

Rethinking quality assessment for 21st century learning: How students use and create knowledge online

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Abstract

Accounts of 21st century work and social practices frequently prompt calls for new models of learning, teaching and assessment utilising digital technologies. A synergy of views shared by multinational organisations, governments and education systems concern the inadequacy of industrial age education models for preparing young people for digitally driven futures. These same organisations prioritise 21 century skills and capabilities like creativity, problem-solving, productive collaboration and inter-cultural communication. Also of note is how the ease and rapidity of connectedness to other people, ideas and cultures via convergent, miniaturised technologies can be confronting to notions of responsible citizenship in both a local and global sense. At the same time, reports of young people's high levels of engagement with new technologies out of school often raise concerns about the purposes of that engagement and how schools might increase their technology-mediated curriculum and assessment. In responding to these diverse challenges, this article focuses on knowledge priorities for today's secondary school students through exploring the key question: *How do we recognise, talk about and value signs of quality learning in student-created multimodal texts?* Key threads in a diverse literature field are drawn upon, as well as the approach developed for evaluating student-created multimodal texts collected for a 2003–2008 research study into curricular digital literacies¹. From this background, the paper offers a new framework for thinking differently about quality assessment for 21st century learning. Essentially, the framework is intended to open discussions about the demands students face as they access, use, create and share knowledge online.

Introduction

Education, political and business sectors currently share a synergy of expectations of schooling for the 21st century. Several significant documents worldwide (like those of 21st Century Learning, 2009, for example) acknowledge the fundamental difference between the educational needs of today's young people and those of earlier generations. Workforce changes will always be tied to whatever technological, scientific and economic developments eventuate. Within this context, educators are charged with preparing young people to thrive in a world of as yet unimaginable change that will require far more than basic literacy and numeracy for survival. Complex, higher-order thinking and problem-solving skills, collaborative projects and innovation have been identified as essential signifiers of future productivity, just as empathy and inter-cultural communication will be of global, networked human beings. Of particular note is how creativity and global connectedness have emerged as critical for business, education and society (Brown, 2008; McWilliam & Haukka, 2008; Pink, 2005; Teaching and Learning Research Programme, 2008).

Many researchers worldwide have investigated young people's screen-based literacy practices, noting their "engagement" at home relative to school (see, for example,

¹ *Using and creating knowledge in the high school years: Performance, production, process and value-adding in electronic curricular literacy* (2003–2008) was funded by an Australian Research Council Discovery Grant and hosted by Griffith University. Chief investigators were Professors Claire Wyatt-Smith and Mike Levy. The study web site can be accessed at <<http://www.griffith.edu.au/education/creating-knowledge>>.

Buckingham, Ed., 2008; Ito, Horst, Bittanti, et al., 2008; Jenkins, 2006; Stern, 2008). Some like Levin and Arafeh (2002) and Selwyn (2006) have noted a “digital disconnect” in terms of the quality of their technological experiences in both places. *Equipping every learner for the 21st century: a white paper* (CISCO, 2007) labelled classrooms as “the only place where learners disconnect” (p. 5). While a “digital connect” implies engagement, attentiveness and personal interest, “engagement” is not sufficient of itself to guarantee that one’s personal capacities for online meaning-making are strong. This observation prompts an imperative for educators to assist the development of robust skills that will withstand technological change and generate creative solutions to complex problems.

Within this context, the notion of design (The New London Group, 2000) has been embraced as fundamental to shaping teacher and student roles within the classroom, and in activating creativity, problem-solving, and the co-creation of knowledge in purposeful ways. When a student can make individual, proactive contributions toward a collaborative project, generate innovative solutions to real-world problems, be creative in unexpected ways, and act in an informed, discerning manner, then student agency is evident and educators can rest assured that she is well-equipped for a changing world. Teacher agency is critical to shaping those learning experiences that effectively utilise new technologies and strengthen those complex skills deemed essential for tomorrow’s world. Here, teachers’ design of authentic tasks using new technologies need to be complemented by assessments that challenge and support the growth of young people’s critical and creative capacities in anticipation of their future worlds of work. Reconsidering the type of evidence of learning to be valued is a good starting point. Hence, *How do we recognise, talk about and value signs of quality learning in student-created multimodal texts?*

In what follows, this article is structured in two parts. The first, *Priorities for 21st century learners*, draws together a range of views on the desired capabilities of 21st century learners along the key threads of creativity and connectivity. The second, *Lenses on quality learning in multimodal texts*, concerns two ways of talking about signs of quality in student-created multimodal texts, developed for, and from, the curricular digital literacies study (2003–2008) and a diverse literature field. From this platform, a framework detailing core concepts and principles to inform the assessment designs for 21st century learning is proposed.

Part 1: Priorities for 21st century learners

Creativity and connectivity have emerged as new priorities for schooling. 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. The creativity literature speaks of innovation, inventiveness and high levels of ingenuity. Connectivity underpins networked worlds and foundational platforms for learning. A fuller explanation follows.

Creativity has been claimed as a critical workforce capacity (Fleming, 2008; McWilliam & Haukka, 2008; Robinson, 2006) across the arts, sciences and society in general. The landmark *All Our Futures: Creativity, Culture and Education* report (Robinson, et al., 1999) valorised creativity across curriculum areas and precipitated a significant financial commitment to developing creativity in British children. Since then, many countries have taken up the creativity challenge, including Singapore (Economic Review Committee, 2002), Australia (Prime Minister’s Science, Engineering and Innovation Council, 2005) and Canada (The

Conference Board of Canada, 2008). Similar to the European Year of Creativity and Innovation, Queensland's Department of Education and Training has declared 2009 "The Year of Creativity" with a host of activities to celebrate and develop creativity in children. For advocates like McWilliam & Haukka (2008), the building of young people's creative capacities should be additional to their basic literacies for their better preparation for future workforce participation. For these authors, creativity is characterised by "human ingenuity and high-level problem-solving" (p. 652), and is the value-adding component to an individual's capabilities and the economy more generally.

Becker (2006) and McWilliam (2005) advocated the notion of "unlearning" as an essential skill for effective 21st century learning. "Unlearning" could be regarded as a prerequisite for creative thinking or action 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. 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.

For some, the sensitivity in the aesthetics of creativity is akin to empathy in relationships. For example, from a business perspective, 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. Similarly, Gorry (2009) argues for greater empathy-raising in digital worlds, concerned that online participants feel more connected to others in cyberspace than next door neighbours, that computer screens become the mediator of life's experiences, and that "technology's parade of fragmented lives may sap us of feeling" (p. 7). Empathy should become a prime determiner of the nature of online interactions at personal, political and business levels.

Just as Pink (2005) has connected creativity with empathy-building capacities, increasing globalisation necessitates extending thinking about connectivity from connecting individuals in far-flung places, to greater consciousness of global issues and the importance of becoming responsible local and global citizens. Earlier, Miliband (2004) tied notions of basic citizenship and the right to work to the nurturing of the "unique talents of each pupil" (p. 4) as major challenges for 21st century education. Similarly, the British Prime Minister argued that globalisation has 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.

A need for the connectivity of formal and informal learning has been gaining popular support (Buckingham, 2007; Ito et al., 2008; Jenkins, 2006; Kimber & Wyatt-Smith, 2009; Sefton-Green, 2003, 2008). Many young people already engage with learning out of school hours, through online, special interest networks—frequently from home computers (Ito et al., 2008; Jenkins, 2006)—and termed "community knowledges" (Kimber & Wyatt-Smith, 2009). A more expansive view of learning spaces encompasses all places and spaces where young people learn and informs educational directions in assisting the improved effectiveness of

their interactions in those online spaces. As knowledge today has no fixed boundaries, then school-based assessment can become more inclusive of other learning spaces and more supportive of young people in their acquisition of those capacities to do so (Wyatt-Smith & Kimber, 2010, forthcoming).

In terms of school learning, connectivity is central to defining the foundational knowledges suited to 21st century learning beyond discrete subject silos. Kimber and Wyatt-Smith (2009) have identified four components to this foundational platform, building on an Australian study into the demands of senior schooling (Cumming & Wyatt-Smith, 2001; Wyatt-Smith & Cumming, 2003). Cumming and Wyatt-Smith distinguished between *curricular knowledges* (the bodies of knowledge and skills particular to specific subjects) and *curriculum literacies* (those literate capabilities needed to learn in the curriculum—that is, the knowledges and capabilities required to access and use meaning systems in using and producing knowledge). These researchers found that for students to be successful academically, they needed to understand not just curriculum requirements, but also the literacy demands of their subject areas. Kimber and Wyatt-Smith (2009) aligned *curricular knowledges* and *curriculum literacies* to both *community knowledges* (as in the connected home-school learning spaces discussed above) and *criterial knowledge* (the explicitly articulated elements that constitute quality in a piece of work). According to Sadler (1989), when learners are able to identify the specific dimensions of criteria and engage with evidence (or lack thereof) in their own and others' work, criteria play a role in self-monitoring and improvement. With regular practice and constructive feedback, the learner is supported in developing expertise over time, an important aspect of the assessment for learning literature (Assessment Reform Group, 2002; Black & Wiliam, 1989; Gibbs & Simpson, 2004; Wyatt-Smith & Cumming, 2003), although no specific mention is made of how learners might think about and use new technologies in ways that might improve the quality of their digital work. Criterial knowledge, when specifically linked to current (and future) uses of technologies, offers potential for enriching the quality of young people's learning. To reiterate, the foundational knowledges recommended for connecting and improving 21st century learning include *community knowledges*, *curricular knowledge*, *curriculum literacies* and *criterial knowledge*.

With the above discussion as background, the intent in this article is to rethink how quality in 21st century learning can be talked about, based on the understanding that:

- (a) assessing the quality of learning with technology requires different assessment principles and practices from those associated with print-dominant classrooms;
- (b) thinking about online multimodal knowledge creation recognises different skills and capacities from those utilised in print-oriented tasks; and
- (c) students' creative and critical capacities for the online use, creation and sharing of knowledge can be nurtured and extended.

The next section begins with an overview of the digital literacies research study as introduction to two different lenses for thinking about what counts as quality in multimodal texts. These lenses represent the evolution of the researchers' thinking about quality, from an emergent, digital consciousness still influenced by print (2004), to one that is more attuned to the particular challenges faced by young people in digital worlds (2009). Underpinning this discussion is the belief that young people's capacities to access, select, synthesise, create and share new knowledge online, in critical, creative, ethical and empathetic ways, need to be core to their agency in school and out-of-school contexts. To achieve this goal, classroom teachers are called up to nurture and extend those 21st century capacities for thriving in digital worlds.

Part 2: Lenses on quality learning in multimodal texts

Overview of the study

The purpose of the research study (2003–2008), *Using and creating knowledge in the high school years: Performance, production, process and value-adding in electronic curricular literacy*, was to obtain a point-in-time capture of secondary schools' students digital capabilities in completing a curricular-related online task involving online research and the creation of a multimodal text. It 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. While students were supported to do the tasks insofar as sample websites were built into task design, there was no expectation that teachers would “teach” how to “do” the task. The intent was to track students' progress from 2004 to 2006.

Discussion in this section is confined to the way that notions of quality in the multimodal texts were identified and talked about. The evaluative criteria and standards for ascertaining quality in the students' multimodal creations were developed and adapted through collaborative discussions with a teacher advisory group. Further details about the study are available in the appendix and on the study website.

Lens 1: Emergent digital consciousness: Print-dominant legacy

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 informed 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*, viewable on the study website and broadly explained next.

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.

It is worth emphasising two main points, however. 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), as the boundary between Developing and Accomplished. The *Evaluative Criteria and Standards for Online Multimodal Texts* can be viewed on the study website.

Table 1. Criteria for evaluating student-created multimodal texts

Criteria for evaluating student-created multimodal texts	
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Cohesion— <i>Overall cohesion</i>	<ul style="list-style-type: none"> ▪ Designing multimodally to engage audience and facilitate meaning-making ▪ Cohesion of ideas within the text ▪ Linking – technical proficiency
Content— <i>What was said</i>	<ul style="list-style-type: none"> ▪ Quality of information ▪ Justification of solution ▪ Sequencing and organisation of information within a node ▪
Design— <i>How it was said</i>	<ul style="list-style-type: none"> ▪ Managing written language features ▪ Managing visual and spatial elements of written text ▪ Managing graphics and other web/screen elements

All student-created multimodal texts (620 in 2004; 221 in 2006) were evaluated independently by six different researchers after validation checking exercises, according to the above criteria and scale. 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 tended to indicate that across the two year period, for this school-like curricular, multimodal knowledge creation, even though new technologies had become more ubiquitous, this cohort of young people had not demonstrated high levels of critical reflection, creative design or transmodal facility.

These findings resonated with a national Australian 2005 study to determine the levels of technological proficiency² of Years 6 and 10 students (MCEETYA, 2007). This research found that only 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. 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 techno-savvy or discriminating users of new technologies and point towards the need for more systematic approaches to pedagogy and assessment to increase critical and creative usage.

When the important notions of creativity and connectivity discussed in the previous section are considered in relation to the above findings, several key factors gain salience. First, any consideration of how young people connect, communicate, collaborate and create in actual and virtual locations must address the quality and manner of their activity. This is reflected in the individual’s capabilities in that environment, in school *and* at home. Classroom teachers are well placed to be the arbiters of quality, negotiators of learning spaces, orchestrators of local and global connectedness, and supporters of young people in their acquisition of those desired capacities to the point of autonomous use out of school. This could well involve shared negotiation and explicit articulation of task, criteria and standards between teacher and students (Kimber & Wyatt-Smith, 2009).

Second, teaching for creativity warrants a higher priority in classrooms: “If we cannot ‘transmit’ creativity, we can certainly teach *for* creativity” (Mc William and Haukka, 2008, p. 654, emphasis in original). This means that whatever the subject area, teachers need to design innovative approaches to curriculum delivery and find ways to foster those skills in individuals and collaborative teams. With creative problem-solving encouraged amongst students, and the opportunity to find team solutions, young people are not just engaged in the activity but also challenged to find innovative solutions. As an umbrella term, “creativity” precipitates complex, higher-order thinking, unexpected juxtapositions of information or disciplinary concepts and elegant solutions to challenging problems.

Third, connectivity will need to become evident in expansive views of learning locations that value community knowledges alongside curriculum knowledge. This will require young people to operate with insight, at any time. Hence critical thinking and informed action needs

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

to shape their online decisions as much as ethical and empathetic decision-making and intercultural consideration, much like Pink's (2005) "high concept–high touch" aptitudes. This suggests an urgent need to shift the goal for learners to become more digitally proficient, critical evaluators, creative producers and ethical, empathetic users of new technologies.

From all these perspectives, creativity becomes not just a capacity for developing in young people for their 21st century lives, but also a challenge for their teachers in designing creative activities in concert with creative and supportive assessment tasks. Learning spaces beg connection just as community knowledges need to be valued alongside criterial knowledge and curriculum literacies in all curricular considerations. With all this established as platform, the second lens for talking about quality will be discussed next. It is one that specifically targets those elements identified for more effective online use, creation and sharing of knowledge that will elevate the quality of thinking, evaluative practice and ethical actions. It is one predicated on the notions of young people developing a wealth of cognitive, aesthetic and empathetic agency, and the critical role for teachers in these processes.

Lens 2: Attuning learning and assessment to digital worlds

This section begins with a reflection on the criteria presented earlier in Table 1 as primarily from print-dominant perspectives. 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 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 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.

This section is concerned with considering the priorities for 21st century learning and assessment as ideal goals, and presents a second lens through which these concerns can be viewed. It takes two starting points. First, the connectivity of learning spaces, from local and global sites, within and across subject areas, and the need to promote ethical, responsible citizenship. Second, it accepts that creative thinking, design and innovations are (i) essential for this century, (ii) complex challenges, and (iii) teachable. Third, it acknowledges the complexities involved in reading the Internet, locating and retrieving information, and ideally mining the sites to address issues of credibility and reliability, even ideology. From this basis, this section moves forward the previous discussion, building on the concepts of transmodal operation and *e-proficiency*, but reframing the e-proficiency, content and design criteria with the new concepts of *e-credibility* and *e-designing*. 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, is proposed as the pinnacle towards which students and teachers can 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 uses, creates and shares knowledge products online. If, for example, a learner operates with "transmodal facility", she would have a fine-tuned ability to work with and across source texts, technology platforms and modes of representations to create new digital texts, and her critical thinking about content and concepts would be balanced with the aesthetics of design (Wyatt-Smith & Kimber, 2010, forthcoming).

A fuller discussion of many of these ideas and a diagrammatic representation are available in Kimber and Wyatt-Smith (2009), but a condensed version follows.

Firstly, it must be recognised that using, creating and sharing online requires technology, the Internet and particular software, and their separate needs require specific skills and strategies, many of which are far removed from print-based ways of reading and communication. The blurring of boundaries between them is as much a defining characteristic as the speed with which the actions can occur and connections made. For the purposes of this explanation, they are separated into two strands: (i) using existing knowledge, texts or materials; and (ii) creating and sharing new knowledge, texts and materials. Secondly, learner agency will be instrumental as the learner needs to operate with transmodal facility across various platforms, modes and activities, and exercises evaluative practices metacognitively, if a quality outcome is to be achieved.

Through this second lens for viewing quality in student learning, the concept of *e-proficiency* is 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 data bases 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. With e-proficiency as a digital learning goal, teachers can assist their students to improve the quality of their knowledge use and production by digital means.

The concept of *e-credibility* assumes critical importance through the invisibility of the Internet and the need for constant credibility and trustworthiness checks. This involves being able to accept or reject indicators of reputed expertise at times and places where informed corroboration may be difficult to ascertain. For example, many young people seek instant corroboration from their networked friends (Flanagin & Metzger, 2008), rather than informed "experts". With so much erroneous and misleading information a keystroke away, young people need to be able to apply discriminating evaluations for themselves, so educators need to play a vital role in this area. With careful evaluation to inform their courses of action, young people will be able to make their own, independent, more discriminating selection of sources, with corroborating evidence and accommodation of different viewpoints. E-credibility is also significant when young people's growing propensity for digital text creations are considered (Lenhart, Madden, Rankin Macgill & Smith, 2007). With speedy communication to wide audiences, issues of plagiarism and intellectual copyright are raised, as well as just how to copy, paste, remix or morph others' work into their own creations. In these ways, ethical use and appropriate acknowledgement will inform transmodal facility and the level of e-credibility of the user. Those who create with e-credibility at the forefront of their consciousness could well be "architects of credibility" (Flanagin & Metzger, 2008, p. 18) whose quality of academic performance and social interactions are enhanced.

E-designing is the visible process and instantiation of creativity. It initially requires active engagement with source material, and “unlearning” (Becker, 2006) is a useful way to allow the imagination free rein to explore solutions, innovations, transformations or original creations. Synthesis of other ideas and accommodation of different viewpoints are required, as well as the technological e-proficiency to exploit the fine functions of software or technology tools. Several researchers have found that academic progress and improved student performances can result from students as designers of multimodal texts (Chen & McGrath, 2003; Facer & Williamson, 2004; Kimber, Pillay & Richards, 2007; Walsh, 2007). Further, The New London Group’s (2000) notions of Designing and the Redesigned endorsed the proactive reshaping of available designs in imaginative ways, attracting widespread support in many education systems and classrooms. While the evaluative practices at the core of e-proficiency and e-credibility also permeate e-designing, here, desirably, their critical and ethical dimensions are balanced by creativity and a sense of the aesthetic. Consistent efforts to embed e-designing as both process and goal for digital learners could help young people to develop rigorous thinking, sensitivity to aesthetic spatial arrangements, and a desire for achieving elegance of design. Success in these areas could help cement e-designing as a value-adding incentive for digital learners. The accomplished e-designer can apply, transform and represent critiqued knowledge from various sources into their own digital, multimodal creation—but ideally, with a strong measure of ethical responsibility and personal pride to ensure that plagiarism does not misrepresent themselves or others’ work.

Table 2 presents the assessment framework for (a) using and (b) creating knowledge online. The two columns allow focus on the differentiation between them for each of the learning priorities, e-proficiency, e-credibility and e-designing. While each is presented in its own row, the arrangement is not hierarchical and is considered as a dynamic, mutually informing and overlapping set of learning priorities. Hence, the dotted lines denote both the boundlessness and the opportunity for intermingling connections and the coalescence of components. The first row foregrounds *Transmodal facility* as the synthesising, connecting element that marks the successful integration of all other elements. It must also be mentioned that the use of “ability” refers not to an innate intelligence but rather a capacity that can be taught, nurtured and developed over time.

The potential of the framework

In considering the potential of this framework for talking about and assessing quality in student-created multimodal texts, several points of note emerge. With the first lens on quality in multimodal text production being print-oriented and offering no explicit statements about what might constitute a quality production or opportunities for teacher or peer feedback at any time during the task completion, it is not surprising that there were so few performances deemed proficient. As well, when Tables 1 and 2 are compared, it is clear that the second offers many more opportunities for clear task setting, points for prior teaching, guided instruction or intervention, detailed feedback and goal setting for desirable online performances than in the first. This notion resonates with the emphasis placed on incorporating criterial knowledge and curriculum literacies into foundational knowledges (Kimber & Wyatt-Smith, 2009) and with the research-based principles for assessment for learning (Assessment Reform Group, 2002), but drawing those principles more closely into digital learning contexts.

Table 2. Assessment Framework for Using, Creating and Sharing Knowledge Online

Use existing knowledge texts or materials	Create and share new knowledge texts or materials
Transmodal Facility 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	
e-proficiency	
<ul style="list-style-type: none"> ▪ Ability to locate and retrieve information in written, visual, auditory, digital modes, using a variety of search engines, data bases, and strategies ▪ Ability to use a range of software efficiently and fluently ▪ Ability to keep efficient records of source texts for tracking purposes 	<ul style="list-style-type: none"> ▪ Ability to select software and mode of display appropriate for selected audience, the medium and type of content ▪ Ability to exploit the affordances of the software and achieve particular effects in accord with the intended audience/ purposes
e-credibility	
<ul style="list-style-type: none"> ▪ Ability to establish accuracy, currency, reliability and trustworthiness of sources (sites and authors) ▪ Ability to discern how values and ideologies are operating in source texts and how these work to represent people, cultures, places and eras ▪ Ability to make a discriminating selection of sources, balance viewpoints and find corroborating evidence ▪ Ability to formulate a position on a topic by informed use of a range of source materials ▪ Ability to identify and examine how elements of a text (verbal, visual/auditory channels) work to communicate and 'normalise' a position 	<ul style="list-style-type: none"> ▪ Discriminating choice of material resources for display or communication ▪ Discriminating use of selected sources ▪ To formulate, communicate and defend as appropriate a position, distinguishing it from other possible positions ▪ Ethical/scholarly acknowledgment and use of all sources
e-designing	
<ul style="list-style-type: none"> ▪ Ability to identify/discern the potential of source material and to select for (a) new applications and (b) appropriate mode/s of display ▪ Ability to utilise sources ethically (e.g., with accurate representation and proper acknowledgements) ▪ Ability to be receptive to the contributions of others 	<ul style="list-style-type: none"> ▪ 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)

When this second lens is considered, opportunities are presented in that both an evaluative and a creative stance are taken up, both in the use of knowledge and in the production of new material. Those close moments for transition between location, selection, copying and transforming material require evaluative consideration on a constant basis, and especially in the creation of new texts, in line with the discussion on ethical decision-making given earlier.

All this mirrors the connectivity of networks, the speed of accessing and transforming digital texts, and the complex interplay between both activities as characterised by screen-based activity where users can be, simultaneously, users, consumers and producers of digital texts.

An area for further development and closer consideration lies in the notion of sharing knowledge, particularly the collaborative way in which young people work online. For example, in the digital literacies research study, students were frequently observed initiating digital interactions, in the same classroom, even when oral communication was possible. In addition, when the nature of community knowledges is considered in the context of online, informal learning, wider opportunities for collaboration and sharing of feedback, with community experts as well as peers, are provided.

As well, through this second lens and the way that the framework has been presented, the profiling of e-credibility requires a critical stance to be taken up and e-designing and e-proficiency encourage reflection on quality in a much more focused way than in the earlier version. 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 now anchored back to the informed use of texts and platforms and modes which can then be understood relative to the working of these 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. Thus the framework offers portability for the capacities that it recognises as essential for achieving a quality digital performance and experience.

Conclusion

This article has confirmed the importance of creativity and connectivity for strengthening learner agency in digital worlds. Where creativity has been aligned with higher order thinking, empathy-building aptitudes and innovative challenges, connectivity has been conceived through online networking and a view of foundational knowledges for 21st century learning that include community knowledges, curricular knowledge, curriculum literacies and criterial knowledge. Of particular note have been the changes in the researchers' conceptual thinking about indicators of quality, from a print-dominant, emergent digital consciousness to a view more attuned to the digital world of young people. This evolution, informed by empirical data and a diverse literature field, demonstrated that what we have traditionally come to know about criteria and standards in assessment does not carry forward into the digital world of today. Given the anticipated changes in future digital technologies, current criteria and standards have little guarantee of longevity in future schooling scenarios. What we know about achievement in former eras of schooling in defined curriculum areas does not extend to these new ways of working online. The current synergy of thinking between business, education and research suggests that today's students require a different, more complex skill set than in the past, and that their teachers have particular responsibilities in elevating seemingly superficial levels of online activity to more critical, creative, empathetic and ethical activity. Just as we can no longer think of knowledge as a fixed entity, we must find ways to carry forward those capabilities that can adapt to, critique and create newer notions of co-created knowledge. This assessment framework opens for discussion the portability of desired capabilities for using, creating and sharing knowledge online.

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Appendix: Overview of Using and creating online knowledge study

Using and creating knowledge in the high school years: Performance, production, process and value-adding in electronic curricular literacy (2003–2008) was funded by an Australian Research Council Discovery Grant and hosted by Griffith University. The intent was to obtain a point-in-time capture of secondary schools' students digital capabilities in completing a curricular-related online task involving online research and the creation of a multimodal text, and to track students' progress across a two-year period.

Participants

Sixteen government and independent secondary schools across a range of socio-economic areas in Queensland participated in this study. Participants included 736 students from Years 8 and 10 in 2004, and 248 from Years 10 and 12 in 2006. 138 students were 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. This data included

- 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, 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 was created, collected and archived electronically.

Further detail about the study is available on the web site

<<http://www.griffith.edu.au/education/creating-knowledge>>