# *Digital learning, digital scholarship and design thinking*

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*This paper identifies opportunities for design thinking to be integrated into digital learning and digital scholarship initiatives. The paper traces how the rise of digital culture has led to the reconsideration of models for learning and the call for new modes of knowledge production, spearheaded by an array of fields from writing programs to computer science. Drawing upon case studies from new media education and the digital humanities, the paper argues that design thinking that is situated, interpretive, and user-oriented is well suited to these initiatives. The paper concludes with a call for design thinking research to engage with emerging models for learning and knowledge production, work whose effects could be felt at an epistemic level for generations.*
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Many in the Design Thinking community have advocated for the relevance of design methods and cognition in the face of global-scale challenges and complex contemporary issues. At the same time, another community—what we will call 'new media educators'—has been advocating for a similar set of skills to address changes in technology, pedagogy, research and scholarly communication within higher education. As we will show, each community has championed similar abilities—such as constructive thinking, problem-solving, collaboration, and multimodality, to name a few—yet new media educators seldom associate these abilities with design. Instead new media educators tend to identify the changes to learning and research with digital technologies, such as computers, Internet-based communication, social media and mobile devices. The focus on technology can eclipse the role of thinking through making as it has been articulated by those within the Design Thinking community for more than 30 years.

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Simultaneously, within education environments, 'new media' has been a catalyst for the reconsideration of educational models relatively unchanged since the 19th century, and even older print-derived models of knowledge



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and scholarship. This reconsideration takes place at all levels, from individual classrooms where instructors experiment with project-based learning, to enterprise-level decisions as academic infrastructures are reconfigured to accommodate digital media. In classrooms, new media activity is spearheaded by a diverse array of fields, from literature departments to computer science, and it is often driven by a sense of urgency based on the tangible sense that the world is very different than it was even a decade ago, and concomitantly, the needs of students are very different as well. Taken broadly, the concerns of new media educators focus on 1) the set of competencies needed by 21st century global citizens who exist in digital and networked societies; 2) a rethinking of the notion of 'literacy' necessary to move closer to achieving those competencies; 3) the ways in which that rethinking must account for the paradigm shift —whether understood as revolution or as evolution—prompted by digital media; and 4) new models for research, scholarship, and student work product enabled by accessible digital tools.

The willingness to rethink enduring approaches provides an opening for design thinking as educators and scholars cast about in search of alternatives. As we will demonstrate as we triangulate among digital learning, digital scholarship, and Design Thinking, design, as it has been theorized by many in the Design Thinking community (Cross, 2006; Lawson & Dorst, 2009; Lawson, 2004, 2005) can account for the often unnamed modes of thinking new media educators hope to inspire. In particular, we will offer an expanded account of design thinking that is built upon the expertise and experience of communication, interface, and interaction design, for it is within these fields that practitioner-led design research is needed to inform the development of new models for digital scholarship that are underway. How might design thinking researchers mobilize a body of knowledge and expertise in order to approach this opportunity for deeply engaged collaboration? How might design thinking research help define a critical juncture whose qualities remain elusive yet whose effects are tangible?

# 1 *Digital learning and design thinking*

## 1.1 *Defining digital learning*

Young people who have grown up with computers, video games, the Internet, and cell phones have been called 'Digital Natives' by some scholars (Palfrey & Gasser, 2008; Prensky, 2001), and while some have critiqued this term (Jenkins, 2007), it conjures the sense of wholesale difference of younger generations from older ones. This cohort is believed to be genuinely different from previous generations in terms of social practices, learning styles, and even cognition, due to their early and constant engagement with information technologies. As a result, digital learning calls for a radical reworking of pedagogy in order to accommodate learners who are bricoleurs: they can piece together

information from multiple sources, are intuitive visual communicators, have strong visual-spatial skills and learn best through inductive discovery.

Initiatives in digital literacy, also called 'multimedia literacy,' are thriving across the U.S. With the stated goal of providing 'skills needed for the 21st century' (Partnership for 21st Century Skills), advocates tend to come from technology-related fields or from learning and literacy, which are the domain of Education and English departments. We can see evidence of this in several national organizations and initiatives dedicated to supporting instructors, programs and entire schools as they adopt and use media-enhanced teaching and learning. These include the New Media Consortium, EDUCAUSE, the MacArthur Foundation's Digital Media and Learning initiative and HASTAC (the Humanities, Arts, Sciences and Technology Advanced Collaborative).

Learning in these contexts is no longer understood as merely absorbing and retaining information within the classroom; it is instead centered on being able to access information and contextualize it, and then use it within a network of peers (Brown & Duguid, 2000; Ito et al., 2009; Jenkins et al., 2006). This happens among students in informal contexts, but less so in the classroom. Learning as it takes place informally and via social media tools is deeply social—as is design, which has always had a dialogic relationship with its culture.

Regardless of the attributes and associated needs ascribed to a so-called digital generation, a generation reared on media also needs literacies to understand these media forms. Alongside innovations in learning, then, have come calls for new literacies, including digital literacy, multimedia literacy, information literacy and so on (Bawden, 2008; Jenkins et al., 2006; Lankshear & Knobel, 2008). In addition, the New Media Consortium helped to define 21st century literacy, noting that it constitutes.

'…the set of abilities and skills where aural, visual and digital literacy overlap. These include the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms.' (The New Media Consortium, 2005: p 2).

In many ways, 21st century literacy sounds very much like designing.

### *1.2 Interpreting design thinking as a 21st century literacy*

Design thinking identifies ways of knowing that can be applied throughout education at all levels, but, as illustrated above, it is in particularly close alignment with the needs and attributes identified by new media educators. Nigel Cross's use of the term 'constructive' thinking, for example, which builds upon what Charles Sanders Peirce calls 'abductive' reasoning, works from incomplete information and evidence, and requires making a creative and

intuitive guess (2006: p 20). As such, abduction may be the form of reasoning that many of us use on a daily basis when we encounter a world that rarely supplies all the information we need. More significantly, however, abduction is a form of reasoning that can function best by making something, reflecting on what's been made, and iterating. The intuitive aspect is transformed into an analytic component in an ongoing process of design thinking.

Educational approaches to digital learning and digital natives tend to value this kind of thinking—thinking that is very concrete and hands-on; thinking that works through creative hunches based on incomplete evidence; and thinking that moves toward more abstract concepts. New media educators would agree, along with Cross, that 'large areas of human cognitive ability' have been neglected in education and as a result, traditional education is no longer a good fit for today's learners (2006: p 11). For Cross and many others, design fills a gap in cognitive thinking capacities, making it not merely an "addition" to a curriculum, but a foundational component.

Richard Buchanan offers a similar distinction between old and new ways of learning in his chronicle of the history of design within the academy, "Design Research and the New Learning." The history is dense and complicated, but Buchanan claims that "design has become the new learning of our time, opening a pathway to the neoteric disciplines that we need if we are to connect and integrate knowledge from many specializations into productive results for individual and social life" (2001: p 7).

In addition to the ways of knowing recognized by Cross and Buchanan, the expertise of communication, interface, and interaction design may provide a point of connection between digital learning and digital scholarship, and as such provide a fruitful starting point for further research. Born out of the experience of designing, the following conceptual frameworks provide an expanded notion of design thinking that is based in specific practices and tested models:

### *1.2.1 Interpretive, Rhetorical, Performative*

In a field concerned with making meaning, a communication designer's training typically includes some aspect of visual rhetoric, semiotics, and visual narrative. These models, which come largely from communication theory, are useful in building out a conception of design thinking that can account for the symbolic dimension of all forms of media. They are directly applicable to notions of digital literacy and fluency, as we understand that critical interpretation is as significant as critical practice.

### *1.2.2 Situated, Networked, Contingent*

The designer's hands-on experience with the systemic embeddedness, contextual dependence, and social agency of interface design can provide a useful

frame of reference in the construction of new models. Indeed, the interface sits at the center of Gui Bonsiepe's ontological diagram of design (1999: p 29). The interdependent condition that defines the interface—and the knowing that comes from working at this nexus—can replace a generic notion of 'literacy' as a set of skills 'acquired' and instead imagines literacy itself as situated, networked, and contingent, and as such, something continually negotiated.

### 1.2.3 User-oriented

An interaction design perspective provides a shift from a technical tool-based orientation to a user-oriented approach to the design of digital media that takes into account not only how an application is used but also the kinds of subject positions, world-views, and models it affords (Moggridge, 2007). This user-orientation is closely aligned with learner-centered educational theories.

## 1.3 Digital learning and design thinking in the curriculum

Successful endeavors in reimagining education for digital learners tend to manifest qualities of design thinking that include these three capacities. 'Quest to Learn,' a 'school for digital kids' grades 6–12, recently founded by the Institute of Play in New York City provides an example in which design thinking and digital learning coalesce. Principles from game design that promote innovation, discovery, strategic thinking, and play are core to the school's curriculum, as is the recognition that contemporary students are immersed in media and technology.

Simply put, the school uses designing as a way of learning. In a recent interview in *Big Think*, design professor Katie Salen, the Executive Director of the Institute of Play and co-author of *Rules of Play*, identifies how game design develops the abductive reasoning discussed by Cross. According to Salen, iterating and problem-solving in response to changing conditions is relevant now more than ever: 'Technology is changing all the time. We have to constantly learn how to do new stuff every day.' Salen goes on to explain how game design allows students to engage deeply with subjects, develop content expertise, and to work on 21st century skills such as 'collaboration, working in teams, complex problem-solving, systems thinking, being able to design and find resources' (Big Think, 2010: n.p.).

Salen indicates an understanding of the role of design thinking through reference to the situated and contingent nature of education broadly; in attention to the user interface; and in deploying design's practices and metaphors as the foundation for the curriculum.

At the college level we also find the rise of digital media has led some educators to consider the larger impact of design thinking across the curriculum. In a recent contribution to the *International Journal of Learning and Media*, Anne

Balsamo acknowledges that design constitutes 'an important body of knowledge that should be incorporated into basic educational programs—in essence, as a "new liberal art"' (2009: p 5).

Indeed, Balsamo helped craft a program intended to implement these ideas when, in 2006, she helped design a program at the University of Southern California called 'Multimedia in the Core.' The idea was to offer all students at USC the possibility of authoring in new media forms, and it followed from this democratic impulse that the best place to provide this opportunity would be within the General Education curriculum, which engages every student at USC. The program therefore united GE courses with multimedia labs that were not provided simply for students to learn to use software applications or to make a project or presentation. The goal was to reimagine the GE course *through* media, and fully integrate the lab component such that the pedagogy, assessment and outcomes would all rely on design thinking, though it was not identified as such at the time. Once again, attention to design's understanding of visual rhetoric, the situated and contingent nature of communication, and user-oriented design proved foundational to the redesign of a curriculum attuned to new literacies.

The course-lab conjunctions were successful individually once they took place, but low enrollment levels prompted a redesign of the program. Students generally resisted the 'extra' work associated with a GE course with which they felt little direct connection. Therefore the introductory lab sections are no longer yoked to specific GE courses but are offered as stand-alone experiences, and students are given more advanced support in the use of media in conjunction with higher level courses, where students have more incentive to engage with their research through the design of media rich projects.

For both Quest to Learn and the Multimedia in the Core programs, educators realized that a new generation of students within a digital culture requires new ways of thinking and knowing. They also realized that these new ways of thinking and knowing center on an expanded notion of design thinking that includes 1) visual rhetoric; 2) comprehension of situated expression; 3) a user-oriented approach, both to students and curricula, and in how students are taught to engage others through their work.

## 2 *Digital Scholarship and Design Thinking*

### 2.1 *Defining digital Scholarship*

If the three design thinking approaches highlighted above have proven useful in designing curricula for a new generation of K-12 and college students, they are equally pertinent in helping scholars across disciplines to reimagine long-standing scholarly practices. Indeed, diverse scholars have responded to the capabilities of digital technology with new methods and new forms, as well

as in the creation of cyberinfrastructures more broadly. Scholarly discourse that was once restricted to printed texts is now being produced in a variety of formats, including short videos, information visualizations, and networked writing, while information architectures, often the province of IT departments, are becoming a focus for scholars as they realize that new tools bring new practices. Christine Borgman uses the term *scholarly information infrastructure* to encompass 'the technology, services, practices, and policy that support research in all disciplines,' adding that the terms *cyberinfrastructure* and *eScience* "refer to an infrastructure that enables forms of scholarship that are information- and data-intensive, distributed, collaborative, and multi-disciplinary" (2009: para. 2).

Scientific journals and research were quick to adapt to new digital paradigms, but only recently have we seen the development of what is called 'Digital Humanities,' defined loosely as the application of computing to research and teaching in the humanities. While Susan Hockey traces instances of humanities computing to 1949 (Hockey, 2004), it is perhaps the publication of books such as Christine Borgman's *Scholarship in the Digital Age*, (2007) Johanna Drucker's *SpecLab: Digital Aesthetics and Projects in Speculative Computing*, (2009a) and Matthew G. Kirschenbaum's *Mechanisms: New Media and the Forensic Imagination*, (2008) all published within the last three years, that reflect the growing significance of the digital humanities.

To produce their digital scholarship, many humanist scholars began by self-authoring their work, including writing their own code and designing their own interfaces. But as projects have become more complex and as the technology has become more sophisticated, it has become increasingly necessary for these same scholars to partner with libraries or IT departments, or to use existing commercial and open source applications and services. As a result, a number of digital archives, research portals, and multimedia authoring tools have been created that have not adequately addressed the epistemological trajectories being designed into their technological infrastructures.

A few scholars, such as Johanna Drucker, have taken notice. Writing in the *Chronicle of Higher Education*, Drucker insists that humanists must not cede the design of tools for scholarly inquiry to IT staff members. "For too long, the digital humanities, the advanced research arm of humanistic scholarly dialog with computational methods, has taken its rules and cues from digital exigencies" (2009b: para. 13).

Clearly this is an area in great need of innovation. Conceptualizing the multimodal and dynamic worlds of digital scholarship should be an ongoing, iterative process, one that incorporates design's abductive reasoning as well as its understanding of users, semiotics, and the instrumentality of both interface and infrastructure. In this regard, scholarly digital projects provide an

opportunity for practitioner-researchers and design thinking researchers to consider the role that design has to play in the generation and representation of knowledge. For as Drucker notes, 'Knowledge does not exist outside of circumstances of use or independent of its material means of expression' (2009b: para. 12).

But designers must act quickly; in a few short years, formats and applications may be adopted and 'locked in' before designers and scholars have had the chance to fully develop and assess the long term implications of new models. This sense of urgency has been articulated very clearly. Christine Borgman, for example, asserts in a recent essay for *Digital Humanities Quarterly,* 'This is a pivotal moment for the digital humanities' (2009: para. 1). She asks, "Can we seize this moment to make digital scholarship a leading force in humanities research? Or will the community fall behind, not-quite-there, among the many victims of the massive restructuring of higher education in the current economic crisis?" (2009: para. 1). Similarly, Drucker insists that humanists currently face 'a critical juncture.' 'The task of modeling an environment for scholarship (not just individual projects, but an environment, with a suite of tools for access, use, and research activity) is not a responsibility that can be offloaded onto libraries or technical staffs. I cannot say this strongly enough: The design of digital tools for scholarship is an intellectual responsibility, not a technical task' (2009b: para. 8).

## *2.2 Digital scholarship and design thinking in humanities research*

Two scholarly journals demonstrate the potential for design practitioner-researchers to contribute to these critical issues. *Electronic Book Review* and *Vectors Journal of Culture and Technology in a Dynamic Vernacular* both use a collaborative production model in which scholars, programmers, and designers work directly with one another to produce digital writing projects. Unlike most commercial and institutional sites on the Internet in which designers are service providers, these journals position their designers as co-researchers. Importantly, each of these projects explicitly recognizes that creating new modes of scholarly discourse is in part a design problem, one whose impact is epistemic.

*Electronic Book Review* is one of the longest-running journals of critical writing on the internet. Since its earliest days, the project has provided a research space for its production team—an editor, a designer, and a programmer. This collaboration has allowed the team to tackle questions that go beyond functional or elegant interface design. For example, when the team moved the journal from a format with individual essays with bespoke interfaces to a database structure in which the journal is conceived as a whole, it was considered an opportunity to pose wide-reaching questions about the nature of the digital

journal and the future of literary criticism. (Branda, 2007; Burdick, 2007; Tabbi, 2007a).

According to *EBR* editor Joseph Tabbi, 'a look at the development of the interface, from version 1.0 in the year 1995 to the current, year-old version 4.0, reveals how the multiplicity of literary expressiveness can drive interface development, rather than the alternative where (in interfaces not designed with literary values in mind) expression is made to conform to categories and constraints imposed by commercial technologies' (2007b: para. 4). Specifically, EBR is concerned with the extent to which concepts can flow through electronic networks, as distinct from the predominant flow of information. The latter, in which documents are brought together by metatags, keywords, and hot links, is arguably destructive of literary value. Where tagging and linking depend on direct, imposed connectivity at the level of the signifier, the creation of literary value depends on suggestiveness, associative thought, ambiguity in expression and intent, fuzzy logic, and verbal resonance (2007b: para. 2)

This emphasis on how the affordances and constraints of the site's interface and information architecture define the ideological boundaries of the literary journal result from the integration of design thinking into the interdisciplinary process of the journal's development. *Electronic Book Review's* model for literary scholarship is the result of a design process in which ideas were made concrete, reflected upon, theorized, used, tested, and iterated further.

Another journal, *Vectors*, has had tremendous impact amongst humanities scholars for its experiments in new modes of critical writing. The editor, Tara McPherson, has a keen understanding that the nascent digital scholarship requires new ways of working and new ways of understanding that must be developed, practiced, and theorized. Therefore the journal runs a workshop each summer in which humanities scholars are exposed to a range of projects and issues in digital publishing. Importantly, the workshop includes time to work side-by-side with designers and programmers. In the process, project teams develop a shared vocabulary, working process, and cross-disciplinary respect and understanding which are manifest in innovative projects. Every member of the team—scholars, designers, and programmers—are acknowledged participants in 'modeling an environment for scholarship,' to use Drucker's terms (2009b: para. 8).

Interestingly, *Vectors* has experienced an evolution similar to that of *EBR*. Early issues of the journal feature projects that are carefully crafted and intended to be immersive media experiences that at the same time invite users to consider the very definition of an 'article' in the digital realm. But this model was critiqued as not being scalable, due to cost and the investment of time and effort it required. In response, in 2010, the *Vectors* team developed a tool called Scalar that allows users to craft an information 'space' with 'paths' through it;

the emphasis on visual design has been replaced with an emphasis on the design of a dynamic platform. In 2011, participants will use the tool in tandem with an archive to imagine a form of scholarly communication that is about creating new workflows and forms of 'writing' that are nonlinear, mutable, and reconfigurable. By integrating design, the *Vectors* team has created a new model for scholarly production.

## 3 Conclusion

If we are, indeed, at a critical juncture in education and scholarship due to the impact of digital technologies and social media, it is worth asking, what will be the role for design? Design thinking researchers have valuable contributions and relevant expertise to bring to the new media education projects that are being produced at a variety of scales, from the classroom to the institution, from literacy skills to knowledge production. Design Thinking that includes interpretive, situated ways of knowing and an understanding of the world from the perspective of another are a near-perfect fit with the concerns of new media educators. As these educators, as well as administrators and students, cast about for new forms of teaching and learning more in line with the needs and potentials of our current moment, the design thinking research community should recognize the challenge as specifically a design challenge. Design thinking can productively inform innovations in curricula, pedagogy, assessment and even the design of teaching spaces, and it can contribute to new modes of knowledge production that are attentive to context rather than content. We do indeed face a critical moment, and our community boasts more than 30 years of research and writing that can inform our contributions. It is imperative that we step forward and take on one of the most significant challenges of our era.

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