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The Journal of Digital Media Arts and Practice is dedicated to providing a platform for scholarly and creative publishing on the burning issues in the rapidly evolving, always contested, and unpredictable field of new media and digital media arts. The purpose of the journal is to provoke questions and discussion on digital media arts research and practice as a means of moving the field forward with rigor, thoughtfulness, and collaboration.

In keeping with iDMAa's mission of serving a wide range of educators, practitioners, scholars, and organizations with interests in digital media, contributors are encouraged to consider formats for their submissions that best suit the author and the reader. Contributors are encouraged to explore nontraditional publication strategies that incorporate multiple forms of media and interactivity and take advantage of an online publishing format.

The Journal of Digital Media Arts and Practice publishes year-round and accepts submissions on a rolling basis. Please go to www.idmaajournal.com for detailed submission guidelines. Advance inquiries prior to submission are welcome and encouraged and can be directed to journal co-editors Brigid Maher (bmaher@american.edu) and Jennifer Proctor (jennproc@umich.edu).

Subscriptions

Membership in iDMAa includes a subscription to the journal. See the website (www.idmaa.org) for details. The annual subscription rate for institutions is \$95 which covers access to the electronic version as well as two copies of the printed issues per year.

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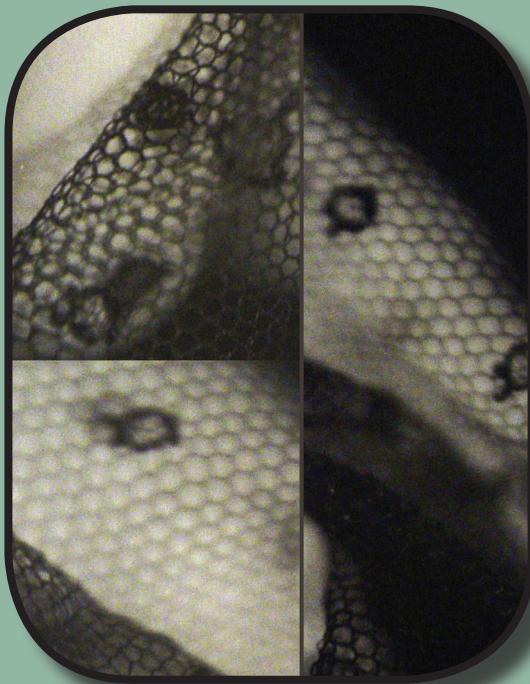
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Letter from the Editors

The International Digital Media Arts Association was thrilled to host our annual conference at Utah Valley University in Orem, Utah in November 2014. The conference theme was "interdisciplinarity." This journal edition features the most compelling papers submitted to the conference. Additionally, we were pleased to announce our new interactive edition of the journal at our Educational Keynote.

The Journal of Digital Media Arts and Practice (formerly the iDMAa Journal) is dedicated to providing a platform for scholarly and creative publishing on the burning issues in the rapidly evolving, always contested, and unpredictable field of new media and digital media arts. The purpose of the journal is to provoke questions and discussion on digital media arts research and practice as a means of moving the field forward with rigor, thoughtfulness, and collaboration.

The International Digital Media and Arts Association (iDMAa) was founded in early 2004 by a group of 15 universities. iDMAa is dedicated to serving educators, practitioners, scholars, and organizations with interests in digital media.

Please visit our interactive site @ idmaajournal.org year round for compelling content at the intersection of art and digital media. And additionally check out the International Digital Media and Arts Association (iDMAa) website at iDMAa.org.

Best,

Brigid Maher, *Co-Executive Editor*
—American University, Washington, D.C.
Jennifer Proctor, *Co-Executive Editor*
—University of Michigan, Dearborn, MI

BRIGID MAHER is a tenured, associate professor of Film and Media Arts. She is Co-Director of the Center for Media and Social Impact and Associate Division Director of the Film and Media Arts Division at American University. Her latest documentary, *The Mama Sherpas*, follows nurse-midwives, the doctors they work with, and their patients over the course of two years. The documentary provides an intimate glimpse into what midwives can bring into the birthing process in the hospital system. Maher's scholarly writing focuses on the interplay between traditional film and new media theories. Her additional award-winning film work has shown in festivals in the U.S. and abroad. Her writings have been published by *Cilect*, the *International Digital Media Arts Conference Journal* and featured in the *D|N|A Anthology*. Maher won a Fulbright Senior Award to teach broadcast media in Lebanon in the spring of 2005. She teaches digital media and editing courses for SOC.

JENNIFER PROCTOR is a filmmaker and media artist based in Ann Arbor, Michigan. Originally hailing from San Rafael, California, she moved to Austin in 1994 to study Radio-Television-Film and Philosophy at the University of Texas.

She then worked for KUT Radio, Austin's NPR station, and in 2003 decided to pursue her love of filmmaking at the University of Iowa. Her work has shown at Aurora Picture Show, Portland Documentary & Experimental Film Fest, MadCat Film Festival, NextFrame, Basement Films, Mini-Cine, Splice This!, FLEXFest, SF Cinematheque, Cinematexas, Ms. Films, Dallas Video Fest, Iowa City Documentary Film Festival, and others. She is the former Managing Director of the Cinematexas Short Film Festival and Austin Cinemaker Co-op.

She holds an MA in Film Studies and an MFA in Film and Video Production from the University of Iowa. She is currently an Assistant Professor in Journalism and Screen Studies at the University of Michigan-Dearborn.

RENÉ ALBERTO GARCÍA CEPEDA is a professor at the Universidad de las Americas Puebla in Mexico. He received his Masters Degree in Art History and Curating from Liverpool Hope University, a second Masters Degree in Museum Studies from the University of East Anglia, and a Bachelors Degree in Information Design from Universidad de las Americas Puebla.

Besides teaching museum history and exhibition design, García Cepeda also works as a freelance curator and photographer, exploring game studies and best practices in digital media curation. His current curatorial practice and museum studies inquiries focus on methods for museums to use mobile apps to expand installation work and museum education, and the new role of museums as entertainment options. His most recent exhibition, *Lugares y Memorias Fragmentadas*, opened August 13, 2015 at Universidad de las Americas, Puebla. It is a photographic exploration of personal journeys over the last five years.

keywords: finish the mission, modern sensibility, knowledge, power, world design, art, narrative, emotion

Figure 5: Law of thirds, lighting, set design and framing in *Brothers: A Tale of Two Brothers*

Reconciling Art History and Video Games

Abstract

Through a study of aesthetic theories, it is possible to make an argument as to why video games have evolved to the degree where artistic intention and themes have become possible.

By combining R.G. Collingwood's theory of expression of emotion, Clive Bell's significant form and Wittgenstein's family resemblances it is possible to demonstrate the artistic qualities of specific video games.



Video games have become one of the most successful forms of entertainment in the world, and as such has become an important distributor of popular culture. This fact has recently interested artists and video game creators who have turned from creating simple entertainment to utilizing the medium to communicate emotions, political messages and even pure aesthetics with their audience. However, within the art world a certain resistance exists not only to video games on the basis of their "low-culture" origins but due to their interactivity, with the most notorious example coming from film critic Roger Ebert where he denounces the lack of authorship that stems from interactivity. This is understandable as historically touch (and by extension interactivity) was ignored. Philosophers from Plato to Hegel fail to discuss it, or subsume it to a broader discussion of the senses (Mileaf 7). Aristotle considered it inferior due to his perception that touch was related to the sensual body (Mileaf 7) while Greenberg banished tactility from readings of "the modern sensibility" (Mileaf 9). Washington Post critic Phillip Kennicott denounces interactivity saying:

"Many art forms are fundamentally resistant to the kind of participation celebrated in the gaming world. The fact that you can't reach into the pages of a novel by Charles Dickens to avert disaster, or assuage the pain in a crucifixion painting from the Renaissance, or save the young courtesan from death in an opera by Verdi is part of the moral and aesthetic project of experiencing them as art. A certain kind of passivity, a submission to the artist's vision, may be essential to art. It's entirely possible that great art disempowers as much as it empowers."

Kennicott ignores the fact that while video games are interactive, they are not boundless. Interaction occurs within the limits the designers set to it. To further illustrate this I submit the following scene from *Spec Ops: the Line* (2012) (<http://bit.ly/1mJc2FZ>), a game released two months after Kennicott's article, which asks the player to use white phosphorous, a banned incendiary substance, on what the player believes is a platoon of enemy soldiers. The game, through dialogue, stresses the immorality of the action, while the protagonist is dismissive of the consequences. When the player takes control, the only option is pressing [spacebar] to fire on the soldiers. Once this is done, the character witnesses

the consequences of the devastation, and suffering caused by his actions. The interaction is limited to pulling the trigger; the narrative is still as set as in Kennicott's examples. But *Spec Ops* uses interactivity to offer a choice: play the game or shut it off, and in that lies the artistry in the interactive choice. As a player you either push through out of a need to "finish the mission" or you just delete the game and "go home." Interactivity is not the abandonment of authorship, it is one of many tools available to authors for delivering meaning.

Having offered a counter to the idea that interactivity negates authorship, now we have to question as to whether video games have authors or even auteurs, that is, individuals with the vision to create works of art with meanings and creativity.

Originally video games were a way for engineers to explore the limits of a new technology (computers), and only afterwards becoming entertainment. The paradigm seemed to go from small independent efforts to massive multi-million dollar production. However by the early 2000's the Internet's reach and ubiquity offered small independent groups the means to connect with other creators and distribute their work without the need for big publishers such as Electronic Arts or Activision-Blizzard. This facilitated independence and creative control which in turn translated into highly experimental titles; however, it came with great financial and personal risks. As a result of this creative freedom, titles such as *Journey* (2012), *Brothers: A Tale of Two Sons* (2013), and *To Build a Better Mousetrap* (2014) have become possible. These games address subjects such as the wonder of discovery, acceptance and growth via a significant other's death, and the injustices and consequences of neo-liberal schemes of production respectively. These are not accidental thematic attributions; in each case, intention is central to these works, and the auteurs have made definite statements on what they intended to communicate. Game creator Jenova Chen tells us "...that not only is *Journey* a metaphor for life and death, it is also an apt description of the struggle that Los Angeles-based Thatgamecompany went through". There is no speculation here, Chen's aim is not to create a toy, instead he displays the same artistic intentions that we can find in Munch's *The Sick Child* (1885-86); this of course applies to other game creators as well.



Figure 1: Peter Molyneux, *Fable III*, 2010

Even in the corporate environment, auteurs do surface from time to time, perhaps with more modest proclivities in comparison with their independent counterparts, but with clear artistic visions. Peter Molyneux (Fig. 1), Tim Schafer, David Cage and Hideo Kojima (Fig. 2) go beyond simple entertainment. They seek to encourage thought and criticism in the tradition of artists such as David or Marina Abramovic.

For example In Peter Molyneux's latest game, *Fable 3*, saving the kingdom is not a matter of combat, it depends on careful economic and social choices where making the morally correct choice might be prejudicial to the long term survival of a kingdom, and vice versa, thus upturning a long narrative tradition of Manichean world views. Another example can be found in Hideo Kojima's *Metal Gear Solid 2* (2001):

"Knowledge will be a major component in the world-wide competitions for power and it is conceivable that nation-states will one day fight for control of information just as they battled for control over territories in the past ... Knowledge and power are simply two sides of the same question: who decides what knowledge is, and who knows what needs to be decided? In the computer age, the question of knowledge is now more than ever a question of government."

Figure 2: Hideo Kojima, *Metal Gear Solid IV*. 2008.

(*Metal Gear Solid 2*, Hideo Kojima, 2001, <http://bit.ly/1pp60zP>)"

Kojima, through his game reflects on how information and societal control through manipulation of knowledge are used to control not only his characters but the player as well, and thus elevates a camp game into a critique of society.

Having argued that authorship and auteurs are possible in the field, it is now necessary to define art and its relationship to video games. To define the term is a complicated task that philosophers as varied as Plato, Kant, Danto, and Nietzsche, amongst others, have attempted; yet repeatedly, art seems to find new forms that do not fit previous rules. As post-modern thought took over, it became clearer that one all encompassing theory is impossible as the field continues expanding (Warburton, 37; Freeland, xviii). In this paper, three theories will be the focus of my research: Clive Bell's significant form (1914), Robin George Collingwood's expression of emotion (1938) and Ludwig Wittgenstein's



family resemblances (1967). While these theories and particularly Bell's theory have been critiqued to the point of obsolescence (Warburton 24-35), they hold particular value as comparison tools. Arguably the three theories cannot respond to all artistic manifestations adequately, yet they each address some of the inherent facets of the art question. Therefore, if we can analyze particular games with a combination of the three theories, we could come closer to determining whether those particular examples are art. It should be mentioned that this is not a qualitative survey; or, as Marcel Duchamp would put it: art may be bad, good or indifferent, but, whatever adjective is used, we must call it art (Duchamp 138).

Clive Bell's significant form states "certain objects, created by human hands, for whatever reason have been charged with a power to produce an aesthetic emotion in sensitive viewers" (Warburton 10; Freeland 96). Here we find ourselves with the question, what is significant form? A combination of lines, shapes and colors in certain relations, which evokes an aesthetic emotion and allows us to examine the structure of the world as it really is. In a way, Bell assigns a metaphysical timeless quality to works of art that not only is irreproducible but observable in a feeling of supreme elation at being exposed to a true work of art (Warburton 10-16; Bell). Critiques of the theory include: To whom is this form significant to? Who are the illuminated ones that can judiciously judge true art? However, the theory involves certain concepts that are well understood and taught in art schools, such as golden ratios, rule of thirds, phi, Fibonacci sequences and color theory (Adams; Zeki). By using these rules and expanding to include scene framing, acting, narrative, and character and world design, then we could use the theory as a way to gauge the artistry of particular examples.

R.G. Collingwood describes art as "the imaginative expression of emotion in a way that goes from a general imprecise feeling, to an expression that allows an understanding on part of the audience of the exact kind of feeling the artist feels" (Warburton 49-50; Collingwood). It is also important that this expression be rid of utilitarian purpose, for example, creating a painting for the purpose of arousing a religious feeling, to entertain or invoke a sense of patriotism, would not be considered art (1958 6). Criticism to the theory is vast. In one hand it admits

too much while excluding too much. Under this definition, multiple artworks would be rejected from the artistic canon. Renaissance paintings, film, theatre and even video games would be rejected offhand (Warburton 60-61). The theory also depends on being privy to the aetiology of the object, something that is often unavailable to the contemporary viewer. Nevertheless, even if this theory *de jure* dismisses video games, game authors themselves adhere to it, as shown in the documentary *Indie Game: The Movie* (2012) and in interviews with other authors (Conditt; Mahardy), therefore any discussion about games as art must include expression of emotion in its analysis.

The last theory is family resemblances, and with it, Wittgenstein seeks to define art through a series of familiar resemblances instead of a common denominator like emotion or the evocation of an aesthetic reaction on the viewer (Warburton 68). Influenced by this, the philosopher Morris Weitz argues that it is impossible to find the essence of art, and instead we should focus on whether particular works can be categorized as art through resemblances to other accepted works of art (Warburton 74-76). Weitz's theory gives no definition of art; instead, he leaves open the possibility that a not yet discovered underlying common characteristic exists and that art would cease should a closed definition be found for it since such an action would negate creativity (Warburton 82). In the case of video games we could argue they hold similarities to performance art like the works of Pippin Barr, or film in Kojima's *Metal Gear Solid*, or to protest art in the case of *Spec Ops The Line*.

Be it Pippin Barr's *The Artist is Present*, or *Spec Ops The Line*, the intention to create art is present in their creators. The following in-depth analysis of the critically successful game *Brothers: A Tale of Two Sons* will help make all these points clear.

Brothers: A Tale of Two Sons (2013, Fig. 3), was created by famed Swedish director Josef Fares in collaboration with Starbreeze Studios. In *Brothers*, we are confronted with the tragedy of a family faced with multiple deaths. In the opening scene we see two children mourning the death of their mother, an event the younger brother blames on himself, while their father is ill and who can only be saved, by finding the tree of life. While the plot follows basic fairy



Figure 3: Josef Fares, *Brothers: A Tale of Two Sons*, 2013

tale tropes, *Brothers* distinguishes itself by expanding on Collingwood's theory of expression of emotion, by allowing us to experience the emotions he wishes to communicate to the audience, through the control of both brothers with one controller.

The game involves the brothers working together solving environmental puzzles; these interactions start as simple two step operations, but eventually grow in complexity. It is this mechanic that drives the main message of *Brothers*, communicating Fares's message of brotherly collaboration and personal growth. The final twist comes in the third act, at which point the younger brother is faced with the death and burial of his older sibling. While some games would load the moment with melodrama, *Brothers*, instead, asks more of us. First, it eliminates inputs from the stick which controlled the older brother, then requires the player to dig a grave, drag the brother into it and finally bury him (Fig. 4, next page). This is done in total silence, and only when the burial is complete, does the musical score resume, and while it is a stirring piece, it is not manipulative; it is sorrowful, yet optimistic.

The epilogue then subverts the mechanics again by returning control of the elder brother's side of the controller, this time, however, acting as a way to provide the younger one the strength to perform actions that previously had been impossible for him alone, driving home the message of the importance of brotherhood and growth. Fares finds a way to make the player experience the grief of the younger brother by using interactivity and turning the audience into the child. This is no vague feeling of

sadness; the vibrations while digging, the act of picking up the boy and finally interring the body add emotional weight. It is an ordeal, one in which Fares and the audience are complicit; the player now knows what interring a sibling feels like, an experience Fares is familiar with, yet in doing so explores it in a new way not possible in film. This is precisely what Collingwood meant when he says: "[The artist] explores his own emotions: to discover emotions in himself of which he was unaware, and, by permitting the audience to witness the discovery, enable them to make a similar discovery about themselves" (Collingwood 6).

Brothers works through the expression of emotions and as an aesthetic experience. Bell tells us "to appreciate a work of art we need bring with us nothing from life, no knowledge of its ideas and affairs, no familiarity with its emotions (Warburton 10)". This in a way is disingenuous, as Fares' work could not have happened without the emotional baggage inherent in his life. However, just as Collingwood recognizes the need for craftsmanship (Warburton 44), we can recognize the aesthetic rules Clive Bell requires for art to be considered as such. These combinations of lines, color and shapes have been found to at least have some neurological truth behind them, and indeed there is a certain biological response to significant arrangements (Zeki). In *Brothers*' case, if we use the expanded definition I previously delineated, we can say that color, composition, framing, character design, physical space and more pictorial concepts all come together to create a work possessing the qualities Bell expected from works of art. Indeed these qualities have been

recognized in critiques of the game by critics such as Stephen Riach who tells us:

"This tale of two brothers looks stunning thanks to a cinematic viewpoint being emphasized at all times and impressive lighting effects being used throughout the adventure. Character models are a bit simplistic-looking, but that style works pretty well since they still convey emotion (Riach)."

Thus, even in isolation from qualities such as intention or context, Fares' work could qualify as art.

Qualities such as emotional depth, beauty and intention of the artist are often cited as common qualities of all art (Warburton 3). Under this category, *Brothers* also succeeds, meeting Wittgenstein theories of family resemblance. The obvious connection is with film; not only is Fares a recognized film director, but *Brothers* itself contains examples of film concepts such as implicit meanings, that is, general themes such as the maturation of a child into a grown up, referential meanings, such as references to real world events, in this case past wars [Lebanon War/The War of the Giants] and deaths in a family [Fares/Younger brother] as well as cinematographic concepts and techniques such as editing, framing, law of thirds, set design, lighting and narrative structure amongst others (Bordwell and Thompson 5-8). One such example can be seen in Figure 5 (article opener image), where the scene not only conveys the emotional tone of the narrative, but also displays qualities such as law of thirds, set design and framing. Therefore, if we accept these aesthetic structures in film as signifiers of art, by taking into account Fares' expression of emotion,

the significant forms manifested through cinematographic techniques and the family resemblances to another art form these techniques represent, we can venture that *Brothers: A Tale of Two Sons* qualifies as a work of art.

As we have seen, intention and authorship are both qualities found in video games, and while we have only surveyed a small sample, it is clear that authors and auteurs exist within the medium and that they are creating works that at least in their own words are art. Often subscribing to a form of R. G. Collingwood's theory of expression of emotion, these artists view video games as a form of expressing themselves and communicating with the world. Not only that, but these works contain the same qualities both thematically and formally as other recognized art forms and as such we must extend the same measure to video games as we do to film, performance or sculpture. It is then the work of the art historian not to decide whether they are artists or not, but to say how.

Ludography

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 Kojima, H. (1998) *Metal Gear Solid*
 – (2001) *Metal Gear Solid 2*
 – (2004) *Metal Gear Solid 3*
 – (2008) *Metal Gear Solid 4*
 – (2014) *Metal Gear Solid V: Ground Zeroes*
 Molyneux P (2010) *Fable 3*
 Pedercini, P. (2014) *To Build a Better Mousetrap*
 Yager Development, (2012) *Spec Ops: the Line*



Figure 4. Josef Fares, *Brothers: A Tale of Two Sons*. 2013.

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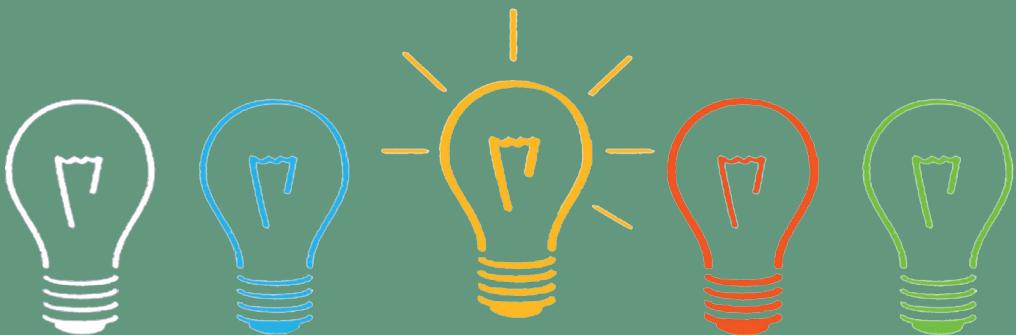
keywords: design thinking, millennials, pedagogy

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Katherine's interdisciplinary research combines traditional academic research skills with insights and techniques learned through professional graphic design practice. She has two research tracks: firstly, tracking power relationships past and present through visual evidence, secondly, trends in the use of digital technology in higher education classrooms.

Katherine earned her PhD from Swinburne University of Technology in Australia. Her dissertation involved an interdisciplinary graphic design and political science history that incorporated more than 200 historical artifacts and more than 1000 illustrations, and presented in a non-traditional thesis format that gave equal preference to the visual artifacts and the text. When not working, she can be found making/fixing/breaking things at home, or hiking in the Sierras with her dog.

Designing Engaging Educational Materials



Abstract

This paper argues that, in order to effectively engage the current cohort of undergraduate students, educational materials need to accommodate those students' cultural, neurophysiological, and psychological needs. It offers design thinking as a tool educators can use to meet these needs. After explaining the origins of design thinking and outlining its various stages, this paper demonstrates the process of using design thinking in the form of a pilot study, in which a suite of integrated educational materials were created.

Introduction

Developing effective educational materials is a crucial skill for educators. There is an increasing gap between the learning experience text books provide, and what students need to succeed (Crichton 3; Moravec; Nikirk 44). Some of the materials educators commonly create themselves include: games, lecture notes, social media feeds, study guides, websites, presentations, and videos.

The simplest measure of educational materials' effectiveness is that they engage students. Engaging materials are understandable by the students using them, and allow them to participate in activities they find meaningful (Dickey 70). When materials are both understandable and meaningful for their target student group, they help build student self-efficacy, or confidence (Fenci and Scheel 23). More specifically, self-efficacy "is a person's situation-specific belief that he or she can succeed in a given domain." The more a student believes in their capacity to learn in a specific class, the more likely they will be to perform in that class (Fenci and Scheel 20).

Despite educators' best efforts at creating educational materials, many of them are not engaging. This paper advocates design thinking as an effective set of tools for developing educational materials that are understandable and meaningful to students. There is some precedent for this approach; it has been argued that design thinking can benefit a range of learning activities in higher education, from teaching writing to organizing learning spaces (See Cassim; Crichton; Long; Purdy).

In terms of structure, firstly, design thinking is offered as an effective means for educators to create better educational materials. Secondly, to demonstrate the potential of this strategy, a detailed example of its use is given, in the form of a pilot study. The result of using design thinking in the pilot study is a short video; the preproduction and production process for this video are then documented. Finally, the entire pilot study is evaluated, and opportunities for further research are discussed.

Design Thinking

Over the last four decades, the term design thinking has been used to mean different things in a wide range of fields (Johansson-Skoldberg, Woodilla,

and Cetinkaya 123). In this article, "design thinking" is used to refer to a series of processes designers regularly use to address problems. Design thinking has both strategic and tactical purposes. Its strategic purpose is to integrate "what is desirable from a human point of view with what is technologically feasible and economically viable" (Brown 4). Its tactical purpose is to produce a solution to an unwieldy problem, usually in the form of a communication, product, or experience (Cassim 192).

Three Models

The stages involved in design thinking have been debated and documented extensively, with two main, widely accepted systems coming to prominence in the last ten years; the design thinking system proposed by design consultancy IDEO, and that proposed by the Hasso Plattner Institute of Design at Stanford (also known as the D-School). IDEO is credited as the first private consultancy to use design thinking as its entire work process (Johansson-Skoldberg, Woodilla, and Cetinkaya 128).

IDEO defines design thinking as five-stages: discovery, interpretation, ideation, experimentation, and evolution (IDEO 14). The D-School's design thinking model emphasizes design thinking as a tool for innovation. It defines design thinking similarly as IDEO, and also with five explicitly stated stages: empathize, define, ideate, prototype and test. A sixth step, "iterate," is not listed with the others, but is clearly integral to the D-School design thinking process (see Figure 1) (Hasso Plattner Institute of Design at Stanford 11).

A sub-set of this approach is "graphic design thinking." While the previous two models attempt

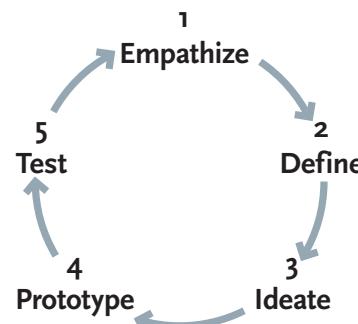


Figure 1: Iteration or Evolution is the process of repeating earlier stages of design thinking until a desireable result is achieved.

to encapsulate processes from multiple design disciplines, the strength of graphic design thinking is its narrow focus. Graphic design thinking refers specifically to the processes graphic designers use in their work (Buchanan 12). Its strategic purpose can be defined as effecting "change in the public's knowledge, attitudes and behavior" (Frascara et al. 3), and its tactical purpose is to produce visually persuasive artifacts and experiences.

Because the tactics of graphic design are so central to its strategic purpose, graphic design thinking places equal emphasis on generative process (strategy) and creating form (tactics) (Frascara et al. 12; Lupton and Phillips 5). Influential graphic designer Ellen Lupton separates graphic design thinking into three explicit stages: defining problems, getting ideas, and creating form (Lupton and Phillips 5). Lupton's model includes two extra stages: testing and revising. As with the D-School's model, these stages are central to Lupton's process, but are not listed explicitly.

These three models, IDEO's design thinking, the D-School's design thinking, and graphic design thinking, are similar. In the case of several stages in the models, the only difference is terminology. Figure 2 shows the equivalence between the stages between these three models.

IDEO	D-SCHOOL	LUXTON
DISCOVERY	EMPATHIZE	DEFINING PROBLEMS
INTERPRETATION	DEFINE	
IDEATION	IDEATE	GETTING IDEAS
EXPERIMENTATION	PROTOTYPE	CREATING FORM
	TEST	TESTING
EVOLUTION	ITERATION	REVISING

Figure 2: Comparison of three design thinking models. Stages in black are explicitly stated, while stages in grey are central to the process, but not stated.

My Approach

Each of the above models emphasize the importance of customizing the order and nature of the design thinking stages, in order to fit the needs of specific contexts and users. The stages of my idiosyncratic design thinking approach are described below. They have developed, and continue to

develop, based on my experiences as a graphic designer, a design educator, and as a researcher. Like the graphic design thinking model described above, my approach focuses equally on generative process and form creation (see Figure 3).

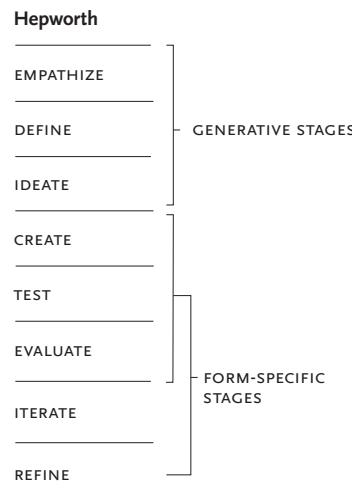


Figure 3: My approach to graphic design thinking. This is the process I developed over the course of my graphic design practice, and combines some elements of the design thinking and graphic design thinking models described previously.

1. Empathize

Empathizing involves listening and observing over an extended period of time, then researching the observed phenomena. This fosters understanding of the needs of everyone involved in the project (Patnaik 42).

2. Define

The users and design problems involved in a project are both defined in this stage. This is done through reviewing material collected in the previous stage, conducting collaborative brainstorming with colleagues, and writing needs summaries or design briefs.

3. Ideate

Generating ideas is a cyclical process of researching, visualizing, and communicating. Reviewing peer reviewed research on the defined problem comes first. Visualization involves drawing many small sketches based very loosely around the problems defined in the previous stage. This is followed by explaining the sketches to colleagues and potential users; talking about each sketch

develops the idea behind it further (Lupton and Phillips 62).

4. Create

Creation includes generating forms at various stages of completeness, from early prototyping to finished artifact. The quality of the form created in this stage depends on which round of iteration it is a part of (Sanders and Stappers 62).

5. Test

Testing requires giving the created form to users, then watching for and listening to their responses (Hasso Plattner Institute of Design at Stanford 10). This is typically done in a “real-world” setting instead of the more common, laboratory-like testing environment.

6. Evaluate

Evaluating involves analyzing the results of the previous test, reflecting on progress to date, and identifying the most promising future directions (Cassim 195–196).

7. Iterate

Iteration involves repeating a number of the previous steps, depending on the needs of the specific project (Hasso Plattner Institute of Design at Stanford 11).

8. Refine

Refining occurs at the end of the iteration process, once the final design concept is chosen. In this stage, the final form of an artifact is modified incrementally at a very fine level. It is differentiated from the other design thinking stages because of the unique focus on form that is not shared by the common design thinking models.

processes (Nikirk 41) than previous generations. The sections that follow detail the process I used to learn about these students, and develop educational materials that meet their needs.

Creating Educational Materials Using Design Thinking

Applying my idiosyncratic design thinking approach to creating educational materials resulted in the following fifteen step iteration process. Although these stages often overlapped and sometimes occurred concurrently, they are presented here as discreet, linear stages for the sake of clarity. Figure 4 contains a visual summary of this approach.

1. Empathize

In the first stage of this design thinking, I supplemented my observation and listening to students with researching two areas: psychological and neurophysiological factors related to learning, and students’ cultural context.

1.1 Psychological and Neurophysiological Factors

I first set out to understand the brain activities central to learning. Psychology and cognition research provides the interested educator with an almost overwhelming amount of information. Here I will provide a summary of the two factors most relevant to educational materials: cognitive load and working memory.

In learning environments, cognitive load is the amount of mental effort required to accomplish a learning goal. The higher the cognitive load required to complete a specific task, the more errors the student will make in the process (Lidwell, Holden, and Butler 148). This is because high cognitive load taxes working (or short-term) memory. When information is received rapidly, much of it is not stored, because working memory can only hold a maximum of seven pieces of information at once (Benson et al. 170).

In addition, the cohort currently in undergraduate school is the first generation to have grown up with online life – smartphones, broadband, social media, Google, and Wikipedia – inextricably intertwined with offline, non-digital life. Known as “digital natives,” these individuals have different information processing capacities than previous generations. They have superior multi-tasking activities than

Pilot Study

This pilot study was started after several semesters of observing a disconnect between my expectations of students and their performance. Anecdotal evidence suggested that many of my colleagues were noticing the same disconnect in their classrooms. This disconnect turned out to be symptomatic of an inter-generational cultural and neurophysiological gap. Current undergraduate students, who are the second wave of the Millennial Generation, and are also the first generation of so-called Digital Natives, have significantly different values (Coomes and DeBard 34) and somewhat different neurophysiological

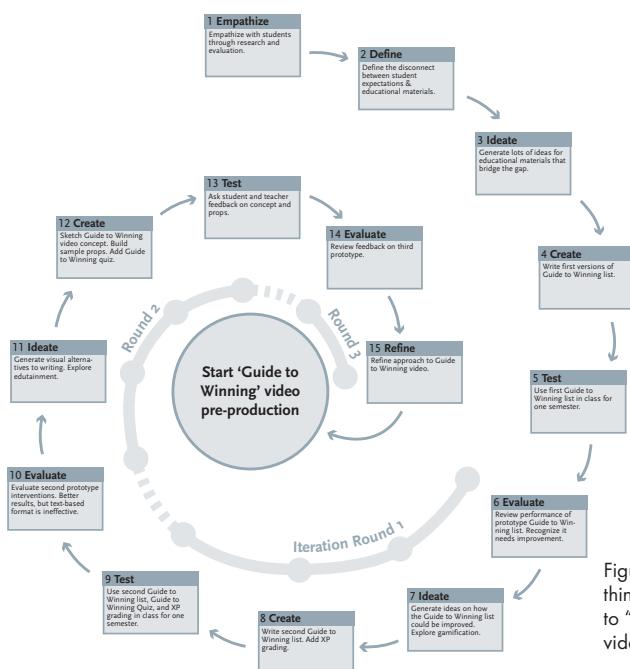


Figure 4: Design thinking process prior to "Guide to Winning" video pre-production

previous generations of the same age, but have much less capacity to sustain attention on one thing, such as reading a long essay. This is due to the extent and pace of their exposure to these innovations, during the time of formative brain development (Nikirk 41).

1.2 Cultural Context

The most frequently documented cultural context of today's undergraduate cohort is that they make up the "second wave" of the Millennial Generation (Howard-Hamilton, Marbley, and Bonner 6). The millennial generation includes all people born between 1980 and 2000, but the second wave includes those born in or after the late 1980s (Rainer and Rainer 2). Basic life skills previous generations have taken for granted are difficult and/or unfamiliar to Millennials (see Holland and Holland 16). Often repeated characteristics of this generation include being particularly confident, self-important, sheltered, and grade motivated (Coomes and DeBard 35-39).

Broad social patterns, specific parenting practices and educational trends have contributed to the development of these traits. The majority of these students have been raised to be rewarded for attendance rather than performance, with disregard for societal conventions, to ignore authority figures,

and to consider laws and morality as flexible personal preferences (Howard-Hamilton, Marbley, and Bonner 11) and (Twenge 23, 31).

This combination of traits is obviously problematic in the higher education setting, where rewards are only given for performance, and the weight of social convention and moral authority have been traditional motivators of student performance. These issues are compounded by the problem that second wave Millennials students do not appear to understand there is a difference between the knowledge their Professors have, and the advice they could receive from any person on the internet (Howard-Hamilton, Marbley, and Bonner 17).

2 Define

After empathizing with students' experience of life generally, and higher education specifically, I sought to define the impact that I wanted educational materials to have on their approach to learning.

It is clear that the current cohort face unprecedented challenges in their undergraduate education. Nevertheless, they still need to learn effective communication and study skills in order to thrive at university and beyond (Holland and Holland 17 and Sherer and Shea 56). Therefore, my goal was to communicate the most important determinants of success at university, with a focus on the knowledge

that was implicit in previous generations, but foreign to this generation of students.

3 Ideate

Due to severe time constraints, this ideation stage was brief. My priority was to generate ideas that were fast and easy to implement, so that I could have material to test in classes I would be teaching in the upcoming semester. During this process, I identified two communication strategies that are important for managing cognitive load, and that I made a priority in my ideation: hierarchy and redundancy. Maintaining a constant, moderate cognitive load in students is optimal for learning. By using these three strategies when creating educational materials, the cognitive load of students can be moderated to an extent.

Creating effective visual and textual hierarchies is perhaps the most important communication strategy for applying to educational materials. Hierarchy refers to breaking up text and images into small, easy to digest chunks of information that visually demonstrate their relationship to each other (Johnson 1). Redundancy is the repetition of important pieces of information at key points, for the purpose of maximizing information retention (Lidwell, Holden, and Butler 204–205). In educational materials, redundancy needs to be used strategically, with only the most crucial information repeated multiple times.

HEPWORTH'S GUIDE TO WINNING AT JOUR300

1. Do more than you're asked to.
2. Teach others what you know.
3. Make work into play.
4. Be nice.
5. Own your grade.

Everyone starts with an F. The volume and quality of your work will increase your grade.

6. Own your actions.

You are responsible for your own attendance, behavior, learning, and work.

4 Create

This first creative process produced multiple versions of the Guide to Winning list. After developing these versions, one was chosen for testing (See Figure 5).

The six items on the list were intended to be a short, easy-to-remember guide to behaviors and communication that is acceptable in the courses I teach. The title included the phrase "Guide to Winning" as an irreverent reference to students high motivation to obtain good grades, and more generally, to be successful at life.

5 Test

This first Guide to Winning list was used in two courses I taught in the Spring semester of 2014. Forty-three students saw the list during this semester, as part of their online course materials. This testing was informal and passive. I observed the class responses to the Guide to Winning list when it was introduced at the beginning of the semester and continually compared student performance in these classes with that of students in previous semesters.

6 Evaluate

Evaluating involved reflecting on the test observations within the context of the research done in stages 1 and 2. In this stage, I came to the conclusion that although the content and concept of the Guide to Winning list was appropriate for my students, it was not engaging in its current form.

7 Ideate

This round of ideation focused on ways to help students engage with the content of the Guide to Winning list. I explored two areas of research as part of this stage: aesthetic usability effect, and gamification.

Aesthetic usability effect is a phenomenon whereby people prefer using things that they find attractive. When people appreciate the aesthetics of a product or experience, they invariably judge those things to work better than less-aesthetically pleasing versions (Lidwell, Holden, and Butler 18 and Norman 17). The emotional gratification of using an aesthetically pleasing resource has a tangible effect on self-efficacy, which Scheel reminds us, is key to success in higher education (Fenci and Scheel 20). I suspected that if the Guide to Winning list were presented in a way that was more aesthetically pleasing to my students, it could engage them more.

Figure 5: Guide to Winning list version 1 (from Step 4 of design thinking process).

GUIDE TO WINNING

- **Owning your grade**
Everyone starts with an F. Your grade increases with the volume and quality of your work.
- **Owning your actions**
You are responsible for your own attendance, behavior, learning, and work.
- **Do more than you're asked**
Before every class, during class, after every class.
- **Teach others what you know**
This is the best way to learn. Plus, it's nice to share.
- **Make work into play**
Finding ways to make work fun improves the quality of your work.
- **Be nice**
Life is too short to act like a jerk.

Figure 6: Guide to Winning list version 2 (from Step 8 of design process).

The term gamification is used to refer to the application of any game strategy to any non-game situation. Gamification has proved particularly helpful in education, with game strategies providing extra motivation for students to become engaged with course materials (Attali and Arieli-Attali 57 and Dickey 68). Some of the game-based strategies that assist learning include progressively harder challenges, levels of accomplishment, immediate visual feedback on performance, interaction with others, clear statements of students' roles, and an accumulating balance experience points (XP) (Dickey 67–69). I predicted that if I were to "gamify" some elements of my course, they might encourage my students to act in accordance with the suggestions in the Guide to Winning list.

8 Create

The second version of the Guide to Winning list was created in this stage (see Figure 6). The list title was shortened to "Guide to Winning" for the sake of catchiness. I re-arranged the order of the items on the list to emphasize self-responsibility and good manners. Emphasis was achieved by employing the principle of serial position effects, whereby the first and last items on a list are better remembered than the middle items (Lidwell, Holden, and Butler 178). I also added some subtle font and color variations

to the list, in an attempt to capitalize on aesthetic usability effect. The final improvement to the Guide to Winning list was adding short, explanatory sentences to each item.

I also added several of the recommendations from the gamification literature to my course materials. I changed the grading to use experience points, added a scoreboard reminiscent of computer games to my online course materials (see Figure 7), and divided the course content up into six distinct, progressively harder sections. These sections further mimicked levels in gaming by being released incrementally. All but the first of these sections were hidden at the start of semester, only being shown to individual students when they had completed all the work in the previous section.

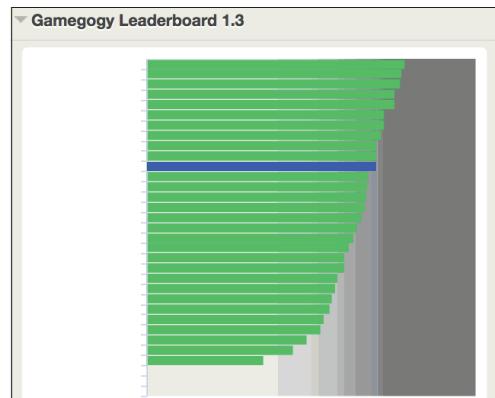


Figure 7: Scoreboard added to online course materials (from Step 8 of design thinking process). Each bar in the graph represents one student's total score. Students see their own bar highlighted.

9 Test

The updated Guide to Winning list and assorted gamification strategies were used in Fall 2014 with 40 students across two sections of the same course. As with the previous testing stage, this was passive and informal. The impact of this suite of changes was immediately noticeable in an increase in motivation and friendly competitiveness among students. Although this was promising, it was not the main aim. Therefore, as in the previous round of testing, I observed student behavior constantly throughout the semester, comparing it with behavior of students during the previous semester, and looking for improvements.

10 Evaluate

Evaluation of the second round of testing involved comparing test results from stage 9 with those from stage 5. The most recent test was a major improvement on the previous test, with students demonstrating more awareness of the relationship between their performance and their grades, and using more courteous, professional language in class and in course communication. The range of interventions also had the unexpected result of creating greater camaraderie between students within the classes. Despite the improvement in student performance, I suspected that the Guide to Winning list could be further improved by presenting it audiovisually.

11 Ideate

This ideation stage was brief but extremely productive. In collaboration with colleagues, I generated many ideas for unique audiovisual ways to engage students in the Guide to Winning content.

12 Create

The ideas generated in the previous stage were the starting point for a series of sketches in this creation stage. After discussing the sketches with colleagues, the most promising visual concepts were developed into rough prototypes. The prototypes were grouped related to one of the following three concepts: historical figures juxtaposed with contemporary cultural references, a cardboard classroom with cardboard furniture and students, and chalkboard stop animation.

13 Test

The prototypes were used to test the appeal of each concept. Both students and teachers were asked for feedback on prototypes in a series of informal interviews. Approximately ten interviews were conducted.

14 Evaluate

Feedback from the previous round of testing indicated that the historical figures and cardboard world concepts were unappealing to students. They interpreted historical characters and a cardboard world as too simplistic, and in some cases, even offensive. The chalkboard stop animation concept was received well.

15 Refine

Based on the findings of the evaluation stage, the Guide to Winning video concept was refined in the direction of the third and most popular concept. This

Source	Item	Cost
Reynolds School Loan	Canon C100 Camera	\$6,000
	Canon C100 L Series Lens	\$1,000
	Arri Lighting	\$2,000
	Senheiser Microphone	\$1,000
	Task Cam External Recorder	\$1,000
	Time Lapse Dolly Slider	\$1,000
	Canon 5D Mark 3 Camera	\$3,500
	64GB SD Cards x 3 @\$250 each	\$750
	Rock 'n' Roller Equipment Trolley	\$200
	Sachtler Carbon Fibre Tripod	\$1000
	Subtotal	\$17,450
Grant 1	Camtasia Screen Capture Software	\$66
	Jot Touch Bluetooth Stylus	\$90
	Animation Desk Software	\$20
	Props	\$324
	Videographer (shooting and editing)	\$2,500
	Subtotal	\$3,000
Grant 2	Production Assistant	\$2,100
Faculty time	Katherine Hepworth	\$3,250
	Total	\$25,800

Figure 8: Costs associated with the “Guide to Winning” video production

involved sketching potential scenes, and thinking up feasible ways to use chalkboard animation, given the time-consuming nature of stop motion shooting, and the strict time and resource constraints on the project. The video concept ultimately ended up as a twist on the traditional teacher-at-desk style of educational videos. The twist involved adding a lot of animation, some comic interludes, and chalkboard stop animation. Once the refinement process was completed, I moved on to video pre-production.

“Guide to Winning” Video Production

Pre-production

The pre-production process started with taking stock of currently available resources. The Reynolds School at the University of Nevada Reno has a large amount of high quality production equipment I was able to use free-of-charge. Initial funding was then secured to cover the cost of props, software, and a videographer. Six months into pre-production, a second round of funding was secured to hire a production assistant. Figure 8 shows the costs (both in-kind and explicit) associated with making this video.

The project management involved in this pilot production included hiring, managing, and monitoring payment of staff, gaining shooting approval, and managing workflow for all team members. The

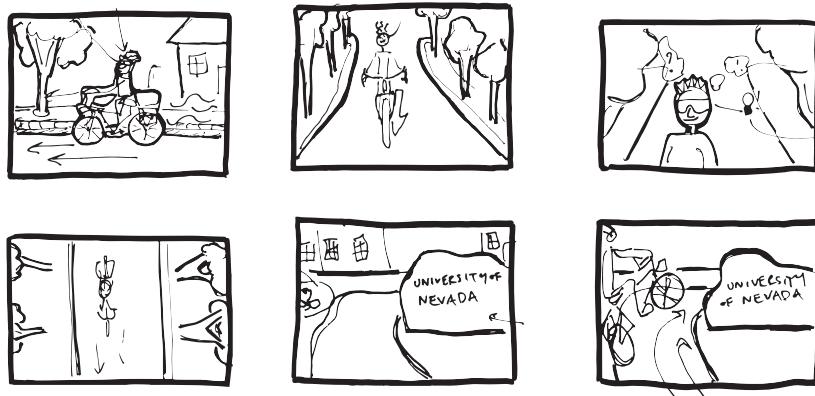


Figure 9: A storyboard created in the pre-production process.

team members included a videographer, production assistant, and me. The pre-production work shared between us included location scouting, storyboard-ing (see Figure 9), and script writing. While the work was shared, the vast majority was done by myself, due in part to funding constraints, and in part due to poor project management.

Production

Production included animation, chalk board stop animation, studio and on-location shooting, and drone camera work. The animation work was most time intensive, with approximately 100 hours of animation work going into 70 animations. Almost all of this animation work was completed by myself, and took approximately four months.

The remaining production work was completed in three days, and was shared more evenly among the three team members. All of the chalk board stop animation occurred on campus, as well as the bulk of the location shooting. The drone footage in the intro scene was shot in suburban Reno.

Post-production

Post-production was completed mostly by the videographer. Several stages of editing revisions were included in post-production, and these were completed by the production assistant and me.

Finished video

The finished video is just over three minutes long, and incorporates most of the communication strategies researched in the design thinking process (see Figure 10). Those communication strategies not incorporated in the video are exercised when all the educational materials are used in combination.

Evaluation + Further Research

The unexpected value of using the design thinking process was the development of a range of interconnected interventions to increase student performance. While I set out with the hope of producing “something” to bridge the gap between my expectations and student performance, I ended up with much more: a re-designed course structure, grading schema, and a short video. These

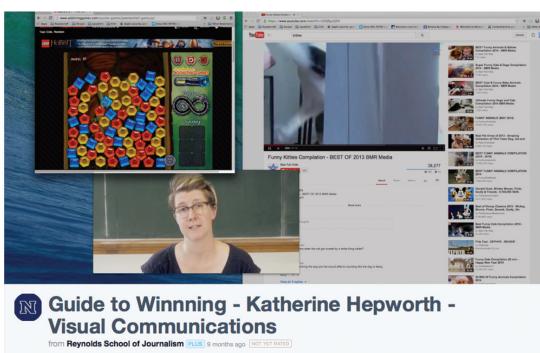


Figure 10: The Guide to Winning video can be seen in full at: <http://bit.ly/GuidetoWinning>

educational materials have been received positively by both students and educators. The video, in particular, has received overwhelming praise.

This project could benefit from further testing to quantify the effectiveness of the developed range of educational materials. Initial positive feedback indicates these materials are effective, and it would be worthwhile to subject them to formal testing to ascertain why. Specifically, the Guide to Winning video would benefit from eye tracking testing and in-depth user interviews. This combination of qualitative and quantitative evaluation could provide greater insight into how and why certain materials become engaging.

In hindsight, the design thinking process could have been enriched by incorporating ethnographic processes into the empathizing stage (see Lupton and Phillips 26), generative techniques across the defining, ideating and creating stages (for example, see Sanders and Stappers 66), and extending the iteration process throughout the video production using the method advocated by Brunsell and Horejsi (8).

The gamification elements in the course materials could also be improved in future iterations. For example, badges for students who demonstrate accomplishment of each of the rules in the Guide to

Winning list would provide extra immediate visual feedback. Also, weaving the narrative element of gameplay into the course materials could provide an additional engagement device. These are areas of opportunity for future studies.

Conclusion

In order to be effective, educational materials must be engaging; understandable to and meaningful for the students using them. Though there is a gap between student needs and what traditional educational resources provide, educators can fill this gap by creating educational materials themselves using design thinking. However, engaging materials are not created by happenstance. This paper has demonstrated how using design thinking can be effective for designing educational materials that address the disconnect between current undergraduate students' performance, and educators' expectations of them. Following the design thinking process, I participated in a cyclical, holistic analysis of all the course materials that contribute to students' learning experience. This analysis facilitated multiple small improvements to course materials, and development of one major improvement: the Guide to Winning video. No doubt design thinking will prove effective for other educators who seek to increase their students engagement and self-efficacy in learning environments.



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MORGAN JENKS is a lecturer in the College of Architecture/Visualization Department at Texas A&M University. His drawings of simple lines and patterns explore transitional states, and his performative work investigates the polarity between technology and the wild, and attempts to synergize the computer and the outdoors. His most recent projects use the dance floor, harnessing unprocessed vocals, acoustic guitar, and wind instruments and merging them with distinctly digital sounds and organic forms to fuse the audience's experience of dancing with botanical imagery.

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keywords: electronic music, Microsoft Kinect, wearable computing, experience aesthetics, immersive, responsive environment, audience/machine interaction

Dance Floor as Wilderness: Audiovisual Performance Towards a Regard for the Non-Man-Made



Introduction

In the Spring of 2014, I went to perform music and visuals at a camp-out and multi day electronic music concert in the Sam Houston National Forest. While in the forest, I was struck by the stark juxtaposition of dark, gasoline powered electronic music ringing through the pristine landscape. A five-minute walk away from camp, there were no visual markers of human activity, and yet the air was saturated with the sound that seemed to signify humanity's razor sharp distinction from all other things. Through the experience, I became aware of a sense of alienation from the environment that coincides with a sense of identification found in information technology. I returned to my day-to-day with a keen desire to become more familiar with nature from my technologized perspective, began a garden of tomatoes, beans, and ornamental plants with my housemates, and I began investigating the local environment with my camera. The desire to bring people to interact with their non-man made surroundings brought me methodologically to using the Microsoft Kinect¹ on the dance floor to fuse the audience's experience of dancing with botanical imagery.

Aesthetic As Signifier

I seek to accentuate the sense of polarity between technology and the wild, but also, I want to synergize the computer and the outdoors. I want people to regard both things creating pairings more so than mixtures. In the performance, unprocessed vocals, acoustic guitar and wind instruments coincide with distinctly digital sounds as well as a visual pairing of organic forms and crisp 3D structures. The non-organic side of this pairing is idiomatic of what has been termed 'post-digital' by composer Kim Cascone (2000: 12). Colloquially termed "glitch," this aesthetic developed in response to the newly affordable computational techniques available to artists without technical backgrounds around the turn of the century (Cascone 13). Through the examination and magnification of the idiosyncrasies in computer audio such as the noise floor in analogue to digital conversion or skipping in CD playback, new sounds entered the cultural space of electronic music. This is the foregrounding of the computational medium

(Cascone 13). Other artists, such as Ryoji Ikeda and Alva Noto, have proceeded from glitch into work that is much more rigorously designed, not glitching at all but functioning properly, as it were. This work is the foregrounding of computational mastery, the revelation of mathematics, and the new formal possibilities afforded by virtuality (MoMA 2013). In my work, I have taken up similar sounds as these artists as a means of plugging into the cultural dialectic regarding technology in our lives.

There is another recent discussion on what is being called the "new aesthetic" (Bridle 2011). This is about turning to our current technologies with the perspective that they are objects of the future, but also totally mundane. Work tied to this concept seems to be another phase of post-digital discourse, ever-newer techniques reaching the masses and undergoing investigation in much the same way that Cascone detailed. I very much feel this discussion in the cultural milieu, almost constantly having new smartphone apps as potential artistic tools. One of these apps, 123D Catch², renders 3D models from a series of still pictures. I primarily use this program to gather scans of my botanical subjects. The process of using this smartphone app has come to resonate strongly with me as connector of these concerns for relationships. Mobile computing represents a move into smaller footprints on the environment, freedom of movement, and increased ability to capture information from the world, yet it is an obscure, filtered window into the world, that has just as much potential to distract as it does to connect. Making 3D scans with photogrammetry is excitingly new and perhaps obtusely pedestrian.

The use of field recordings and traditional instruments compliments the glitch aesthetic. I see it as an important critical stance that I am both developing custom software and I am preserving the aspect of live acoustic technique. This is an affirmation of the practically magical possibilities of digital media, and a reaction against the potential for humans to become sedentary with the stimulation of media (Sisson, et al. 2010: 311). I leave myself vulnerable to playing wrong notes or playing out of time, and thus challenge myself to improve. We must include

1. Microsoft Corporation. "Xbox Kinect|Full Body Gaming and Voice Control." Accessed July 1, 2014. <http://www.xbox.com/en-US/kinect>.
2. Autodesk Corporation. "123D." Accessed July 1, 2014. <http://www.123dapp.com>.

our bodies in the future, because it's not just "use it or lose it" as the saying goes, but use it to improve it (Shibata, et al. 2011: 1414).

Relationships in Performance

For several years, I have been invested in making electronic music happen in live improvisation.

Programming for variability and control, spanning orchestrational and structural as well as soloistic possibilities, has been motivated by an intrinsic love of the technological materials themselves and intensified by a tension in my experience of much media based performance. As Sanden notes, "The desire for interactive liveness is made even more palpable in its absence" (2013: 88-89). I have created several specialized interfaces, and after establishing a certain level of competency with my own methods of input, the notion of involving the audience arose in tandem with the newer ecological conceptual thrust. The possibility of audience control resonated with the idea of perspectives on nature and technology and also as a strategy to encourage audiences' personal investment in the live event and its unfolding. The system takes a perspective on the audience and offers participants real-time feedback for their activity simultaneously as it presents recorded environmental structures.

The interactivity between an electronic musician and their systems is what Sanden calls "musician/machine" interactivity (2013: 102-103). This refers to traditional performer causation of the musical events. The new audience interactivity is what Sanden might term audience/machine interaction, though the interactive role of the audience challenges the very term "audience" itself. Future developments may completely dissolve the distinction between stage and dancefloor. However, in the current iteration of Ecosystem As Relationship, this audience/machine interaction exists alongside and also interacts with performer/machine interaction.

Distinct features of audience motion are derived from the raw depth video stream of a Microsoft Kinect Controller and are used to modulate graphics, as well as high level parameters of sounds. The import of this reactivity is that audiences receive

both visual and sonic feedback of their presence within the performance and are more attuned to unique occurrences in the moment. They are prompted to physically engage more, and I aim to play together with the flow of the crowd to create a shared sense of agency.

Technical Details

To detail the particulars of the audience driven components, the depth image stream from the Kinect is first received within the Max environment through the `jit.freenect.grab` external³. The depth stream is represented as a two-dimensional grayscale video with floating point values for each pixel that represent the distance from the camera. These distances are scaled and transposed to normalize a manually selected depth range. Range selection allows for site responsive calibration of the system to fit within the size of a given performance space and also cuts down a fair amount of depth noise from small details at the far end of the Kinect's vision. The depth stream is then down-sampled from a resolution of 640 by 480 pixels to a resolution of 32 by 24. This further reduces noise from oblique and reflective surfaces, averaging the input values to form the output. Downsampling also lowers the computational load of the stream going through optical flow analysis, which is next in the signal processing chain. I have opted for optical flow tracking instead of user identification because it is more suited to dealing with many audience members at once and is much less computationally intensive than skeleton tracking. The optical flow processing is accomplished with Pelletier's `cv.jit.opticalflow` object⁴, and its output takes the form of two image streams within which each pixel is a signed floating

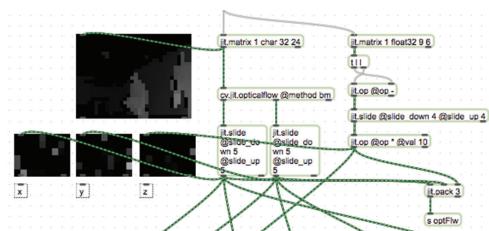


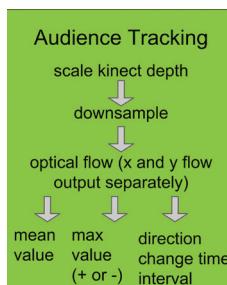
Figure 1: The x, y, and z optical flow values. Negative pixels are clipped at black in these displays.

3. Pelletier, Jean-Marc. "jit.freenect.grab - Kinect in Max/MSP/Jitter" Accessed September 1, 2014. <http://jmpelletier.com/freenect/>.
4. Autodesk Corporation. "123D." Accessed July 1, 2014. <http://www.123dapp.com>.

point number representing the movement vector of the source signal within that particular region of the image. Of the two outputs from the optical flow solver, one stream contains vertical movements, and one contains horizontal movements. Changes on the z-axis are found by subtracting the current frame's pixel values from the previous frame's values.

The optical flow image streams are sent to a namespace for usage within the visual system, and can be mapped multi-dimensionally to geometrical data of the 3D graphics. I often use the array of flow vectors to displace a mesh by summing the coordinates of mesh vertices with the flow vectors. This creates a springy effect where vertices return to their origin when audience motion subsides. Particle systems can also be affected by the flow field as an array of forces resulting in particles that continuously move along as if caught in a breeze generated by the audience.

The flow outputs are treated in three distinct ways to track discernable features of the audience's activity. Firstly, the pixels of the flow image are taken to their absolute values and averaged in order to measure



how active the whole dance floor is. Secondly, the vertical flow image is divided into a left and right half, and each of these is sorted for the vector with the largest magnitude, which grants direct motion control to the most active people on the left and right sides of the dance floor. Thirdly, the pixels of the flow image are monitored for changes of direction. This is accomplished by multiplying the current and previous frame and then checking for products less than zero. If there are any changes in direction in a frame, an interval timer is updated to output how rapidly people are moving back and forth on the dance floor.

These treatments of the data are sent to a second computer and then combined in different ways to

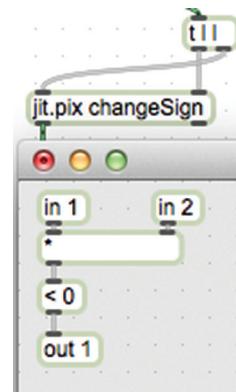


Figure 2: The calculation to find changes in direction.

modulate musical elements: two drones, field recordings, and rhythmic samples. One drone rises and falls in volume with the average movements and is panned left and right with the greatest horizontal vector from both the left and right halves. Field recordings are modulated with these same inputs after the control signals are smoothed to create longer envelopes. The field recordings are also processed through various amplitude modulations that only begin to kick in at high levels of activity and will effectively scramble the field recordings. Another drone is routed through two band pass filters which sweep up or down according to the largest vertical vector on the split left and right halves of the input stream. Volume in each EQ band of this drone is controlled by the absolute value of these vertical vectors so that motion up or down will generate output. Rhythmic samples are triggered from a composed MIDI loop that is gated based on MIDI velocity. As changes in audience direction rise in frequency, so too does the gate threshold such that stationary rhythmic dancing results in more rhythmic musical events than broader flowing dancing does.

Further Development

In performance, connection with the audience is being achieved, but it could be further refined. From the initial two performances with audience input, several situations have arisen which point to limitations of visual reactivity. So far, the individual pieces for the system have been designed with only specific ranges of intensity in mind, but in performance, audiences have at times acted outside of the intended intensity. For example, during a performance of a particular upbeat number, the audience decided to take a break, leaving the visuals nearly static.

In another instance, I ended the set on an intricate but subdued piece with visuals that will not respond more dramatically than very subtle shifts of light and shadow across a stationary form. I kept the beat going through the transition into this piece, and the audience was energized from the previous song. Subsequently, they turned to waving their arms around playfully in an effort to get a response from the graphics. Because of this mismatch between the audience's input and the system's output, the outcome seemed drastically underwhelming. There was no visual sense of kinetic correlation.

A few possibilities for improvement come to mind. The most basic change to make is that there should be some reactivity to musical events in all of the visual systems. At present, some pieces have musically triggered events such as camera movements or popping shapes, while others have only responses to Kinect input. I suspect that this confounds the audience's attempts to identify consistencies across pieces in the set and that the inconsistency should be avoided.

The full range of audience activity needs to be accounted for in order to maintain flow through any given audience reaction. An obvious strategy for this would simply be to standardize an amount of visual activity across all compositions to correlate to both the most active and the least active that the dance floor could potentially be. This would open up audience agency, and open up the compositions to a range of states. Another possible strategy for having an intended scope of intensity might be to program for negative feedback to motion outside of the desired range. For example, a flower that shrivels when there is too much activity, but blossoms when it

is calm. This strategy brings up interesting questions about what the audio might do when the audience behaves outside of a target mood. A stage of filtering and distortion could be applied to all of the sound in order to dampen or strain the affect, but it seems less interesting for me to try to enforce limits on the unfolding of the performances. It seems that development into greater possible states will be more rewarding and also allow for the original, limited, state.

These performances are an attempt to re-introduce people to their environment, to highlight the disconnection along with our elevated place in the world, and to make an opportunity for new personal involvement. It is consequently important to me that the performances of this work tie-in to other educational, agricultural, and community groups in order to extend the the performance beyond the show. In continuing this practice, I will include guest speakers, booths for local groups, and visual materials explaining how to get connected. This cooperation with others is not necessarily contained within the discrete individual works here, but is intended as an important aspect of the encompassing performance practice. Furthermore, the studio process of this work involves a substantial amount of time outdoors, collecting footage and field recordings, as well as the time spent gardening, nurturing the subjects of the recorded materials. With the readily available 123D catch app, it seems interesting and feasible to crowd-source the generation of the 3D landscape content. This might take the form of many more diverse 3D models appearing in procession throughout an evening's performance, and would connect the virtual content and the audience to a collective practice of outdoor investigation.

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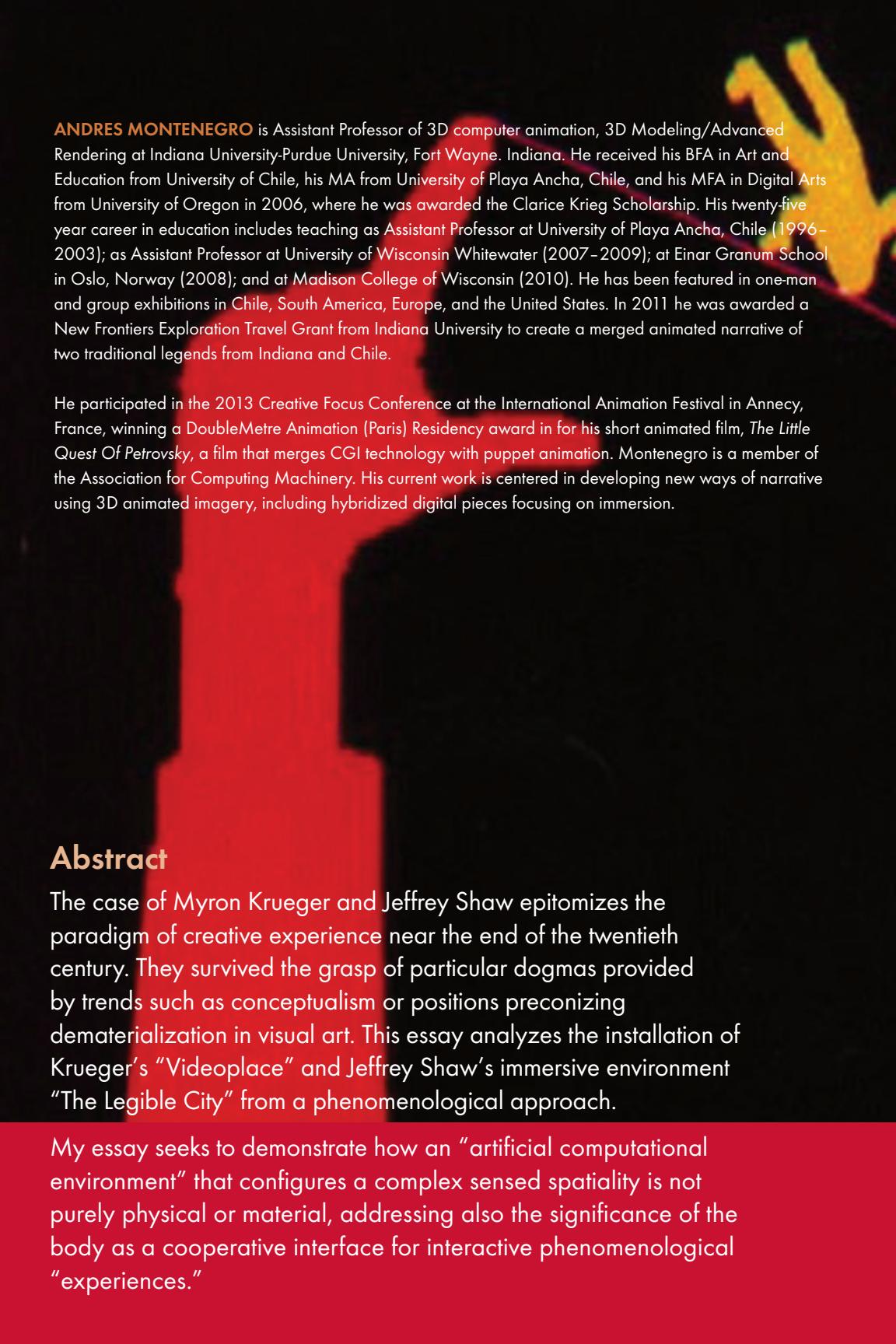
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He participated in the 2013 Creative Focus Conference at the International Animation Festival in Annecy, France, winning a DoubleMetre Animation (Paris) Residency award in for his short animated film, *The Little Quest Of Petrovsky*, a film that merges CGI technology with puppet animation. Montenegro is a member of the Association for Computing Machinery. His current work is centered in developing new ways of narrative using 3D animated imagery, including hybridized digital pieces focusing on immersion.

Abstract

The case of Myron Krueger and Jeffrey Shaw epitomizes the paradigm of creative experience near the end of the twentieth century. They survived the grasp of particular dogmas provided by trends such as conceptualism or positions preconizing dematerialization in visual art. This essay analyzes the installation of Krueger's "Videoplace" and Jeffrey Shaw's immersive environment "The Legible City" from a phenomenological approach.

My essay seeks to demonstrate how an "artificial computational environment" that configures a complex sensed spatiality is not purely physical or material, addressing also the significance of the body as a cooperative interface for interactive phenomenological "experiences."

Two Phenomenological Notions:

As Expressed in the Interactive Art
Contained Within Myron Krueger
and Jeffrey Shaw's
Immersive Environment

keywords: isomorphous,
artificial reality, immersive
learning, multichannel, dynamic
intermediary, graphical interface

Overview

The case of Myron Krueger and Jeffrey Shaw epitomizes the paradigm of computing creative experience near the end of the twentieth century, and represents the emblematic vindications of art production synthesis.

To begin, I will discuss the installation of Krueger's "Videoplace," which was created in 1974, and enacts the paragon of the phenomenological relationship between body and space, referring to the body as a mediating responsive interface. Then I will discuss the second artist, Jeffrey Shaw, with his work "The Legible City," presented in 1989 in New York, and later in Amsterdam in 1991. In this installation Shaw configures a particular phenomenological relationship of interactivity using the body and architecture.

Videoplace and the Beginning of Virtual Reality as a Phenomenological Event

Krueger begins in the sixties with experiences uniting technology and visual arts. This was significant because of his scientific background in Computer Science and Engineering. These developments using computers had noteworthy previous involvement through Experiments with Art and Technology (E.A.T.)¹ (Krueger 423) in the mid-sixties in New York. It began originally as a group of artists and computer scientists, including personalities like Robert Rauschenberg and engineer Billy Klüver.

The need of artists to have "experiences" instead of syntactical readings in the sixties becomes a fundamental category to understand the process of fusion of technology and art. This fact would later provide a resource for the development of a methodological production of artwork, nevertheless integrating novel elements of visual significance (Expanded Cinema, Experimental Animation, Multimedia, and Video Art).

Thereupon the concept of "Virtual Reality" emerges thanks to Myron Krueger, becoming the construct that unfolds the dimension of reality within an environment-installation. The quintessential experience of this new approach to reality is "interactivity," an action based on the dualism of interaction-response.

Responses had to set up an effective experience of communication in the context of a stimulating immersive space: "The visual responses should be projected on the dimension of the environment, and other sources of visual stimulation should be minimized" (146).

Citing the theories of Maurice Merleau-Ponty, James Steeves offers a definition that helps to understand this conflict between perception as experience and an artificial environment: "The artist, like mime, is aware of the creative role that the body plays in perception and attempts to return the viewer's attention to the creative power of the body" (7).

In "Art and Existence", Eugene Kaelin Analyzes Merleau-Ponty's sense of involvement within an art piece, asserting that within the context of an aesthetic theory, "the non-reflective component of human experience represents our basic intuitive or pre-reflective intercourse with aesthetic stimuli" (318). This will determine our intervention in the interactive piece. However, this intervention would be a product of the experience rather than a mechanical exercise.

In her article "Performing Phenomenology," Suzan Kobel discusses staying away from preconceived notions and expectations in order to inhabit the immediate moment of perception. This action carried out through our pre-reflective or pre-conceptual notion of the world, will finally help us to reveal what it is implied in the explicit event of our lives (18).

Moving your body is not only a matter of performing a function, it is also an aesthetic experience (Hook 175). James Steeves reflects about this point:

Merleau-Ponty argues that an art form traces the path of the artist's body in relation to a particular way of "seeing" the world that the viewer is invited to explore and revisit by interpreting the art form in terms of her own embodied experience. A work of art arrests the attention of the individual to contemplate the way that its colors and surfaces present a world to the body to interpret and inhabit (7).

Krueger applies the technology for the interactivity, but this is a consequence of an artistic aim to invite participation in lieu of contemplation. Despite this,

1. Artists and the art community responded enthusiastically to E.A.T. By 1969, given early efforts to attract engineers, the group had over 2,000 engineer members willing to work with artists. (Daniel Langlois Foundation).

the entire first stage of interaction is contemplation, because the main act of the viewer's engagement is to become first an observer then a participant. Krueger develops a statement about computer art through seven points:

Computational Art

1. Other art that is fundamentally interactive computer applications are of interest, but not a new art form based on the computer.
2. The quality of the interactive relationship is paramount. Traditional notions of visual or musical beauty are initially high. Answer the middle!
3. If the answers are intelligent, it is imperative that the computer captures the behavior of the participant to the fullest extent possible.
4. Real-time graphics and synthesized sound generated graphical interfaces ensure the most articulate and powerful answers.
5. Visual responses should be projected on a scale on the immersive environment and other sources of visual stimulation should be minimized.
6. Participants must be able to understand how to personally provoke responses. The experience is stronger when the interaction is between an individual and the computational environment.
7. It is desirable to think in terms of inventing a tool for exploring the interactive medium, instead of creating a series of discrete objects, each of which is a "piece" (147).

This declaration states that the relationship between actor/spectator and reality is complex because the new instance provided by the artist is a reformulation of reality as a digital model of it. It is the interaction between an artificial environment and a person that implements this behavior driven by the user's customary movements.

Stevees describes the interest of Merlau-Ponty in art and aesthetic regarding the body as a kind of productive interface of responses and behaviors: "Since Merlau-Ponty's essay on aesthetic theory is further extended to the art forms of dance, cinema and music. Each of these aesthetic forms relies on the imagining body to communicate and express new ways of experiencing the sensible world" (8).



Figure 1: Myron Krueger, Videoplace, 1974. Video still

For Merlau-Ponty, the meaning of art: "is not the subject, it is the allusive logic of the perceived world" (Stevees 8). Krueger describes the Videoplace (See Fig.1) installation adding the statement that explains his piece as a new experience in perceiving the world:

"The VIDEOPLACE interactions redefine the human's body relationship to reality. We have expectations how physical actions will affect the world. VIDEOPLACE uses these expectations as a compositional element. By defining unusual relationships between cause and effect, this medium comments on our sense of reality" (150).

The environment created by Krueger is the result of the real-time exchange of men and machines (See Fig. 2). Krueger himself in his article "An Easy Entry Artificial Reality," formulates his creations as an "art medium" where cause and effect would be defined by the artist and changed in composed ways from moment to moment (150).



Figure 2: Myron Krueger, Videoplace, 1974. Video still

Krueger explains the aesthetic statement of his piece:

"The impact of the experience will derive from the fact that each person has a very proprietary feeling towards his own image.

What happens to his image happens to him. In fact, when one person's image overlaps another's there is a psychological sensation akin to touch. In VIDEOPLACE, this sensation can be enhanced in a number of ways." (Packer and Jordan 113).

Krueger created an environment where pre-conceptual events help us to sense phenomena with no physical existence, where the only physical element is the interaction of the body facing a compelling virtual computer generated stimuli.

Jeffrey Shaw's Legible City as an Aesthetic Experience of Interaction

Jeffrey Shaw began his artistic production in the mid-sixties, first as a painter and then abandoning painting to adopt new expressions within emerging media available at that time such as installations and expanded cinema (expanding the formal terms of a film to integrate the live spectator experience). 1967's "MovieMovie" was his first experience in this modality, being a combination of several types of avant-garde expressions. The concept of expanded cinema was probably the first approach that Shaw would experience using technology.

It was definitely Shaw's ability to assemble a group of features in brilliant displays that made it possible to relate conceptually to installations, performances, events, situations and environments.

During the eighties he achieved a sophisticated level of development in his work, addressing issues such as virtual space, body interaction, and virtual architecture. His relationship with technology became particularly profuse in developing interactivity. According to Peter Weibel, Shaw in principle could achieve a confluence of visual possibilities foreboding a further evolution in his work:

1. Mobile screens
2. Audience participation
3. New materials
4. Mobile projections, these four conditions brought into being a new equation between image and space, between image and spectator. A dynamic architectonic space for visual events was created by the kinesis of the viewers' bodies and three-dimensional screen structures (10).

Like Krueger, Shaw incorporates the phenomenological extent of the body interacting primarily with a conceptual space and building an environment in which bodily experience was challenged through multiple sensorial channels. Shaw considered architecture as a malleable concept containing humanistic and ethnological components: "Architecture and body served as projection screen, the spectators were integrated in the image because they were denizens of the architecture, and the image could be entered because it was integrated in the architecture." (Weibel 10).

The beginnings of Shaw's work in interactive environments required the participation of the audience as a collective body articulated through a social component. The shift of "expanded cinema environment" to "extended virtual environment" was the expected evolution of this art form, connecting the actor's sensing capabilities with a more refined use of technology.

Jeffrey Shaw understood the importance of architectural spaces as places of social subjectivity and areas of experiences where the audience could sense the environment in a performing attitude. In the analysis of perspectives on the phenomenological space Morris Davis says: "As Husserl, Merleau-Ponty, and others point out, we never perceive a thing as fully present all at once; things are present through limited perceptual aspects." (107).

This context offers the possibility of developing a "soft" architecture as Shaw says. This becomes an exercise of tacit experiences living in a particular state of reduction. If we participate in a performing space where interaction demonstrates a level of relationships between individuals and objects, this would imply that the environment does reveal significant experience as a result. Morris says this about this point:

"Living things explicitly manifest something implied in our perceptual experience: that things are perceived in place, that the first unit of perception is not a *figure-on-a-ground* (as Merleau-Ponty argues), but a *thing-in-a-place*. We too are evolved, living, moving beings, and we too have evolved to be perceived in places and perceive other places, so it should not surprise us that our perception is geared first of all to *thing-place* relations. (Our places and ways of beings in

them are, though, clothed in cultural significations." (107).

Shaw creates a "place" where the parameters of the environment are prerequisites for carrying out a phenomenology of space. The relevance of the work of Jeffrey Shaw is basically a phenomenological exercise of "Epochē."²

During the seventies Shaw put more emphasis on architectural configuration instead of the image. Shaw had developed installations using slide projectors, mirroring techniques, and "Anamorphosis."³

The concern with space and their interrelations with the body and the social body is one of the main lines of development in Shaw's work. According to Peter Weibel:

"If the relationship between image and space is a constant subject running through the different stages and phases of development in Jeffrey Shaw's oeuvre, it is accompanied by the basic method of isomorphism. The term 'isomorphous' denotes a similarity between unrelated forms and indicates the existence of a format similarity, or sameness, between visual and real signs, virtual and real images, virtual and real spaces." (14).

We can see in Shaw a concern about the modern definition of contemporary art especially in terms of argumentative exercise of validation and reinvention. Peter Weibel discusses the theoretical framework of Shaw:

"Behind this isomorphism lies a fundamental axiom of Conceptual art namely the tautology known from the work of Joseph Kosuth. Other structures of conceptual art, such as self-reference and self-resemblance, loop formations or the circular observer situation based on mirrors and semi transparent glass wall observable in the architectural sculptures of Dan Graham are carried on in Shaw's work." (15).

Shaw integrates a wide range of ideas of intellectual dynamic during the sixties; also his works go beyond reality in terms of a situational setting. Shaw

emphasizes a perceptual exercise, which highlights the values of the opposite of representation based on the symbolic and the imaginary plane. Different streams of validation are nurturing the theoretical platform of Shaw. To this respect Weibel states:

"Shaw's installations aim at the expanded states of consciousness and reality. He used the means of digital technology to pursue the contextualization of perceptual procedures to an extent that surpassed the results of Op art and Kinetic art, at the same time acting on the insights communicated by Conceptual art and Action art. With the narrative presentation of perceptual procedures he so singularly integrated in media art, Shaw offered art many possible ways of breaking out the traditional impasses and opening up unexplored horizons." (17).

The "Legible City" is the product of the concerns that arise in the work of Jeffrey Shaw regarding the possible use of new answers offered as opportunities for interaction in virtual space, through its implementation as computational environment. In her article "Performing Phenomenology," Susan Kozel indicates the tension about positivist theories and technology, and how she indicates a way of solution to this tension through the convergence between the body and computers, asserting this engagement, as a methodology will produce knowledge within an ample array of new artistic formulations. (11).

The "Legible City" was a work in which the text simulated real buildings assuming a metaphorical articulation based on architectural-spatial information. To this respect Weibel explains: "The letters join together to form coherent sentences legible to the visitor riding round on a bicycle. This form of representation consummates an idea hinted at the Middle Ages and Baroque, namely that a relationship exists between syntax and structural design, between architectural and alphabet." (19).

Anna Kouppanou and Paul Standish mention a disclosed ethics in Digital Technology that stresses the inseparability of the person from their environment, a relation that is always mediated technologically. (106).

2. *Epochē*: Bracketing reality itself. We should indeed put all things for the natural empirical world in "brackets," subjecting them to a transcendental suspension of conviction—to epochē. ([Brittanica.com](#))
3. *Anamorphosis* is a reversible deformation of an image produced by an optical method (for example, by using a curved mirror), or through a mathematical procedure. ([Brittanica.com](#))

According to Jeffrey Shaw this experience is critical for the understanding of a new immersive context: "The composition Shaw delivered using technology shows the interconnection between the observers and the world, in an increasingly complex and variable relationship, because only such complexity and variety can understand the necessary degree of freedom to model the world as a user's manual." (Morris 19).

Kouppanou and Standish in "Between Information Ethics and Phenomenology," recognize in the individuals an undercurrent "informational ecology," when they immerse in the digital/virtual environments, in the end becomes a merge of users and environment to be acknowledged as the "self." (114). The "virtual" experiences in the work of Shaw are not detached from reality although they offer different levels of perception. For example, a bicycle (See Fig. 3) becomes a dynamic intermediary for the user: "In the Legible City, for instance, a bicycle-interface requires the visitor to make a physical effort in order to move through a resistance-free universe, or to slow down in order to read its streets." (Duguet 51).



Figure 3: Jeffrey Shaw, *The Legible City*, 1988–1991.
Source: Art facts.net.

The interactive piece "The Legible City" is definitely geared towards the status of a mental theater where user's participation becomes essential. The language of the "play" takes on a new creative dimension associated with the body, immersive environment, architecture, interactivity, and narrative structure (See Fig. 4).

It is possible today to recreate the configuration of Shaw and Krueger's environments through different programs and hardware available such as Isadora, Jitter/MaxMSP, Quartz Composer, PureData, Kinect, Arduino, and I-Cubex.

The iconic work of these two artists represents a

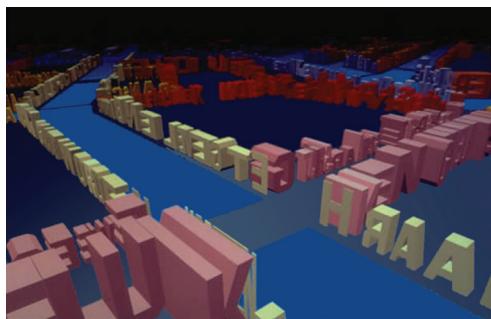


Figure 4: Jeffrey Shaw, *The Legible City*, 1988–1991.
Source: Art facts.net.

paradigm of digital immersion and interaction. The effectiveness of these digital paradigms still endures as masterpiece models.

Conclusion

New generations of artists working with technology and new media have reinvented the use of physical interfaces quoting Jeffrey Shaw's framework.

Interfacing a bike for exercising could be as valid for use as a keyboard, a joystick, a touch screen tablet, or a 3D mouse. This can be clearly seen in one of the pieces of Stefan Sagmeister's exhibit "The Happy Show" (See Fig. 5) presented at the gallery "La Gaîté Lyrique" in Paris in March 2014.

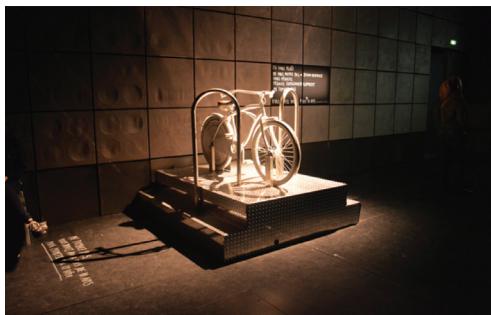


Figure 5: Stefan Sagmeister, *The Happy Show*, Galerie La Gaîté Lyrique, Paris 2014.

Sagmeister literally reproduces the interface proposed by Jeffrey Shaw in 1991. The user or visitor rides a stationary bike while pedaling to change the content of a screen furnished in neon text (Fig. 5), which is generating different characters and bright words (See Fig. 6). We can say that this would be a kind of homage, but ultimately the original tenets of "The Legible City" remains unchanged.



Figure 6: Stefan Sagmeister, *The Happy Show*, Galerie La Gaîté Lyrique. Paris 2014.

In conclusion, the artists should not fear the exploration of a much larger territory such is the case of the realm of emerging technologies, which is often unfamiliar and usually dismissed because of its ephemeral and evanescent standards. The teachings of Krueger and Shaw show us how feasible it is to discover an aesthetic dimension in the phenomenological practice of hybridization using physical, computational environments, and performing narrative from our "bodies," to finally create responsive interaction that will become enduring acts of creative intervention.

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Her research interests focus on the relationship between design education and professional practice, and how this influences design pedagogy. Recent work includes the development of a card-based system for teaching design fundamentals in an outdoor classroom; investigations into ethnographic and generational research methods; and transformations in digital publishing.

Content + Strategy



Content Strategy

A not-so-simple equation
for millennial
digital design students

Abstract

Digital design brings with it the ability to layer and display information in a complex manner. For students focused on the next new technological capability, it can be challenging for them to slow down and consider the fundamental aspects of a design project. Careful assessment of the information to be displayed and how it will be presented to the audience are fundamental considerations many "Millennial" students are quick to bypass. Technology will continue to evolve and quickly surpass technology skills initially learned in the studio classroom. However, strong content strategy skills will develop and evolve with the designer who endeavors to develop them. But how do we convince students of this?

keywords: worldview,
generational, digital design,
Millennial, curriculum, Gen Me

Introduction

Students currently inhabiting college classrooms are members of the Millennial Generation. This generation was born between 1981 and 1999. Also known as Generation Me and the Net Generation, this generation is considered the most technologically connected generation to date. They have grown up in a time where wireless technology and the Internet provide on-demand entertainment and immediate information—whenever and wherever they desire it. This creates in them as college students an aptitude and fearlessness for technology that those before them have not benefited from. However, these characteristics alone do not create the consummate digital designer.

Because technology has been so accessible to them, these students are unaccustomed to slowly and diligently sorting through information. As a whole, they are used to having instant access at their fingertips, which shapes their worldview and design approach. In the Millennial design classroom it becomes challenging to establish a careful measure of content; therefore, teaching strategies are required to help students develop an analytic and thorough design process. Using generational research to better understand and connect with Millennial students is the first step to creating effective curriculum for them.

Generational Research

Everyone belongs to a generation. Some embrace this idea while others prefer not to be lumped with their age mates. There is a long-standing debate regarding the effectiveness of generational research. Much of the research has been deemed as speculation and accumulation of mere qualitative data with no actual proof of true differences between generations. Who we are as individuals is due in large part to the culture we experienced during our formative years. This idea is the basis for generational research. Generational research is not meant to stereotype the generations. It is intended to show what people from certain generations are

like on average. Generational studies show strong consistencies of the whole, but of course there will always be exceptions to the rule.¹

The Millennial generation encapsulates a group of people born after the concept of 'self-focus' entered the cultural mainstream. This generation has never known a world that put duty before self. Reliable birth control, legalized abortion and a shift toward parenthood as a choice rather than obligation make this generation the most "wanted" generation of children in American history.²

Jean M. Twenge, Ph.D. explores this generation in detail in her book, *Generation Me*. This book presents the results of twelve studies on generational differences, based on data from 1.3 million young Americans. During her doctorate research at the University of Michigan, Twenge discovered this data by reviewing questionnaires that measure personality traits and attitudes. These questionnaires had been used thousands of times since the 1950s, 1960s, and 1970s, and most people who filled them out were college students and school children. Because the questions had not changed on the questionnaires, she was able to compare scores and see exactly how young people's personalities and attitudes have changed. Her book is unique because it summarizes large amounts of psychological data collected at various times—across generations.

Twenge collected quantitative data showing there has been a shift in the personalities and perceptions of today's students. College instructors are addressing a new and different type of student. The vastly different—and often opposing—perspectives and world-views of this generation are not their "fault." Instead, young people of today should be seen as products of their culture, a culture that teaches them primacy of the individual at virtually every step, and it's a culture that was in place before they were even born. Asking students of today to adopt personalities and attitudes of a previous time is like asking an adult American to instantly become a nationality completely foreign to them.³

Many psychologists have begun researching

1. Jean Twenge, "Introduction." *Generation Me: Why Today's Young Americans Are More Confident, Assertive, Entitled—and More Miserable Than Ever Before*. New York: Free, 2006. Print.
2. Ibid.
3. Ibid.

and trying to understand this generation. The aforementioned Twenge, Ph.D. is one of the leading researchers in this area. Through studies and ensuing research, she has begun to discover the trends, personalities and perspectives that are common to Generation Me. Twenge's research has shown Generation Me has been told they were special from childhood through television, movies, school programs, etc., creating a change in their world view. The focus on "self" is different from the viewpoints of past generations. Boomers focused on introspection and self-absorption. Generation Me is not self-absorbed, but rather self-important. It is taken for granted they are independent, special individuals so they need not really think about it.⁴

So what is an instructor to do? The first step is to try and understand the Gen Me audience in our classroom. They have a different outlook on life because the times that shaped the Millennials are very different from older generations. They can't be blamed for absorbing the culture around them. Their attitudes are not wrong—just different. Trying to understand their worldview will help any instructor connect more readily with Gen Me students.

It's important for us to realize the strong sense of entitlement we are beginning to see in our students is a natural outcome of the self-esteem movement. And it has been acquired through 18 years of upbringing. We cannot change this, but we can understand this means we will have to be prepared to explain very clearly that success and privileges will not happen overnight. Many employers express frustration with the high expectations new Gen Me employees have for salaries and promotions.

The need for speed is especially pronounced with this Millennial generation, who literally grew up on technology. They were born in the 1980s and 1990s as, first, personal computers and video games, and, later, the Internet and cell phones came to dominate our lives. Helicopter parents who hover over their millennial children have fed into the need for instant gratification by intervening to solve every problem, buying them the latest in fashion and technology,

and dishing out praise for even the smallest accomplishment. Because many things have come easily to Millennials, they aren't always willing to "pay their dues," their work ethic is different from that of previous generations, and they look for opportunities to ease their workload. So taking this research and understanding into consideration, how can we adapt key aspects of our design curriculum to better serve this generation?

Content Strategy

Digital design brings with it the ability to layer and display information in a complex manner. For a generation focused on the next new technological capability, it can be challenging for them to slow down and consider the fundamental aspects of a design project. Careful assessment of the information to be displayed and how it will be presented to the audience are fundamental considerations many Millennials are quick to bypass.

In the problem-solving context of design, content strategy begins by asking us to confront the constraints of the problem. Graphic design is "the relationship between form and content," writes Paul Rand. No more, no less, however we complicate it with promises of budget or the dazzle of new platforms. Those are the tools and dimensions with which we can solve communication problems—and in the right hands, they're enough. "To design is to communicate clearly by whatever means you can control or master," writes Milton Glaser. No more, no less a challenge, but only if we acknowledge all of our tools.⁵

Content strategy is in large part the design of a system by which content is distributed over time. Or to put it more simply, content strategy dictates what's going to appear when, and according to what criteria. Print publications have always strategized content, holding articles for future publications and prioritizing the ones that will be published. On screen, there are other questions to be answered: How many blog posts will be published each day, and will they be posted when available or at a specific time? Is the time that something is published

4. Ibid.

5. Margot Bloomstein. "Communication Foundation." *Print* 3 June 2014: 22–25. Print.

6. Sue Apfelbaum, and Juliette Cezzar. "Elements of Editorial Design." *Designing the Editorial Experience: A Primer for Print, Web, and Mobile*. Beverly: Rockport, 2014. 20-21. Print.

the only consideration for its visual hierarchy? How frequently will content appear in a tweet stream or a push notification from a mobile app? And how will breaking news affect the rhythm that has been put in place? ⁶

Also of importance for students to realize when addressing content strategy is the fact that content does not only refer to text. Images, audio and video can sometimes be even more important than the text they accompany. When properly anticipated these various content types can work together to strengthen the message or concept. ⁷ Introducing students to the idea of assessing and gathering their content types as a whole before they begin designing is one of the first steps. This helps them learn how to build strategy into their content consideration—rather than beginning to design and gathering additional content to round out their design as they go.

The most complex part of content strategy for students is strategy. It is also one of the most essential skills for professional practice. This is a key aspect that makes transition into professional practice challenging for many. In professional practice, a design for a client typically does not operate as an isolated project—as is the case in the classroom. Professionally, we hope to develop an on-going relationship with a client. This affords savvy designers the ability to orchestrate the varied projects they design for a specific client to function as a whole—each project contributing to building the story or brand for that client. With this in mind, it is essential for student projects to not be considered in isolation, but rather as an overall plan to help students understand how each relates, connects and builds on one another. To aid in establishing these ideas with students it is helpful to begin projects with a content inventory in which students assess the content they have, the content they will need and the goals of their content—simply put, getting them to understand what content they have and its communication purpose is a good first step.

Students also need to be introduced to the most

basic considerations of content strategy. In professional practice it is especially important to evaluate the size of the various kinds of content, as this can greatly influence the user experience. Students taking this into consideration can begin with rough estimates of the sizes of various features: word count for text features, pixel dimensions for images or video, and files sizes for downloadable, stand alone content elements like audio files or PDF documents. Knowing in advance the size of the content elements that must be accommodated helps students see how they can make smart, informed decisions when presenting information. ⁸

Millennial students do not intuitively consider how each piece of content might unfold to have the most impact and build the narrative of their design—or even consider a wide range of delivery mechanisms with varying audiences in mind. This is something they must be encouraged to consider. Remember, this generation of students has been brought up in a society where the focus on self is paramount—it's often a challenge for them to empathize with an audience other than themselves. Their path to the classroom door has been carefully guided and orchestrated by parents who want the best for them. College is the start of independence for most Millennials. It not only means expanding their worldview, but also learning to plan for themselves—and the content they are designing for.

Content strategy offers the next step in realizing communication goals in Paul Rand's emphasis on the relationship between form and content. Content strategy isn't a new tool for students to add to their skill set, but rather a unifying force between the purpose of their work and the ways in which they will engage future clients. It aids them in digging into the first step of understanding the client's communication goals. ⁹ Technology will continue to advance and quickly surpass technical skills initially learned in the studio classroom. However, strong content strategy skills will develop and evolve with the designer who endeavors to develop them.

7. Jesse James Garrett. "The Scope Plane." *The Elements of User Experience: User-centered Design for the Web and Beyond*. 2nd ed. Berkeley, CA: New Riders, 2011. 74–75. Print.
8. Ibid
9. Bloomstein, Margot. "Communication Foundation." *Print* 3. June 2014: 22–25. Print.

Design Curriculum for Millennials:

The tendency of current design students to initially place importance on style and technology is one that resonates with design instructors across the nation. This case study began with this concern in mind. How do we get Millennial students to slow down and invest in content and the design process? Through the lens of a digital publication design class a series of strategies were explored to better engage Millennial students with their content.

In initial explorations students were supplied content and asked to create a flat map (also known as page maps) as is done in traditional publication design to aid in the strategy and planning of content and page layout. Typically the burden of finding content is placed on a student with his or her design projects because there is no client to supply it. In the early stages of this case study, students were supplied project content to alleviate this burden. It was theorized the time students saved finding or even creating their own content could be better spent engaging with provided content. This theory proved false. In later stages of the case study it was observed students more readily engaged with content they had the freedom to curate. Flat maps of the student-curated content were more detailed and displayed greater strategic thinking. This may have been due to level of engagement, or simply because students were able to select content they more readily understood—allowing them to more easily process and work with it. Although in professional practice designers must reconcile themselves to the content they are provided, self-curated content proved a more accessible entry point for students making initial forays into planning and strategy.

Raised by highly communicative, participation-oriented parents, the Millennials have been included in major family decisions since they were old enough to point. From deciding where to go on family vacations to which computer to buy, Millennials have always been a part of the day-to-day negotiations of their home lives. This is a quality they bring to



college classrooms and their future workplace. It means they will not dutifully follow instruction, but it also means they'll be able to contribute and collaborate right from the start. This generation is more likely to have gone to day care, have worked in a service job or met new people on regular basis. High levels of extraversion have been an adaptation of theirs—they typically thrive in group work situations. Integrating group work components into classroom projects not only builds morale, but when properly guided introduces rigor to their thought processes.

Small group discussion sessions can aid the strategic development of projects. Structuring class time so students could address in small groups with one another how their content was structured and how that guided their designs was beneficial. The millennial generation has grown up in a world that has encouraged them to focus on self. This focus on self is not necessarily self-absorbed or isolationist, but it is problematic when trying to teach students to put the user first. When designing they make many assumptions. These discussions helped students see

their perspective was not the only one—especially when even their peers had a different view point. Also beneficial was the introduction of personas. Personas are the fictional write-up of individuals who would represent a design's audience members. Initial personas developed by the students were invariably expressions of themselves. When presenting their personas to the class, their lack of diversity quickly became evident. This exercise also helped students move beyond the focus of self and begin to see how they could use observation and objectivity to understand different perspectives.

As instructors of Millennials, we can begin to play a role in better preparing them for the reality of life. Introducing them to the idea of perseverance, and that rewards are not immediate will help them succeed in the workplace and as designers. Their familiarity with instant gratification can be seen in the reluctance of design students to invest in solid process work for their projects. Building a series of checks and balances into the process work helps them learn the perseverance and self-control needed to create fully developed, thought-out design solutions.

Having students engage with content through the creation of an information architecture—which is traditionally used in the development of web design—also proved an effective tool. Initially students were asked to do a traditional flat map (page map) for their digital publication designs. Developing information architectures allowed students to better consider

the potentially connected nature of various content. Students used typical information architecture methodology for their development. Key to this methodology is categorizing, distributing and moving around content with post-it notes. This helped students be more fluid and reiterative in the process of planning their content. Once their content was mapped out, the students reassembled into their discussion groups to walk one another through their information architecture. This further highlighted assumptions initially made, and forced further iteration into the planning process of their digital publication designs.

Because of the culture they have been raised in Millennial students are unaccustomed to slowly and diligently sorting through information. As a whole, they are used to instant access at their fingertips, this shapes their worldview and design approach. In the Millennial design classroom, it becomes challenging to establish a careful measure of content; therefore, teaching strategies are required to help students develop an analytic and thorough design process. The methods outlined in this essay helped students to slow down and invest more in the process of their design project. As students became more process oriented, their critical thinking skills developed. Once critical thinking skills were established, students began to understand the long-term value of developing a process that carefully considers the information and strategy for its communication. It is this level of thinking that will stand the test of time as technology constantly evolves.

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