

INTRODUCTION TO THE SPECIAL ISSUE ON HISTORIC DESIGN CASES

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Our collective knowledge of learning experiences is embodied in the designs we create, and many of those designs are in danger of being forgotten. The authors contributing to this issue are keenly aware of this: “somewhat painfully, designs disappear almost immediately” (Carroll, p. 57). This special issue brings our field alongside other design disciplines, in marking significant milestones in design innovation, recognizing avenues explored and sometimes abandoned in complex designs for learning, celebrating the often unrecognized breakthroughs instructional design and technology has had in its past. Without the documentation of these designed artifacts including the narratives of their creations, we take avoidable risks—a misconception that each new breakthrough is itself entirely new, repeating failures we as a field have already grappled with and sometimes overcome, and overlooking the insights built into designs we use every day. Unlike other design fields, instructional design has not nurtured a sustained interest in documenting cases from the past and engaging in our design history. Skilled designers build on the precedent they have acquired not only through their own designing, but in the designs they have experienced that were created by others. IJDL was created to be a source for that type of virtual precedent, and this issue takes an important step toward fulfilling that purpose.

From an initial call for historic designs for learning and a subsequent process of peer review, we have selected the design cases that appear here by prioritizing the closeness and intimacy the authors had to revealing design rationale. The process resulted in three types of historical design cases: 1) immediate participants reflecting on the design process, 2) users of the designed learning experience 3) historians reconstructing the past through designed artifacts and interviews with those who were involved in their creation. The age of each project, its place in the history of learning and technology, as well as the representative diversity of these designs played heavily on our decisions. We actively encouraged a representative sample, taking into account both breadth of topics and the genres of designs represented. These cases explain how things we may interact with daily have come to be as they are, as many of the designs highlighted in this issue have directly and indirectly informed our contemporary design practice in designing for intentional

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learning, illustrating many of the challenges of designing for intentional change (Nelson & Stolterman, 2012).

To be clear, this is not a review of knowledge that has been previously assembled elsewhere. Rather, these authors have exposed new precedent bound up in these designs, through reflections of each design's tangible and intangible parts. While it is partially true that one might be able to draw design knowledge simply from the artifacts themselves, real access to the all the precedent of a case comes from the retelling of these episodic memories of what went into a design and how it came to be as it was in the end. The historical significance is in more than just the artifacts themselves.

As designers, these artifacts affect us in deep and profound ways. Our episodic memories of the designs about which we read expand our repertoires to create learning experiences. It is up to readers to extract whatever precedent from these designs they might find useful. The articles in this special issue present a clear argument that a retrospective view of pivotal designs intended for learning has much to offer the contemporary designer.

OVERVIEW

Each of these cases represents a rich construction of design context and the learning experience, alluding to the effect of the passage of time on how we understand designed artifacts and experiences. Many pages could be written extracting these themes, but we have assembled just a few key areas of contrast in order to provide the beginning of a discussion regarding our relationship to design activity from

the past, which we hope endures beyond this special issue. In each of the sections below, a common objective (bringing learning to scale), a common perspective (designing for learner agency), or a common context (the social context of a design or designing) could be starting points for a deeper, more introspective discussion of our history in designing for learning.

Bringing Learning to Scale

A number of the articles collected here focus on designs that served much larger populations than other designs at the time could. The *Time-Shared, Interactive, Computer-Controlled Information/Instructional Television* (TICCIT) project (Gibbons & O'Neal), *Nicaragua Radio Mathematics Project* (NRMP; Trumbore), *Midwest Program on Airborne Television Instruction* (MPATI; Tracey & Stefaniak), and to a lesser extent the *Artificial Intelligence Personal Consultant* (Oravec), projects each represent how designers grappled with emergent technologies, creating learning environments that harnessed these technologies to serve larger populations than could have been previously imagined. It is not surprising that broadcast technologies, such as radio (NRMP: Trumbore) and television (MPATI: Tracey & Stefaniak; TICCIT: Gibbons & O'Neal) figured prominently in some of these early designs. Trumbore writes that researchers were directly addressing this goal of scale: "Their efforts actualized a long-held vision of using technology to construct an 'artificial tutor' to scale personalized and accurate instruction on demand." (p. 21). It is important to note that she was situating this comment in 1966, not 2014, even though we see this same design objective today, almost 50 years later.

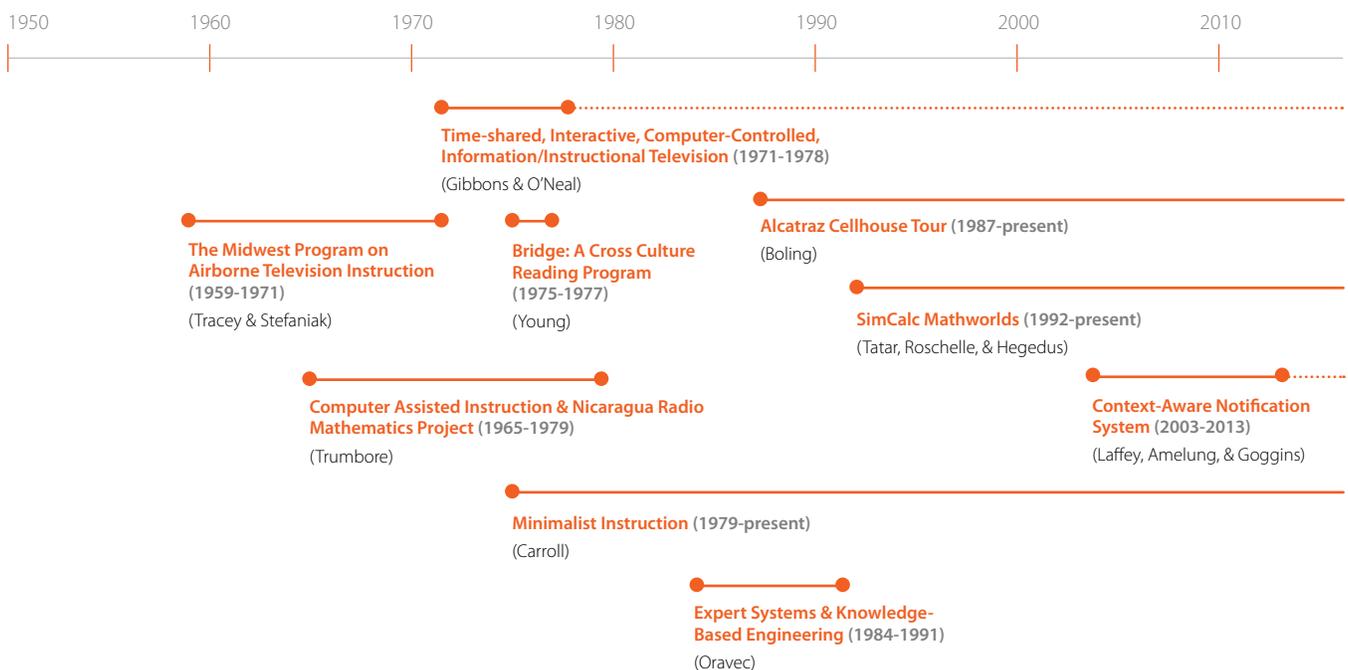


FIGURE 1. Historic designs for learning in this issue arranged chronologically from left to right.

With an increase in scale came geographically dispersed populations, and that additional complexity figured prominently into these historic cases. The airborne broadcasts of the MPATI project (Tracey & Stefaniak) were a noble effort to serve rural populations in the American Midwest. But of course, these distant populations were not without unique constraints of their own that contributed to design challenges. Geopolitical concerns spelled the end of the interactive radio instruction (IRI) project in Nicaragua (Trumbore), and context sensitivity, or the brittleness of the expert system to adjust to new users and contexts, contributed to the retirement of the expert system discussed in Oravec's analysis of a knowledge engineering system at the Campbell Soup Corporation. Gibbons & O'Neal make note of the fact that the dispersed locations of learners played into a constraint initially thought to have been overcome: "At first transmission quality was uneven, and as quality went up, so did the phone bill" (p. 2). Despite the large outlays of funding some of these projects enjoyed, cost remained an issue. This was true not only in nationally-funded, technology-rich designs like TICCIT (Gibbons & O'Neal) and MPATI (Tracey & Stefaniak), where the cessation of funding signaled the end of the technology, but also in designs that had less technical requirements, such as a lack of funds to supply individual worksheets to students in Nicaragua (Trumbore).

Designing for Learner Agency

Carroll gives credit to the designed artifacts that brought learning to learners as an inspiration for the perspective behind minimalist instruction, a positive perspective that "saw what people were doing with self-instruction as indicating strengths that needed to be encouraged, facilitated, better supported, and further strengthened by designs" (p. 63). The two short cases in *Creating Minimalist Instruction* embody an awareness of learner agency expressed through the design itself, and such ideas have been carried on in a multitude of designs for learning since, two of which appear in this issue. Laffey, Amelung, and Goggins' case on the *Context Aware Notification System* (CANS) was built around learners' innate desires to go to where "the action was" (p. 102). In a similar sense, the *SimCalc Mathworlds* design (Tatar, Rochelle, & Hegedus) aimed to democratize learning of complex ideas in mathematics through active participation in dynamic representations. This issue also provides an early example of recognizing the role of immersive experience within guided instruction. In the informal context of a walking tour, Boling identifies that the pivotal design decision was to capitalize on the learner moving through spaces within the cellhouse of the Alcatraz prison. Each of these cases provide readers with concrete examples of our shared history in the complex task of designing for learner agency.

The challenge of designing for learner agency provides a perspective to look at the cases presented in this special issue as a chronological whole (Figure 1). While the

relationships among cases are surely not direct, they are also not random. Learner agency was framed differently in the examples prior to 1979 as compared to the later designs. At some point in or before 1979, the frame shifted from designing for different learners with different needs (e.g., TICCIT, MPATI), to designs driven by the learners themselves (e.g., SimCalc Mathworlds, CANS) in the era of the personal computer. For example, in the TICCIT project, the designers grappled with how to present static materials while at the same time presenting component skills and detailed elaborations via *base frames* that effectively split the screen into dynamic parts so learners could move within the content areas as desired (Gibbons & O'Neal). The NRMP project at Stanford tackled the same issue using two completely separate machines (Trumbore). Each of these early design solutions framed the challenge of addressing a diverse learner population differently from the later designs appearing in this special issue. In SimCalc, the frame was set around refining exactly what was to be learned—"restructured knowing through finding points of possible design action where learners' strengths, representational affordances, and a reorganized curriculum provided the opportunity to understand MVC [mathematics of change and variation] in a new way" (Tatar, Rochelle & Hegedus, p. 87, emphasis in the original). In the CANS description from the early 2000s, the designers addressed the learner directly, emphasizing the role of "social action and information about that action," and how important a number of these perspectives were in forming their approach to the design (p. 104). In each of these examples, the role of tools in relation to learner agency was not deterministically linked to emergent technologies: While the tools employed by the CANS and SimCalc designs were elaborate modern computer configurations, in the Alcatraz Cellhouse Tour (Boling) the enabling technology was the (then new) Sony Walkman, and in the Minimalist Instruction (Carroll) examples, the tools were a deck of cards.

Designs for Social Contexts

The social context in which a design is implemented comes forward in a number of these historic cases. In particular, the use of vernacular as a design feature appears in *Bridge: A Cross Culture Reading Program* (Young) and *SimCalc Mathworlds* (Tatar, Rochelle, & Hegedus). Young describes a set of textbooks designed to better serve a linguistic subgroup of the American population—inner city African-American elementary school learners—where the vernacular created a pathway to a more mainstream discourse. In SimCalc, the design created access to mathematical ideas and procedures normally encapsulated in unfamiliar symbols and only available to those with knowledge of Calculus. In both of these cases, the authors reflect on how the use of vernacular revealed ways in which the curriculum itself needed to be reworked. Both designs met with pushback from outside stakeholders and met varying degrees of acceptance, from slow adoptions to angry editorials. These

cases evidence Carroll's statement (this issue) that "the most difficult step in design innovation [is] getting someone else to understand and adopt a new design." (p. 60). The historical perspective is uniquely valuable in this regard.

The process of creating designs for learning is itself a social activity that takes place in a complex world. The social contexts of designing that are the focus of these cases include the influence of designs that did not appear as subjects in this issue, but influenced designs that did. For example, Papert's LOGO turtle geometry (an influence on the SimCalc project) and the PLATO project (a contemporary of the TICCIT project) are implicitly discussed in the contexts of a number of the design cases in this issue. Each case discusses what was influencing the designers as they came to the task, the members of design teams, the dynamics produced by individuals, and the chemistry among designers with different, and often quite disparate, skills sets. In curating these cases, we noticed it was quite a challenge for authors to pin down a date for the beginning of a design. We found ourselves asking authors to identify at least an approximate year for the start of each design. This may be unfair because in each of the narratives, the design grew out of previous designs, or inspirational opportunities which closely paired with a certain context, making the subject of the article a snapshot in time rather than a closed narrative behind a single artifact. The dates in the figures and titles can be read as approximate ranges for the beginnings of these designs because there was little consensus among the cases as to what constitutes the actual beginning. For example, Gibbons and O'Neal point to an insightful moment from a project lead that caused the design process to begin in the ways that resulted in the final design. Similarly, Boling asserts that the Alcatraz design formally started with a call for proposals, but the critical experience that impacted the most critical design decision came years earlier as the designer sat on a airplane taking off and experienced motion in sync with audio. In the sense that design is a social activity, these cases as a group make the argument that the start of a design is a reflection of the frame from which you are approaching it—which is frequently birthed prior to the start of the formal design process.

FUTURE DIRECTIONS AND WHAT IT ALL MEANS

The aspirations and innovations embodied in the designs contained in this issue go beyond the technologies used to create them. Each historic design case we have included contains a narrative of the obsolescence of some tools, the appearance of new technologies, and techniques that could enable designs that better accomplish those aspirations or introduce new tools or technologies to the learning community. Of course, with these new designs came new challenges. While it is unlikely that there will be airplanes

broadcasting lessons across the Midwest (Tracey & Stefaniak), or that the teletype machine (Trumbore) or not-so-floppy diskette (Carroll) will reappear as a fashionable design choice, the same cannot be said for the use of vernacular to convey complex ideas (Young; Tatar, Rochelle & Hegedus), and the use of collective knowledge as a means of teaching and learning (Oravec; Laffey, Amelung, & Goggins). While each historic design case includes technologies and techniques, we have purposefully left the utility of these up to the reader (Smith, 2010). IJDL was founded on this idea; that the reader should be empowered through these design cases, to select the aspects of each case that serves them best for what they are trying to do.

Each of these cases referenced different viewpoints: some completely retrospective (Tracey & Stefaniak), some autoethnographic (Carroll; Gibbons & O'Neal; Laffey et al.; Tatar et al.); some documentary or reconstructive (Boling; Oravec; Trumbore; Young). Each viewpoint provides a fertile ground for future design cases, and each approach includes a unique set of challenges in producing a robust record of the designed artifact or experience. In particular, the level of depth the author can expose is limited by their access to the design process—either in terms of artifacts, or in recall of the episodes that led to a design becoming the way it was. In all of these instances, however, it was possible to document design precedent, and this provides us an imperative as a design community moving forward—we will end up not learning from the successes and failures of the past if these design experiences remain undocumented and unstudied. This is only the beginning.

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Reviewers for this special issue

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