodal texts with six design elements identifies (linguistic, visual, audio, gestural, spatial and multimodal) and four associated components of pedagogy (situated practice, overt instruction, critical framing and transformed practice). For the New London Group, learner agency was fostered with active transformations of meaning across different media. Updated variants incorporating new media developments include Martin (2002), Cope and Kalantzis (2010) and Cole and Pullen (2010). The P21 Framework (Partnership for 21st Skills, 2009) addressed core curriculum content areas and literacies, as well as essential “skills, knowledge and expertise” (p. 1). Priority skill areas were identified as critical thinking, problem-solving, communication and collaboration. Mining of the thinking processes as in Marzano’s (1988) Dimensions of Thinking and Dimensions of Learning and Costa and Kallick’s (2000) Habits of Mind have been adopted in many schools around the world. Drawn from research into cognition and learning, these frameworks gave explicit attention to the types of thinking and attitudinal changes necessary for improving young people’s approaches to tasks and human relationships.

Frameworks, heuristics and strategies such as those outlined here have helped deepen our understanding of particular features of learning and operating in a digital world. However, an emergent emphasis on identity formation, particularly the capacity for inner reflection, suggests that educators should be less caught up in lengthy lists of skills and more focused on attending to their students’ holistic development. In this instance, identity is taken to encompass the cognitive, affective and performative dimensions of identity. The Norwegian Ministry of Research and Education (Søby, 2003), for example, have adapted the German notion of Bildung to “digital bildung” when framing their literacy curriculum for new times:

Digital Bildung expresses a more holistic understanding of how children and youths learn and develop their identity … the concept encompasses and combines the way in which skills, qualifications, and knowledge are used. As such, digital Bildung suggests an integrated, holistic approach that enables reflection on the effects that ICT has on different aspects of human development: communicative competence, critical thinking skills, and enculturation processes, among others. (p. 8)

Greater consciousness of the effects of new technologies on developing identities will stem from further research in these areas. While we have been shown many of the ways that young people use new technologies for social and academic purposes, and the increasing trend towards screen-based practices, concerns have been raised about their lack of critical reflection with new technologies (Buckingham, 2007; Kimber & Wyatt-Smith, 2010; MCEECEDYA, 2010). Speculation about the possible impact of digital media on young people’s developing minds came with Weigel and Heikkinen’s (2007) research noting potentially transformative effects:

Given the extent to which text-based literacy has impacted human cognition, the current environment of novel visual and digital representations — where text is digitized, where video is streaming, portable and on demand, where screens are ‘nervous,’ where intimate friends can be on the other side of the world, and where media content itself is created to a growing extent by fans and amateurs — is likely having a similar transformative impact on developing minds. (pp. 8–9)

Drawing on empirical research, the authors concluded that “sustained levels of computer and cellphone engagement are shaping the habits of mind of young people” (p. 28). If a “habit of mind” indicates habituated practice, and that is associated with ways of working with screen-based media, then developing constructive habits of mind would be desirable.

But concerns were raised that, despite high levels of multitasking or digital engagement, and even high academic achievement, many young people were less able to read “real-life facial and social cues … [and] ill-equipped socially and ethically to use their knowledge in a responsible, constructive, creative and personally fulfilling fashion” (p. 50). For Turkle (2012b), young people’s passion for connectivity could
be preventing them from developing their capacity for developing meaningful relationships and quality self-reflection:

social media continually asks us what’s “on our mind,” but we have little motivation to say something truly self-reflective. Self-reflection in conversation requires trust. It’s hard to do anything with 3,000 Facebook friends except connect. (para. 15)

Turkle elaborated further by arguing that the frequency of connection and the multiplicity of small bytes of information were combining to erode the quality of relationships and the individual’s capacity for truly knowing one’s self.

While more targeted research is necessary before supported findings can endorse such claims, these concerns warrant attention and addressing in practical terms. The concept of digital mindsets could well be one way of addressing these concerns.

**Digital Mindsets**

Our concept of digital mindsets has been drawn from cognitive research, education, neuroscience and psychology as a way of considering major components that help shape identity and informed agency in online spaces within the classroom context. As the digital age has become simultaneously more complex and rapidly transmissible, it is imperative that the quality of attention paid to all manner of actions and interactions be improved. All this occurs in a context where global citizenship is not only possible but also cannot be ignored (Oxfam, 2006). Hence, digital mindsets are disciplined ways of thinking about screen-based literacy practices, autonomously enacted. Further explanation follows.

The term “mindsets” is derived from Carol Dweck’s (2006) research in psychology with attitudes to learning for improvement—“fixed” and “growth mindsets”. Her premise, supported by scientific research, is that people are capable of changing how they think to make significant progress. With “fixed” mindsets, individuals accept their level of intelligence and talents as their peak and, as consequence, that improvement is impossible. For them, negativity and self-defeating inner talk limit progress. By contrast, individuals with “growth mindsets” are receptive to change, accept obstacles as challenges to be overcome, and can increase their brain’s capacity. “Mindsets” also resonates with Daniel Siegel’s (2010) concept of “mindsight”, developed from his research in psychiatry. Siegel described mindsight as a particular kind of focused attention that an individual can develop at any age for closely examining one’s thinking processes, emotions and behaviours. Like the improved brain functioning with growth mindsets, the nature of attention in mindsight can affect the structure of the brain as well as activating resilience, well-being and compassion.

Just as “growth mindsets” are teachable and shown to be more conducive to improved learning than “fixed mindsets”, digital mindsets could well improve the quality of learning and interaction in the digital world. As shown in Figure 1, digital mindsets require the individual to adopt four main stances when operating and interacting online: critical inquirer, innovative designer, local/global citizen, and ethical decision-maker. Each of these four stances focuses on a particular attribute of the identity of the learner, rather than focus on the skills. Each represents a balance between cognitive demands and practical skills, while elevating respect for wider community members, whether local or global. They help articulate those cognitive and affective dimensions that underpin one’s identity, actions and interactions in a screen-based age. For young people, a focusing framework that guides their intentional attention could help improve the quality of their actions and interactions, both online and offline. For teachers, attending to the provision of activities that stretch young people’s capabilities in each dimension could enable cognitive growth and improved facility for independent operation and collaborative interactions, both online and offline.
Critical inquirer

As demonstrated in the preceding discussion on e-credibility, critical and evaluative thinking helps to bolster informed choices, respected corroboration and higher order thinking about information sources, authorship and related issues. Specific cognitive expectations of subject disciplines already address the need for academic rigour. The specific goals in information literacy help guide the user towards greater discernment in the pursuit and use of online materials.

Innovative designer

With creativity and innovation widely embraced at personal, corporate and governmental levels as shown previously, and easily achieved at near professional levels using features of new technologies, this stance is both possible and desirable. Elements from the previous discussion on e-designing have particular salience here.

Local/global citizen

Oxfam (2006) described the importance of educating young people for global citizenship in terms of developing “the knowledge, skills and values needed for securing a just and sustainable world in which all may fulfil their potential” (p. 1). From the stance of local/global citizen, young people can develop a greater understanding of their connection with others and a heightened sense of responsibility for how one’s personal decisions, actions or words might impact on others. Collaborative and community-minded engagement is advocated, with focus on people’s acceptance of their responsibilities as local or global citizens to achieve the peace, sustainability and future growth across the planet.

Ethical decision-maker

As an ethical decision-maker, the individual recognises that ethical decisions are critical for improving society in social, political and economic terms. This dimension alone can engender rich debate, even from the early years. It concerns social justice and human rights within the bounds of legal systems and cultures’ moral codes. When absorbed into their habitus, young people should have greater consciousness of the possible ramifications of decisions made on self or others.

When considered together as a model (see Figure 1), the four dimensions offer a more holistic way of thinking about actions to be taken and decisions made. Inter/cultural awareness is the supporting concept on which the digital mindsets rest. They are bounded by “cognition” as the reminder of thoughtful action, whatever the context, and “empathy”, as a spiritual emotion that will underpin more considerate decisions that impact on others. “Agency” is placed at the top of the diagram to represent the ideal, forward-movement of the individual, fully informed by each of the core dimensions.

By adopting these four stances, young people’s perspectives on literate or community behaviours can become both broader and better balanced, hopefully resulting in better informed agency and relationships. Each is important and each should be used. When the elements of the Table 2 framework are reconsidered in tandem with the model presented above, the absence of any reference to local/global citizen is apparent. The only references to ethical decisions in the table are within a scholarly framework with the purpose of preventing plagiarism. There is no wider application of ethical choices, empathetic consideration, or responsibility for one’s actions. The strength of an individual’s transmodal facility in using and creating knowledge would help define them as digitally adept, but it would not reflect the calibre of their identity. The extent and quality of their e-proficiency might produce a proficiently researched and beautifully executed digital text, but it might not reveal any consciousness of different cultural viewpoints or perspectives. In short, the framework is focused on product and process and designed to increase the level of quality of outcomes. It positions the student as a designer of digital texts, not an holistic identity.
By adopting the model, opportunities are offered for strengthening the selection of other checklists and strategies as previously mentioned by judicious overlaying of the four dimensions. With informed agency for young people imbued with empathy and responsible, creative, globally considerate and socially just action being the goal, the model offers a framework for adoption by the user, whether teacher selecting tasks or designing classroom activities, or student undertaking school-based tasks or passion-based activities. Through the lens of digital mindsets, teachers and students can ensure a comprehensive, balanced approach to becoming digitally literate, informed, global citizens. Developing digital mindsets is core business in all stages of education, beginning with the early years.

Conclusion

In this paper, we have presented some of the pressing issues associated with a changing digital world. We have drawn on research in education, media and psychology to consider the types of learning that may become essential for coping with evolving digital and socially mediated practices. As greater understanding of what working and interacting in social worlds entails, additional lenses are provided for reviewing current educational practices at all levels of schooling. Assisting young people to apply appropriate strategies for the task in hand to create high quality products remains a priority and countless sets of strategic objectives provide those guidelines across subject disciplines and fields. Assisting young people to be the very best that they can be, personally, socially and ethically, also remains a key priority, but this has become more complicated within a digital media context. Through interweaving concepts in digital mindsets across subject disciplines and the years of schooling, a stronger foundation could be laid for positioning young people, from screenbots to screenagers as digitally literate and ethically minded individuals. In that way, they will cope not just with an increasing proliferation of information, but also the complexities of living in a multicultural, multimediated world.
Acknowledgments

- The Australian Research Council for funding to enable the longitudinal research study hosted at Griffith University, Australia, 2003–2008 (Chief investigators: Professors Claire Wyatt-Smith and Mike Levy)
- The Principal, Brisbane Girls Grammar School, Australia, for supporting the secondment of Dr Kay Kimber to Griffith University, 2007–2012.

References


