The Journal of the International Digital Media and Arts Association

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Submission Guidelines

The Journal of The International Digital Media and Arts Association responds to the rapidly developing field of digital media and arts in a variety of settings–academic, educational, artistic, political, and social. The editorial board invites original submissions that consider the development, application, and understanding of digital media and arts; the purpose of the journal is to promote awareness of this growin field and to prompt discussion about the issues that are a part of our increasingly digital world.

Please send drafts of full articles to associate editor Sharon Ross at **sross@colum.edu.** Articles can be submitted for peer review (15–25 pages) or for our *Commentary and Criticism* (5–15 pages). All submissions should be in .rtf with any imagery saved in a separate file.

Papers presented at the annual conference are automatically considered for our annual conference issue; we also at times run themed issues–please visit our website: **http://www.idmaa.org/journal/**

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Front Cover image: Brian Evans' *Pensée Perdu* (see pg. 30)

Introduction

Eye of the Beholder, Professional Environment

–Sharon Ross, iDMAa Editorial Team

In this issue of iDMAa's journal, we explore the concept of digital/media art in a variety of ways that converge almost uncannily–in every Freudian sense of that term, where the familiar is made strange and vice versa. "Art" has always been a contentious category along a wide spectrum. Can one be taught to appreciate art, and even to know it when you see it? Can the popular and the commoditized coexist with the artistic? Is art a profession or a calling? Do we evaluate along aesthetic lines only–and if so, does an aesthetic eye include an emotional domain? Where does the audience and viewer perspective come in with defining art?

Many still see the use of digital/media as an intrusion into the field of art, a perspective with long-standing roots perhaps most recently–in broad strokes–tied to the 1960s Pop Art movement. Today the rhetoric is amplified as we read great works on our Kindles, view classics on our iPads, and listen to symphonies on an ironically small aural scale acoustically. Further muddying the waters is the ever-growing role of the audience–singular or many–partaking in an environment that tells us our input matters (and who can freely and instantaneously tell thousands their impression). Add in an economy that disadvantages the independent artist and the art-seeker alike, and any attempt to pin down what "is art" could be seen as an exercise in futility.

Oddly, what I find reassuring is that people anywhere find it a valuable endeavor today to examine the concept of art, rather than descending into cynicism or avoiding the inevitable fact that part of human nature is to classify and evaluate–and create something meaningful on whatever scale. L. Rodayne Esmay takes us on an intimate tour of works from iDMAa's IDEAS exhibit, examining his emotional reactions to the works presented while incorporating the perspective of the artists as well, fusing the two to describe succinctly his overall perception and assessment. Most of us personally think of art as something that strikes us individually and uniquely in some way, and here Esmay "makes that strange" by actually examining that process as something shared.

Daniel Cooper, Suzy Smith, and Brandon Waite also explore the notion of how art is shaped by examining the role mobile devices and second screens in how audiences interact with television. Focusing primarily on the 2012 election, their observations can be applied to any number of television viewing experiences–be it live tweeting during the premiere of Mad Men or scanning social media while watching the NCAA tournament games. How much of art is in the reception, and how much in the "original text?"

John Ludwick and Dan Baldwin explore the field of animated filmmaking, which has steadily

become more accepted as artistic, even as the infusion of digital technology has created debates within the film world of the old versus the new painstaking ways of animation. Their piece reminds us that art is work, and that work necessitates training (perhaps now more than ever) in terms of skilled animation and effects. In today's digital environment, a self-sustaining animator learns from engineers, software technicians, and—as they suggest—from industry professionals with specific needs from their employees. In a similar vein, Dene Grigar et al. examine an attempt to teaching mobile app design and development, concluding that instructor must learn with student in a field as uncharted as this one is—and that partnering with industry professionals is key to educating artists aiming to find a career path with which they can literally live. I see these two articles as a gentle but important reminder that we no longer live in a romantic era where patrons sponsored artists to immerse themselves in their calling; and perhaps more to the point, this era was a mythology as patrons always had projects they insisted on having completed to their satisfaction. While working within and beside companies who have a very real bottom line may strike many in arts/education as anathema, can we ethically or satisfactorily educate artists of any stripe today without also teaching them how to thrive among digital industries' expectations?

Tying together this range of articles is a veritable think piece from Matthew Payne and Mike Fleisch that I found personally captivating, a straight-on look at the popular notion that games can never truly belong in the domain of talking about art, not even in comparison to film (which, need I remind you, was relegated to the same standing less than 50 years ago). What I found so refreshing about this article is that they do not attempt to answer the question even of games' status; they instead poke at the debate itself. And while this certainly makes strange my point above, that continuing to explore the concept of art has value, I simply love how they take discourse about art to task in a passionate yet even-handed manner. Given the recent loss of Roger Ebert, who simultaneously championed film as an art form even while refusing to do the same for games, their essay uncannily urges us to ponder the pros and cons of labeling media works as art at all.

Finally, as a special addendum, we have an interview with Peter Raad. For our past tenth anniversary issue, we conducted interviews with a wide range of digital media artists of varying stripes; Mr. Raad's interview came in after our publication date, but we wanted to include it here lest it be lost in the archives!

I hope you enjoy this issue's discussion about art and work and education and Iencourage you to give us your feedback online at iDMAa's website.

Happy reading!

—Sharon Marie Ross

Peter E. Raad

Peter E. Raad (Ph.D., MS, and MSME, University of Tennessee, Knoxville) holds the Linda Wertheimer Hart Professorship and is a full professor of mechanical engineering at Southern Methodist University. In 1999 he founded the Linda and Mitch Hart eCenter, a university-wide center dedicated to helping business and society address the intended and unintended consequences of interactive network technologies with an emphasis on the Internet. In 2002, he founded The Guildhall at SMU, a novel, industry/university cross-disciplinary graduate program designed to educate and train future practitioners and innovators in the fast-growing field of digital game development. He served as director of the Hart eCenter and executive director of The Guildhall at SMU until May 2012. Previously, he served as the associate dean of the SMU School of Engineering.

Prof. Raad has received several awards including the Outstanding Graduate Faculty Award four times, the Outstanding Undergraduate Faculty Award twice, the 1999–2000 ASME North Texas Section Engineer of the Year, the 2006 Harvey Rosten Award for Excellence in Electronic Thermal Analysis, and Next-Gen's Top 25 Most Influential People in the Video Gaming Industry in 2007.

Dr. Raad has published over 50 journal articles, and presented over 100 conference and invited talks. He holds U.S. and international patents in thermal metrology and computational characterization of multi-scale integrated circuits. He has received over $2.5 million in funding support for his research in tsunami mitigation and in metrology of submicron electronics. In 2006, he founded TMX Scientific to innovate and commercialize deep submicron thermal measurement systems and ultra-fast thermal computational engines. He is a fellow of ASME and a senior member of IEEE.

iDMAa 10th Anniversary Conference Journal
Questions for Thought Leaders

Responses and Thoughts

Peter E. Raad

keywords: machines, technical artists, scaffolding power of technology, HCI, chunking, multi-code supercomputers

iDMAa: Looking back over the last ten years, what are the things that stand out within these broad intersections?

PR: It is vividly apparent that the technologies of digital information and networked interactivity have made a significant and irreversible change in how we live, work, learn, and play. These technologies have altered how we human beings communicate, interact, socialize, and even think. The whole notion of organized society, from the individual to the group, has been recast in a digital framework. More soberly, I believe that these changes are having a profound impact on our perception of self, or identity, and group, or belonging. Geography, immediate familial ties, and physical experiences are used to define identity, both the view of oneself as well as the projection of that self outwardly to others. By expanding boundaries and allowing nearly instant connectivity to anyone and anywhere, both real and virtual, the digital is changing the melding process of the self. With equally strong and yet opposing forces, digital media makes it possible to simultaneously recast oneself within different contexts while rendering our ability to completely sever ourselves from previous projections nearly impossible. But such warning bells should not take away from the powerful positive impact that interactive networked technologies have on art and media in general. If art is the universal understanding of personal experiences, then the digitization of art enables the connecting of personal experiences in unprecedented accessible ways and amplifies their dissemination by highly democratic means.

One may take from the above that the idea that technology significantly alters human experience is somehow a new and unprecedented phenomenon. It is not new at all! Technologies have always changed human beings. I like the notion that we should not call ourselves homo sapiens, as we have proven not to be so wise, but rather we should refer to ourselves as homo technologicus, as a species that makes and uses technology. In a very real way, we humans create technology, which in turn changes us and reshapes us. We speak of many symbiotic relationships between humans and other species, and how we have helped each other survive, but the most potent of relationships, if we can call it that, has been between humans and technology, initially "machines," and more recently machines and software. We create new technologies, which in turn give us the increased power and ability to create even newer and more powerful technologies. This has existed since we struck two flint stones together or used a stick of wood to make a hole in the ground. What is unprecedented, though, is the speed with which significant technological breakthroughs are now coming, or, should we say more accurately, coming at us. It used to be that several generations lived within a given technological era, where the stuff that we humans made and used persisted for several generations. Now, many important, and even transformative, technological advances appear within a single generation. So much so that even parents and children have significantly different familiarity with and dependencies on the technologies of the day, such as smart phones, tablets, videogame consoles, social networks, video and music platforms and sites, etc. If we accept the fact that the technology we make remakes us, then within the last ten years we have experienced an existence in which generations of different technological "ilk" are living different lives within the same timeframe.

I haven't even yet mentioned how digital media have changed the perception of power, the conduct of political reform, the ability to crack challenging scientific problems by using the power of crowd sourcing, or the real notion of joint authorship made possible by digital collaboration. Perhaps I'll get to these at a later point.

iDMAa: How do these changes affect your work?

PR: Work has clearly changed. Undoubtedly, many still labor in the fields or otherwise physically exert themselves to make life better for the rest of us. But for most, particularly in the more affluent nations, work has become inextricably connected to the digital. I find that a significant amount of my time is now taken by communication rather than by ideation, contemplation, or creation. Because it is so easy to communicate and because we humans are by our very nature communicators, we spend more and more time communicating. The inherent value within each communication is generally not as high. As a matter of fact, there seems to me to be an inverse relationship between volume and value. Just think of the mounds of email we receive every day that are of little significance, and which seem to have implicitly relieved us of the needs for consideration and reflection in our written communications. Alas, the art of letter writing has joined the list of endangered species!

Another area of change affecting my work is the notion of subject matter authority. The near instant connectivity and the breaking down of geographic barriers have widened the established circles of "expertise." For many centuries, disciplines were built around clear hierarchies and processes for knowledge acquisition, advancement, and dissemination. Knowledge came to be measured by the possession of its instruments – tablets, scrolls, books, libraries, equipment, tools, and laboratories – and the process of passing on these instruments from each generation of masters to subsequent generations of students, journeymen, and apprentices – in schools, universities, ateliers, guilds, and conservatories. Digital and interactive network technologies have been changing all of these long established structures. First, what I like to call computer-aided thinking multiplied the effectiveness of the individual, but then, the addition of networked interactivity amplified the potential of the individual to the power of the larger numbers of collaborating crowds. Today, we are witnessing a surprisingly quiet and yet powerful examination of the roles of institutions of learning and the teaching professions. If educators are no longer the gatekeepers or the exclusive vessels of knowledge, and if institutions of learning are no longer the sole repositories of the annals of information, then what is the new role of the professoriate and the traditional campus?

iDMAa: What new technologies interest you, or are you excited about?

PR: The scaffolding power of technology, in general, and computing technologies, in particular, have enabled humans to solve many challenging problems and to push the boundaries of our existence. Tackling problems of ever increasing complexity has required developing and growing expertise, which has led us to a natural division of professions and work fields. Since the Socratic notion that "there are diversities of natures among us which are adapted to different occupations," humans have sought and valued mastery and expertise. When the field of knowledge was still relatively contained, it was not unusual for some brilliant human beings to make their mark in more than one field. With the establishment of the educational models of the industrial era, students were made to focus on an area of specialization, and naturally super-specialization became the ultimate pursuit. When problems crossed disciplinary boundaries, teams of individual experts were formed to tackle these, but as individual disciplines grew, they spliced into multiple sub-disciplines, and with every iteration, the distances between disciplines grew. This state of affairs was reasonable and even encouraged since problems were becoming more challenging, requiring ever increasing focus and deeper specialization. Since the languages of the various disciplines diverged so much, it became increasingly difficult for experts in different fields to leverage each other's expertise, and so experts tended to work within their own individual domains. However, computing technology became so powerful and so cheap that it could act as an intermediary between experts by, in essence, capturing the expertise in one field and putting it at the disposal of experts in another field who could "drive" the vehicle without necessarily needing to know how to build it. Just as a teenager doesn't need to know how a complex car is built to be able to accomplish the task of transporting herself to the movie theater, a gifted composer can create a catchy piece without knowing how to play every single instrument in that piece. The digital platform in this case provides a common intermediary to articulate the various instruments, which themselves have been encapsulated by different fields of expertise that the otherwise gifted composer could not possible master, or for that matter should be expected to.

The problems that we are and will be faced with in the twenty-first century are highly cross-disciplinary and multi-dimensional, requiring the expertise of many. Since fields are so wide and deep, and no one has the opportunity anymore to become an expert in more than one or two fields, we cannot rely on the individual DaVinci who has mastered several disparate domains, but rather on the DaVinci team whose members wield and can bring to bear the sum, or even the product, of the disciplines that the problem at hand requires. Interactive network technology is precisely that medium which can enable the team to leverage the expertise of its individuals, not at the lowest common denominator of their collective understanding of each other's expertise, but rather at the apex of the knowledge, knowhow, and abilities of each individual expert. So suddenly, instead of dividing and conquering large complex problems, we solve them by assembling and teaming up against them. As I mentioned above, the digital amplifies the power of the individual to the power of the team. But now imagine that the membership of this team encompasses those experts who are present as

well as those who have been previously encapsulated. Since the challenges and opportunities of the twenty-first century reside at the intersections of the sciences of nano-, bio-, info-, and neuro-technology, we will need experts who can meld the atom, gene, byte, and neuron, and consequently we will need educational processes that produce the types of DaVinci teams of experts that we have just discussed.

Cheap computational power has made it possible to experiment endlessly, to play "what-ifs," to search for solutions, and effectively to accelerate innovation through such rapid prototyping. This same computational power has opened up the realm of the visual, so that experimentation can easily encompass the sense of seeing, and in doing so, enable us to manipulate parameters and constraints to see what happens. And we do so in a safe and controllable environment, just as, say, in a flight simulator. No wonder video games are as powerful as they are at holding our attention. They engross us in a process of personal discovery, challenging us to meet new situations and to resolve them with skills acquired in previous iterations. This scaffolding of thinking and muscle memory is not a mere exercise in mimicry. Far from it, I firmly believe that experiences gained in such a way actually grow our mind's ability to assess and solve new and more complex problems. We have an understanding of this symbiotic relationship between practice and growth when it comes to sports or skill-based fields. We know that the tennis player does not merely hold a racket, but rather that the racket becomes an extension of the player's body being masterfully manipulated by the brain no differently than we might use utensils to eat our meal. Surgeons don't think about the instruments they hold. Rather they use those instruments as natural extensions of their being to solve the problem at hand. We need only try to remember the first few times we drove a car to realize how progressive experimentation leads to mastery, which is when we subsume a subject matter into our very self.

It should not be surprising to us that the visual has such power on human learning. We've all heard the saying "a picture is worth a thousand words." I like to extrapolate this idiom by saying that a video is worth a thousand pictures, if nothing else because it takes that many and more to make a video. I further like to extrapolate that an interactive video or simulation is worth a thousand videos because we're able to explore and make decisions that alter the outcomes within the simulated world. In a very real way, then, an interactive simulation is worth a billion words. This is not to mean that we don't need words anymore, far from it! It simply means that we're able to engage more of ourselves when we use more of our senses, i.e., more channels to our brain as well as senses that engage our brain in patterns that seem to be more closely aligned with our brain's process of deciphering, codifying, and retaining experiences and knowledge.

iDMAa: What do you believe the future holds for digital arts or media education?

PR: Technology has always undergirded the arts, from painting, to sculpting, to performing. Artists use instruments to create artifacts and experiences to share as well as to scaffold their own development. But these instruments and media to date have been real and containing, and at their limits, tethering the artist's imagination to the physical and the practical. Digitization, on the other hand, can be what low gravity is to physical movement, freeing the art student to explore unconstrained by real-world physics and the art master to create beyond the bounds of materiality.

I also believe that the challenges that we face and the powerful technologies of interactivity and computing will move us (hopefully!) to value equally both sides of our brain. Our educational systems have forced us to choose between the right and the left sides of our brain and even place differential value on one versus the other as if a human being could exist with only one side! This has led to an educational system that favors one side over the other to the point of allowing, even choosing, to let the "lesser" side atrophy. As I alluded to previously, the problems that we face in the twenty-first century are highly cross-disciplinary and complex, making it imperative that we approach problem solving with our whole brain, not just half of it. I think this will have a positive impact on art and media, in that we will no longer think about art as merely an "ennobling" pursuit or something we do to entertain ourselves, but rather as an integral part of formulating the right questions and bringing "artistic means" to solving them. As an example, the engineering approach has always placed value on sketching and drawing as an important first step to casting a problem. Computational technologies that make visual immersion possible will only heighten that perceived value, and it is not a wild

prediction to propose that future engineers will also be "technical artists" in the sense that they will be adept at constructing and using visual and artistic interactive media as part of their problem solving arsenal. This and intersections of other disciplines with art should serve to broaden both the appreciation for the arts and their study. I have been saying for quite some time now that I am not for STEM (science, technology, engineering, and mathematics), but rather for STEAM, where the arts take a central and equal place in our pursuit to educate future generations—a potentially controversial position for an engineering educator!

iDMAa: What—through technological shifts—have we lost as a culture in the last ten years?

PR: One of the most powerful benefits of low-cost computing power and storage has been customization, as in the tailoring of search results to the interests of the person doing the searching. This widespread capability has permeated well beyond searching and has led to the inversion of previously accepted norms of information exchange. The notion of broadcasting or pushing ideas, stories, advertisements, and the like, has been replaced with the more individual-centric notion of pulling or customization of experiences. This sea change did not lead to the loss of shared communal experiences, but rather to the broadening and redefinition of what a community represents. While geography and institutional memberships (e.g., family, school, work) tended to define community, the Internet made it possible to form communities of common interest beyond the boundaries of geography or even language, nationality, etc. Yes, there is no arguing the fact that nowadays individuals can build bridges with faraway likeminded persons because of the Internet. But perhaps a more powerful component to this newfound capability is in locating or finding these likeminded individuals and the ease with which these communities can be built and maintained, and this is entirely due to large-scale searchable databases. Currently, this customization allows people in the sales and services fields to tailor their interactions with us based on our likes and dislikes. But ultimately, customization can lead to our ability to acquire artifacts that have been made according to our choices or needs, whether it is the components of a computer, the color of a car, or even the formulation of a medicine. The cost of ownership has always been driven down by standardization, but cheaper and cheaper automation, computing, and manufacturing is making customization affordable to increasingly larger segments of society.

The above is some of what we have gained, and it is good. However, the ease of customization also has the unintended consequence of what I like to call the loss of serendipity, and ultimately the potential for isolation and intellectual self-centeredness. A perfect example is the ease with which we are able to select what news we wish to read or what movies we would like to see. With the act of perusing a newspaper, magazine, or the racks of a library or bookstore, came the chance of encountering topics which we might not have sought or even been aware of. Listening or reading commentaries that are counter to our beliefs or life experiences could lead us to greater understanding or appreciation of others, or even simply strengthening those beliefs by testing them. Sharing the same space with others could lead to the start of special and lifelong relationships. This serendipity needs freedom of movement and association, thrives on taking chances, and requires a healthy lack of certitude. All of these can get lost if one hears, listens, and associates with the already familiar and customary. To grow is to venture beyond the safe shores of our personal boundaries.

iDMAa: Looking back on your own professional experience with digital culture, is there something you wish you had learned more about/explored/been a part of?

PR: I was fortunate to be on an academic path that allowed me to become proficient in computational sciences

while also acquiring the mindsets associated with the practice of engineering and with engineering systems thinking. I have also been fortunate to gain a deep appreciation for literature, music, and the arts. I would do that all over again. What I wish I knew more about is in the arenas of cognitive psychology and neurosciences. The brain is the next exciting frontier! Someone said that we know more about the bottom of the oceans than we know about our own brain, and that's probably true. My experiences in founding The Guildhall at SMU and designing a curriculum that crosses the disciplines of art, design, and technology have given me a keen interest in the potential of intersecting neurons and bytes – in other words, the melding of the fields of interactive networked technology and cognitive sciences.

iDMAa: What will the next generations of students bring to our digital culture?

PR: This generation brings courage, a "no-fear" attitude, and the sense of unbridled exploration! Students bring a mindset that is comfortable with iterative trial and error, with learning through multiple failings, and with systems thinking. All of these are beneficial attributes, but it is also a generation that has less patience for detail, a low tolerance for the "hard subjects," and a predisposition for "chunking," or bite-sized problem solving. It is a generation that is attuned to reliance on crowd sourcing and thinking en masse. There seems to be this undercurrent of not worrying about learning for ourselves because someone we know or have access to can give us the answer. This comfort level with not knowing or not fully commanding a subject matter is alarming. Ultimately, I fear that such attitudes could lead to an abdication of one's responsibility for one's own knowledge to the collective. It then falls on the shoulders of the next generation of parents and educators to strive to keep the love of individual knowledge alive and its pursuit a worthy personal goal.

iDMAa: How will people be interacting with search and knowledge exploration in ten years? Will we still recognize it?

PR: One of the evolutions that I am most excited about is in the area of human computer interaction (HCI). Since the industrial revolution, technologists have been guilty of shoving technology down the throat of society, without feeling the responsibility of trying to anticipate, much less understand, the unintended consequences of their particular technology. The acceleration of the introduction of technology into society has made it even more difficult for individuals to assimilate every new invention that comes along. This is certainly true in computing technologies: ever faster computers, larger storage, smaller footprints, more mobility, and the ever more complex software to take advantage of all that increased power. The most vexing nature of this "innovation for the sake of innovating" approach is how humans have been forced to adapt to the machines as opposed to the other way around. It seems like since we humans were more adaptable and intelligent than those computing platforms that were supposed to be making our lives and toil easier, we were the ones expected to learn the machine's language and adapt to the means of communicating with it. This has led to high levels of complexity in hardware and software, invariably leaving behind those who could not adapt, in essence creating a chasm between those who are "with it" and those who aren't.

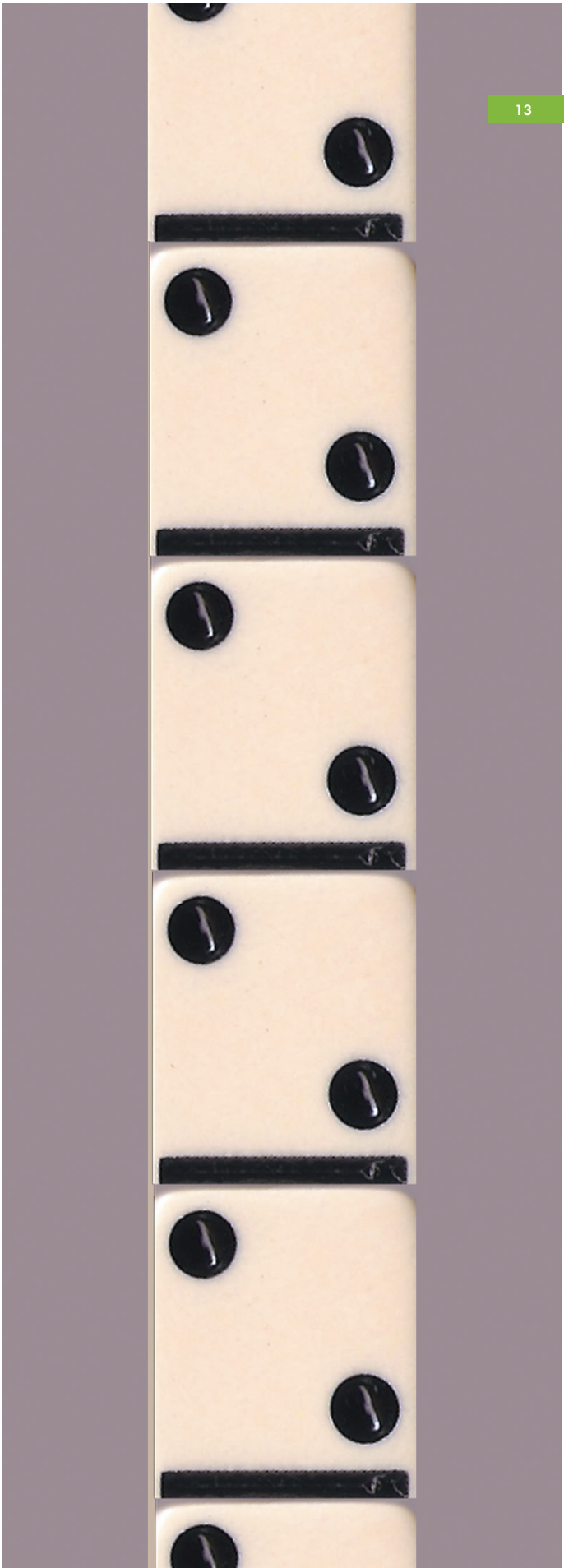
Now, technology has always required a learning curve and the gaining of some level of proficiency for proper utilization. But, as we discussed earlier, when subsequent waves of the new, improved, and ever more complicated come at us with faster frequencies, even the hardiest of technophiles eventually run out of breath. If the vocation of the technologist compels them to continually tweak, evolve, and modify, is it a given that the non-technologist majority must just keep up? Did anyone ever ask us if we really needed a multi-code supercomputer to type a letter? What then are we to make of this inevitable accelerating wheel of technological innovation, particularly in the interactive network technology sphere? The answer in my mind rests within the problem itself. Given that interactive and computing technologies have advanced so much beyond the needs of the average human being, the technologist can, even must, use this vast power to make the machine learn the human being as opposed to the other way around. HCI gives us the means by which machine complexity can be controlled by natural human faculties. We only have to think of how trivial the basic controls of a car are – steering wheel, shifter, two pedals – and yet, as we mentioned earlier, a teenager can control a beastly power plant on wheels with chemicals, mechanisms, electricity, computers, software, and sensors, all keeping track of millions of details per second and still has the

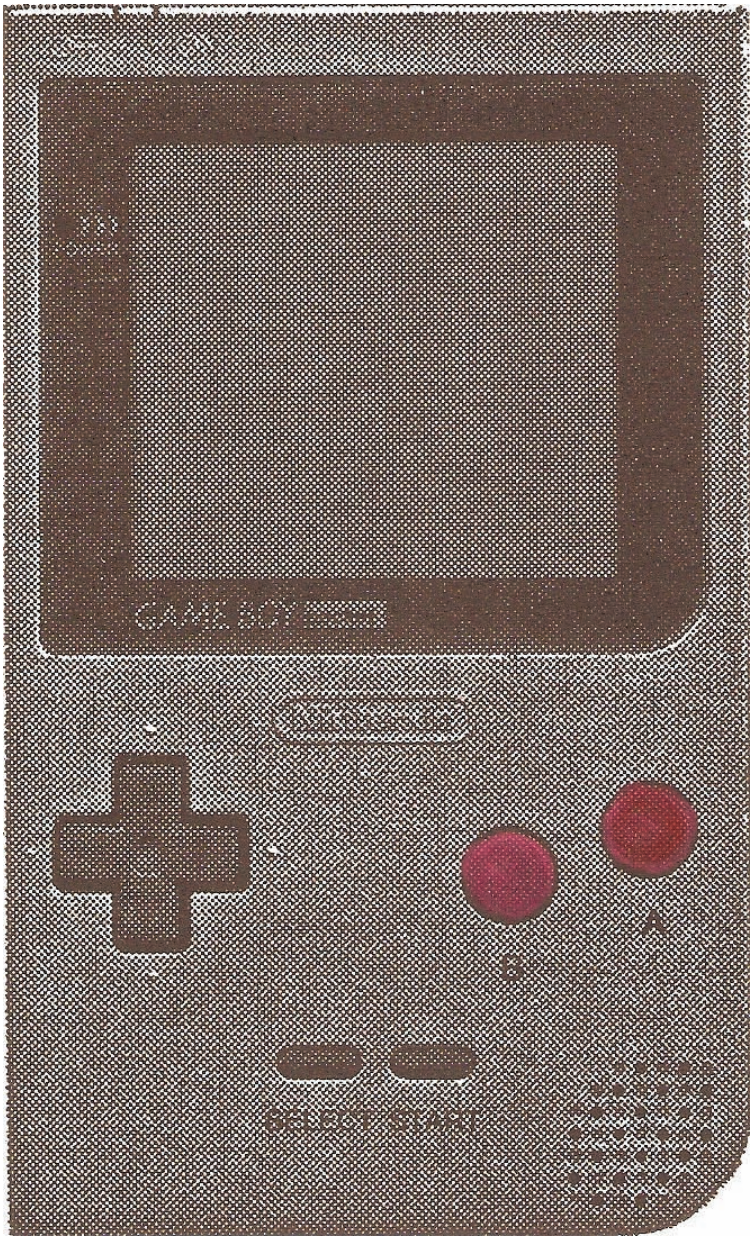
bandwidth to warn us that another car is in our blind spot or that we might want to refuel in 35 miles or so, give or take 5 miles! And yes, you can even now speak to the car and tell it to call home or to play your favorite song. Now, that's putting the power of technology at the disposal of human beings. Of course, we already have many such examples, including voice recognition, gesture-based control, predictive search, exoskeletal prosthesis, and the like. The trend will only continue, and as we now know, will even accelerate well beyond our capacity to predict. The news is good though: we have gone past the threshold needed to make machines that can adapt to humans rather than the other way around.

iDMAa: Most valuable lesson learned from the past decade?

PR: On the negative side, I have come to realize that if you let the pessimists, the shortsighted, the tentative, and the lazy catch up with you, they'll bring your efforts and the fruits of your labor down to the level of their aspirations, vision, industriousness, and abilities. The corollary lesson is that the cost of trying to do something is not much more than actually doing it, but the rewards are far more satisfying. However, institutions seem to spend more money and energy on deciding not to do something than to actually do what stretches them.

The other equally valuable but positive lesson that I have learned is what makes a team and what makes it successful. A team is not simply a group of experts; that's just the surface of it. While expertise is absolutely necessary, members of an effective team have to also share a common vision, culture, and purpose; have a sense of belonging and relevance; and be able to extract a sense of self-worth from their belonging to the team. Such a team of experts that can in addition engage in clear and collegial communications and make efficient use of time and resources can execute with exquisite effectiveness and be highly productive.





Jillian Bruschera, *Game Boy,* letterpress print, 2013

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Dr. Daniel Cooper (MA, Ball State University) is the project manager for design at Ball State University's Center for Media Design, where he leads research and design projects relating to user experience, mobile interface design and information visualization. His work has been recognized by the Society for News Design and presented in multiple venues including: EDUCAUSE, Television of Tomorrow, American Association of Advertising Industries, Convergence and Society Conference, Vizcom and the International Digital Media and Arts Association. Before joining Ball State, Cooper was the Senior Designer for business news at the *Fort Worth Star-Telegram*.

SUZY SMITH

Suzy Smith (MComm, Georgia State University) is an assistant professor of telecommunications at Ball State University. Smith teaches courses in news writing and multimedia story presentation. She specializes in sports and news delivered via alternative storytelling formats, including mobile and Internet delivery systems. Before joining Ball State, Smith spent more than twenty-four years in the news and communications industry as a senior producer with CNN.com, a senior producer at the Weather Channel, a supervising producer with CNN/*Sports Illustrated*, and a producer with CNN Sports.

BRANDON CORDELL WAITE

Brandon Cordell Waite (Ph.D., University of Tennessee; MA, Appalachin State University) received undergraduate degrees in English and Political Science from Appalachian State University in Boone, NC, and is currently an assistant professor of political science and Emerging Media Fellow with the Center for Media Design at Ball State University. Brandon's research interests center on the nexus between technology and politics. One of Ball State's Emerging Media Faculty Fellows, Waite's latest projects include an interactive broadcast model for C-SPAN and a Debate 2012 iPad application. He has been an invited speaker at the annual International e-Government Conference and recently completed a chapter for inclusion in the new volume *Communicator-in-Chief: A Look at How Barack Obama Used New Media Technology to Win the White House* (Lexington Books).

Debate 2012

Second screen design and interactive political content delivery for television viewers

Abstract

The emerging dominance of mobile devices in the home is having a profound impact on how consumers watch television. These "second screens" are being employed by content producers as an exciting platform for engaging viewers in ways never thought possible, thus redefining the definition of interactive television. Games, social media, and additional story content can be delivered in hand to the consumer in direct relation to what they are seeing on their television screen.

This paper discusses the creation and related user experience of a second-screen application designed to deliver relevant news content and social media relating to the 2012 presidential debates.

keywords:

interactive media, research-informed design, iPad, alternative storytelling, Gameboy

Introduction

The era of the television's prominence in the living room is long over. Once considered the household center for news, entertainment and video games, television no longer commands the full attention it once held due to the widespread proliferation of mobile media. Today, television viewers are more likely to watch their favorite program while also using their smartphone or tablet. In 2012 Google reported that viewers are watching television with another device in hand 77% of the time.[1]

Instead of warring over viewers' fragmented attention, broadcasters and content creators have embraced the arrival of mobile media as a means of transforming the passive TV viewing experience into an enriching, interactive social platform. Rather than being a competing act, interactive television content providers are utilizing mobile media as companion devices or "second screens" to deliver rich interactive content such as statistics, character bios, or even alternative camera angles.

Just as compelling is the influx of social media into the interactive viewing experience. Through second screens, viewers can chat with friends or the larger Internet community even if they are watching from home alone. Viewers can share content, make comments or tweet in real-time about their favorite shows.

Second-screen apps offer compelling user experiences for live televised events as well. Some of the most popular interactive television apps have been made exclusively for sporting events and award shows. There is great potential in news and politics for second-screen applications. Events like the presidential debates cover a wide-variety of questions and answers that would drive audiences to their mobile devices to fact check, find relevant news coverage and analysis as well as use social media to share their own commentary with their friends.

This paper reports on a project that involved the design, development and user experience testing of a second screen application called *Debate 2012,* a companion app for the iPad that delivers relevant news and social media content for presidential debate viewers. An interdisciplinary team of faculty, graduate, and undergraduate students from Ball State University employed a research-informed design process and focus groups to develop and evaluate their work. This paper reports on the results and explore the outcomes, and assesses the implications of this study.

Literature Review

We are a society that consumes media. As technology improves so does the variety of ways in which the public uses it and interacts with it. Just over 90 percent of U.S. television households pay for a subscription service, whether it be cable, satellite or telephone company. [2]

More than 75% of American adults own a laptop or a desktop computer.[3] In addition, more than 50% of the people in the U.S. own a smartphone, and about 20% of homes own a tablet. [4, 5] Of those people who own a smartphone or a tablet, nearly 40% of them use it while watching television at least once a day, and 84% say they do it at least once a month. [6]

This recent trend of employing mobile platforms to consume media while watching TV has come to be known as *using second screens*. Little is known about how the consumer interacts with multiple devices at once. However, the simple act of using two devices at once is not enough to constitute a second screen usage. Rather, a connection of some type between the two devices is the goal.

1. Dai Pham, "Navigating the new multi-screen world: Insights show how consumers use different devices together," *Google Mobile Ads Blog,* http://googlemobileads.blogspot.co.uk/2012/08/navigating-new-multi-screen-world.html.
2. Jimmy Schaeffler, "U.S. Pay TV Infrastructure: Is It Up To The Mobile + Internet Video Challenge?," *Multichannel News,* July 24, 2012, http://www.multichannel.com/blogs/us-pay-tv-infrastructure-it-mobile-internet-video-challenge.
3. Amy Mitchell et al., "Mobile Devices and News Consumption: Some Good Signs for Journalism," The Pew Research Center's Project for Excellence in Journalism: The State of the News Media 2012, http://stateofthemedia.org/2012/mobile-devices-and-news-consumption-some-good-signs-for-journalism/.
4. nielsenwire, "Watching TV? Don't Forget Your Smartphone, Tablet, Consumer blog, http://blog.nielsen.com/nielsenwire/consumer/watching-tv-dont-forget-your-smartphone-tablet/.
5. nielsenwire, "The Cross-Platform Report: A New Connected Community," Consumer blog, http://blog.nielsen.com/nielsenwire/consumer/the-cross-platform-report-a-new-connected-community/.
6. Ibid

Second-screen applications are designed to work with the content of the first screen, and push related content to the second screen. According to Russ Stanton in a White paper for TATA consultancy services, *Second Screen Revolutionizing the Television Experience*, Stanton says:

> "The ultimate goal is to bring the audience focus back to the program they are watching, rather than an unrelated distraction like Facebook." [7]

Second-screen apps are primarily divided into two types: 1) *Synced apps* that run on a tablet or smart phone, and integrate some type of interaction between the audience and the program with either additional content about the program, or with quizzes or polls that engage the audience with what is happening on the television screen, or, 2) *Social apps,* sometimes called companion apps,[8] that encourage the use of social media between viewers of the program.[9]

7. Russ Stanton, "Second Screen Revolutionizing the Television Experience," *White Paper,* http://www.tcs.com/resources/white_papers/Pages/Second-Screen-Revolutionizing-Television-Experience-Part-1.aspx.
8. George Winslow, "Broadcasters Sync Up Second-Screen Efforts," *Broadcasting & Cable,* November 19, 2012, 20, http://www.broadcastingcable.com/article/490467-Broadcasters_Sync_Up_Second_Screen_Efforts.php.
9. Jonathan Weitz, "Second Screen Opportunities for Advertisers," *Online Media Daily commentary blog,* http://www.mediapost.com/publications/article/154286/second-screen-opportunities-for-advertisers.html#axzz2lfg1tase

Studies have indicated that some people see second screen apps as a distraction to the first screen.[10] But this development is not slowing the production and implementation of second screen applications; it's merely impacting the focus and the design. At the recent Consumer Electronic Show in Las Vegas, second screen apps were on display including those from cable companies, television networks, movie houses, start ups and even "old guard" industry players. [11]

Most second-screen players have focused on sports and entertainment programming, however a push is being made in the news arena. In the past second screen apps have synced the two screens primarily through the use of audio cues placed in the television programming. The microphone on the mobile or tablet device picked up the audio cue and synced the two devices, activating the push of related content.[12] Creating this type of synchronization during a non-scripted, live event is difficult.

Another way to maintain some type of synchronization is by focusing on social media. When Barack Obama campaigned for President in 2008 the public found his constant use of social media fascinating. Fast-forward four years and the growth in the use of social media in presidential politics has grown exponentially. Candidates have twitter handles, Facebook pages, YouTube channels and a variety of additional tools and techniques to spread their message and to raise the millions of dollars that it takes to run a campaign. Shamma, Kennedy and Churchill examined Twitter activity during one 2008 presidential debate between Barack Obama and John McCain. They found that nearly 91 percent of the time, the topic being tweeted about aligned with the topic begin discussed in the debate.[13] This in a sense offers the potential to serve as a way to synchronize the experience between the two screens.

While there are currently a number of second screen applications that are either content-based or social-media based, there are not currently many available that combine both. Creating a second-screen experience that combines both pushing related content to the viewer while at the same time using social media as a way to synchronize the user experience, appears to be the ideal focus for future second screen applications.

Project Goals

The goals for this project were: 1) Design and develop a fully functional and interactive iPad application that offered relevant news and social media conversation streams relating to the presidential debates, and 2) deliver content in real-time and in a contextually relevant fashion. Faculty and students were divided into two teams: One focusing on the collection and aggregation of news content, the other on the design and development of the application's user interface.

Project Outcomes

In four months, our team had a fully functioning iPad application that was successfully deployed through the iTunes app store. Over 4000 users downloaded an application that delivered relevant news stories and videos relating to the topics being discussed during each of the presidential debates. This content was delivered in real-time through an easy to use interface. In addition to viewing related news content, users could also follow the concurrent social conversation through an integrated twitter feed that followed the #debate2012 hashtag.

In order to devise a synchronous second screen viewing experience for the audience, the design and development team had to solve a few unique challenges. Unlike other second screen apps deployed relating to scripted television programing or live events when the content and formats are predetermined, the presidential debates are unscripted and based on a loosely defined format. While other apps are able to employ audio content recognition or internet protocol delivery systems that push content to mobile devices based on

10. Michael E. Holmes, Sheree Josephson, Ryan E. Carney, *Visual Attention to Television Programs With a Second-screen Application: ETRA '12 Proceedings of the Symposium on Eye Tracking Research and Applications,* Santa Barbara, CA, March 28-30, 2012.
11. Alexis Santos, "The State of the Second Screen: Will TV Companion Apps Proliferate or Dwindle?" *Engadget,* January 11, 2012, http://www.engadget.com/2013/01/11/the-state-of-the-second-screen/.
12. Mike Proulx and Stacey Shepatin, *Social TV, How Marketers Can Reach and Engage Audiences by Connecting Television to the Web, Social Media, and Mobile* (Hoboken, New Jersey: John Wiley & Sons Inc., 2012).
13. David A. Shamma, Lyndon Kennedy, and Elizabeth F. Churchill, *Tweet the Debates: uUnderstanding Community Annotation of Uncollected Sources: Proceedings of the First SIGMM Workshop on Social Media*, Beijing, China, October 23, 2009.

predetermined times or events, we did not have that luxury due to the limitations as discussed above.

Instead of relying on predetermined event triggers, the content team devised a list of topics ranging from health care to national security that would serve to categorize the likely discussion points to occur during each debate. News stories and video content from a variety of mainstream media outlets were aggregated and tagged in advance based on this predetermined list. During the debate itself, whenever the moderator posed a question to the candidates, a member of our team would post the question at the top of the application screen along with a signal to display content relevant to the currently discussed topic. The idea behind this delivery system was to always display content relevant to the debate occurring on television as well as reinforce that the mobile app was updating live. A countdown clock was also deployed to further reinforce that paradigm.

The in-app Twitter stream also took advantage of the categorization system used to filter news stories and videos. By filtering #debate2012 by topic, we made the long stream of tweets more manageable and more contextually relevant to the currently selected topic. Additionally, based on prior second screen-design research completed by the team, the decision was made to also filter out retweets since it is often common to see large numbers of duplicate quotes that flood the stream and hamper the end-user experience.

Findings

Thirteen users were brought together to interact with the Debate 2012 second screen application while watching the final two 2012 presidential debates. These debates were held on Tuesday, October 16, 2012 and Monday, October 22, 2012. After using the application for the hour and a half duration of each debate, focus groups were held to assess the level and type by the users.

The focus groups for the most part acknowledged the importance and the potential usability of this type of application. For the most part users felt that related content giving more context and more detailed information about the candidates and their views was good. They were also engaged with the social media aspect of the app; many suggesting that it made watching a debate more enjoyable and that tweeting during the debate made them feel more engaged in the political process, or at least in the conversation surrounding the political process. Users also found the debate-related content informational and useful. However without commercials during the debate they found little time to consume the information, indicating that using and consuming the information before or after the debate would have been a better use of the application. Without commercials, the related content served as more of a distraction, pulling viewers' attention away from the first screen (television) instead of serving as a companion screen to the first screen.

While engagement with the related content was limited, almost all of the participants were engaged with the social media aspect of the application. All were tweeting or reading tweets during the debate. Twitter was definitely the driving force of the application, however it is unclear whether that is because social media is often a driving force in an application like this, or because the related content provided to the users appears to have been too much of a distraction.

There is some indication that unfamiliarity with the application may have impacted the level of comfort with the application. Many of the participants indicated that it took a little bit of time for them to understand exactly how the application worked, but that once it became familiar, it was easy to navigate.

Future Applications

Observations and feedback from the focus groups suggest that not only is the design of a second screen application important for a better user experience, but so too is the type of content. Examining which features as well as what types of content should be added, deleted or changed is at the core of research-informed design.

The level of attention that media outlets are giving to the development and the promotion of these types of user devices is growing and suggests that audiences are primed to engage with applications like this.[14] It is clear from the findings of this study that it's not enough to just provide the user the content and format on which to view it, the application must provide the user content

14. Alexis Santos, "The State of the Second Screen: Will TV Companion Apps Proliferate or Dwindle?" *Engadget,* 1/11/2013.

that creates a symbiotic relationship between the first and second screen, strengthens the user experience on the second screen and does not distract in any way from the first screen. Therefore, great care must be taken in identifying appropriate opportunities and then providing the correct type of content on the second screen device, content that works well with the first screen in every way. This means providing the user with appropriate time to identify and then consume the related content they are interested in and to choose the correct way to push that content to them.

Future incarnations of this application must take into account that without commercial breaks, long form content like newspaper articles and news videos are hard to consume on secondary screens. Therefore shorter, information summaries would provide a much needed additional layer of content that can be consumed quickly and server as an entry-point to longer forms. Additionally, a bookmarking mechanism would serve as a valuable tool to highlight interesting content for later viewing after the live event.

As this technology matures, second screens will offer profoundly innovative methods for delivering interactive media, and will continue to shape the future of television programming. To meet this challenge, the content producers will need to evolve content production in relation to this new blended media experience.

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Ideas 2012

A Curator's Thoughts as a Concept Becomes Reality

I once had the opportunity to meander through a gallery with the late Dr. Larry Bakke, my academic mentor when I was a graduate student at Syracuse University.

Dr. Bakke could have waxed long in his critique of each image in the exhibit. He seemed to have a photographic memory of images, and he certainly had the communication skills of a seasoned professor. As a student at the time, I hung on every word and welcomed his rambling exposition. However, a few minutes into our walk through, he stopped the long critique and simply began to describe works in short (most often three to five words) descriptions that were more an emotional reaction to the work at hand, and much less an academic exercise.

That day changed the way I observe art, especially in a gallery setting. I walk through, look at the exhibits one by one, take a moment to search my emotional reaction and then seek to clarify my feelings in as few words as possible. These are personal thought on the artwork in front of me, not necessarily intended for an audience. Sometimes the results are near-poetic, sometimes obvious, every once in a while they are clever or funny (can something be clever or funny if nobody else is listening to them?).

In this article I wanted to explore several of the works exhibited using this *Bakke-esque* style. The pieces selected are those that were deemed to have reflected best the *2012 Ideas* theme. The artists themselves have contributed generously to this article.

My closing thoughts on Ideas *2012*: *Substantive*. And, grateful to all those that shared their personal ideas and creative energy.

L. RODAYNE ESMAY

L. Rodayne Esmay holds a bachelor's degree from Brigham Young University, and an MFA from Syracuse University. Early in his career he did classic animation, but left that field to work as an illustrator and designer for Philips Electronics. After eight years in industry, he returned to school to tackle an MFA, and upon completion went to work for Allen Communication Inc., a small company that produces interactive multimedia. While at Allen, Rodayne did interaction design, 3D modeling, and animation for a host of clients including Toyota, IBM, Hewlett Packard, Ford, Union Pacific, Times Mirror, American Express, Prudential Securities, and the U.S. Air Force. He has been at Utah Valley University, in the Department of Digital Media since 2004. In 2012 he was granted the academic rank of professor.

Universal Tourist by Christin Bolewski

familiar, cross-cultural, reflective, momentarily, casual

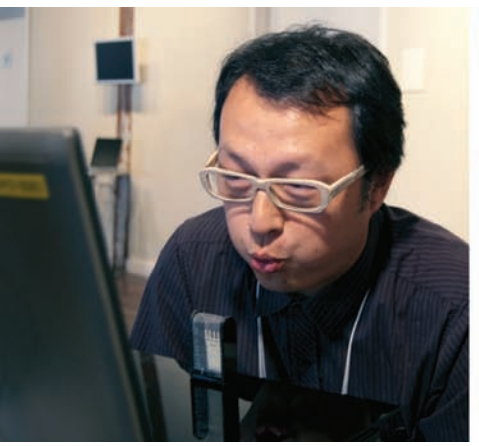
This piece comes from an artistic research project in contemporary moving image practice by Christin, a digital media artist and experimental filmmaker from Germany. Her work is a critical investigation of the potential of digital media to expand the aesthetic possibilities of audiovisual and film art. It includes alternation and remediation of traditional art concepts and film structures, video installations, genre mix, nonlinear storytelling, combination of still and moving image, digital image and sound manipulation.

Universal Tourist is a video documentary observation and a sociological and cultural study of a global phenomenon of mass consumer culture: it interrogates tourist photographic practices – the holiday snapshot. The video observes tourists while they act as tourists worldwide at sixteen iconic destinations, including The Queens Horse Guards, London; Potala Lhasa, TCL Chinese Theatre (formerly Grauman's Chinese Theatre, and Mann's Chinese Theatre) in Los Angeles; Tianamen Square, Beijing; Christ the Redeemer, Rio de Janeiro; etc. It takes pictures of people taking pictures. It records them while they record themselves. The photographic pose of the traveler and the "decisive moment" of photography are explored as a moving image. Photographic "truth," "real," staged and authentic moments are investigated and questioned in relation to photographic and sociological theory. The amateur "accidental aesthetic" of the snapshot – immediate and raw glimpses of time – is captured on video and edited in a dramatic structure that accelerates to a furious-paced trip around the globe. At each given moment of time there are hundreds and thousands of travelers from all over the world performing the same ritual over and over again.

Puff by Drew Browning

clever, curious, pleasing, tactile, inviting

Most interfaces to control computers are so familiar as to become invisible. Like many things we do daily, we don't think any further about the consequences of our actions. *Puff* uses an unusual interface to call attention to our breath – our output, that becomes input and affects something – disrupts a system that is in balance, creates a pressure that moves or changes something. Images of the natural world are interleaved with environments created in and with the computer, but again influenced by the user.



Interface: We are accustomed to seeing our hand, through mouse, trackpad or other interface, move a cursor on the screen. We take for granted that using a finger to click a button or key will produce a particular result. We have become used to touching or swiping a device screen. We understand pressure switches, joysticks and game controllers, the Wii, etc. Using our breath to produce a result is still new enough to cause us to reflect on the meaning of the physical action.

The breath is an intimate thing. Not coming from the outside, as do most interfaces that use touch or pressure, it transcends the boundary between self and environment by moving something from interior to exterior. We mimic the action of the natural world by creating wind. Ironically, this intangible process becomes real and visceral when we see its result in a virtual world – we are connected powerfully to the images, sounds, and processes that result.

Watercolors by Angela Diamos

delicate, morphing, elemental

Exhibited in the electronic theater, *Watercolors* is one of many abstract time-based pieces that Diamos constructed for the Los Angeles Abstract Movie Workshop. "When I do work in a more abstract way, I find that there are recurring themes that I express that relate to my more realistic work with landscapes. I seem to be pulling out landscapes, which offer a subjective experience that is ephemeral and ambiguous. The landscape that stands apart from a clear-cut modernistic interpretation. The beauty of decay and loss is suggestive and surreal, a romantic perspective realized through the use of (mainly) western landscapes and reminding the viewer of the transient quality inherent in the spaces created and the land upon which they abide. Reality placed into an artificial space becomes a world of tenuous relationships mirroring that which is naturally occurring and that, which is conceived by human beings. I question our connection to reality and give the viewer the responsibility to look beyond one's immediate environment and consider differing signatures of reality that connects us to a wider universe.

"The music that I used for *Watercolors* had to also fit the parameters for abstraction. *Ascension*, created by Meredith Monk, emphasizes the abstract world of *Watercolors*. There are no spoken words, but *a cappella* tones that when repeated and layered together form a rich textural soundscape."

Above: still from Watercolors *by Angela Diamos*

Jonesboro, TN, 4th of July Parade 2011
by Cher Cornett

metaphoric, winding, chronicle, an invitation to watermelon and ice cream

A parade provides a sequence of images, or tableaus, that give an overall snapshot of the community, and is in itself a natural narrative. *Jonesboro, TN, 4th of July Parade 2011* was assembled in typical parade fashion as a work of art measuring 145 inches wide x 5 ¾ inches high.

"This work is the documentation of a small town parade in the oldest town in Tennessee using an iPhone and the 'Hipstamatic' photography app. The aged effect created by the app appropriately expresses the historic atmosphere of the event, and reflects the character of Jonesborough and the people who live there.

"By using a smart phone to capture the images, not only had I captured a visual record of the event, but all of the other interactions I had during the parade. In essence, I had a journal that encapsulated not only the parade, but references to events over the extended holiday weekend. This work is a visual representation of this journal in the form of a timeline.

I am interested in how technology is providing new ways for us journal our lives and create our stories. The content created on a

daily basis through texting, posting online, and capturing images and audio becomes a way of capturing moments in time, and sharing and contributing to stories in our personal communities. My recent works are outgrowths of my own use of iPhone and iPad apps and social media to tell stories, and share in the stories of others."

Kedushat Yetzirah or *Holiness of Creation*

by Dena Eber

deeply personal, spiritual, revealing, cryptic, ancient

"The work I had on display for the *IDEAS* exhibition is part of a series that is an embodiment of both awe and wonderment as it makes reference to the roughly 3500-year-old religious ritual of the *mikveh* (Jewish ritual bath), which today is primarily (but not exclusively) used by married, menstruating orthodox women. The ritual is ripe with spiritualism and beauty both for the women who practice it and for the relationship that they have with their husbands, but at the same time, it marginalizes other women and other things that make them special outside of their menstrual cycles and reproductive capabilities.

In these works I represent other transformative powers of the practice using a feminist and *halachically* (Jewish law) grounded frame of reference. These works address the reclamation of the ritual so that it reflects *kavannah*, or meaning and intention for those who perform it today, thus celebrating health and wholeness for all Jewish women, including those who are not married, or those who are lesbian or postmenopausal.

I do this by creating a visual narrative that represents biblical matriarchs as real women in ancient *mikveh* ruins (figure 1, above) or submerging in a body of water (figure 2, below) and the archetypical contemporary assimilated Jewish woman pictured as Barbie. Ruth Handler, a Jewish immigrant from Germany created Barbie, modeled after a German doll, and named the toy in honor of her daughter, Barbara. The individual titles specify the use of the *mikveh*, for example transformation, or thanking God for making her a woman. The Biblical matriarchs are also named in the title, honoring them by fictitiously imagining what they might use the *mikveh* for had they been given a voice in the scriptures. In turn, Barbie, the assimilated Jew, uses the *mikveh* for the same transformative powers, thus connecting the ancient with the contemporary.

The title of this body of work, *Kedushat Yetzirah* or *Holiness of Creation*, also translated as *Sanctity of Creation*, replaces the term *Tohorat HaMishpahah* or *Family Purity*, thus contemporizing the *mikveh* ritual, and emphasizing the affirmative facets of femininity. Rabbi Susan Grossman suggested this new term in her *teshuvot* (responsa, or a body of rabbinic rulings) to encourage *mikveh* practice for all women, "So that they may celebrate their womanhood through the *mikveh* ritual."

Dena Eber was the originator and organizational mastermind behind the Ideas *exhibition for eight years. Her efforts to promote the work of artists that choose digital tools have been long and dedicated.* Ideas *will continue to be an avenue for artists and academics in the digital space, but only because individuals like Dena have poured so much of their heart and soul into it success.*

Something New in 2012: Annette Barbier, Brian Evans

Ideas 2012 featured a new wrinkle. Two artists that have contributed significantly to the artistic digital disciplines over time were invited to exhibit a body of work. Annette Barbier and Brian Evans both accepted the offer to display a portion of their portfolio, and in doing so, added greatly to the tone and substance of the overall exhibit.

Annette Barbier has long been fascinated with the potential of new technologies to engage the artist in unique and innovative ways of thinking. From early works with videosynthesis in the 1970s, to interactive three-dimensional environments and augmented reality at present, she has found the continual growth of technological media to be challenging and invigorating. She does considerable work in collaboration with **Drew Browning,** and the two exhibited singular and collaborative works in Savannah.

Drew and Annette grew out of an art context that was closing the door on structuralism and minimalism. Working in video at the time made them automatically iconoclasts: crusaders for a populist, political, anti-establishment stance in art, using a medium which most artists and art professionals saw only as "cheap film" if they saw it at all. They were dedicated to the proposition that cutting edge art is not "content-poured" into the container of a medium, but rather an investigation of the new possibilities that a new medium offered. They have continued to probe the potential that new technologies make available, believing that original content arises from a dialogue between an artist and a medium. In addition, this dialogue need not be solely between the "artist" and the medium; authorship can extend to the viewer, making her a participant, through sensors like microphones and video cameras, and more recently computers, biofeedback devices, etc.

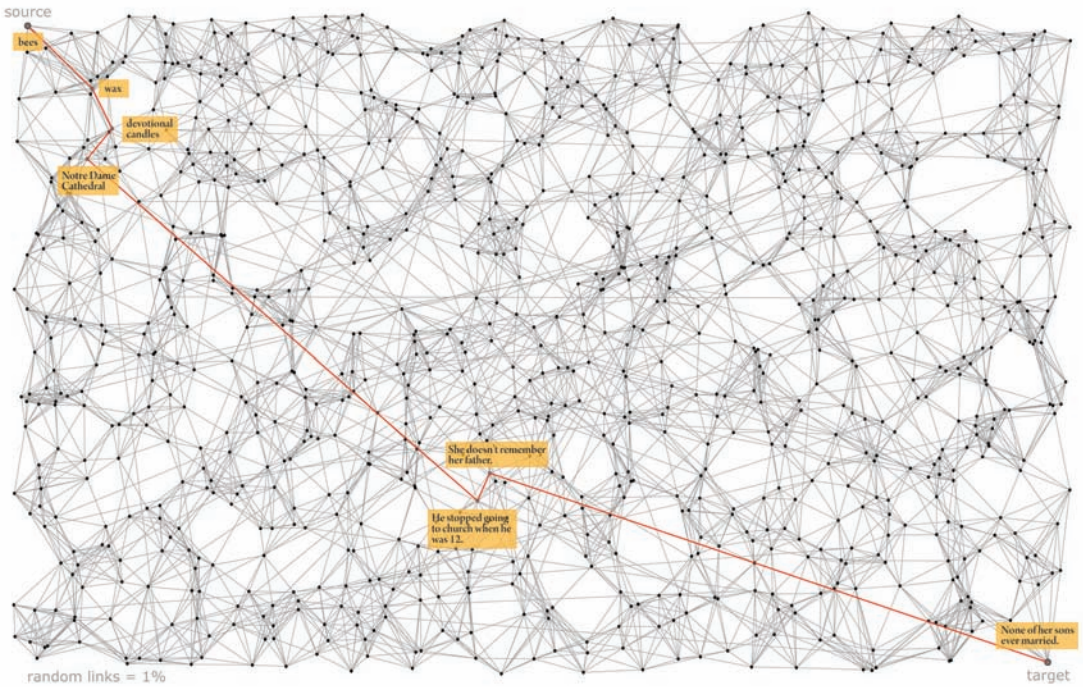
The work Annette displayed in *Ideas 2012* is concerned with our relationship to the natural environment, which is increasingly compromised; human interference has led to species extinction through direct action (as in the extinction of the passenger pigeon through hunting) or indirect action (through importing species which have competed successfully with native species). She describes her work in the captions on the next page.

Ruffled Feathers (this page)
"In this work I used Canada Goose feathers as the medium to remind us of the damaging effects of human-induced monoculture. Feathers are etched with the names of extinct bird species, the last date and place (if known) they were seen, and their bar code representations, bar codes being a reference to our manipulation and commodification of the natural world."

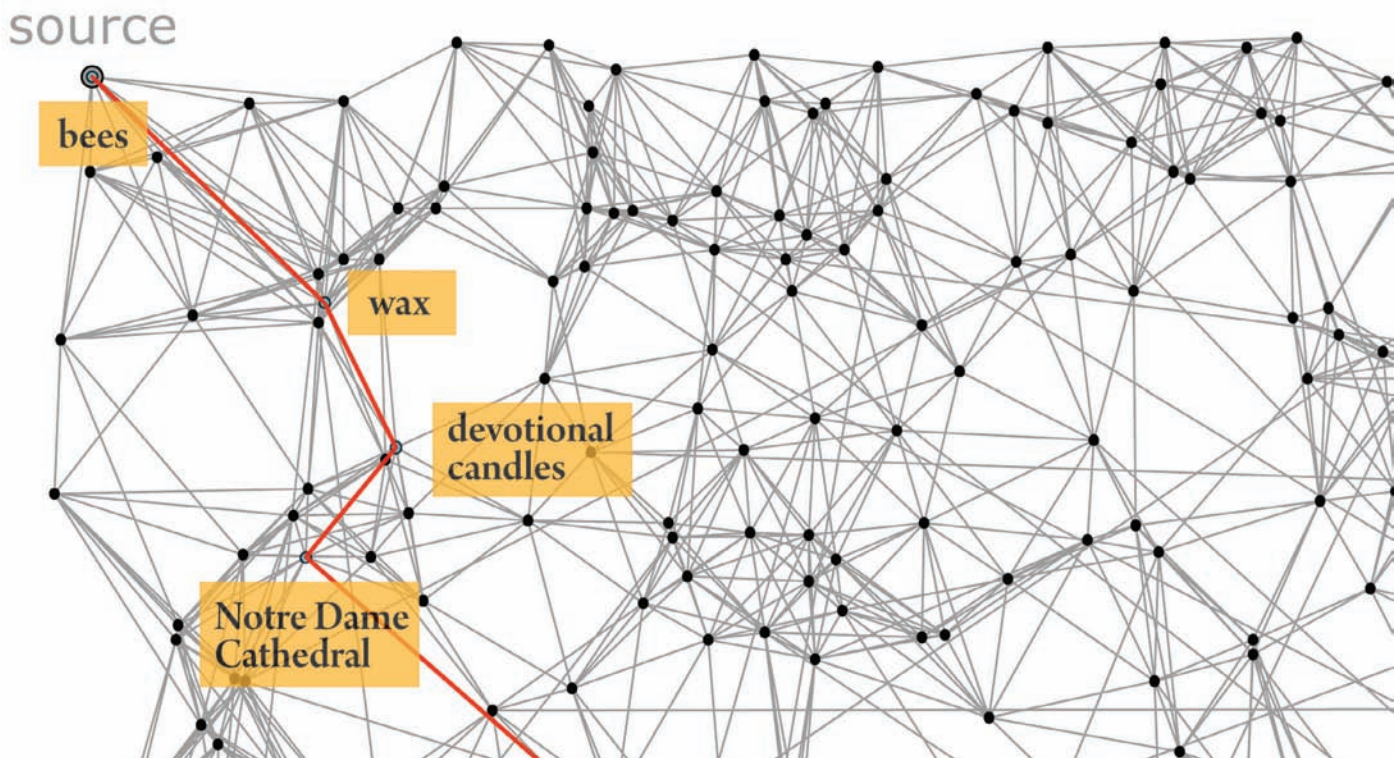
Casualties (pictured on previous page)
"This series consists of laser etched photos on glass of birds found on the sidewalks of Chicago during the migratory season. Birds frequently die as a result of collisions with windows, particularly in the downtown area with its many glass curtain skyscrapers."

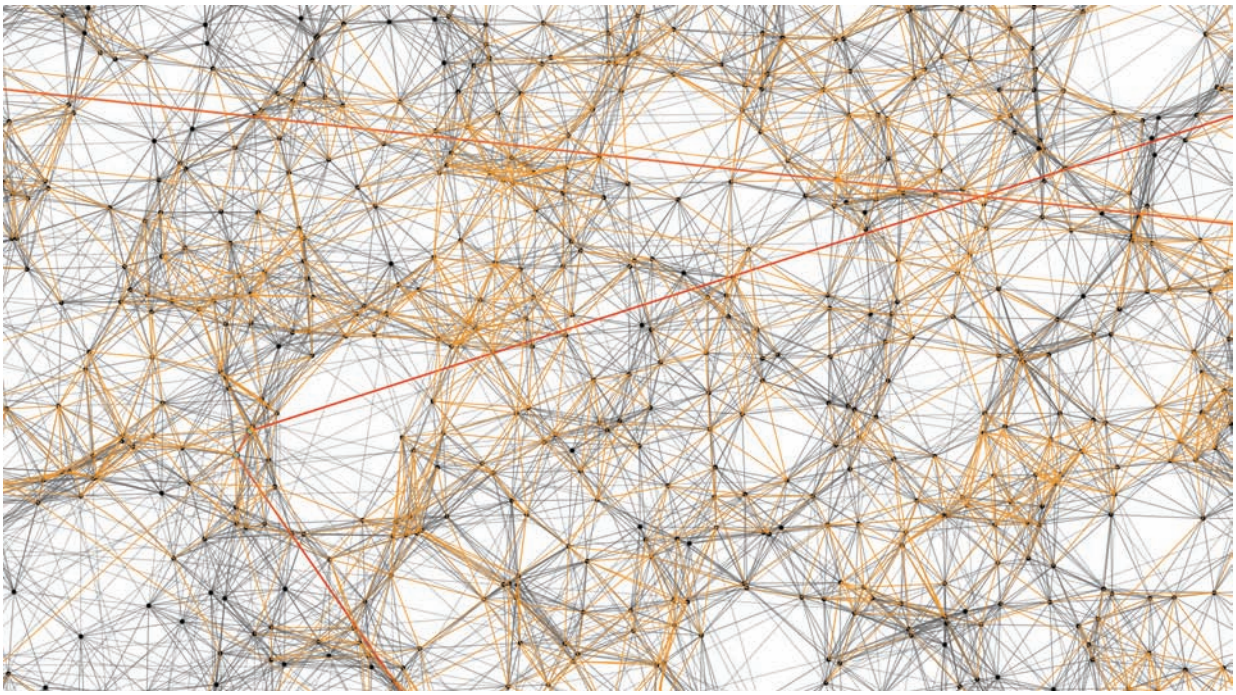
Step On It (Interactive installation, not pictured here.)
"The state of the world is increasingly fragile, and one of the most important tensions of our time is between our attitude towards the earth as a resource to use or as an entity to be cared for. The nest acknowledges the frail, breakable nature of the world while the video presents more and more abstract images of the earth that we have increasingly come to dominate, subdivide, map, and subjugate. Stepping on the footprints activates the video loop, and echoes the footsteps, marching, and stomping of booted feet that overlay maps of increasing antiquity."

Brian Evans approach to the creative process is analytical, containing certain mathematically patterned elements in the design and execution of his work. Indeed, a body of his work has been completed with the support of the National Science Foundation, and the Leadership Board of the College of Arts and Sciences, University of Alabama.



Above: Brian Evans' *Melancholia;* below, detail from the same piece.





Above: detail from Evans' *Pensée Perdu,* full version shown on front cover of this issue.

"There is a mechanism for creativity," says Evans. "We can explore that mechanism at many stages or levels across a wide expanse, stretching from the complexities of human culture to the simple material movement of electrons. Human behavior, working from perception and cognition, manifests as culture. That behavior begins as the movement of ions, electro-chemical activity–signals moving though the complex networks of our brains. Eventually those signals manifest as human action in the world. Interestingly both our created culture and our neural signaling have at their base the same process–pattern matching.

"We can define creativity as "the act of noticing patterns...making them visible in some kind of model, or theory, or poem, or sculpture, so that the insights gained don't just float away." And "creative people don't just express themselves in metaphor, in analogy, they see and think in metaphor and analogy..." [1] Patterns are noticed across some conceptual divide and expressed as metaphor.

"Hofstadter tells us that, 'in regards to cognition, analogy is everything.' [2] It follows then that creativity, a subset of cognitive processes, is also as an exercise of analogical thinking and conceptual metaphor, building from the idea that metaphor, 'the mapping across conceptual domains,' is fundamental for creative practice, novelty and knowledge building. [3]

"A metaphor is a pattern match found between conceptually unlike things. It exists for us as a loop. We compare and contrast signals coming in through our senses to signals stored in our memory, looking for a pattern match. If there is no match then the incoming signal is new and strange. We need to understand and so search more deeply for a match. Some dimension of the new must match something in memory or we cannot know the new. Desire to know the new is strong. Life is the constant processing of our surroundings in support of this desire. The search for knowledge is ongoing.

"'The relation between what we see and what we know is never settled.' [4] This is a relation of the strange and the familiar–the loop of learning and creativity (manifested as innovation)."

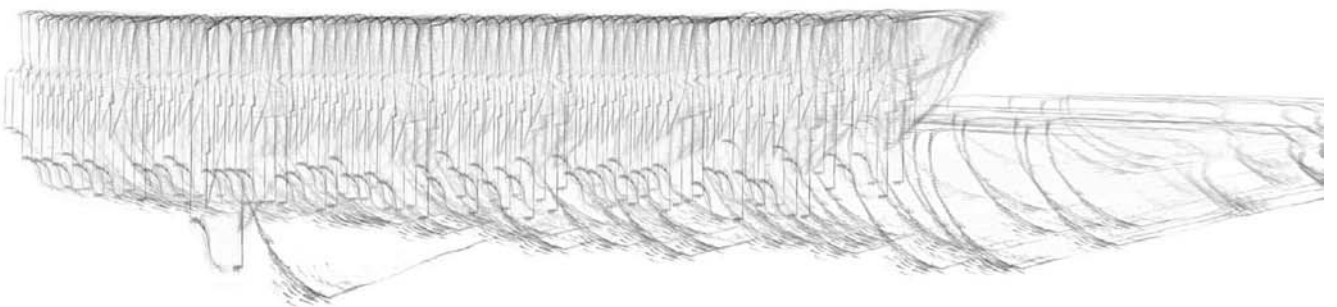
1. Ruef, K. 2003. *The Private Eye: (5X) Looking/Thinking by Analogy,* 3rd ed. Lyle, WA: The Private Eye Project.
2. Hofstadter, D. 2001. "Epilogue: Analogy as the Core of Cognition." *The Analogical Mind: Perspectives from Cognitive Science.* Cambridge: MIT Press. p. 499-538.
3. Lakoff, G., Johnson, M. 2003. *Metaphors We Live By.* University of Chicago Press. p. 252.
4. Berger, T. 1972. *Ways of Seeing.* London: Penguin Books. p. 7.

RUN ( )
by Cara Thompson

fine and fragile, loose... one of the most techinical displays in the gallery, but its "tech" lies hidden, and the work assumes a feeling of moving through air.

I came to digital work from the studio. My first love as an artist was the humble pencil. I love the possibilities and flexibility of digital work – the endless variations available at a key's press. But the one thing I could never love was the cold precision of a vector line. Too perfect. Too pristine.

I love the work of Agnes Martin. All those not-so-perfect lines standing there – just barely wavering, but wavering enough to make them human. These are the things I think about in my work: how to bring the fallibility of the human mark into the machine.



RUN ( ) is a series of generative drawings created using data gathered from a GPS watch on my running routes. The program for the creation of these drawings was created using Processing, an open source programming language created for artists. The drawings from the data was fairly simple:

Process:

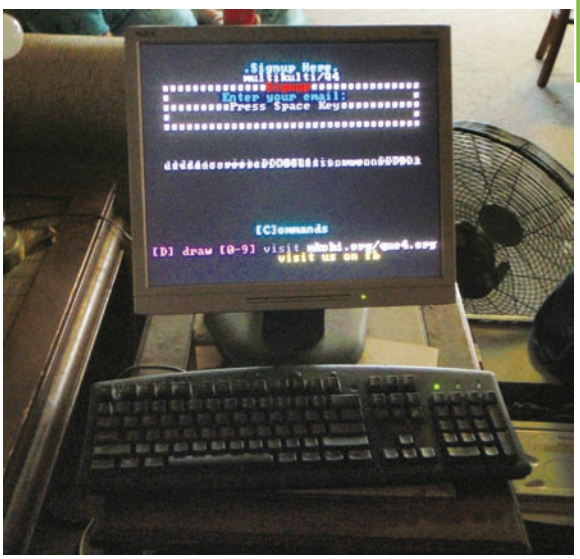
- Decide to run.
- Draw 1–3 lines or shapes in pencil.
- Put on GPS watch.
- Run.
- Scan images.
- Download data from watch. Run scanned images through the program.

Factors such as speed, altitude, and distance affected the placement, size, and rotation of the marks. It was important to me that this was NOT to be data visualization. In other words, I don't need an audience to see the shape of my route. (I can do that on Google Earth very easily). Rather, this is data–*UN*-visualization. The data becomes the means of creating a unique and abstract drawing.

–from an interview with Cara Thompson

Gaming Art

keywords:
art, Ebert, video games, Duchamp, debate, discourse



Abstract

This article makes the case that the "are video games art?" debate – recently reignited when famed film critic Roger Ebert declared that games can never achieve artistic standing – presents us with instructive insights about how popular commodities attain cultural worth. The true value of this public debate lies in the way that it showcases how the discourse itself functions as a kind of game. Furthermore, the debate highlights the need for recognizing video gaming's power as an engine for creativity and innovation across the arts.

MICHAEL FLEISCH

Mike Fleisch is an award-winning designer, filmmaker, and writer. A graphic facilitator since 2003, he has created live, real-time visual representations from the speech of luminaries as diverse as Warren Buffett and Noam Chomsky. Chase Public, Mike's nonprofit art and assembly space, has hosted poetry readings, music concerts, art openings, book signings, independent theater, stand-up comedy, hotly-contested debates, collaborative art-making, radical activism workshops, crazy-ass parties, and maybe one bird fight. Mostly poetry readings. His first feature film, *Good Work*, is in post-production. Mike loves his wife and three sons, and is strongly considering his first tattoo. He remains a regular contributor to *HiLobrow.com*, one of *TIME* magazine's top ten blogs of 2010, where he recently completed a term as artist-in-residence.

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Playing Games with Art

Famed Dadaist Marcel Duchamp opined once that: "... while not all artists are chess players, all chess players are artists."[1] Although this curious assertion likely speaks more to Duchamp's love of chess and his signature style of provocation than it does to any systematic assessment of art's ontology, it nevertheless gestures that a relationship exists between what we understand to be games, and what we understand to be art. This claim signals that artistry and artistic practice lie nascent in all manner of things or events that are not customarily thought to be "art" or "artistic" – including video games and acts of gameplay.

The essays in this issue explore topics connected to the digitization of art and the practices of digital artists operating in the late twentieth and early twenty-first centuries. This has been an exciting and tumultuous era for the creative arts and for its practitioners. We are, of course, familiar with the general contours of today's interconnected and digitized mediascapes, including the rapid and radical remediation of content across forms, formats, and platforms; the proliferation of user-created content – from viral videos, to modified video game levels, to internet memes – that is dispersed and distributed across social networking sites; and the persistent struggles between the copyright and copyleft movements where one side leverages the legal regime to maintain a grip on its lucrative intellectual properties, while the other side – fueled by a participatory spirit and aided by a suite of digital tools – deconstructs and reassembles popular culture for innumerable ends (many of which are not monetized). We also know that digital technologies have, for decades now, functioned as a collective fountainhead for innovative collaborations and expressive acts. It is thus not terribly surprising that age-old questions about what constitutes "art" would reemerge in this environment. Indeed, the cautionary quotes that hover in seeming perpetuity around "art" like defensive shoulder pads are a striking visual and grammatical reminder of our collective anxiety with the term. During this time, the digital form that has attracted the most public scrutiny and vexed hand wringing over its contested status as a new media *objet d'art* has been the video game.

Instead of entering into well-traversed debates about whether video games' textual machinations, narrative indeterminacy, and digital code automatically foreclose them from artistic standing, and in lieu of wading into even broader but no less murky definitional waters over what constitutes art – we propose alternative paths for approaching the video game-as-art question. First we explore the problematic assumptions that have thus far inadequately served as a discursive foundation; next we survey and contextualize the cultural pursuits generated in video gaming's wake. But why this approach? Why study the debate and gaming's paratexts, and not video games proper? Why examine the effect and not the cause – the proverbial pond ripples and not the pebble? (Wasn't the lesson of Plato's cave allegory, after all, that we are better served to liberate ourselves from the flickering wall of shadows and investigate what real truth looks like in the cleansing light of the sun?). What revelatory power does this exhausting and tiresome debate about artistic legitimacy and gaming's associated epiphenomena wield that its base phenomena does not or cannot disclose?

Spoiler alert: this piece will *not* answer the question: "are video games art?" The decision to sidestep the very query that motivated this essay's writing – while recognizing full well its seeming irony – should neither surprise nor disappoint anyone who has followed the games-as-art "debates" (yet another term that demands cautionary quotes). The reasons for taking this tack are numerous. First, others have addressed this thorny question head-on from multiple angles. Some scholars have examined the artistic merits of the medium's core, interactive nature, while others have detailed those external and contextual factors that situate and frame games as art.[2] Second, fixing and bounding what constitutes art at this moment – or any other for that matter – is ultimately untenable because it reductively distills contingent values to some formalistic and ahistorical set of prerequisites (i.e., for exhibit A to be art, it must have the following elements...), as well as

1. Jesse Schell quoted in Samantha Murphy's "Can Video Games be Art?," *New Scientist,* September 20, 2010, accessed February 15, 2012. http://www.newscientist.com/blogs/culturelab/2010/09/can-video-games-be-art.html
2. For example, see: Ian Bogost, *How to do Things with Videogames* (Minneapolis: University of Minnesota Press, 2011), 9-17; Phillip D. Deen, "Interactivity, Inhabitation, and Pragmatist Aesthetics," *Game Studies*, 11(2) (May 2011), accessed February 15, 2012. http://gamestudies.org/1102/articles/deen; Grant Tavinor, "Video Games as Mass Art," *Contemporary Aesthetics*, 9 (2011), accessed February 15, 2012. http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=616; Aaron Smuts, "Are Video Games Art?," *Contemporary Aesthetics,* 3 (2005), accessed February 15, 2012. http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=299

eliding and denigrating all those public struggles over meaning-making that go into understanding something called art. Critical media studies and cultural studies endeavors have shown us time and time again how social regimes and actors work to fix meanings that serve their own ideological ends. Thus, any litmus test that would adjudicate between what is and what is not an artistic video game would be complicit in the reification of the ever unfolding and always historically situated negotiation of popular meaning.

We believe that there is a better way forward. The first step involves deconstructing the games-as-art debate to uncover instructive lessons that lurk in its contested terrain. Next, we consider a wide variety of art projects that are inspired by video games and by gaming culture. Our hope is that by carefully analyzing the nature of the debate, and by examining works that testify to the power of video games as an expressive medium, we can short-circuit this viciously constricting and unproductive argument and reframe it as yet one more indicator of video games' power as an engine for creativity and innovation across media and the arts.

The Hidden Lesson of Beating a Dead Horse (or, Making a Game of Discourse)

The is-it-art debate is comparatively new to video games. But such questions are certainly not new for moving image media. In1932, film critic and theorist Rudolph Arnheim covered similar territory for what would become cinema studies in his influential *Film as Art*.[3] Decades later, television historian and critic Horace Newcomb revisited this topic for his object of study in *TV: The Most Popular Art*.[4] Yet the divisive point of departure for video gamers, at least in recent years, has been none other than famed film reviewer Roger Ebert.

Ebert's offhanded and repeated dismissal of video games as an artistic medium might itself be easily dismissed as uninformed commentary were he not a syndicated columnist with a considerable audience. It's difficult to estimate which domain's definition Ebert more egregiously truncates: art or games. Putting aside the quaint (and occasionally endearing) quality of his gruff opining, the raucous exchange instigated by Ebert's pronouncements speak to the values that we assign to certain cultural categories, and to the personal investments bound up in creating and defending those hierarchical strata and complex divisions among art and commerce.

Let's quickly review the critic's curt commentary on games. Roger Ebert's suspicion of video games' artistic merit appears sporadically in his columns over the years, usually as asides and afterthoughts. Most point to his 2005 review of the video game-inspired movie Doom, and a follow-up response to a reader's question as being his earliest and most widely circulated comments on the subject.[5] During this time, Ebert's contention that video games by their very nature cannot achieve art status, shifts in focus, but a few central points remain consistent:

1. Art preconditionally requires an auteur, with an artist's soul, vision, and taste, guiding passive appreciators to an inevitable, enlightened conclusion.
2. Games necessarily include winners and losers, objectives, rules, points, and some control over the outcome.
3. No video games to date may be considered art.

All of Ebert's previous comments were, in effect, the opening act to his now infamous April 16, 2010 piece: "Video games can never be art," which addresses, point by point, game designer Kellee Santiago's popular TEDx talk, itself a response to Ebert's earlier claims.[6] As one might imagine, this singular column incited a public avalanche of

3. Rudolph Arnheim, *Film as Art* (Film als Kunst, 1932), (Berkeley and Los Angeles: University of California Press, 1957).
4. Henry Jenkins. "Video Games: The New Lively Art," in Handbook for Video Game Studies, edited by Jeffery Goldstein (Cambridge, MA: MIT Press, 2005), accessed February 15, 2012. http://web.mit.edu/cms/People/henry3/GamesNewLively.html
5. See, Ebert, "Doom," (2005) accessed February 15, 2012. http://rogerebert.suntimes.com/apps/pbcs.dll/article?AID=/20051020/REVIEWS/51012003/1023; and Ebert, "Answer Man," (November 27, 2005) accessed February 15, 2012. http://rogerebert.suntimes.com/apps/pbcs.dll/section?category=answerman&date=20051127
6. Kellee Santiago's TEDX presentation addressing Ebert's claims, the basis for Ebert's response, "Video games can never be art," has been widely cited and circulated. Santiago is a game designer from thatgamestudio, and her presentation is available at: http://www.youtube.com/watch?v=K9y6MYDSAww (accessed February 25, 2012). Ebert's columns "Video games can never be art" and the follow-up piece, "Okay, kids, play on my lawn" are available at: http://blogs.suntimes.com/ebert/2010/04/video_games_can_never_be_art.html; and http://blogs.suntimes.com/ebert/2010/07/okay_kids_play_on_my_lawn.html, respectfully (accessed February 25, 2012).

popular and scholarly responses, as well as Ebert's own eventual *mea culpa,* appropriately if somewhat sarcastically titled, "Okay, kids, play on my lawn." Here, Ebert relented on a key point, finally agreeing with video game apologists that he should refrain from making blanket statements like "video games can never be art," at least until he's "more familiar with the actual experience of video games." Ebert's admission, "I may be wrong, but if I'm not willing to play a video game to find that out, I should say so," sapped some measure of the debate's intensity.

Yet as games journalist Rich Stanton observes in his column on the debate, "...the problem was never [Ebert's] opinion, or indeed any other ad hominem attack on video games. The problem is that in engaging with the question we put art on a pedestal – and 'art' just doesn't exist."[7] This is partly correct, as art is unquestionably a wily target. But just because it is a multifarious and elusive category does not mean that art doesn't exist. Art exists powerfully as discourse, as an idea. And art reflects a host of material connections to people's everyday lives. It is *precisely* art's aura of remove that leads some to claim that it doesn't exist, and prompts some dubious gamers to lament that such concerns are largely irrelevant to them since "all they're playing is a game."

Summarizing the wide-ranging "Ebert vs. Gamers" exchanges in a word is surprisingly easy – they are frustrating. On both sides the public harangues have been frustrating for a variety of reasons. First, the "debate" is often reductively framed. It assumes that there exists some final judgment to be made concerning video gaming's artistic capabilities. The debate seemingly presumes that if and only if the right game were to be considered, this would end the debate (ignoring, for instance that like all techno-social media, the form changes shape over time – as a delivery system and as a system of communication). Second, the debate is too often treated like a zero-sum equation where an illegitimate medium's gain is a well-respected art form's loss. (We can certainly appreciate this concern. Remember how much less you thought of Da Vinci's *Mona Lisa* after seeing Welles' *Citizen Kane*? Or the way that Tchaikovsky's compositions suffer under the weight of Warhol's silent experimental films?). This formulation denies the meaningful connections and influences that exist across different modes of creative expression, and more insidiously (and ironically), limits examinations of game experiences to a framework of established ideologies and norms at work in other modes of creative expression. In the relatively narrow present debate the battleground has thus frequently become whether games engender responses similar to the greatest hits of western culture.

Others meanwhile stress the need for finer evaluative gradations to appreciate video games' still evolving formal elements (e.g., narrative complexity, elegant game design, immersive sound effects) so that the medium might gain incremental footholds in artistic circles. This is, for example, the position that Kellee Santiago takes in her TEDx talk: one day, so the logic goes, games might gain entry into the official pantheon of the arts. Interesting points of fact: games are already considered for achievement by the British Academy of Film and Television Arts (BAFTAs); there is a 2012 exhibit showcasing gaming history at the Smithsonian Institute[8]; the U.S. Library of Congress has been working for years to archive canonical game titles on a variety of platforms; and even the U.S. Supreme Court's Justice Antonin Scalia, along with the majority of the court, understands games as art, and thus deserving of First Amendment protection.[9] Huzzah.

Welcome as these external signs of institutional legitimacy might be to gaming's apologists, they may still underwhelm those who have given this debate serious scrutiny. Invariably, it seems, frustration gives way to fatigue. After all, any consideration of video games as art begs no less difficult questions about the nature of art *writ large*. It bears underscoring that such questions are not necessarily unproductive or even unanswerable; rather, the public harangues amongst taste brokers and fans themselves are, in the end analysis, more illuminating and revealing than simple "yes" or "no" answers concerning games' artistic status. Moreover, there is an unappreciated upside to these tired and bitter exchanges. What emerges from this fierce conflagration over cultural worth and artistic quality is the realization that *defining art is itself a kind of*

7. Rich Stanton, "Who Framed Roger Ebert?" Eurogamer.net, January 18, 2012, accessed February 15, 2012. http://www.eurogamer.net/articles/2012-01-16-who-framed-roger-ebert

8. For additional information on this exhibit, see: http://americanart.si.edu/exhibitions/archive/2012/games (accessed July 9, 2012).

9. John D. Sutter, "Supreme Court sees video games as art," *CNN*, accessed February 20, 2012. http://articles.cnn.com/2011-06-27/tech/supreme.court.video.game.art_1_sale-of-violent-video-video-games-hansel-and-gretel?_s=PM:TECH

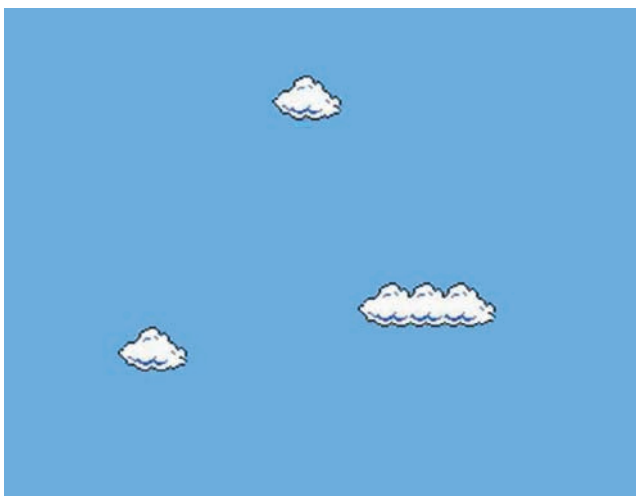
game – though (unless you're Banksy) perhaps not a terribly fun one. And maybe it is this realization that inspired Duchamp's observation linking chess players and artists.

Art Parties Vs. Art Gambits

Instead of arguing on behalf of those aesthetic elements that games have successfully appropriated from established artistic forms, constituting in effect some artistically palatable Frankenstein's monster (a solid musical score for legs, beautifully animated narrative sequences for a torso, Oscar-caliber voice acting for arms, etc.), it is worth exploring the ways in which games have influenced other artistic forms, opening them up to new practices. Game-inspired creative projects and happenings are often offered up as one piece of para-textual or extra-textual evidence of video gaming inherent or, at the very least, increasingly evident artistic *bona fides*. The few examples that follow are proffered not as *objets d'art,* but as interventions that have impacted different communities of artistic practice in lasting ways.

Given the thoroughness with which high, low, and middle-brow taste distinctions permeate creative practices of all stripes, it is not surprising that the following game-inspired non-game projects occupy different rungs of our shared cultural hierarchy.[10] Let's begin at the top of that proverbial ladder with what has been called "Game Art." These examples include pieces where artists use "the creative technologies and content of video games to artistic ends ... Game Art is then a designation derived from the mode of production and the content developed with these tools."[11] According to John Sharp, Game Art should neither be confused with "artgames" – those projects that assume the computational or procedural shape of a game to some expressive end – nor with art that has games as its primary subject matter.[12] Game Art never quite caught on in the art community for some of the reasons evident in Ebert's scattershot critique (e.g., the malleability and indeterminacy of game narrative, seeming lack of an auteur, etc.). Sharp also attributes Game Art's lack of traction to the art establishment's unfamiliarity with gaming culture and the difficulty of meshing traditional artistic critique with interactivity and play, among other factors (again, points evident in Ebert's posts). Popular examples of Game Art include Cory Arcangel's *Super Mario Clouds* (2002–),[13] where the iconic Nintendo game *Super Mario Bros.* (1985) has been hacked to remove all but the scrolling white clouds on a blue background; Velvet Strike Team's "counter military graffiti" created for the popular first-person shooter *Counter-Strike*, which injects anti-war sentiment into a virtual warzone[14]; and Joseph DeLappe's performances where he would type in multiplayer chat boxes the names of real soldiers killed in action while playing the U.S. military's recruitment game, *America's Army* (2002)[15]. It is important to remember that although Game Art may not have been well-received by the contemporary art scene, museum and gallery doors such as those at the Whitney Museum of American Art were nevertheless opened to these works, and non-gaming attendees exposed to these challenging pieces.

10. Here, Pierre Bourdieu's work on the relationship between artistic legitimacy, taste cultures, and cultural worth is especially illuminating. Bourdieu's analysis of how cultural productions perpetuate the social and symbolic capital of dominant groups while complicating simplistic understandings of economic exchange has been generative for a range of media scholars, sociologists, and cultural critics. Readers may find the following works to be useful: Pierre Bourdieu, *Outline of a Theory of Practice*. (Cambridge: Cambridge University Press, 1977); Pierre Bourdieu, "The Production of Belief: Contribution to an Economy of Symbolic Goods." *Media, Culture & Society* 2, no. 3 (1980): 261-293; and Pierre Bourdieu, "The Forms of Capital," in *Handbook of Theory and Research for the Sociology of Education*, ed. J.G. Richardson, 241Ð258. (New York: Greenwood Press, 1986).
11. John Sharp, "A Curiously Short History of Game Art," paper presented at the 2012 Foundations of Digital Games Conference. Accessed July 9, 2012. http://dl.acm.org/citation.cfm?id=2282348
12. See for example: Matteo Bittanti, *Gamescenes: Art in the Age of Videogames*. M. Battanti and D. Quaranta Ed. (Johan & Levi Editore, 2009).
13. See Cory Arcangel's *Super Mario Clouds* at: http://www.coryarcangel.com/things-i-made/supermarioclouds/ *(shown at right)*
14. See Velvet Strike Force's Counter-Strike graffiti: http://www.opensorcery.net/velvet-strike
15. See Joseph DeLappe's work at: http://delappe.net/



Machinima – a convergent media practice where digital movies are crafted using game content – is a decidedly more mainstream and middlebrow example of game-inspired mash-ups. A portmanteau of the words "machine" and "cinema," machinima videos are choreographed gameplay performances that are recorded and edited into original narratives or experimental videos. Game franchises like *Halo* and *The Sims* are especially popular among machinima-makers because of their broad popularity as games and their built-in image capturing tools.[16] The majority of machinima shorts playfully and parodically reference gaming and media culture. This is not the form's stylistic or expressive limit, however. For instance, Jon Griggs' *Deviation* (2006), which was created using the first-person shooter *Counter-Strike* (1999), critiques the repetitive militarized violence that characterizes the genre. This film was also the first of its kind to debut at the Tribeca Film Festival.[17] Machinima has since gained acceptance at other film festivals; there is also a commercial site dedicated to the craft (Machinima.com), including a highly trafficked YouTube channel; and machinima is the subject of a recent scholarly anthology, *The Machinima Reader*.[18] In addition to its potential for political commentary and critique, the form also holds promise for educators wishing to teach students about media literacy by having them deconstruct and reassemble games into original stories.[19]

Finally, there are all those "lower" forms of cultural production that manifest themselves across a variety of media, and which fly under the broader heading of game art – be it commissioned by private game firms or by "outsider" artists. From inside the industry, there is a wealth of concept art that is sometimes packaged with limited editions of certain titles, or is later compiled in anthologies. There are also art shows that showcase the influence of gaming characters and their virtual worlds – what Sharp calls "game-inspired imagery" – in shows like the annual "i am 8-bit" exhibition in Los Angeles (which now has its own book series).[20] Game-inspired handiwork of a more fleeting and public nature is available as street art and graffiti. One such practitioner who has received widespread attention is the French urban artist "Invader." Beginning in the mid-1990's, Invader pasted square mosaic tiles on Paris facades to form characters from the 1978 arcade classic *Space Invaders*. The artist carefully documents placement of the abstract aliens, and classifies installations as "Invasions." Invader's creations now grace the walls of cities all over the world, and his work is featured prominently in Banksy's documentary film, *Exit Through the Gift Shop* (2010)[21]. Finally, more modest but no less eclectic fan-created wares are available on the popular arts and crafts website, Etsy.com. Here, one can find no shortage of video game knickknacks in the form of handmade purses, dresses, assorted furniture, dolls, ashtrays, needlework, etc.

The point of this brief list, to reiterate, is not to trot out these pieces as evidence of games' inherent and *a priori* artistic worthiness. Rather, the hope is that by recognizing how deeply video games and game culture have permeated a range of creative endeavors, we will see the advantages in assuming an open stance towards the idea of art as an ongoing process, rather than as some inflexible set of either/or cultural categories that get mapped over "acceptable" media objects. There is no reason that the one and zero binary that beats at the heart of all-things digital should replicate the false dichotomy of having to label something as artistic or not. It is more useful and productive to frame the "game of art discourse" as constituting an ever widening public forum, instead of a winner-take-all contest between two sides, where game-inspired projects and interventions make Ebert-like arguments appear myopic and petulant.

The idea of art as a process and as a nexus for meaning-making is reminiscent of Paul Hirsch and Horace Newcomb's essay, "Television as a Cultural Forum."[22] As noted by Matthew Thomas Payne, Hirsch and Newcomb argue for a focus "on the manifold ways audiences talk about television to one another. In doing so, the authors design a hermeneutic for understanding television culture

16. That said, with the right equipment, any game can be recorded and edited like a found footage film.
17. Griggs' *Deviation* (2006) can be seen at: http://hardlightfilms.com/deviation/
18. Henry Lowood & Michael Nitsche (Eds.), *The Machinima Reader* (Cambridge, MA: MIT Press, 2011).
19. Matthew Thomas Payne, "Everything I Need to Know about Filmmaking I Learned from Playing The Sims: The Educational Promise of Machinima." In Henry Lowood & Michael Nitsche (Eds.) *The Machinima Reader* (Cambridge, MA: MIT Press, 2011).
20. More information about this annual event is available at: http://iam8bit.com/
21. For more examples of Invader's work see: http://www.space-invaders.com/
22. Paul Hirsch and Horace Newcomb, "Television as a Cultural Forum: Implications for Research." In Horace Newcomb's (Ed.) *Television: The Critical View.* (New York: Oxford, 1994).

James Hajicek, *Real Cloud,* oil on canvas

as an engaged community-centric dialogue, not as a one-way, analyst-centric monologue about that audience."[23] Games likewise function as a site of popular reflection, contestation, and play. But games are not only a forum; as systems of interactive procedures, games are also a catalyst for action. That their internal processes, changing narratives, dynamic characters, etc. would be reimagined for a host of creative expressions is not terribly surprising. What is more surprising is the reluctance by some to deem this activity worthy of artistic consideration.

Again, this is a relatively new struggle for video games, not for the art world. The Ebert-centered online war of words was only the most recent battlefront in a longer conflict over cultural worth. Let us not forget that Duchamp's own "readymades," found art objects so called purely by virtue of the artist repurposing and designating them as such, infamously exposed art's contingent claims of legitimacy decades ago. The digitization of art does not alter fundamentally the relationship between the categories we understand as "games" and "art" so much as it magnifies and complicates their imbricated relationships.

If this is the case, the question that follows is not "are games art," but rather "what kind of game is the 'are video games art' debate"? Certainly Ebert's line of attack sees the question as a winner-take-all affair, a zero-sum game reminiscent of chess or the U.S. government's countless "red versus blue" military simulations conducted during the Cold War. But we know that this is not the

23. Matthew Thomas Payne, "Online Gaming as a Cultural Forum," *Proceedings of DiGRA 2005 Conference: Changing Views – Worlds in Play.* http://www.digra.org/dl/db/06276.31564.pdf

only available gaming paradigm. There are cooperative games. There are open-world "sandbox" games. And there are virtual worlds that lack top-down goal structures but which nevertheless elicit a wealth of user-created content that is crafted to be shared with fellow gamers. Perhaps, then, the real foundational question is not "are video games art" or even "what kind of game is this debate," but *"what kind of games are the experience of art and artistic practice?"*

Examples of ludic dispositions in artistic practice abound. Collaborative Surrealist "exquisite corpse" games sought creative results beyond what any individual artist-player could ever conceive. In the Exquisite Corpse, collaborators sequentially contribute to a creative whole, with little or no knowledge of what others are contributing. The result is expansive artistic inquiry and quality achieved via the game construct, and perhaps more importantly, focused on it. Creative explorations frequently owe their existence and character to an ethos and aesthetic of play bounded by rigorous limitations of process, materials, or other elements. The results of such experimentation and response may be observed in the street dance-games of Brazilian Capoeira, or in the hushed halls of metropolitan art galleries. One example of such an exhibit in Berlin inspired a reviewer to write, "Exciting art, for me, is... Art that envisions other, impossible or very distantly possible, dimensions; art that has its original sketch in a dream." It's a passage that could easily have been describing a video game. Indeed, the exhibition statement describes art as a "pure game" that is "played very seriously."[24]

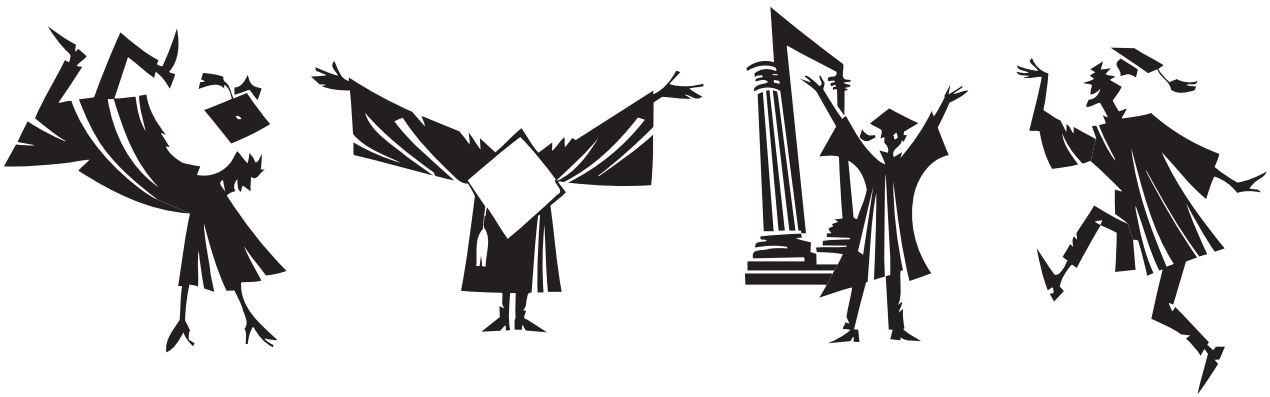
All games – digital or otherwise – are creative canvases that facilitate and encourage acts of virtual performance and play. We should not ignore the aspirational questions that rest tacitly here, too. In no particular order: what kind of game do we wish art to be; what kind of player-artists (or artist-players) do we wish to become; and, why do we create what we create? Is it to *win*? Or is it to *play*?

In his response to Ebert, game producer and former games journalist Jim Preston argues that gamers should ignore the "is-it-art" debate because of the sheer diversity of games available. Time is ultimately on their side, Preston contends. He believes that gamers should refuse to adopt any unbending aesthetic or philosophical stance that replicates Ebert's essentializing position, and should instead focus their energies on "creating the conditions in which video games can be viewed as art."[25] This position is evident in the playful title of Preston's piece, "The Arty Party," which refers to the imagined scene that a great many gamers share: there exists a great club somewhere where legitimate creators enjoy one another's company while the hoi polloi (gamers, comic book folks, etc.) remain exiled outside to gaze in over one another's hunched shoulders through a steamy window. Indeed, it is this dichotomy of the haves and have-nots, the shared image of a velvet rope separating forms of cultural production that perpetuates these reductive debates over meaning and value. Ebert's bold proclamation that "games will never be art" told gamers that if he were in change, they would never have a seat at the proverbial table. There are only winners and losers at Ebert's Arty Party. Fortunately, a creative spirit has long been thriving outside of the metaphorical Arty Party, as fans and artists have chosen to pursue all manner of creative ventures with little regard for what the party's bouncers or its hosts might think.

Returning to Marcel Duchamp, it's fortuitous for our purposes that the word gambit refers to both (1) an opening move in chess where one sacrifices a pawn for a better position, and (2) an initial remark intended to open a conversation. Again Duchamp: "The creative act is not performed by the artist alone; the spectator brings the work in contact with the external world by deciphering and interpreting its inner qualifications and thus adds his contribution to the creative act."[26] Duchamp would remind us all, and Ebert especially, that the point of arguing about art, is not to win – it is not to say "checkmate" – rather, the point is to say, "your move."

24. Mara Goldwyn, "Art as Pure Play: Play it Seriously," *Art Slant,* September 24, 2011, accessed July 13, 2012. http://www.artslant.com/ber/articles/show/28104
25. Jim Preston, "The Arty Party," *Gamasutra,* February 11, 2008, accessed February 20, 2012. http://www.gamasutra.com/view/feature/3536/the_arty_party.php
26. Marcel Duchamp, "The Creative Act," Session on the Creative Act, Convention of the American Federation of Arts, Houston, Texas (April, 1957). Accessed March 1, 2012. http://iaaa.nl/cursusAA&AI/duchamp.html

Embedding Faculty into Industry



Understanding the Real World Expectations of Our Graduates

keywords:
embedding, entertainment, teaching, faculty, technology, engineering, media, media arts, culture, john hughes

JOHN B. LUDWICK

John B. Ludwick (MFA Sequential Art, BFA Graphic Design) has been a storyboard artist for over a decade. He has directed 2-D and 3-D animation television spots for Cartoon Network, PBS Kids, Toon Disney and many others. He has contributed to local and international studios to plan narrative, documentary, and explanatory animation projects including Adrenaline Motion Pictures, Mediasauce, Performance Services, Inc., The Basement, Meysen Inc., and many others. He's presented at the Savannah College of Art and Design, Huntington Christian University, Heartland Film Institute, and twice at SIGGRAPH.

DAN BALDWIN

Dan Baldwin (MFA Illustration, BFA Painting) has been actively involved in the fields of painting, illustration, and animation for over 15 years, and has amassed a body of nationally and internationally disseminated work. A Society of Illustrators Los Angeles medalist, his work has been reviewed, published or exhibited at SIGGRAPH, the Ottawa International Film Animation Festival, the Indianapolis International Film Festival, the Oranje Film Lounge, *Computer Graphics World* magazine, *Consumer Reports* magazine, and as a contributing artist to numerous text books and personal animation projects.

Abstract

Engineering and technology students face intense educational demands in school. Their faculty, challenged to develop coursework that balances theory and applied principles, endeavor to create an environment that mirrors the rigor of real-world industry demands. Professors have less time to ensure that information disseminated to their students parallels the current needs of their industry partners as their job descriptions continue to broaden under a constantly evolving tsunami of technology, hardware, and software solutions. This problem is commonplace for many faculty, whose goal is to offer the most relevant classroom experience possible to their students. One solution may be overtly obvious; faculty should embed themselves in the industry fields where their students will ultimately gain employment.

In the summer of 2008, the authors took part in a faculty education program hosted by Rhythm & Hues in Los Angeles, California, a world leader in realistic, three-dimensional animation and special effects for the film industry. Digital production in Hollywood represents the frontline of technological problem-solving; professors can confront the context of their own craftsmanship and the relevancy of their technological curriculum by participating in summer programs that embed them in similarly intense production environments.

This paper will detail the experiences and lessons learned through a comprehensive explanation of the facilities' pipeline as well as the opportunities presented for discussion on the expectations of graduates from a broad range of engineering, technology, and art schools across the country. It is the authors' intention that an adaptable model be incorporated into their professional and pedagogical development, regardless of their technology discipline.

Introduction

Faculty today are often inundated with responsibilities that span advising to research. Time is scarce, and anyone who teaches technology courses quickly understands the challenge of remaining current with best practices in theory and application that are utilized in industry. An arduously developed classroom lecture, demonstration or exercise can, and often does, become extraneous in mere weeks with the advent of a new software suite or technology. "As a general matter, innovation represents change, and there is usually built-in resistance to change."[1] Engineering technology faculty are a part of a field that must embrace change. However, this "built-in resistance" often stems from the reinvestment of the time required to master new technologies and maintain quality-learning environments in the classroom. Therefore, increased value is placed upon the instructor's technical expertise and dissemination as students become more technologically sophisticated.

Is the mastery of contemporary technological theory and application alone enough to adequately prepare students for the workplace? Is there a fundamental disassociation between what is being taught and learned in the classroom versus the cultural expectation in industry? Typically new employees are hired for interpersonal and technical skills, and after time are socialized into industry culture.[2] Whereas the understanding of software and theory may grant employment, success in the field revolves around creative leadership and knowledge of how the industry culture functions.[3] For the full-time technology educator, this poses another significant problem: training students for a rapidly evolving industry in which the educator doesn't actively belong.

Throughout the country, engineering technology curricula require internship credits for undergraduate and graduate students. This opportunity provides a method for the student to gain insight into the industry culture. Faculty can benefit from a similar idea: embedding themselves in the industry fields where their students will ultimately gain employment. John Van Vliet, a special effects supervisor whose film credits span *Tron* (1982) to *Marley and Me* (2008), believes embedding faculty into industry provides valuable information that can contribute to the future success of students:

> Being [embedded] will enable you to better understand the workflow and the skills necessary to succeed in this business. But the most important thing you'll experience (and the one thing that most schools don't teach) is how the "culture" works. The film community has its own community/culture and the visual effects group has its own subculture within that group. I see a lot of people show up in Hollywood oblivious to this, and if they somehow do manage to land a job, often blow it by not understanding how their new world works.[4]

To fully prepare engineering technology students, regardless of discipline, for successful futures in industry an effort must be made to incorporate the culture of that field into the curriculum. Embedding faculty into industry culture reinforces concepts such as hardware/software solutions and discloses intangible ideas such as workplace expectation, policy and procedure for students.

Background

John Hughes earned both his Bachelors and Masters degrees rooted in electrical engineering. The innovations he contributed to the motion picture industry were engineering ones, chiefly motion control camera systems necessary for the integration of Computer-Generated (CG) effects.[5] From this innovation Hughes founded Rhythm & Hues in 1987, to capitalize on the rising demand for CG effects. Their specialty is quadruped animation, and mouth-replacement animation effects for animals, which earned the studio a Visual Effects Academy Award for the movie

1. Maier, R. and Weidner, E. (1975). "Creating and encouraging an innovative academic environment in higher education," *Higher Education,* Vol. 4, No. 1, Elsevier: Amsterdam.
2. Jones, C (1996), "Careers in project networks: the case of the film industry," in Arthur, M.B, Rousseau, D.M (Eds).(2001). *The Boundaryless Career: A New Employment Principle for a New Organizational Era,* Oxford University Press, USA.
3. Caldwell, Craig (2006). "Tenure-Track Candidacy Speech." Informatics and Communications Technology Complex. IUPUI. May 2006.
4. Van Vliet, John, (personal communication, November 7, 2005).
5. Samuelson, David W. (1980). *Motion Picture Camera and Lighting Equipment, Second Edition*, Focal Press. Butterworth-Heinemann. Linacre House, Jordan hill, Oxford OX2 8DP. 225 Wildwood Avenue, Woburn, MA 01801–2041. ©1980 David W. Samuelson.

Babe.[6] The studio also received both critical and Academy recognition for Visual Effects in *The Chronicles of Narnia: The Lion, The Witch, and the Wardrobe* in 2005.

Hughes is "committed to improving education for California students..."[7] and maintains an active presence in several education boards across the state. Hughes is carrying on a tradition largely attributed to the early days of CG Animation, where open cooperation between researchers and artisans developed the earliest full-screen digital effects, later to become Pixar. The company still "[stays] close to innovations happening in the academic community."[8] Collaboration, therefore, is the essence of embedding; an integral component of higher education because it is required for the workplace for which we prepare our students.[9]

The philosophy of Rhythm & Hues founder John Hughes, the Faculty Education Program, and the experience of the authors have a direct bearing on the format and discourse of faculty embedding. Through the articulation of these facets we endeavor to address the many fields where embedding may occur.

Rhythm & Hues' Faculty Education Program reaches out to U.S. educators in order to better identify potential student candidates, improve understanding and contributions to curricula, and enhance academic-to-industry relationships. The program format incorporates five phases: call for participants, orientation and daily operations, global overview, department overviews, and participant feedback. The sequence of events is listed below for the Rhythm & Hues (R&H) Program. This model provides a structured, yet flexible format easily adapted for a variety of different industries that desire to embed academics.

Call for Participants

In this phase, R&H screened possible faculty candidates in the areas of knowledge domain, curricular content and technological relevancy to ascertain a potential match with the studio's goals. The authors of this paper could best be described as contemporary practitioners of digital graphics whose skills span interactive design, illustration and animation preproduction work. The authors were selected to participate in the Faculty Education Program because they teach the applied communication of graphics and therefore have a chance to positively influence the next potential group of employees. Is it relevant to stress that, in this case, R+H was very adamant to ensure that the instructor's current class load best reflected the desired skills needed within the studio. This precaution eliminated the chance of incorporating an educator merely "curious" about learning their pipeline or Hollywood special effects, into the program.

Call for Participants: Analysis

Central to success during this phase is the ability to determine the technological relevancy, knowledge discipline, and the theory/application alignment of the participating educator with the industry partner. Preparing the answers to several fundamental questions during this phase could provide insight into a possible collaboration between academician and industry.

- Does the educator or academic program currently route students, or have graduates currently employed, with this potential industry partner?
- Is the knowledge of the educator peripheral or central to the potential embedding industry?

The correct complement of knowledge domain to industry practice can provide future collaboration and well-trained candidates for the business. In addition, the distinction between theory-based and application-based instruction can establish the style of embedding employed. Whereas the R&H program is perfectly suited for theory-based professors, it is the author's intentions to emphasize the need for a practice-based embedding program.

Orientation and Daily Operations

The elected candidates compensated for airfare and accommodations during the Faculty Education Program. Upon arrival to the Rhythm & Hues studio in Los Angeles, an informal talk was scheduled with many of the featured speakers. A facility tour was arranged to welcome faculty

6. Byrd, Scot, Content Ed. "John Hughes, President and Founder." Rhythm & Hues Company website. Summer 2005. Retrieved January 30, 2009 from the Rhythm and Hues Website: http://www.rhythm.com/inside_randh/company_founders_john.shtml
7. *Ibid.* Rhythm & Hues. "Faculty Education Program" (July 2008). Santa Monica, CA.
8. Catmull, Ed. "How Pixar Fosters Collective Creativity." *Harvard Business Review.* September 2008. Pages 65–72.
9. Levin, D.S., & Ben-Jacob, M.G. (1998). "Distance Learning for the Twenty-First Century: A Dual Perspective." Proceedings of the Lilly Conference on College 6' University Teaching, United Kingdom.

to the program and establish a layout of the various production environments. Perhaps the most intriguing reoccurring activity of the week was introduced on this day. Faculty participants were able to witness the interaction and feedback between studio executives and departmental supervisors over the progress from the previous day. This daily progress or "dailies" represented the director's paid time with the R+H studio. As each clip, with some as brief as a few seconds, was projected in front of all departmental supervisors, the director offered his verbal feedback. Afterwards, any department involved in the execution of that particular shot was given these notes and planned to revise accordingly. In most cases, improvement was expected during the next daily session. This activity, not often seen by the public, allowed the authors to glimpse the instigating forces of the R+H pipeline. Although silence was strictly enforced, the dailies allowed faculty to fully comprehend the level of expectation, layers of departmental involvement, utilization of proprietary software, and perhaps most importantly the level of time management enforced for these large budget productions. The large budgets of Hollywood movies are well known, but the level of time management enforced for such large budgets is not.

Orientation and Daily Operations Overview: Analysis

After witnessing the discussion that surrounded the dailies, the authors were able draw a correlation that would directly benefit the classroom environment. Through class critique and project evaluations, the incorporation of "academic dailies" would provide feedback in a manner that would instill both the practice and culture of its industry equivalent.

It cannot be overstated that faculty need to understand the driving forces behind the industry with which they are embedded. Educators aspire to not only teach the founding principles of a discipline, but the very factors that influence its economic well-being.

Global Overview

A team of Faculty Educators from Rhythm & Hues disclosed a comprehensive, global overview of the studio pipeline to faculty to facilitate better context between departments and their upcoming presentations. At three hours in length, this session served as the foundation for our education for the week. Each department discipline in the production pipeline was defined and elaborated through Q&A, but not with the same rigor, as each department would define itself later.

Global Overview: Analysis

Simply put, every embedding industry needs to elaborate on the instigation/deliverable life cycle of a project. After analysis of the individual departmental pieces that contribute to production, faculty more readily understands the pipeline and therefore become better equipped to teach that environment to their students.

Department Overviews

The departmental overviews provided in-depth understanding of the production interworking of each area of Rhythm & Hues. A thirty-minute discussion was led by each department supervisor and began by defining the discipline and its role in the company. Every supervisor provided actual examples from production footage, in attempts to best clarify the day-to-day obligations of the department. Often supervisors highlighted the multiple iterations created in response to the dailies from that time. Some departments showed archival footage – in this case, *The Mummy: Tomb of the Dragon Emperor*, which was scheduled for release the following Friday. Other departments showed in-progress footage from *They Came From Upstairs* and *Cirque Du Freak*. The experience was similar to watching DVD extras content, albeit combined with the opportunity for personal questions and insight. More importantly, the footage examples often illustrated the discipline better through the problem solving inspired from the director's revisions. Each department concluded with their expectations for applicants in their discipline, and ideas on how to improve the curricula to better reflect the current industry practice. Several supervisors allowed observation of portfolio and resume grading; providing key insight on how best to prepare students for Rhythm & Hues employment.

Rhythm & Hues is no different from most industries because they have "star" positions that receive the highest volume of submissions: animation and animation effects. Additionally, positions exist to support the "star" positions: rigging, research and development and tracking. What the varying departments helped to clarify for the faculty

are the obscure disciplines that create a bridge between others throughout production. 2D animation, for example, enhances the realism of the other departments' production in a variety of methods. The 2D animation department commonly employed work involving the creation of shadows cast by virtual characters, or eliminating a limb to be replaced with a CG element. Previously unknown and due to this newfound awareness, these bridge positions will now be discussed in detail in the classroom. Disseminating this "inside" information into the classroom represents one of the many benefits of embedding faculty into industry.

Department Overviews: Analysis

The authors recommend a sequence of questioning faculty should bring to bear when interacting with various departments in a company organization:

- What is this discipline of study associated with this department?
- What knowledge helps one to excel?
- What are the challenges facing this discipline?
- What personalities fail at this discipline?
- What assignments might be included in a curriculum for this discipline?

If a department, within their doors, has the opportunity to address all of these issues among faculty the results of the experience will be cyclical. The departmental goals will become more transparent, and the likelihood of finding appropriately skilled candidates will increase. Additionally, the faculty will better understand these departmental goals, and will thus better educate students for these positions.

Participant Feedback

Open dialogue between the embedding industry and its participants allow both parties to reap the rewards of collaboration. The culmination of the forty-hour embedding process was an exchange of feedback, and all department heads listened as the faculty discussed the merits and opportunities for improvement to the Faculty Education Program. This participant feedback session underlined an investment at the corporate level to ensure that more highly trained students will enter the workforce with more realistic expectations. This informal discussion provided great collateral feedback as the industry learned about the current state of graphics education, and faculty solidified their experience with their industry partners.

The embedding program as planned and implemented by Rhythm & Hues is a perfect model for theory-based professors. It allows a safe distance from the important operations of the studio while still providing the depth of knowledge necessary for curricular incorporation. This model can be adapted by any industry willing to recruit personnel within their ranks and seriously assess their needs and the curriculum of the participants.

Embedding can entail three stages of participation. It is the opinion of the authors that the model below would serve both parties of the embedding process.

Three-Stage Embedding for Applied-Based Professors

In Three-Stage Embedding, the embedded professor moves from theory, to practice and simulation, to shadowing. This will help the embedding industry filter professors that may not be ready for the demands of shadowing and introduce professors to their curricula in a practical, more integrated way.

Stage One: Theory

This is the precise model as practiced by Rhythm & Hughes. It is appropriate for any professor instructing in relevant or peripheral fields. Five days is sufficient for this stage of embedding, as any hands on training may, in fact, slow down the delivery of information. This stage is extremely inclusive and can be given to the widest range of participants.

Stage Two:Practice

Practice is divided into two levels of mastery. First, the embedding industry assigns prepared tasks culled from their own production and tailored to measure a single result. In the case of Rhythm & Hues, this might include a single assignment from each department. 2D animation (mentioned earlier) might assign the erasure of an actor's limb in a traveling camera scene within a certain time limit. The hands-on assignment may reveal nuances not apparent in general discussion, and can also be provided to the students in the professor's own curriculum. A professor adequately handling this level may move on to Simulation.

In Simulation, the professor is provided with a duplicate of a current, real task already being completed by an employee of the embedding industry. The digital nature of technological industries, which this paper addresses, allows for duplication of whole projects without destruction of the original. The professor is expected to complete this task, but is contractually obligated to non-disclosure and non-usage. The imbedding industry is contractually held to not use the finished task for any reason. This stage can last anywhere from two weeks to one month. However, this task will assess if the professor is qualified for the final stage.

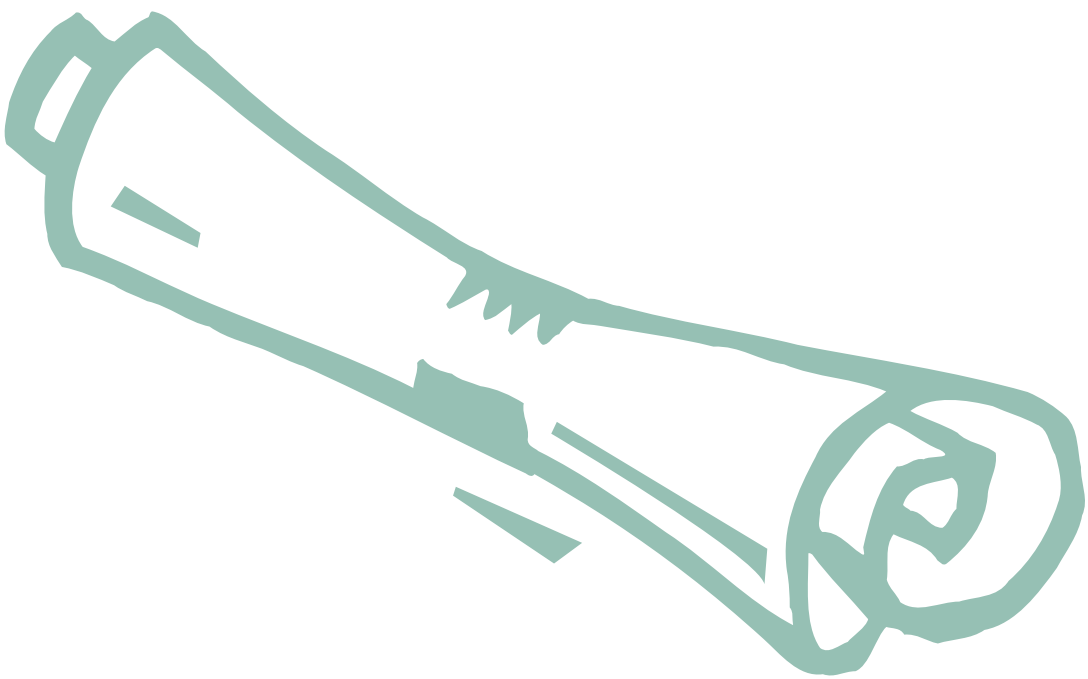
Stage Three: Shadowing

Here, the professor is fully embedded in the hosting industry, working on real assignments and under contractual obligation of non-disclosure. Ultimately, the goal is the preparation of skilled and culturally relevant student applicants for industry. For embedding to be a secure environment for both professor and industry, distinctions need to be articulated as to what can be shared in the classroom, with other schools, and with the press. The freedom encouraged by the security of all parties is what facilitates the sharing of information and the innovation of practice.[10]

The total length of a Three-Stage Embedding experience is three months; the equivalent of a summer break, and during this stage the experience would be much more reflective of the experience of a new employee hired specifically for that role. Not only does the technology become applied, the embedded educator also experiences the culture of the work environment.

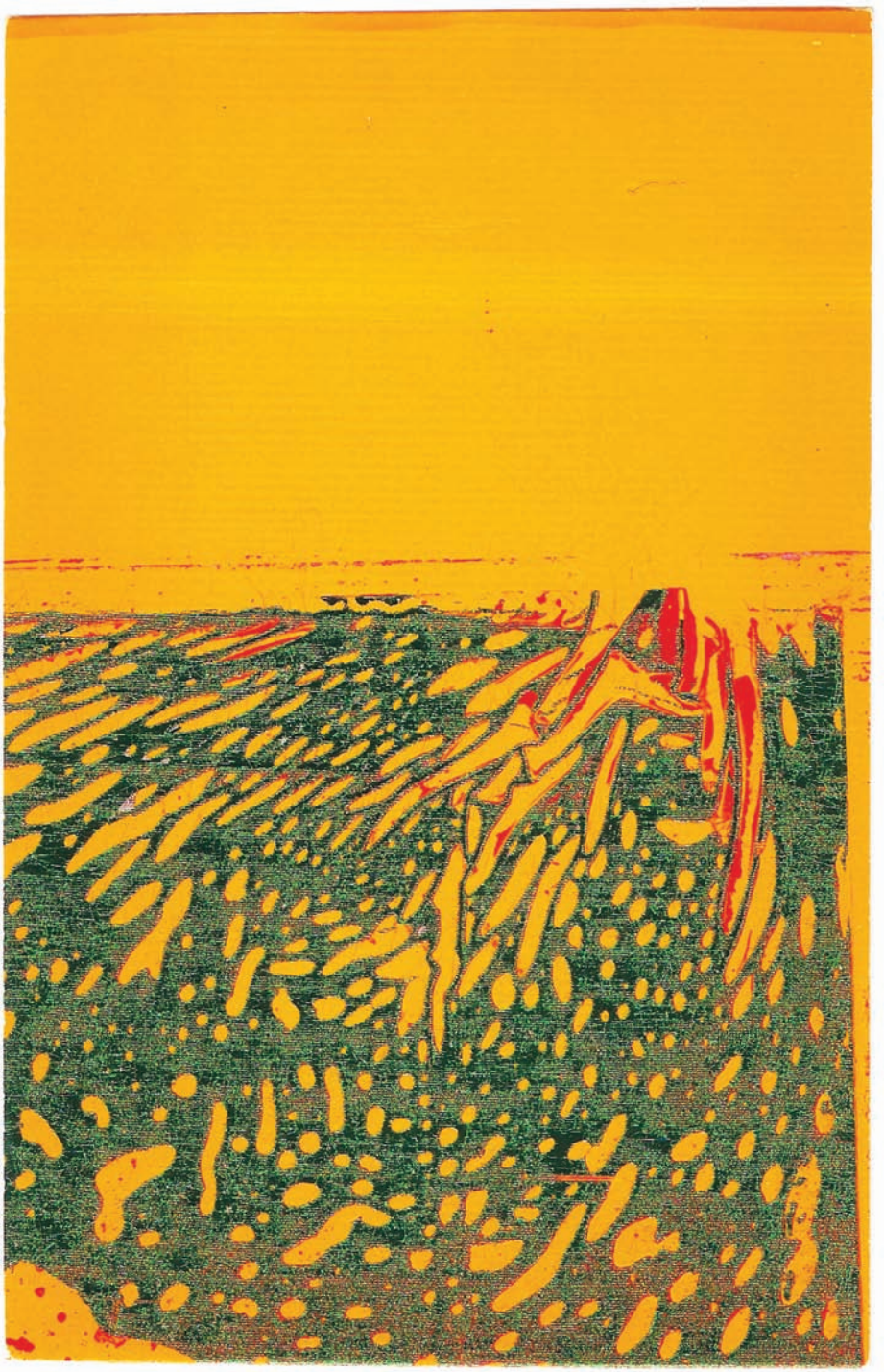
Embedding Summary

Whereas the example of the embedding process illustrated in this paper directly involves graphics technology, the authors believe that the benefits to industry, faculty and students, regardless of discipline are abundantly apparent. Industry, through active participation, gains a more knowledgeable and culturally aware talent pool that supports long-term goals. Professors receive current, more rigorous and often unidentified insights that contribute to professional development in a rapidly changing industry. Students, through the collaboration of industry and faculty, gain increased opportunities in the discipline they endeavor to practice. Whereas the concept where faculty and students work individually with industry is not uncommon, this unique triadic model of collaboration creates transparency of practice among all invested groups.



10. Catmull, Ed. "How Pixar Fosters Collective Creativity." *Harvard Business Review.* September 2008. Pages 65–72.

James Hajicek, Road Trip, ink on coated paper, 2001



keywords:
apps, reflection, MTRI, tools, interface, entrepreneur incubator, mobile devices, situation-centered design, multimedia

Teaching Mobile App Design + Development

Dene Grigar
with John Barber, Will Luers, Michael Rabby, Aaron May, + Brett Oppegaard
Creative Media + Digital Culture Program
Washington State University, Vancouver

DENE GRIGAR

Dene Grigar is an Associate Professor and Director of The Creative Media & Digital Culture Program at Washington State University Vancouver. She works in the area of electronic literature, emergent technology and cognition, and ephemera. She is the author of various net artworks, including *Fallow Field: A Story in Two Parts,* and *The Jungfrau Tapes: A Conversation with Diana Slattery about The Glide Project*, both of which have appeared in *The Iowa Review Web*; as well as the multimedia performance and installation *When Ghosts Will Die* (with Canadian multimedia artist Steve Gibson), a piece that experiments with motion tracking technology to produce networked multimedia narratives. Her most recent projects include *Fort Vancouver Mobile* (location-aware nonfiction content for mobile phones to be used at the Fort Vancouver National Historic Site, funded by a 2011 NEH Start Up Grant), and *The Grand Emporium of the West*, funded by a 2012 "We the People" Grant. She is also Associate Editor of *Leonardo Reviews* and Vice President of the Electronic Literature Organization.

Grigar has established herself as a curator of digital media, curating eight exhibits since 2005, including those for the Planetary Colleguim, the ELO 2008 and ELO 2012, and MLA 2012 and MLA 2013. Upcoming curatorial projects include the April 3–5, 2013 Electronic Literature Showcase at the Library of Congress; a showcase at the 2013 Digital Humanities Summer Institute at the University of Victoria; and an exhibit at Illuminations, the gallery for the School of English, Media, and Theatre Studies at the National University of Ireland Maynooth in March 2014. She is the Founding Director of the CMDC Program-associated Nouspace Gallery & Media Lounge, located in downtown Vancouver.

About 350,000 mobile apps have been released since May 2011, and more than 77% of the people in the world now have mobile devices. About 5 billion dollars are projected to be spent on mobile advertising during the next five years. Those statistic are among the many to suggest that just as web design emerged as the territory to explore in the mid 1990s, app design constitutes the one to study today. Yet because of the newness of the field and the fact that much of app development has generated from commercial and a "DIY" sensibility, teaching app design and development is not yet common in academic institutions.

This growth in mobile media and the dearth of pedagogical models prompted the faculty of The Creative Media + Digital Culture Program at Washington State University Vancouver to work together to find ways to integrate the teaching of app design and development into its curriculum. This move led them to create the Mobile Tech Research Institute (MTRI), a summer program that provided both undergraduates and faculty an opportunity to learn together how to work in the mobile medium but also gave faculty the imperative to build curriculum, pedagogies, and methodologies for teaching app design and development from the ground up. What we learned from that experience may be of interest to other digital media scholars and artists. Thus, this essay provides information about curriculum design, class projects and activities, technical requirements, teaching resources, and partnerships.

Part 1
Getting Started: Conceptualizing a Program in App Design and Development

At the outset, we envisioned the MTRI project as a two-year initiative that would involve a partnership between the university and the Southwest Washington region. In that regard, we imagined that if we could begin a systematic teaching of mobile media in our program and provide support for students with good ideas for app development, we could, in effect, help to rebuild the region's poor economy through this new, creative, green industry (See Fig. 1). To facilitate this vision, MTRI was originally conceptualized to contain four components: 1) a "Research Forum" that would bring in seven scholars and industry professionals in the area of mobile technology to work with community and students to develop local industry and projects, respectively; 2) "Coursework" in mobile app design and development for top undergraduates leading to the production of an app that would be used by

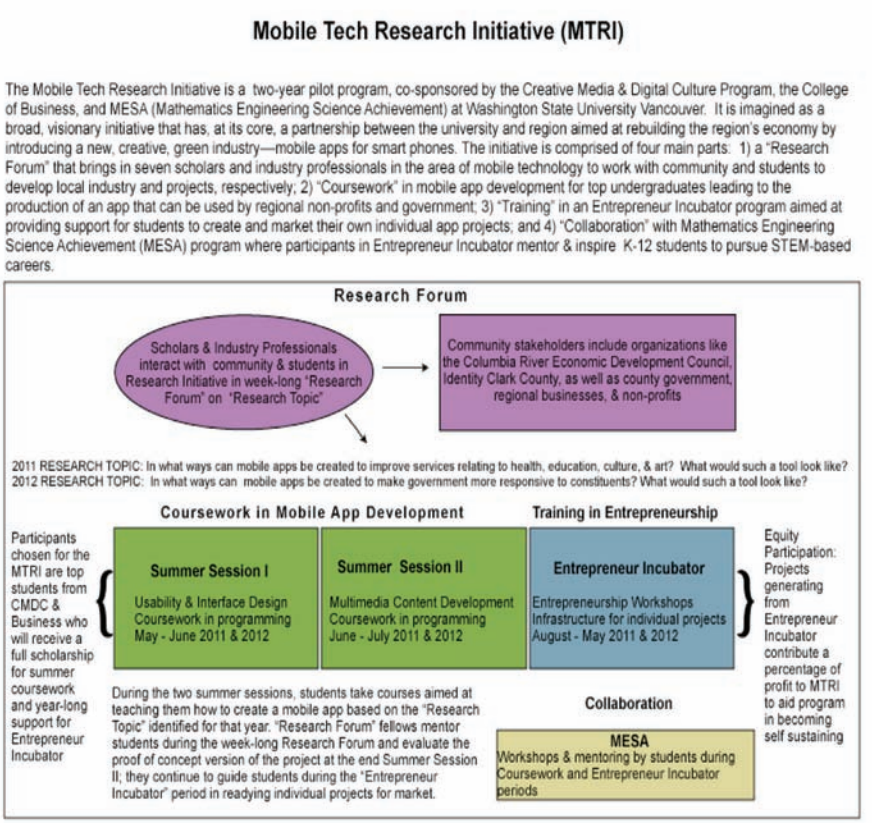


Figure 1.
The MTRI Plan

regional non-profits and government; 3) "Training" in an Entrepreneur Incubator program that would provide support for students to create and market their own individual app projects; and 4) "Collaboration" with a Mathematics Engineering Science Achievement (MESA) program where participants in an Entrepreneur Incubator would mentor and inspire K–12 students to pursue STEM-based careers. Because The CMDC Program has a strong community outreach tradition, the faculty developed the project so that the research questions we would seek to answer in the design and development of our app would be those needed by the larger Southwest Washington community. Thus, the 2011 Research Question was, "In what ways can mobile apps be created to improve services relating to health, education, culture, and art? What would such a tool look like?" The app we imagined building for that focus would have been one created for the county health office, the local school district, or a large arts organization. The 2012 Research Question asked, "In what ways can mobile apps be created to make government more responsive to constituents? What would such a tool look like?" This app would have been produced for our city or county, both of which did not yet have this kind of technology available for its constituents.

As a faculty without a graduate program, we were also looking for ways to interact with others undertaking research in this area, so that we could stretch our knowledge and understanding and share information we have about multimedia design and development. Some of us were already working on mobile projects. For example, Brett Oppegaard had begun the *Fort Vancouver Mobile* project in 2010 and had co-authored, with Dene Grigar, the National Endowment for the Digital Humanities Start-Up grant funded a few months later. Will Luers taught web-based app development in his web coding course. John Barber taught usability and interface design in his class and had been working with student groups to develop an app for the CMDC Program. What we needed, though, was a formal gathering, a research forum, that would provide us the opportunity to explore effective ways to integrate app technologies into culture and to examine what it meant to do so. Thus the "Research Forum" aimed to bring a combination of national thought leaders and local community leaders to campus to meet these two needs. We imagined that such a forum would inform the second step in our plan: "Coursework," a cohesive approach to teaching of app design and development. We imagined that the courses would take place during the summer during the two six-week sessions and knew we needed to select top students with strong coding and designing skills in order for the plan to be successful. The students taking these courses would, then, create a mobile app based on the "Research Topic" identified for that year. "Research Forum" fellows were envisioned as mentoring students during the week-long forum and evaluating the proof-of-concept version of the project at the end Summer Session I; we also imagined that the Research Forum fellows would continue to guide students during the "Entrepreneur Incubator" period in readying individual projects for market. We also realized that if we were, indeed, going to build an entrepreneur culture in the region, we would have to provide an incubator component to provide the initial infrastructure needed to be successful. Thus, we sought out and found collaborators in the College of Business who agreed to oversee this component of the project. We also invited MESA (Mathematics Engineering Science Achievement), an organization that promotes STEM (Science, Technology, Engineering, Mathematics) education to underrepresented students in grades K-12, to work with us so that our students would themselves become mentors and, ultimately, seed future participants in MTRI. Finally, we imagined an Equity Participation approach to the overall structure, meaning that projects generating from Entrepreneur Incubator would contribute a percentage of profit to MTRI to aid the program in becoming self-sustaining. With this structure in mind, we began to shop the project to potential funders. All in all, we conceptualized MTRI as a broad, collaborative, visionary initiative that would require a lot of support.

Unfortunately, fall 2010 was a difficult time to raise money in our region. Few businesses or individuals had extra funds to donate to nonprofits since they themselves were fighting for survival. Clark County, where the university is located, lost approximately 3,600 jobs in 2010, and the unemployment rate rose two percentage points, taking the rate to a high of 14.8 percent ("We're Still Hurting"). Median income dropped six percent during the economic downturn ("Median Household Income"). At the same time, tuition at state institutions was rising as the economy was falling. Tuition for WSU students had gone up a total of 26 percent in two years, making it even more challenging for our students to attend school and more necessary

for us to find scholarships for them. From October 2010 to March 2011, we spoke to community and government leaders about funding but to no avail. Hearing about our idea through our tech support manager, Aaron May, however, the owners of Dick Hannah Dealerships stepped in and donated close to $68,000 for the "Coursework" component of the MTRI project. This donation provided 10 students with the opportunity to become "MTRI Fellows" and to receive tuition funding for a full summer, amounting to over $6,000 per student. The donation also covered the cost of students' books, course fees, and field trips associated with the MTRI project. Faculty decided that students would make two apps during the project: the first would be a free customer care app for the Dick Hannah company; the second would be an app for a local nonprofit arts organization. Faculty continued to look for funding for the other three areas of our plan, but by April we realized that we would have to concentrate solely on teaching app design and development, leaving the research questions for us to wrestle with among ourselves and the incubation of future app development businesses to our program to nurture.

As faculty were developing a large-scale vision of the MTRI plan, it also was working to develop the intellectual infrastructure needed to implement it –– that is, the curriculum to include in the project, faculty to teach the curriculum, and students able to meet the challenges that advanced design and development brings. Because creating apps entails front end design, back-end coding, testing, and content development, it was obvious at the outset that it would not be one course needed to teach mobile app design and development but four. Luckily, our program has these courses already in inventory, and faculty able to teach them each semester. But in order to teach students how to create mobile apps, even with these courses already available to us, we faced two challenges: First, we knew that it would be hard, if not impossible, to put these four courses together in a special cluster of intensive study, and then ask faculty to commit an entire summer of teaching and learning, and require students to take a full load of classes during both summer sessions; second, our courses had been originally conceptualized for desktop web environments and, so, some of us had never taught mobile app design and development and did not know exactly what resources were available or how to do it.

The courses we identified as the four to teach in a mobile app design and development cluster were: DTC 336 "Design and Composition," DTC 478 "Usability and Interface Design," DTC 477 "Advanced Multimedia Authoring," and DTC 338 "Special Topics in Digital Technology & Culture." None of these courses are found in the required core for the major but, instead, are electives students can choose to take as part of the B.A in Digital Technology & Culture. The fact that these courses function as options for students gave us freedom to reconceptualize them so that they would provide a good understanding of theories and methods of design techniques, testing, special multimedia features, and the various languages needed for both Apple and Android apps. Additionally, DTC 477 and DTC 478 require the prerequisite course, DTC 355 "Multimedia Authoring," meaning that students involved in the MTRI project and taking this course cluster would have already learned HTML5 and CSS3 and had already produced multimedia content for the web. The DTC 338 "Special Topics" designation allows us to teach a variety of subject matter and made it possible to orient the class toward "The Development of Apps for iPhones and Androids" for the summer cluster.

We grouped the courses in two pairs, one for each summer session. This meant that each half of the project would last six weeks and that we had exactly 12 weeks to teach how to make apps and actually make two of them. It seemed to us that the first summer session should focus on design and the second on development. Pragmatically, we envisioned students learning about design requirements, including app aesthetics and Apple and Android design protocols, as well as content planning, so that at the end of the first summer session, students would complete a prototype and wireframe and produce a design standard for their apps. The second session would see these same students continue with the project by coding the apps and adding content to them. Faculty weighed in on the course curriculum and course schedule, developing the program into a cohesive summer study that involved this structure:

Summer I: May 9–June 17, 2011

DTC 336 Design and Composition
Professor: Dr. Dene Grigar; MW 11–2:20, VMMC 111
A course focusing on layout and design techniques, including color, alignment, balance, etc., for mobile sites and apps to help students problem-solve design challenges.

DTC 478 Usability and Interface Design
Professor: Dr. John Barber; TTH 2:30-5:50, VMMC 111
In this course, students learn to design effective interfaces for mobile sites and assess their uses.

Summer II: June 20–July 29, 2011

DTC 477 Advanced Multimedia Authoring
Professor: Will Luers; TTH 2:30–5:30, VMMC 111
A course designed to teach students how to work with images, text, video, sound, and other digital objects for mobile sites.

DTC 338.01 Special Topics: App Development for iPhones and Androids
Professors: Nicholas Schiller, Nicholas Hill;
MW 11–2:20, VMMC 111
A special topics course aimed at teaching students programming for iPhone and Android development.

Faculty understood that the commitment to teach in MTRI assumed with it a commitment to retool ourselves, essentially becoming learners alongside our students. The challenge, however, was not an interest in expanding our knowledge into the mobile medium and learning all aspects of creating for the mobile medium; rather, as mentioned previously, it was undertaking such an exploration during an entire summer when we normally would be working on individual research projects. But we recognized quickly the benefits that MTRI could offer us. It is worth mentioning at this juncture that, as a faculty, we have adopted "action research," as one of our main research methods. Action research is a "systematic enquiry conducted though the medium of practical action, calculated to devise or test new, or newly imported, information, ideas, forms, or procedures and to generate communicable knowledge." It offers three different approaches (Research into/about Design, Research for Design, and Research through Design) and suggests "that practice and research [can] establish an effective liaison under specific circumstances" (Vannotti 51-60). Put simply, action research allows us to put design at the center of our research and suggests that mobile apps are not merely things we study but rather the reason for our exploration. Our work with MTRI has led to an invitation for all of us to teach at a Digital Humanities Summer Institute in Victoria, Canada in 2012 and publish articles and give presentations on methodology, pedagogy, and development in academic journals and conferences, respectively.

But while faculty were in agreement that MTRI would be worthwhile to pursue for both our research and teaching, we still needed to develop an incentive for convincing students, who generally need to work full-time in the summer in order to attend the university in the fall and spring, that spending the summer going to school all day every day for 12 weeks would be beneficial to them. Scholarships helped to make our case.

As mentioned previously, Dick Hannah Dealerships donated close to $68,000 for the "Coursework" component of the MTRI project, enough money for 10 students to receive funding for full summer tuition, books, course fees, and field trips. The faculty organized the project so that we would grant this funding to 10 top students in the program and, thereby, provide summer "fellowships" to these students. They would, in effect, become "MTRI Fellows," and the fellowship would serve as an honor as well as an incentive. It is important to emphasize that even in the best economic times, Southwest Washington is not a wealthy area, and a high percentage of our students are first-generation college students. This understanding means that all students are "needs-based students" and, so, "excellence" figured as the main criteria faculty used for selecting students for MTRI. We drew from our courses those students who produced the best work in multimedia design, coding, content development, and project management/teamwork. Out of the 175 undergraduates in our program, faculty issued invitations to 10 to join MTRI. All accepted. We also decided to invite a faculty member on leave from the University of Southern California to join us as a post-doctoral fellow, and a staff member to assist as well as a post-baccalaureate, as a way of stimulating deep discussions of mobile theory and developing potential new instructors and consultants within our program. Other staff members and additional faculty joined us, too, due to the high interest in learning about mobile media. The incentive to learn mobile app design and development, to

be chosen for a select group from among peers, and/or to receive full funding for an entire semester of coursework resulted in a dynamic learning community.

Figure 2. MTRI Fellows and Faculty

In the fall of 2010, when we began planning for MTRI, no textbooks existed that directly addressed the mobile medium. More than a year later, the first few academic books on this subject emerged, including Jason Farman's *Mobile Interface Theory,* and Jo Groebel, Eli Noam, and Valerie Feldmann's *Mobile Media: Content and Services for Wireless Communication*. What source material faculty did have access to while planning for MTRI, though, were non-academic resources on mobile app design and development that offered a commercial perspective. Our literature review turned up books such as Robert Hoekman's *Designing the Obvious*, Ken Yarmosh's *App Savvy,* Steve Krug's *Don't Make Me Think,* Cameron Moll's *Mobile Web Design,* Jonathan Stark's *iPhone Apps,* Vandad Nahavandipoor's *iOS4 Programming Cookbook,* and Josh Clark's *Tapworthy*. We adopted these and included others that we had used in our courses, such as Dan Cederholm's *CSS3 for Designers,* Jeremy Keith's *HTML for Designers,* and James Bennett's *Design Fundamentals for New Media*. But knowledge gaps still existed not even addressed in articles and essays that we found.

One illustrative example of such a gap that Grigar confronted in DTC 336 "Design and Composition" focused on app aesthetics. The truth of the matter is that there is really not much in the way of good material to use for teaching aesthetics for web-based multimedia design and development, so it was not surprising to any of us that nothing yet existed on this subject for apps. Commercial publications center primarily on usability–how apps work for users, how users navigate information, and how they interact physically with the interface or computing device. Missing are discussions of the ways in which color functions in mobile environments, the fact that texture is essentially useless in environments where such little real estate is available, and that shape provides a strong focus for getting across concepts, style, and message. Put simply, Grigar had to figure out for herself that, despite what may seem a direct parallel, apps are not miniature works of art but, rather, something else. And the aesthetic underlying that "something else" had to be learned by thinking about the affordances and constraints of the mobile environment and getting her hands dirty making apps. To do this, she had to realize that her course material was essentially provisional (thus, be willing to make mistakes in class, since learning about apps was taking place while she was teaching it). These experiences mirrored earlier design and redesign efforts on the Fort Vancouver Mobile project she and Oppegaard were involved in, in which best-practice benchmarks were first established in the workshop but, then were improved and refined through implementation and testing in the field as a generative and iterative process.

Part 2
What We Taught (and Learned Along the Way)

Teaching app development requires bringing together a set of tools and practices that are still in evolution. Every few months, new software arrives to challenge existing methodologies. Undoubtedly, by the time these words are published, certain obstacles will have been overcome by upgrades to existing software, or a new software package, such as Apple's "iBook Author," will alter the current market of interactive products. The challenge for educators is to find functional tools that students can learn relatively quickly so that the work in the class can go directly into the conceptual, practical, and collaborative aspects of app design.

As mentioned, the courses in the MTRI project were organized into two summer sessions with design as the main theme of the first, and development of the second. Thus, DTC 336 "Design and Composition" and DTC 478 "Usability and Interface Design" were followed by DTC 477 "Advanced Multimedia Authoring" and DTC 338 "Special Topics: App Development for iPhones and Androids."

DTC 336 "Design and Composition," according to the university catalog, teaches "design practices and processes for composition for a multimedia environment, including color, pattern, and shape." This broad view lends itself well for designing for mobile environments. Because all courses in the CMDC Program combine both theory and practice, students in DTC 336 read about concepts underlying design and composition for multimedia digital environments and produce work using Adobe PhotoShop, Illustrator, GarageBand, Audacity, iMovie, and Final Cut. The MTRI project built upon this established approach and asked students to produce the prototype for a mobile app, including its wireframe, which would be developed with content and coded during summer II, so that it would be ready for delivery in mid-August. Assessment was based on four activities: The design and composition of the App Prototype, which was worth 50 percent of the overall grade for the course; a Design Report, that explains the approaches and processes used to produce their prototype, worth 20 percent of the overall grade; an Oral Presentation to the client (Dick Hannah company stakeholders), an activity worth 20 percent of the overall grade; and a Reflection Paper, that asked students to think about the work they undertook in the course and write about what they learned about design and composition and themselves as multimedia designers, an activity worth 10 percent of the overall grade.

We used three books for the course: *App Savvy* by Ken Yarmosh, *Designing the Obvious* by Robert Hoekman, and *Design Fundamentals for New Media* by James Gordon Bennett. The first two address approaches students need to know for multimedia design: user-centered design, iterative design, and rapid-prototyping; thus, they were helpful in providing a general notion of creating apps and design, respectively. The third, *Design Fundamentals for New Media* by James Gordon Bennett, provided students with basic information about multimedia design based on desktop environments. As mentioned previously, no text to date focuses on app aesthetics. So, we also read essays and chapters on web and app design by Lyndon Cerejo, Jurgen Schieble, Bill Moggridge, and Abhijit Kadle. Guest speakers involved in app development in the Portland-Vancouver metropolitan area included Frank Mungeam from the KGW news agency and Reed Rotondo from Pixel River, a local design firm. Mungeam remained with us as a consultant on the MTRI project since he had experience with taking apps to market. Students researched apps in the iTunes App Store and in the Android Market to get a handle on best practices and read reviews about apps on various online sites.

All activities in the course centered on teaching students to think through design principles that correlate to mobile apps and, then, to apply those principles for creating the prototype and wireframe. This approach meant that we had to consult the development guidelines for Apple (and later Android) to understand the requirements from the launcher icon and common screens, such as the splash and landing screens; know what kind of information is allowable on menu and navigation bars; and develop an appreciation for producing images, texts, videos, and slide shows for small screens. Students found Illustrator helpful for prototyping because it allowed them to scale images to the sizes they needed easily, and they used PhotoShop for producing the wireframe.

Figure 3. Wireframe for the Dick Hannah App

As the class came to a close, faculty developed a list of qualities for app design that they knew can be applied to future courses, and students had produced the prototype and wireframe for their app. (See Fig. 3).

DTC 478 "Usability and Interface Design" focuses on the overlay of design, content, users, and situation in order to promote efficient and effective utilization of desktop and mobile interfaces for various media objects. In this course, interfaces are seen as portals between a variety of users in a similar situation and collections of digital data or information. Students in this course conceptualize,

critique, analyze, evaluate, and produce usable interfaces for various digital media devices. Because usability and interface design is the study of how we design, build, and then actually use digital interfaces, the desired outcome is the smooth and easy use of such interfaces. It is about assuring that what we build works as intended and in the situation in which it is utilized. So, the nature and extent of situation-centered design, and of usability built into interfaces, derives from the understanding why someone will use an interface and for what purpose. This approach provides the course direction, follows the "learn, think, build" focus of The CMDC Program, and addresses specific research questions for this course.

- (LEARN) How do users (ourselves included) respond to interfaces and their design?
- (THINK) What does "usable" mean and how do we assess the usability of interfaces?
- (BUILD) How do we assure usability throughout the design and building process?

As noted previously, because much of app development has evolved from commercial and "DIY" sensibility, teaching app design and development, and by extension usability and interface design, is not yet common or standardized in academic institutions. We felt the need to develop, for the MTRI project, an approach that sought best practices of unique app affordances, interface usability, and user experience. Using our course texts, Robert Hoekman's *Designing the Obvious,* Ken Yarmosh's *App Savvy,* Steve Krug's *Don't Make Me Think,* and Cameron Moll's *Mobile Web Design,* we set goals for our endeavor:

- Conceptualize the mobile environment and its affordances in relation to our project. Specifically, we needed a quick, general overview of the mobile environment, insight into the differences between apps and mobile-based websites, knowledge of the spatial considerations for smart phone and tablets, and an understanding of how all these factors affected usability and user experience.

- Develop information architecture and usability for our mobile project. We needed to understand how developing information architecture for mobile projects may be different from web-based ones. Specifically, we needed to be able to develop the information structure for our mobile project.

- Produce, rapidly and repeatedly, robust wireframes and prototypes for our mobile project through which we could gain a better understanding of how working with text, images, video, sound, and other digital content would be different in mobile environments than web-based. Specificiallly, we needed to understand any limitations and apply best practices associated with the development and utilization of multimedia content for our mobile project.

- Understand the coding and programming requirements for mobile devices and how these factors might affect usability and interface design. Various code languages and platforms would be utilized and we needed to have a good idea of how they would influence and determine the production methodology for our mobile project. Specifically, we needed to know what resources we needed to complete our work.

We achieved these goals as follows. First, we meet with Dick Hannah stakeholders in order to determine their desires and considerations for the desired app, along with their thoughts regarding the purpose for its creation and utilization. Our focus in this first meeting was "WHY build this app?" The answer came in several guises: provide customer-dealer contact, promote customer-dealer relationship, augment existing customer services, provide new level of services, provide information management, and provide customer resources. The common theme among these reasons was information and its flow between Dick Hannah Dealerships and its customers. Discovering this theme allowed us to think about how to organize information in convenient and logical groupings, or, as we called them, "information buckets," in order to enhance its usability. This information organization would, we felt, surely change as the project evolved, but from the start we would have a sense of the app's underlying information architecture and how this might drive navigation.

Next, we considered the question, "How will this app accomplish its purpose?" The answers included a number of suggested resources, which, after preliminary scaling, changes, and combinations, produced a manageable top-level directory of the resources offered by the app. From this point, we were able to conceive an interface that was smaller, more concise, while affording room for resource expansion under each of these top-level headings. These resource headings might, we felt, translate into navigation

buttons at the top level of the interface. Selecting specific buttons would allow users to interact and relate with the app in a number of significant and important ways. For example, selecting the "Service" button might provide users the ability to schedule an appointment, to read recall information or service messages, to connect with the Collision Center, or the Parts Department. Understanding the potential organizational structure for information resources afforded by our proposed app, we began planning for its implementation. We did this through rapid iteration using wireframes and prototypes.

Wireframes are quick visualizations of individual screens. They show only the potential placement and organization of elements, not the visual design, content, or interactivity of the app. We created wireframes on a whiteboard, each member of the team augmenting or changing what someone else had produced. Multiple iterations were, thus, easily created in immediate response to ongoing discussions between the design and development teams, and sometimes with other project stakeholders. At the end of each session, we captured our work photographically. Using these photographs, we created more robust and detailed wireframes which became the genesis of our next session discussions. The photographs were preserved in our project archives.

Once the wireframes were stabilized, we moved to the rapid iteration of prototypes, or visualizations of all the screens associated with the mobile app. Prototypes can show not only placement of elements, as do wireframes, but the type (text, image, etc.) and extent of each element, what interactivity it affords, and which screen is the result of any action. Again, we began with collaboration at the whiteboard, moving from there to paper prototypes produced by individuals or teams taking ownership of specific aspects of the proposed app. Using paper prototypes, we could develop task scenarios for usability testing. This approach to usability, we felt, provided increased opportunities for the pervasive examination of our project to identify problems and/or errors. It was easier, and less expensive, we reasoned, to fix problems on paper than it would be once we started coding the app.

In agreement as to the information architecture, and the navigation structure that provided the best support and access, we were ready to code and develop the app. The robust wireframes and prototypes developed through the collaborative efforts that took place in both courses in the first summer session served as blueprints for the building, ultimately saving time and effort. By working to achieve usability first and foremost, we were able to determine what features and affordances were necessary, and which were desirable, even "cool," but not necessary to the functionality of the app and its achievement of a specific purpose. When it came time to turn the project over to the coders and developers, we knew exactly what to build, what features and affordances were required, and how the various parts of the app were designed to work together. Like the developers, the visual designers also had a blueprint, complete with style guides, color palettes, and content strategies. Team members not designing or developing worked to provide the necessary content. Again, they had a clear set of directions to follow. No time was wasted determining what content to procure or produce. We had answered these questions during our rapid iterations sessions. Each member of our team knew what needed to be done, and why, in order to assure the most satisfactory user experience, and the highest level of usability. For all these reasons, our return on investment was far more rewarding than if we had begun straight away with building of the app.

DTC 477 "Advanced Multimedia Authoring" focused on teaching students how to utilize HTML5 and CSS3 for the production of native apps. At the time of this writing, the most common method of creating a native mobile app was to use the particular mobile device's own development tools. The free iOS and Android SDKs (software development kits) include simulator tools for target devices and contain extensive support resources. However, the programming languages for each SDK are unique. Apple uses Objective C, and Android uses Java. These are not widely used coding languages and require a steep learning curve, especially for students with little background in programming trying to learn to make apps in 12 weeks.

Another method, and the one adopted for MTRI, was to use standard web tools (HTML5, CSS3 and Javascript) to build a web-app with mobile-like navigation and, then, package the files into a native app for distribution. PhoneGap, an open-source mobile app framework with an active community of developers, works with a variety of SDKs to package native apps written as web files. PhoneGap can access unique device APIs, such as the camera and geolocation hardware functions, and it also

fits the requirements for distribution to either the Apple or Android markets, following their distinct specifications.

As mentioned previously, MTRI students had all taken the introductory class DTC 355 "Multimedia Authoring," in which they learned the basics of HTML, CSS and Javascript as well as Photoshop and Illustrator. In the first classes of DTC 477 "Advanced Multimedia Authoring," selected as one of the courses in the MTRI cluster, some time was spent introducing new features of HTML5 and CSS3, especially focusing on how these features work with Javascript. For example, they learned to use "media queries" to change CSS layout between landscape and portrait modes, accessing Javascript and jQuery plugins for controlling touch navigation, and using the Google Maps API for acquiring the user's geolocation.

The first assignment in DTC 477 was to build a one-page web-app (a mobile website) that was responsive to different device orientations and widths. In the assignment, called Place Portrait, students compiled information––text, interactive maps, images, video and/or audio––about a favorite place anywhere in the world. Students, then, were given a template that demonstrated the new HTML5 features for mobile design and were allowed to play at arranging layouts of media elements while becoming conscious of the particular constraints of mobile design. This activity was intended to provide students the opportunity to explore technologies and concepts needed for the larger project that loomed.

We chose to develop the MTRI app using a comprehensive mobile framework that worked well with the specifications of the client. Although there was initial resistance to this approach (it was perceived to be too limited), students came to appreciate the flexibility and ease with which they could build pages that share common styles and behaviors. The jQuery Mobile Framework made formatting, touch events, and transitions quite intuitive, but it still required a basic understanding of Javascript and jQuery. To introduce principles of programming and computational thinking, students built simple games using free online software from MIT. Scratch, for example, is a graphically based game-creator in which one makes objects animate and respond to user interactivity. The software is easy to learn but quickly demonstrates that programming is a thinking process. For non-programmers, an important principle to understand is that good programming begins as a way of thinking – not the mastery of a particular computer language.

After being introduced to the principles of programming in a play environment, students were immersed in the basic syntax of Javascript and Javascript libraries, specifically jQuery. They could, then, see the familiar graphic code blocks in Scratch translated as lines of computer code. Through short practical exercises, students developed an understanding of Javascript and how it works with elements on a web page. Of course, some students picked up the programming skills more quickly than others and could take on more challenges, but all students were required to attain a certain proficiency so they could think about the app they were making with the proper depth. After learning the basic syntax of Javascript and jQuery, students were introduced to the jQuery Mobile Framework. Flexible and functional, the framework allowed students to immediately apply touch events, pagination, and transitions without needing to write code. It helped that they understood how it all worked, especially when it became necessary to alter the template. Writing code for certain app functions, such as showing geolocation on a map, or capturing and storing form inputs, was left to those students who showed an aptitude and desire to jump into programming at a deeper level.

Once the HTML5 pages were tested and working with the various Javascript and jQuery libraries, all files were imported into Apple's SDK: Xcode. In its first stage of development, the Dick Hannah Customer Care app was tested using Xcode and its iPhone simulator. When version 1.0 was ready, students and faculty discovered Apple's process of licencing, testing and submission was more complicated than anticipated. Submitting updates to Apple, however, was quite simple. An Android version was also submitted later without much difficulty.

DTC 338 "Special Topics: App Development for iPhones and Androids," as noted earlier, allowed us to package and teach specific subject matter and orient the class toward a specific goal: successful completion of the app. In this course, the emphasis was on programming necessary for successful app development and deployment and so we felt it most productive to link this class closely with the concurrent DTC 477 "Advanced Multimedia Authoring" course. Essentially, DTC 338 became a laboratory for DTC 477, a context in which students could, following our

guiding principles of action research, learn to build by putting into practice a developing body of knowledge and ability. Most of these class sessions were devoted to collaborative problem solving and/or focused development research. As discussed below, this course was co-taught by a recent CMDC graduate with professional-level programming skills, thus allowing faculty and students the opportunity to learn from theoretical as well as practical, applied perspectives.

Part 3
Theory, Practice, and the Real-World Experience

We designed our pedagogy for teaching mobile app development to include practical and applied perspectives, not because theoretical pickings on this subject are thin but rather because directing students to focus on situated material and particular practices of particular people in particular places, in the "here and now," constitutes a dynamic action-research ethic. That ethic aims to demonstrate that deep understanding comes from clear awareness of social and educational practices in situ. Such a focus means the emphasis for student interpretations are drawn from the product of the specific material, social, and historical circumstances that produced the practices, and by which, they are reproduced regularly through social interaction in the particular setting (Kemmis & McTaggart, 2005, pp. 277-279).

Action research meanwhile incorporates both qualitative and quantitative approaches, based on the needs of the particular research situations, because qualitative data is due to change when circumstances change, and quantitative data serves only as a crude approximation of the ways in which participants understand themselves. Action researchers, from this viewpoint, therefore try to understand practice from its individual and social aspects, as well as objectively and subjectively, and as constructed and reconstructed historically both in the terms of the discourses and in terms of those constructed actions and consequences. If open to construction, then these research methods must also be open to reconstruction, and extend beyond the realm of preformed solutions, including the potential for borrowing and remixing, such as applying and adjusting established desktop computing ideals to mobile environments, in an effort to bring new light to the nature, processes, and consequences of the particular object of study (pp. 290-293). The action research mantra established by Orlando Fals Borda (1979), then, is to: "investigate reality in order to transform it" and transform reality in order to investigate it (qtd. in Kemmis, 2006, p. 470). This interpretive perspective, from which action research generates, acknowledges the researcher as an insider, as a part of the fabric of the inquiry, and an indivisible element of the environment within which people, including the researcher, are interacting (McNiff + Whitehead, 2006, p. 10).

Researchers traditionally tend to try to distance themselves from their work, as if such separation somehow distinguishes the results as "more plausible, credible, perhaps even more 'scientific'" (Burnaford, Fischer, et al., 2001, p. 7). Kurt Lewin (1948), though, contends that the person stands at the center of his or her life space and that an understanding of that life only can be accomplished by beginning with the perspective of that individual. Put into a research context, that the researcher starts exactly where he or she is, and then tries to do something. Knowledge, in turn, can be created from problem solving in real-life situations (Herr & Anderson, 2005, p. 11). Such a personal emphasis on knowledge building was reinforced by Jean Piaget, Howard Gardner, and John Dewey, who wrote (1985, p. 39): "The discovery is never made; it is always making" (qtd. in Burnaford, 2001, p. 8-11).

Students in the MTRI program, as in all CMDC courses, consistently combined talk about theory and abstract conceptualizations with complementary hands-on application of those ideas and experimentation that exposed numerous gaps in the scholarly knowledge about mobile app design. While supporting creative freedom and innovation in research, such an action-based approach also builds practical skills and valuable project-management experiences. In the process of reading about—and theorizing about—building mobile apps, our students also made practical gains in skills related to writing, editing, design, photography, videography, collaboration, team coordination, public relations, marketing, and technical manipulations of various computer and Internet technologies. Core action research goals, therefore, include improving practice and developing individuals but also transforming practice as well as participants (Herr & Anderson, 2005, p. 9). As Thomas and Brown point out, "When we build, we do more than create content" ...we also create context by building within a particular environment, often

providing links or creating connections and juxtapositions to give meaning to content." They add, "By participating in the making of meaning, we also learn how to judge and evaluate it, giving special sensitivity to the ways information can be shaped, positively as well as negatively" (2011, p. 94-6). During such a process, the creator transcends "from experience to embodiment, where the personal investment in technology and digital media changes the focus from social agency to personal agency. When that happens, technology and digital media begin to be viewed as an extension of oneself" (p. 103). Learning, therefore, becomes an integrated part of humanity, rather than just something a person happens to do at school.

Part 4
Needed Resources

The site of this extension between technology and our human selves (i.e. the primary learning environment for MTRI students and faculty) was The CMDC Program's multimedia lab. This space is equipped with 25 Apple iMacs and six Mac Pros. The students' iMacs are arranged in six pods of four to encourage group work and peer assistance. All of the iMacs are set up with identical hardware (21.5", Mid-2010, 32.Ghz Intel Core i3 processor, 8GB Ram, 1TB HD) and software packages to ensure students have the flexibility to work on their apps at any machine.

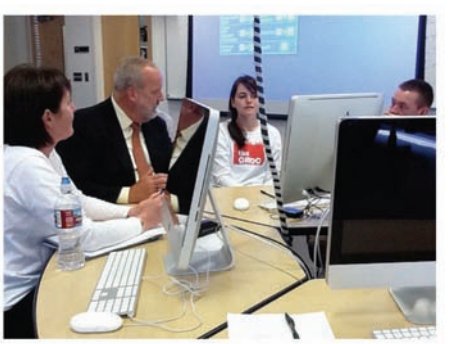


Figure 4.
The CMDC Program's classroom layout, and its use for collaborating.

Our lab already owned some of the programs needed for MTRI, including image editors, web browsers, and text editors. However, it was necessary to install new software items for the purposes of app development and testing. It should be noted that installing software requires administrative access to the destination computers and may require the assistance of one's IT department's personnel.

To prepare the lab, we first made sure we were using the current version of the Mac operating system, which at the time was OS X v10.6 "Snow Leopard." Then, we installed the Apple iOS Developer Tools, including the Xcode application. For Android app development, we installed the Eclipse developer environment and Android SDK. Then, we set up the Android Development Tools (ADT) Plugin for Eclipse, which provides easy access to the Android SDK. Finally, we installed the PhoneGap mobile framework, which allowed us to wrap HTML5 web apps in platform-specific containers for distribution to the Apple App Store and Android Market. All of these programs have associated websites with clear instructions on how to download, install, and configure the software.

The Apple iPhone was first released in 2007 and has undergone four major revisions since that time; therefore, it is important to stay abreast of software and hardware upgrades and to test on every iteration of the phone available. This means that faculty interested in teaching app design and development should have access to a selection of mobile devices for prototype testing. Although the developer tools do include simulators for iPhone, Android, and iPad screen sizes, there is nothing quite like being able to view, touch, swipe, and pinch your budding app on the actual devices your audience will be using. An app may run smoothly on a new iPhone 4S, but it may not perform on an older 3G model. It may look fine on a phone-sized screen, but not layout effectively on a tablet. The MTRI program, understanding the need for access to these tools, purchased two iPads for the project with the MTRI donation. Faculty and students also personally owned a wide variety of devices, which allowed most of us to have access to testing our apps.

Figure 5. App Development Programs Used in MTRI

Part 5
Faculty as Learners

Most of the faculty who participated in the MTRI attended other classes in the sequence throughout the summer. This gave us a unique perspective as observers/learners as well as participants, and a few of these observations are worth noting here.

First, having faculty attend the classes sends a powerful message to the students in the program. When a professor stops the routine of their research time in the summer to extend their skill sets, s/he leads by example. Since MTRI is an interdisciplinary program, having faculty involved in this capacity helped to reinforce the respect that each have for one another and their respective areas of study. This sensibility adds to the culture of innovation– –that is, learning does not stop at pre-determined boundaries. With every class having at least one other professor attending, faculty embodied the phrase that has peppered many teaching philosophies over the past few decades: lifetime learning. Students see professors sitting in classes learning for the sake of learning, rather than as a necessary step to an endpoint. This also helps to establish a culture in which students value the opportunity to learn. For example, following MTRI we offered several short series of workshops on technologies such as PHP, MYSql, and WordPress that did not count for credit but filled up quickly, nonetheless.

Second, it required a different set of expectations for teaching. Every faculty member in the four-course sequence taught a subject he or she had long taught but had to revamp it for the mobile environment. The syllabi served more as guides, and less as contracts, and faculty adjusted expectations and assignments as needed. Coupled with the summer-long app project, this approach entailed a certain vulnerability–the teachers did not always know everything in the mobile environment, and they did not hide this fact from the students. Here, the culture of "everyone as learners" fostered a positive climate. Rather than giving answers, the approach involved peeling back the curtain. Students were brought into the world of learning and discovery alongside faculty. Students learned how to find further information through DIY and crowd-sourcing methods and were given the tools to research answers, much in the way faculty teach themselves. Once the opening lecture material was presented, learning became viral. Within each class, as students completed activities, they roamed the room helping both fellow students and faculty who had missed something in the code, or were otherwise having some trouble successfully completing the activity. This approach spread until everyone had completed the assignment; it worked more efficiently than one faculty member roaming around trying to help a roomful of students at once. One salient example of the success of this approach focuses on one of the MTRI Fellows who was selected for her project management and content specialist skills. Though she had never taken well to coding in her previous courses, she became competent in Objective C and revelled in her ability to assist other students who considered themselves great coders. She emerged as the natural teacher among the MTRI Fellows, and because all students were potentially vulnerable, no one person felt outside the parameters to learn.

One course, DTC 338 "Special Topics: App Development for iPhones and Androids," was co-taught by a recent graduate with professional-level programming skills. Involving an alum, as we did in MTRI, allowed students to learn and, then, return to share their knowledge with us. Perhaps not every professor would feel comfortable doing this, but in keeping with crowd-sourcing and participatory learning models that The CMDC Program embraces, we found it to be a remarkably satisfying experience to attend a class taught by a former undergraduate who had been in our classes just the previous year. Given that the current generation of students is, perhaps, the first to teach its own parents life skills generated by new technologies (Tapscott), this mode of learning makes sense to explore in our college classrooms.

Finally, two other factors helped make this sequence and project successful. Beyond the faculty having a certain level of comfort with ambiguity, the project needed students who could handle this environment. Having the opportunity to select students for the classes enabled us to cull a strong cohort. Simply put, the project would have failed had the students not been up for the challenge. Their willingness to put in the necessary work to learn, think, and ultimately build (an app in this case) entailed the most crucial aspect of the project. Like the faculty, they needed to be flexible and committed. Although these two qualities are vital for the post-college world, many college courses are so tightly controlled that students' problem solving skills become secondary, or they simply exist within the confines of a paper. A group of students with the focus of "exactly what do we have to do to get an A" would not have worked.

The summer school format allowed for intensive sessions and gave students the opportunity to focus on one project. We did detect at the start of the second summer session a bit of fatigue in the students, having gone straight in from the spring to summer semester without a break. Interestingly, though, the fatigue quickly dissipated once the coding started and they began to see the fruits of their labor in an app that worked.

Conclusion

The end result of the MTRI project was the design and development of two apps, with the main focus on the Dick Hannah Customer Care app now found in the Apple App Store and the Android Market. Our story, of course, does not end with the success we had with making apps in MTRI; rather, as we have intimated throughout this essay, it constitutes a new beginning: CMDC 2.0, so to speak. While we were not able to undertake the whole of our vision for the MTRI project, we did train a cohort of talented students to make apps. The faculty did retool ourselves so that we now teach app design and development in all of our courses. We did help to provide funding for 10 students to attend classes during the summer and, so, be fast-tracked through their degree. We did develop a close partnership with a local business interested in investing in education. Following MTRI, we matriculated students into good jobs and graduate programs where they can utilize what they have learned because of these endeavors. Finally, we are still working with some of these students on another challenging project funded, again, by Dick Hannah Dealerships: an interactive, augmented reality installation, entitled "Autovation," for the Oregon Museum for Science and Industry. So, at the time of this writing, six of the MTRI Fellows who have not yet graduated from our program, along with four new students selected for this honor, are now engaged in the design and development of this project, and sitting at the heart of it are the very technologies we all had to learn for app design and development.

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Screen capture from the mobile app game *Proppa* by Prof. Joseph Linhoff, DePaul University, Chicago.

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schilderijen zijn kleurrijk en kenmerken zich door serene en mystieke onderwerpen. Na de eeuwwisseling legde hij zich toe op bekoorlijke bloemstillevens en decoratieve werken. Nooit eerder is Redon zo compleet gepresenteerd. De in het Van Gogh Museum tentoongestelde werken en de resultaten van recent onderzoek leveren een onuitwisbaar beeld op van Redons leven en werk.

James Hajicek, *Mobile Warrior*, ink and collage on coated paper, 2001