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Evolving Art in Junior High

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ABSTRACT

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A junior high teacher and artist altered the curriculum of his Art Foundations II course and his own artistic practice in response to complexity thinking. This teacher-artist-researcher uses the arts-based methodology a/r/tography to make meaning of the relationship between his art and pedagogy. The a/r/tographer explains the impact of complexity on the philosophy of education, a/r/tography as a methodology, and the meaning making that occurred are included. Evolution was used as a methodology for art making and as constraint for developing artworks in the classroom and in the author's own art. The teacher-artist-researcher conceptualizes art as an emergent complex cultural practice that evolves over time. He argues that artists, teachers, consumers, and students are implicated in the evolution of art.

Keywords: complexity thinking, evolution, a/r/tography, enabling constraints, art education, curriculum

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CHAPTER 1

INTRODUCTION

> Complexity theory is alluring; once we are aware of it we see it happening everywhere. This should not obscure the very real questions that have to be answered about its nature, status, methodology, utility and contribution to the philosophy of education (Morrison, 2008, p. 29).

Like Morrison, I have begun to be aware of complexity everywhere. Complexity science is not pedagogy and does not offer direct suggestions for teaching. As a science it merely attempts to objectively describe phenomena. Nonetheless, my artistic and teaching practices have been affected by my study of complexity science as I have partially changed my worldview, which had previously been less adequate in describing a classroom-learning situation. By applying complexity thinking to my ninth grade Art Foundations II class I hoped to be able to help answer some of the questions Morrison asks about its utility and contribution to education.

Complexity thinking is a cross-disciplinary movement that begins with rejecting the idea that all phenomena can be explained by reductionist methods of breaking things down into the smallest element (Davis, Sumara, & Luce-Kapler, 2008). Although many complicated phenomena can be described as sums of their parts, *complex systems* are not reducible to the elements of which they are made. The combination and interaction of parts creates a system whose character could not have been predicted based on the nature of the separate parts. Most any teacher will tell you that a class is more than a sum of its students. I teach a class of 34

middle-level kids in a suburban Utah city. Individually the students are great to work with and produce sort-of-interesting art. Together, though, more is going on. One group of boys is defiant. They seem to push against the grain of the class. Individually, they are not a problem, but collectively something else happens. Interestingly, it seems that the group loses its rebellious dynamic when one particular boy (a good kid by himself) is absent. Also interesting is the way this small group of boys dominates the social structure of the class in such a way that many other students clam up and fail to participate. What is going on in my classroom? Why don't 34 separately self-motivated kids meld into one self-motivated class? Why is third period so wildly different than fourth when I teach the same lesson? Most teachers can tell you of a class they have taught that changed 180 degrees with the change of a single student. Obviously, a class is not just a sum of its students. It is a *complex* system.

Many people hold a *reductionist* view of the world. They believe complicated things can be reduced into their separate parts. This is certainly true of many things. Molecules are made of atoms. Engines are made up of pistons, camshafts, spark plugs, and distributors. We will call things that can be reduced to their comprising parts *complicated.* The actions of complicated things are generally predictable based on their interworking parts. A person who understands the basic workings of an engine could probably identify a missing part that caused it to fail in its function. If I unplug a spark plug, then its piston will cease firing. But the actions of complex systems are rarely so predictable. Ask yourself, "What will happen to the price of fuel tomorrow if Apple announces that a new virus is destroying all iPhones?" Well,

you do not know. But neither does the most well-informed expert. That is because the economy is not complicated; it is complex, like a class. Some identifying characteristics of complex systems is that they adapt, learn, self-organize, and are constantly changing. They are frequently made up of other nested complex systems (Davis, 2004). No one person is at the head of the economy, calling the shots, but it tends to function just the same.

Examples of complex systems include the human brain, stock markets, ant colonies, and classroom learning systems. Recently complexity thinking has been applied to the social sciences (Davis & Sumara, 2006). As I have engaged in researching philosophies and discourses of thought pertaining to art education, I have been captured by the allure of complexity. In this study I attempted to identify the impact of teaching with a complex perspective.

Throughout my research I sought to ask how complexity thinking might impact my pedagogy and my art. This was the driving question behind my inquiry. My study of complexity thinking immediately began changing my teaching and my art making. I looked for ways to incorporate complexivist concepts into my art. I was already making changes in my classroom, but complexity thinking affected my choices. The interconnectedness of my research, my art, and my teaching led me to choose a/r/tography as a methodology for researching the effects of complexity in my Foundations II class.

A/r/tography is an arts-based research methodology that is relatively young. The earliest I have seen the word present in literature is 2004, though the strategies and techniques had been in use prior to this under the banner of other

methodologies and the relationships of artist/researcher/teacher (Irwin & de Cosson, 2004). As a postmodern arts-based methodology a/r/tography is a qualitative method of inquiry that recognizes art making as a form of research. Within a/r/tography, art-as-art and art-as-research are "fluid spaces" (Wilson, 2004, p. 7) that affect each other and don't have sharply defined boundaries. It differs from other arts-based methodologies in the way it marries various roles the researcher performs and seeks to find meaning in the spaces between them (Irwin & Springgay, 2008).

Using a/r/tography as a methodology, I set about inquiring how complexity thinking might affect my 9th grade Foundations 2 class. I changed my curriculum in response to my readings about complexity. I attempted to decentralize the class, leaving behind the idea of teacher-as-dispenser-of-knowledge. In response to genetic paintings I had created the previous summer, I designed a curriculum in which students would evolve artworks over the course of nine generations during the semester. I also inquired through my own art making. This resulted in an installation that included six panels at a time displayed on a pillar in the school. This installation evolved in response to student input. The relationship between my teaching, art making, and research provided many new understandings, which I have attempted to communicate and discover through my writing.

I have come to better understand the relationship between the community in which my school is placed and its effect on the art of my students. I have considered the culture of my school and its impact on student art. I have observed the evolution of art on a small scale and drawn parallels to the evolution of the nature of art

through human history. I have recognized the impact of artists, teachers, and art-consumers on the evolution of art through history and argue for these agents to recognize their complicity in art's development.

I argue that the social phenomenon that is art is an example of complex emergence. Art-worlds function as decentralized complex systems. Artists, artworks, consumers, galleries, museums, and art-economies follow a pattern of nestedness. On the level of my classroom, these characteristics function at a smaller scale but show similarity. My students and I continue to affect the evolution of art in the Utah community we live in.

The remainder of this thesis will be organized as follows. In chapter two I give a deeper explanation of complexity thinking and why it has captured my attention. I also address its presence in art education literature and discuss how I expect it to affect my work. In chapter three I describe a/r/tography as a methodology. I examine its relationship to complexity thinking and summarize some examples of its use in secondary education. I also address some concerns brought up by opponents to arts-based research and offer criteria that may be used to evaluate this research.

Chapter four is a presentation of the curriculum that was influenced by complexity thinking. It also includes descriptions and examples of student work as well as my own art that was made during the semester. In chapter five I draw some understandings as I seek to make meaning from my inquiry.

CHAPTER 2

REVIEW OF LITERATURE

An Overview of Complexity Thinking and Learning Systems

Three principles associated with complexity will aid understanding of this a/r/tographical inquiry. A discussion of decentralized networks and nested systems will illustrate the structure of complexity. With such a structure in mind a complexivist vision of knowledge and learning will be useful.

Decentralized Networks

Network theory is commonly used to inform descriptions of complex phenomena. Complicated and complex systems are made up of interacting agents. In network terms these are known as *nodes.* Nodes can interact or be controlled in many different patterns or structures. For example, if a single node or hub controls every node in a system, it is described as a *centralized system.* Communication between nodes in a centralized system happens very quickly, as each node is only one step away from the rest of the nodes; however, the system is only as strong as the center hub. If the hub fails, then the system fails. *Distributed systems,* in which all nodes are connected to the nodes near to them, are incredibly robust. However, communication between nodes across the system happens very slowly, requiring many connections on average (Davis, Luce-Kapler, & Sumara, 2008).

The network of a complex system can be described as *decentralized.* These systems exhibit clustering of nodes with relatively few long-distance connections. The likelihood of a node to have a certain number of connections follows a power law distribution. The majority of nodes in such a network have relatively few

connections, and a few nodes have many connections. Communication over decentralized networks is much quicker than over a distributed network, as there is a low degree of separation between nodes. They are also reasonably robust; the deletion of a single node is not likely to be a problem due to the prevalence of nodes with few connections. The deletion of a hub will still have significant impact (Mitchell, 2009).

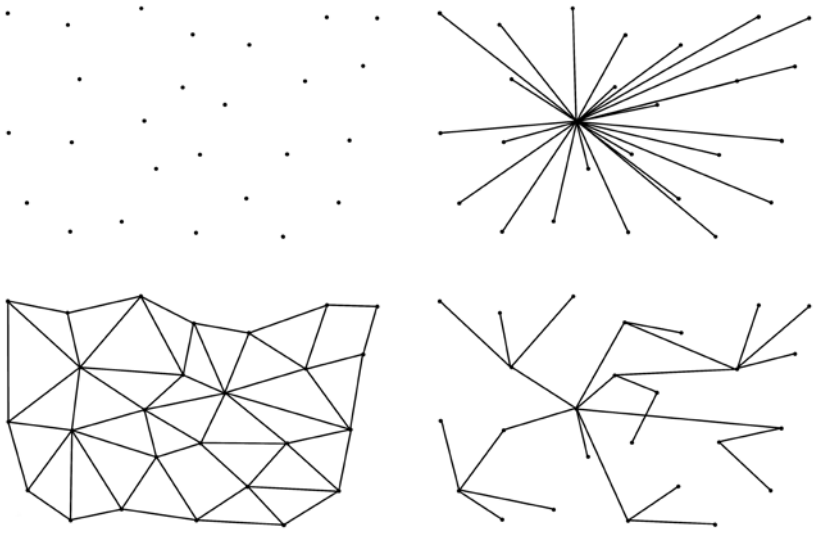

Figure 1. A collection of nodes (top left), nodes joined in a centralized network (top right), nodes joined in a distributed network (bottom left), nodes joined in a decentralized network (bottom right). Complex entities tend to be structured as decentralized networks.

As I describe later, I tried to facilitate conditions for a decentralized network of ideas among class members in my class. This network necessarily extended beyond the boundaries of the class. Decentralization might be considered a prerequisite to the complex emergence of new phenomena.

Nestedness and Learning Systems

Complex systems are often made up of other nested systems that can also be complex. For example, the human brain is a complex system nested within the

human body. A person is a complex system nested with a social body. Social bodies interact to form large-scale societies. The nestedness goes on.

Figure 2. A diagram of nested complex systems, adapted from Davis, 2008, p. 51.

From an educational perspective, one of the most interesting things to consider within complexity is the way learning is understood. Complex systems are never static; they are constantly adapting, shifting, and changing. When this happens at the level of the brain we call it learning. But a great offering of complexity is to consider the changes that happen at other levels to be learning as well. For example, the immune system *learns* the structure necessary to eradicate a disease in the

body. American society *learns* to utilize the advantages found in ethical diversity. In fact Davis, Sumara, and Luce-Kapler (2008) define complex systems as "systems that learn" (p.78). Mitchell (2009), coming from a non-education perspective, discusses complex systems in terms of information processing and computation. The adapting, learning, or computing does not take place at the same rate for each of the nested levels. Response at the subcellular level is incredibly fast. As you work your way outward toward larger systems, the response time slows down, with evolution (in which a species learns biological survival characteristics) occurring at a crawl relative to personal-human perspective.

Emergence

As complex systems adapt and change in a decentralized environment, they continue to exhibit increasing levels of organization. The self-organization that emerges in a decentralized system is perhaps the most alluring quality of complexity. *Emergence* is a description of the way order arises from the uncontrolled interactions of individual agents in a complex system (Haggis, 2008). Disorder is first present, and structure emerges. Emergence is particularly of interest in a creative discipline that hopes to explore new concepts and understandings that have not yet been considered.

My Interest in Complexity

Reasons I am interested in complexity include early exposure through popular literature, constructivist conceptions of learning, the connection between complexity thinking and art-making practices, and the expanded view of learning systems.

I finished reading *Jurassic Park* (Crichton, 1990) for the first time just as I began my 5th grade year at Barrett Elementary. In addition to being intrigued by the story, I often found myself engaged by the scientific explanations in Michael Crichton's work, and *Jurassic Park* delivered in that respect. Between each part of the book was an image of an iteration of the dragon fractal. I do not recall an explanation for the fractal or even a description of what it was, but I do remember going back through the pages of the book and attempting to identify whatever pattern was apparently being used to create the diagram. I was also intrigued by the character Ian Malcolm's explanation of chaos theory, although I could not really grasp much beyond the basic idea behind the butterfly effect that he presented. Thinking about it now, I believe that I viewed chaos theory, and indeed Malcolm's character, as being a representation of scientific intelligence, which I admired. Later, in high school, I attempted some reading about chaos theory and found that the advanced articles I had chosen were beyond my understanding, which only served to entrench my preconception of the theory.

As an undergraduate, I executed the instructions for a Sol Lewitt wall drawing on canvas. The drawing included 50 points connected by straight lines. I liked the form so much that I began using it in much of my work. The form of connected lines helped to drive the content of the work, which eventually became about the network of interactions in fictional communities. I later realized that these artworks harmonize with some subjects of study within complexity.

Figure 3. Installation view of Gift Economy shown at the College of Eastern Utah in 2009. I had conceptualized a fictional culture that functioned with a gift-based economy. The installation represented my ideas about the network of such an economy and its self-regulating characteristics. Looking back now with a complexivist perspective, I believe that the installation carries a close relationship to and influence on my current work and studies relating to complexity thinking.

During the winter semester of 2012 in a graduate art education course at Brigham Young University, Dr. Daniel Barney made a reference to chaos theory as being a precursor to complexity theory, which I had never encountered. All of my eighteen years of pent-up curiosity drove me to look into the theory, and current Internet accessibility allowed me to read understandable summaries of the claims and observations of complexity science. For some reason, I feel a connection to the theory that is rooted in the pages of that paperback I read as a ten-year-old. This connection continues to influence me, but I am now interested in complexity thinking for its philosophical and pragmatic offerings to the field of art education.

I am engaged by complexity thinking over other approaches in part because it agrees with elements from many other postmodern discourses with which I am sympathetic (e.g. constructivism, post-structuralism) while at the same time expanding the realm of consideration to more-than-human spheres (Davis &

Sumara, 2006). I will now summarize these discourses and identify their cohesion with complexity thinking.

Constructivism is a group of theories that describe the way individuals keep a sufficient conception of their world even as that conception is altered and changed as the individual learns. The individual constructs understandings in response to previously held conceptions. The change that a knower undergoes during the process of learning is not as dependent on the event as it is on the knower (Davis, 2004). *Social constructivists*, who view knowledge as a phenomenon that is created socially and culturally, expand these concepts. Society forms a working conception of the world collectively, and the individual is jointly constructed by the world and aids in the world's construction (Davis, 2004). This whole process is an example of complexity. The individual is a complex entity nested within the complex entity of society. In order to grasp a constructionist view of knowledge, one must jump between levels. Society adapts, learns, and constructs frames of knowing in tandem with individuals. The ultimate adaptation, or learning, is dependent on both the individual and the society but is not wholly determined by either one.

Social constructivism makes sense to me. When I consider my own conception of the world, I see a thing that is constantly shifting and changing but is never finished. Constructivists do not view people as incomplete entities that are working to become complete sometime in the future. A person's understanding of their world tends to be good enough for them to function, even as that understanding changes dynamically over time. Inconsistencies in their personal understandings are overlooked. One important point here is that knowledge is

viewed as a created or constructed thing. This is in contrast to metaphysical discourses such as rationalism and empiricism that describe truth as constant and unchanging, waiting to be discovered (Davis, 2004). However, constructivist views are in line with many postmodern modes of thinking. At this point in the continuing evolution of art and education, I feel that a postmodern philosophy is the only viable option. With Doll (2005) I argue for educational method that is more "chaotic and complex" (p. 47).

Social constructivism also meshes with my understanding of the nature of art. Carroll (1988) has described art as a cultural practice that has evolved through amplification, repetition, or repudiation of existing conceptions of art through history. In this way society is creating the knowledge of art. Although I don't think this is all there is to art, this is a major part of the way I conceive of art. It is constructivist in nature and fits easily with the thought processes of c*omplexivists,* or those who espouse complexity thinking. The network of artists and consumers of art are interacting in a complex web of association that is constantly redefining the nature of art. This is somewhat consistent with Dickie's (1974) conception of systems or institutions he calls "the art world" (p. 27). I clarify this within complexity discourse with the recognition that there are many systems or *art worlds* within the realm of the human concept of art. Each of these is dynamic and adaptive, and the totality of them function together as a complex system and a decentralized network.

Post-structuralist and critical discourses including deconstruction are also aligned with complexity thinking (Davis & Sumara, 2006; Davis, 2008). Post-

structuralists posit that meaning is created in the relationships between texts and in what is left out of them. This meaning is never neutral and leads to often-unnoticed power relationships that shape individuals (Davis, 2004). Here again we see discourses that are describing complex phenomena. Critical discourses identify unexpected and frequently unobserved influences. Complexivists recognize that within a complex system there is probably not a single cause that is responsible for an effect. For example, the oppression of a group of people can be perpetuated in billboards, commercials, political speeches, parenting attitudes, and social norms about dating, in jokes told in the lunch line and in the most common careers the group participates in. Looking at such a situation from all these angles is a complex perspective. Understanding that these power relationships are being perpetuated and looking to recognize where they occur is important for educators. Although I don't think critical theory should be the primary driving agent for a curriculum[1], I believe this is an important characteristic of our complex social world. Teachers of any subject should try to be aware of the hidden biases in their curriculum.

The role of decentralized networks in complexity thinking is connected to some current views of creativity. Creative acts are commonly the results of seemingly unconnected ideas bouncing around and running into other ideas at just the right time. Although it is impossible to force such moments of insight and inspiration, these kinds of moments can be cultivated by allowing agents to interact in spontaneous and non-linear ways (Johnson, 2010). As I have read about creativity I have found the connection to complexity to be exciting. One way to view creativity

[1] See my discussion of Visual Culture Education below.

is as an example of emergence. As previously mentioned, e*mergence* is a description of the way order arises from the uncontrolled interactions of individual agents in a complex system (Haggis, 2008). In fact, Johnson (2010) parallels the way ideas come about with the way that species evolve through natural selection, which is the quintessential example of emergence. Genetic diversity, mutations, and constantly mixing genes allow life to produce traits that are suited to new conditions. The adaptation is creative.

One final reason I find myself engaged by complexity thinking is the way it presents an expanded view of learning systems. As mentioned previously, I agree with many constructivist and post-structuralist ideas about the origin of knowledge and the ways that we make sense of the world. Complexity thinking expands ideas about learning to include systems both larger and smaller than the individual. Complex systems adapt and change and are never static. The human mind or brain is a complex system, and learning can be described in complex terms. Complex systems other than the human brain respond to stimuli in emergent and elaborately recursive ways that can also be described as learning. A classroom of students interacting resembles a complex system. In the social constructivist sense, the collective is producing knowledge. Knowledge is simultaneously being produced in each learner. The individual learner is a nested system within the larger classroom system. As the class adapts, it learns as a collective. In this conception the teacher can be described as "the consciousness of the collective" (Davis et al., 2008, p. 172) as he or she directs the perception of the class to different places.

Art Education Literature and Complexity

Explicit references to complexity thinking within art education literature are rare, but they do exist. More commonly educationists write about principles that can be related conceptually to complexity thinking, and an abundance of these references exist. In this section I cover connections between complexity thinking and art educators' conceptions of constructivism and visual culture. Then I discuss more specific references to complexity in art education literature.

I have brought up the similarities between constructivist approaches to learning and complexity thinking. Constructivism has been both implicitly and explicitly discussed within art education literature. For example, Gude's (2004) rejection of modernist elements and principles in favor of non-foundational postmodern principles is reminiscent of constructivist attitudes towards learning where an individual is able to construct a contemporary conception of art making even without having a linear, ground-up education in somebody else's idea of the basics. Milbrandt, Felts, and Richards (2004) describe a more direct application of constructivist theory to art education in which students were given responsibilities in generating evaluation criteria and project objectives. Students' questions were turned back to the students to solve, in contrast with a teacher being the sole expounder of knowledge. Students participated in integrations of criticism and history and took responsibility for their own learning in the art classroom. In discussing a constructivist approach to teaching a high school art class, Hesser (2009) points to potential problems with classroom management in a class without teacher control. As a constructivist teacher he needed to alter strategies and be

flexible. He also describes the struggle some students had with recognizing the value of his approach. The contrast between constructivist approaches to education and the more common convergent standards-based practices in schools can be unsettling to students. An art classroom oriented by complexity thinking can have much in common with these examples of constructivist classrooms.

Previously I mentioned the connection between post-structuralist discourses and complexity thinking. Critical theory can be thought of as being well situated within the bounds of complexity thinking. Critical theory recognizes the artificial nature of knowledge for individuals and looks to observe often overlooked methods of meaning making, such as elements left out of texts and unnoticed power relationships. Within the field of art education critical theory is most plainly manifest in the discourse of visual culture.

Duncum (2008) has stated that critical theory has attained the status of a common influence in art education. Visual culture theory is a critical approach to the images that make up fine art and popular culture in general. For example, a visual culture lesson might seek to identify the once-unquestioned role of women in Disney animations as powerless figures to be rescued by men. Visual culture art education calls into question such power relationships that are frequently taken for granted. Duncum (2010) has laid out principles that can be used to encourage critical dialogue within art classrooms. These include power, ideology, representation, seduction, gaze, intertextuality, and multimodality.

The major problem that has arisen with visual culture art education has been the disconnection between theory and practice (Herrmann, 2005). In theory, visual

culture education should encourage students to engage critically with images and arrive at their own conclusions as they engage in collaborative co-constructions of knowledge. Indeed, Herrmann's (2005) description of classroom learning environments has much in common with constructivist approaches where individuals are constantly reforming their conception of the world. This is not surprising, as post-structuralist ideas (including visual culture art education) are an elaboration and not a rejection of structuralist sensibility in which "explicit knowledge is the mere surface" of the mix "of experience and interpretation" (Davis, 2004, p.130). Both Duncum (2008) and Herrman (2005) have argued that visual culture art education loses its relevance when educators attempt to implement pre-packaged lesson plans or impose their own preconceived biases in response to visual imagery. Still, the original intent of visual culture theory does hold much in common with complexity thinking as it urges learners to consider diverse influences on their perception of the world and to question their own biases as they consider the way they have formed their understandings.

There are some more direct engagements with complexity thinking within the realm of art education. May (2011) has discussed decentralization within art classrooms, arguing for art educators who encourage collaboration and non-linear curricula. The importance of conversation in the studio environment, student self-reflection, and writing have been emphasized in response to complexity thinking, along with the need to avoid strict learning objectives in a search for emergent understandings (May, 2011). Lackey (2003) has written about the complex network of the field of art education and conceptualized it as having many sites outside of

formal institutions of schooling. Barney (2009) has applied complexity thinking to engagements with secondary school art students and has observed unanticipated emergent possibilities arise.[2] Unexpected collaborations between students resulted in artworks that were more than either student could have hoped to make on their own.

Castro (2007) has used complexity thinking to reflect on his practice as a high school photography teacher and has observed the emergence of meaning in response to *enabling constraints* imposed on students. Constraints that enable allow learners to navigate the space between the known and the unknown as they build coherent constructions of understanding. "Well structured constraints create a space that can orient and enable artistic inquiry" (Castro, 2007, p. 76). Additionally, they open up the possibility for students to synthesize new understandings. Constraints that are well structured do not dictate what a student must do, but rather give boundaries that define what a student cannot do and allow for unanticipated results. In this way they are *expansive* rather than *prescriptive* (Davis, et. al., 2008).

It is clear that complexity thinking has had some influence on the field of art education as demonstrated by the aforementioned literature, and that many art educational perspectives have epistemological similarities to complexivist views. The direct impact of complexity thinking has been far from pervasive. It is likely that

[2] That is to say that the specific emergences were unanticipated while the possibility of emergence was indeed a focus of the study and the course was structured to encourage emergence.

most art educators are unfamiliar with its specific theoretical perspectives, although they might agree with some of its tenets without using the term complexity thinking.

Tracking the Effects of Complexity Thinking in my Research

In discussing an application of complexity thinking to failing schools, Mason (2008) claims that what we should understand is that one intervention will likely be insufficient. What is needed is intervention at every level, from the community to the family to the classroom. To bring this discussion down one level from the school to my own classroom is easy. What I need to do is not so easy. To improve my teaching I should intervene at every level, or at least to be aware that multiple levels matter (Davis et al., 2008). Consequently, I do not hesitate to make many concurrent changes to aspects of my pedagogy. I need not be worried about isolating a variable, as that would be a contradiction to my entire philosophy, returning as it does to a reductionist sensibility. I acknowledge the fact that the changes I have made to the structure and curriculum of my class cannot be solely attributed to complexity thinking. Similarly I cannot point to my studies into complexity as being the sole cause of changes in performance in artist-students or in myself as artist-teacher. To do so contradicts the highly independent character of complex systems. However, I will be able to draw correlations and make observations through the lens of complexity thinking.

My primary means of tracking the effects of complexity thinking on my class was personal journaling and reflection. I reflected and wrote on a regular basis. I responded to needs of individual students, to community habits, school culture characteristics, and classroom sociality as I interpreted and influenced each of these

through a lens of complexity thinking. My personal reflections were an important tracking method. Additionally, I photographed personal and student artwork throughout the semester. As a class we discussed influences on and evolutions of artworks. Student responses were another tracking method. In my own art I responded conceptually to complexity thinking. My artwork itself is an implicit record of actions taken. Many changes that I made to the structure of the course were direct responses to complexity thinking. This is documented with simple statements such as, "Complexivists think *this,* so I did *this* in response."

What Complexity Thinking Might Offer

I am excited by the possible offerings complexity thinking holds for my students and me. I have previously mentioned the connection between emergence and creativity. One thing I expected to observe in my class is the manifestation of emergent phenomena. An awareness of complexity allowed me to organize activities that encouraged emergent behaviors, artworks, ideas, or knowledge. Barney (2009) has discussed his attempts to cultivate conditions for emergence within a secondary school classroom and highlights the impossibility of forcing emergence. Rather, he says, "In my efforts to allow for non-hegemonic bottom-up emergence, I had to wait. I needed to be patient" (p. 148). Thus, I sought to create conditions that would result in emergent understandings while acknowledging the fact that they may or may not occur and that they may not be recognized.

Connected to the idea of emergence is the possibility that education can be about more than learning what is already known. In reference to educating within a complexivist discourse, Davis (2004) observes that "teaching and learning seem to

be more about expanding the space of the possible and creating the conditions for the emergence of the as-yet unimagined, rather than about perpetuating entrenched habits of interpretation" (p. 184). To clarify this, the hope is not that everything done in the class produces new knowledge. Rather, I hope to engage students in an effort "to investigate *established knowledge* while engaging in a process of *establishing knowledge"* (Davis et al., 2008, p. 194). This process can be encouraged by increasing student interaction with each other, improving the flow of information through the class, and increasing diversity among the agents in the complex system of my classroom (Mason, 2008). In this way my class had the potential to access understandings that are held in the higher-than-individual levels of nested systems that include the art worlds.

This understanding, namely that human society as a complex entity is a *knower* of ideas that are critical for my students to access, prompts me to expose students to a wide range of artistic ideas, media, artists, and artistic evolutions. In so doing I will be flooding their complex understandings of art[3] with variables that can potentially affect the nature of emergent phenomena within the class. My goal here is to expand the space of the "*adjacent possible*" (Johnson, 2010, p. 31). *The adjacent possible* is a reference to the limits of our abilities to jump beyond immediate choices in evolutionary development. For example, the iPad could not really have been developed before the desktop computer. Many developments were required before the iPad became a possibility. But developers didn't have to personally invent

[3] Their understandings are complex in the social constructivist sense of being construed from their experiences and biology. Their grasp of art at this point is far from matured.

the desktop computer to make use of extending some of the technologies to the iPad. Similarly, a student may conceive of new ideas after having been exposed to the ideas that contemporary artists are working through. Increasing the variables/information in the class expanded the realm of the *adjacent possible* for my students and me. The concept of enabling constraints that has been previously addressed was useful in assisting students in engaging prior knowledge while accessing a state of imbalance that allows them to create the "as yet unimagined" (Davis, 2004, p.184).

Although complexity thinking does not give direct recommendations for education, an educator who engages in teaching through a lens of complexity thinking may find insights into improving his or her practice. Other art educators in academic literature have addressed some of these insights, but more research can be done to more fully identify ways of improving pedagogy through an application of complexity thinking. The emergence of new understandings is a potential and desirable outcome of using complexity thinking in my junior high art class.

CHAPTER 3

METHODOLOGY

An Overview of A/r/tography

An a/r/tographer is an artist and a writer, hence the *art* and *graph* present in the word. Additionally the a/r/t represents the three roles of artist, researcher, and teacher as they come in close proximity to each other (Irwin & Springgay, 2008). A/r/tographers can engage in any art form and in any role of teaching. The ancient Greek philosophers discussed three different kinds of thought, including *theoria* (knowing), *praxis* (doing) and *poesis* (making). In a/r/tography these become theory/research, teaching/learning, and art/making. A/r/tography doesn't place theory and practice against each other, but instead looks at the relationships between and among artist, researcher, and teacher (Irwin, 2004).

Irwin (2004), a major influence in the development of a/r/tography, argues that a/r/tography is a lived practice. Artworks are not just added illustrations to research, and the writing is not simply a commentary on the art. A/r/tography is relational, and the connection between the two, writing and art, is its own inquiry (Irwin & Springgay, 2008). "A/r/tography is a form of representation that privileges both text *and* image as they meet within moments of metissage. But most of all, a/r/tography is about each of us living a life of deep meaning enhanced through perceptual practices that reveal what was once hidden, create what has never been known, and imagine what we hope to achieve" (Irwin, 2004).

Metissage is a word commonly associated with the places of unique meaning-making in a/r/tography and is a metaphor for artist/researcher/teacher. Metissage

is a language of the land between two cultures. It refers to that place where two peoples meet and contrast each other. As the cultures adapt to one another, a new culture arises, and new meaning is created. This is where the artist/researcher/teacher resides, according to Irwin. Sites of art can be reconceptualized as being dependent on contexts, subjects, and viewers (Irwin & Springgay, 2008). Meaning is created in the space between the viewer and the work rather than being an inherent characteristic of the work. The meaning in an a/r/tographical study is not explicit. Understandings are constructed as the viewer or reader engages the work (Leavy, 2012).

Instead of prescribed steps, renderings are outlined that represent characteristics that may, or may not, be present in a/r/tographic research. Renderings are principles an a/r/tographer uses to create meaning. These renderings are meant to give possibilities to the researcher and serve as a beginning, but not exhaustive, list of principles that can be used in research. The renderings are contiguity, living inquiry, metaphor and metonymy, openings, reverberations, and excess (Springgay, Irwin, & Kind, 2005).

Community is important to a/r/tographers as they seek to participate in a discourse of living inquiry or theory. Teachers can be any kind of educator or person engaged in education. “Similarly, with a/r/tography, art is broadly conceived to mean sensory-oriented products understood, interpreted or questioned through ongoing engagements and encounters with the world” (Irwin & Springgay, 2008). The roles of educators and artists are similar in many respects. The a/r/tographer inquires through both educational and artistic processes (Irwin & Springgay, 2008).

A/r/tography lends itself to a blending of different methodological practices. Early a/r/tographical texts were undertaken under other methodologies and demonstrate the evolution of a/r/tography as its own form (Irwin & de Cosson, 2004). Action research, autobiography, and narrative inquiry are examples of methodologies that could be blended with a/r/tography.

I believe that my identity as an artist has a strong positive influence on my pedagogy. I am attempting to expand the integration of my artist/teacher/researcher identities. Keeping them separate is artificial because they already influence and inform each other. My identity as an artist is part of who I am as a teacher. Davis, Sumara, and Luce-Kapler (2008) point out that "to be inventive in their pedagogies, teachers must be skilled with the forms that they intend to use" (p. 214). In my own teaching practice I find that the best teaching moments come when I am drawing from my personal learning and experiences with a subject. A/r/tography also meshes well with the concept of complexity thinking with which my research is concerned because it emphasizes the relationships between phenomena and allows for the construction of new understanding.

The Relationship Between A/r/tography and Complexity Thinking

As developed in chapter 2, many different kinds of complex systems are found in diverse branches of science. The interdisciplinary field of complex systems looks to identify ways in which these systems behave similarly (Mitchell, 2009). Some of the strategies for observing complex behavior are being applied to classrooms, curriculum, and pedagogy under the term *complexity thinking*. To utilize complexity thinking in the classroom a teacher should recognize that many

disparate and seemingly unrelated variables affect the learning system through their interaction. A teacher is not set at opposition to the student, but can be a student and a teacher simultaneously (Davis, Sumara, & Luce-Kapler, 2008).

My research is concerned with implementing complexity thinking in a ninth-grade art class as a driving theory behind curriculum design, classroom structure, and as a methodology to evolve student artworks over the course of the semester. A/r/tography is particularly well suited to researching and analyzing this. Complexity thinking encourages a teacher to be aware of the characteristics of complex learning systems. Countless variables are in constant flux and interaction in any learning environment. Many of these variables are complex entities themselves. Some examples include networks of students, teachers, and parents that are all impacting the learning environment. Each individual student is a complex agent constantly structuring and restructuring his or her conception of the world. Although a teacher cannot be aware of all these interacting variables, a teacher engaged in complexity thinking will recognize that they all matter (Davis et al., 2008). A/r/tography encourages this awareness by recognizing the interactive nature of roles that have been traditionally viewed as separate. "A/r/tography as practice-based research is situated in the in-between, where theory-as-practice-as-process-as-complication intentionally unsettles perception and knowing through living inquiry" (Irwin & Springgay, 2008, p. xxi).

A/r/tography and complexity thinking applied to pedagogy have similar goals. Irwin and Springgay (2008) write that "a/r/tography (is) concerned with *creating the circumstances* to produce knowledge and understanding through

inquiry laden processes" (p. xxiv). Similarly, Davis, Sumara, and Luce Kapler write that within complexity thinking:

> learning and teaching seem to be more about expanding the space of the possible and creating conditions for the emergence of the as-yet unimagined. In this frame, education is not about convergence onto a pre-existent truth, but about divergence. Learning and teaching are recursively elaborative processes of opening up new spaces of possibility by exploring current spaces (2008, p. 225).

Complexity thinking questions the widely held belief that the individual is the center of knowing and points to communities, languages, and classrooms as adaptive learning systems, to name a few (Davis & Sumara, 2006). A/r/tography recognizes the meaning that is being constructed between a/r/tographers in a community and between communities. By recognizing a/r/tographers' ability to participate in the creation of knowledge, I affirm that art itself is an invention that continues to be created and altered by society (Carroll, 1988).

Complexity thinking recognizes that any observer is implicated in his or her observation, which is to say that who and what they are and the very fact that they are observing changes the object of their observation. Davis (2008) argues that a researcher has an "ethical imperative… to be attentive to how he or she is implicated in the phenomena studied" (p. 59). Researchers are changing the universe even as they perform research. No objective view exists. Researchers' observations are strongly influenced by their past experiences and current conceptions of the world. These conceptions unavoidably affect the process of research (Davis & Sumara,

2006). A/r/tography foregrounds the role of the researcher in the act of research and in so doing accepts the invitation from complexivists to acknowledge complicity. A/r/tography is well suited to research dealing with complexity thinking.

A/r/tography in K-12 Educational Sites

A/r/tography has been utilized within K-12 educational sites in a variety of ways. Barney (2009) used a/r/tography as a research methodology as well as a pedagogical strategy. Students acted as researchers and artists as the class investigated concepts and manifestations of dress. Barney was engaged in artistic investigations with his students, and students helped to teach each other in a decentralized classroom experience.

Porter (2004) describes bringing her studio into her art classroom as part of an a/r/tographic inquiry. At first she was afraid that there could be disrespect or vandalism, as there had been such issues in the area previously. In the end she found the students respected her for her artwork and were interested in what she was doing. The presence of her studio affected the climate and the culture of the class.

I was not completely sure how my research using a/r/tography would play out before I began, but I had some loose expectations. First of all I planned to be making art in response to concepts based in complexity thinking. I decided to move my studio into my classroom for this so that I could more easily integrate my artist and teacher identities. I expected this to have an effect on my class culture. Creating these kinds of artworks had already given me insights into classroom practice. For

example, when I created paintings over the previous summer that evolved according to a system, I found that a lack of variables in the system prevented a higher frequency of change. This proved to be a disadvantage to the system. In my classroom I've noticed that if students aren't exposed to many skills or contemporary art practices they tend to revisit preconceptions of their experience with art in a static way. I've discovered that students need access to more variables, not necessarily through more freedom, but rather through a greater level of exposure to outside influences and diverse contemporary art practices. Previously my studio was at my home, and students had no real conception of how I actually worked because they only ever saw me interacting with their artworks using their tools.

During the course of the semester I monitored student progress through informal interviews, photographing student artworks, and using personal journaling and reflection. This happened simultaneously with my art making, further research in scholarly writings, and teaching. I anticipated that I would be able to arrive at new understandings as I discovered the openings, reverberations, metaphors, and excess found in and around these practices.

Considerations from Opponents to Arts-based Research

Arts-based research methodologies are not universally considered to be valid forms of research. For example, Keys and Guyas (2006) cite personal experience in job interviews with university faculty who disregarded their arts-based research methods without recognizing the scholarly value of the research. Opponents and

proponents of arts-based research methodologies have offered considerations that should be addressed by researchers.

Arts-based research is often open-ended in its meaning making. Indeed this is one if its major offerings. O'Donoghue (2009) points out that this can result in misinterpretations of research and asks what possible implications there might be in such confusion. The possibility that two different readers can arrive at two different understandings of the research can be viewed as a positive or a negative thing. A complexivist might point out that this is always the case, that two individuals never have the same understanding of phenomena because their interpretations are dependent upon their own biology and previous experiences. Nevertheless, understandings will likely be more diverse with arts-based methodologies than with other, more analytical strategies. In my research I tried to be aware of the contrast between qualitative arts-based research and quantitative methods of inquiry. O'Donoghue (2009) elaborates that viewers may engage arts-based research superficially and lose the deeper meanings. I expect this may often be the case. I cannot assume that readers will access the value in my research. I am unsure of what my responsibility is in this area.

Eisner raises the question of whether generalizations can be taken from individual cases (Eisner 2006). My research does not purport to be generalizable in the analytical sense. However, that does not negate its value to others who can draw ideas, considerations, and new conceptions of art education from my account. I have tried to write in such a way that the research is accessible by other educators without making claims that would rely on the generalizability of my data.

Pariser (2009) says that "there is a fundamental disjunction between the research that artists do and the research that social scientists do, and that to call both activities 'research' does a disservice to both groups of practitioners" (p. 1). He further claims that Eisner was really just trying to legitimate fine arts practitioners within the academy when he began promoting arts-based research. Pariser's point is that even if we are constructing knowledge in the constructivist sense, there is a fundamental difference between knowledge constructed within different methodologies. More traditional qualitative research follows certain processes that allow for a different degree of generalizability. Nothing is gained by blurring the distinction between these two forms of inquiry (Pariser, 2009).

I appreciate Pariser's view because I found myself asking similar questions when I first encountered the idea of arts-based research. Constructivism and complexity give me the philosophical and logical framework to consider the legitimate offerings of arts-based research, but I certainly recognize the difference in application between arts-based research and more traditional qualitative methods. For me it makes little difference if I call my investigations *research* or if I just refer to them as *inquiry*. I will call them research because a/r/tography is developing with that vocabulary; however, if one wished to read my investigations as inquiry so as to avoid confusion with more positivistic social science research, that would not be a problem for me. I am sympathetic to Pariser's question of whether this vocabulary has been chosen in an attempt to grasp at legitimacy within academia. However, the inquiry can be valuable regardless of which term is used.

Jagodzinski and Wallin (2013) pull heavily from the philosophical framework of Deleuze to build a critique of arts-based research in general and of a/r/tography specifically. In a manner that seems to answer Pariser's concern they build an argument against the proliferation of arts-based methodologies that work within the existing traditions of scholarly research. They state that their "quarrel with a/r/tography is not that it isn't radical in relation to the state of the field of art-based research, but that it is not radical enough" (p. 76). They further imply that those developing the methodology are bogged down by motivators within academics such as obtaining grant money. From my perspective it appears that a/r/tography has made strong forward-strides in arts-based research. It has much to offer as it continues to develop. A/r/tography is young enough that its identity might change noticeably in coming years. A more comprehensive critique that considers the offerings of more recent a/r/tographic investigations would be welcome.

A/r/tography is an arts-based research methodology that is particularly well suited to investigating an application of complexity thinking in a junior high art class due in part to considerations of multiple levels of nested systems and in the unclear boundaries between systems. Although critics of arts-based research question its legitimacy in comparison to more analytical modes of social science research, I believe a/r/tographic inquiries that exemplify good art, good writing, and good pedagogy are yet valuable in the discourse of art education.

Evaluating This Research

As many readers and viewers of my research will not be familiar with a/r/tography and/or complexity thinking, I offer some possible suggestions by which the research may be evaluated. Within a/r/tography, methods of assessment continue to evolve (Irwin, 2004). A/r/tographic studies should not be judged against strictly predetermined criteria, as this would serve to delimit the potential for the "emergence of the as-yet unimagined" (Davis, 2004, p. 184). Irwin and Springgay (2008) suggest that as a lived act, the mode of assessment could possibly be developed during the course of the research. Generally it has been suggested that, "concepts need to be evaluated by their ability to provide access to phenomena not otherwise attainable; their new organization needs to be compelling and yield new and relevant information" (Springgay, Irwin, Kind, 2005, p. 909).

It is important to recognize that a/r/tographers represent two traditions that carry their own strong history. A tradition of writing and scholarly research has been developed across many disciplines with some variation. Additionally there is a separate tradition of art making that follows a different method of rigor and validity. Both of these traditions need to be considered by the a/r/tographer. Springgay, Irwin, and Kind (2005) suggest that the writing in a/r/tography should be good writing and that the art should be good art. A/r/tographic texts should have value in their separate disciplines even as they create new meaning in contiguity. Positioning an artwork in response to historical and contemporary art practices is seen as parallel to scholars using citations to recognize and position themselves within their field.

In his a/r/tographic and artistic inquiry into dress, Barney (2009) identifies the cultural practices of art making and research as modes of judging his a/r/tographic work. He also adds the third contiguous element of a/r/tography by addressing the quality of his pedagogy. Good arts-based research should be clearly within the professional discourse of artists in addition to being within the discourse of educational philosophy (ODonoghue, 2009). In harmony with the methods and suggestions for evaluation that I have mentioned, I offer three questions for readers and viewers. Is it good art? Is it good research? And finally, is it good pedagogy? By elaborating these questions I offer a way for readers and viewers of my research who are unfamiliar with my methodology and/or philosophies to find common ground from which to judge my work.

Is It Good Art?

There are many ways to judge the success of an artwork, and many methods of judgment follow a particular discourse of aesthetic philosophy. Rather than elaborating each of those here, I will simply offer my understanding of the value of art within the context of three philosophers dealing with art and aesthetics and position their opinions out of their original context and within the sphere of complexity thinking.

Martin Heidegger (1994) gives a compelling description of what art does. More accurately, he describes our response when we experience art. For Heidegger, the work of art is determined by the viewer's relationship to it and by the way he or she categorizes the thing in his or her mind. As a phenomenologist, Heidegger describes the way that we perceive a work of art in contrast to the way that we

perceive a piece of equipment. A piece of equipment is something that we don't think a lot about when it is functioning properly. If something about a piece of equipment draws our attention outside of its intended use, then generally that is viewed as a flaw, i.e. a hole in a sock. An artwork, on the other hand, is something that we consider in great depth. The work of art reveals something to us.

For Heidegger (1994), this revelation, or unconcealing, constitutes *truth,* and thus the object is a work of art when it is communicating truth. Though this may be too broad to be an accurate definition of art by itself, this view of truth can offer a measure of how successful an artwork is. Artworks are more successful when they help us see things in a slightly new way, make a connection, or come to a realization that we hadn't seen before. Note that this unconcealing of truth in an artwork can be viewed consistently with social constructivist and complexivist understandings of meaning making with the significant twist of recognizing the truth as being a created meaning rather than a metaphysical correlation. Thus, an artwork can be viewed as successful in its ability to direct our perceptions to the creation of new meanings, or to arrive at knowing. It is also important to recognize with this twist that an individual's culture and personal experience will affect and even partly determine what meanings are made.

Goodman (1994) made an attempt to qualify the nature of what an artwork has to offer when he wrote about the five symptoms of the aesthetic. What I like from his attempt (although these aren't the terms in which he spoke of it) is simply the idea that artworks that help create greater meaning, whether in quantity or quality, are more successful than those that do not. He claimed that artworks should

not arrive at a cognitively empty experience. They should appeal to the understanding and not just to the senses. Some understandings can seem so complicated that we glimpse them only briefly. Occasionally these meanings collapse when it is discovered there was no substance behind the complicatedness, but other times the experience of arriving at meaning is enriched by the effort of coming to an understanding.

I invite viewers of the artworks I have made as part of my research to judge them by their ability to provoke in the viewer a discovery of new meanings. In this way, the artworks should serve a function parallel to the role of a teacher as a director of perception (Davis, Sumara, & Luce-Kapler, 2008). The understandings they create in response to my art may change when coupled with a reading of this text-based portion of my inquiry (meaning the thesis itself). I also discovered valuable meanings with my students. Carroll (1988) has described art as a cultural practice that has evolved through amplification, repetition, or repudiation of existing conceptions of art through history. In this way society is creating the knowledge of art and what it is. Along these lines I offer one last method of judging my art, and that is the manner in which it fits within the contemporary cultural practice of art whether as an amplification, repetition, or repudiation of current conceptions.

Is It Good Research?

My work exists within an existing discourse of art education research. Any reader familiar with scholarly texts within the field should be able to recognize the way the work is positioned within the context of current practices by citations,

references, and correlations made in my review of literature throughout the study. I also offer the same mode of judgment I listed above in reference to my art, specifically the identification of the way meaning is created in the research. Good questions and ideas arise from successful arts-based research (Eisner 2006). The renderings of a/r/tography, described below, allow for the creation of such questions and ideas.

As a methodology a/r/tography does not give prescribed steps. To create prescribed steps to follow for arts-based research would be problematic because possibility is found in the ambiguity (Barney, 2009). That is the uncertain space where discovery can occur (Wilson, 2004). Instead of prescribed steps, renderings are outlined that represent characteristics that may, or may not, be present in a/r/tographic research. These renderings are meant to give possibilities to the researcher and to serve as a beginning list of principles that can be used in research and evaluation. The renderings are contiguity, living inquiry, metaphor and metonymy, openings, reverberations, and excess. This discussion of renderings is taken from Stephanie Springgay, Rita Irwin, and Sylvia Wilson Kind's (2005) outlining of a/r/tographic inquiry. Although their discussion is simplified elsewhere (see Irwin & Springgay, 2008), my summary comes from that original article.

Contiguity refers in part to the relationship between the artist/researcher/teacher as well as to the image/word. This *folding* of roles allows for multiple points to come in contact in unexpected ways. The a/r/tographer is not expected to make these roles distinct or separate, but to allow them to inform or contradict each other as meaning is made.

Living inquiry is a rendering that describes that the nature of an a/r/tographer's practice is an integral aspect of who that a/r/tographer is. What an a/r/tographer does and what that a/r/tographer may produce are necessary parts of his or her identity. The various roles of a/r/tography exist in the same person and are not separate from life. Living inquiry is "an embodied encounter constituted through visual and textual *understandings and experiences* rather than mere visual and textual *representations"* (Springgay et al., 2005, p. 902). Meaning making takes place between the reader/viewer and the text/art. The work is subjectively created and subjectively consumed. "A/r/tographers rerepresent their questions, practices, emergent understandings, and creative analytic texts as they integrate knowing, doing, and making through aesthetic experiences that convey meaning rather than facts" (p. 903). Living inquiry connotes a commitment to this kind of engagement with the world (Gouzouasis, Irwin, Miles, & Gordon, 2013).

Metaphor and metonymy are modes of communication a/r/tographers use to create expansive meaning. Metonyms are relationships between words or images where one thing has displaced another in meaning. Metonyms and metaphors are meant to allow for open-ended interpretations. The meaning isn't supposed to be limitless, however.

Openings are the spaces between things where meanings can be found. The openings can obscure or disrupt. Openings can be worn, torn, or inherent. These openings allow the reader/viewer to enter a space. The a/r/tographer isn't just describing knowledge, but inviting another to help arrive at meaning.

Reverberation refers to the slippage of meaning in rhythms and patterns that are manifest to the reader/viewer. "Privately and socially constructed, reverberations activate openings to let others' work and words resonate throughout in a tangled co-laboring" (Springgay et al., 2005, p. 907).

Excess refers to the possibilities that arise, unexpected, from research practices, art making, or pedagogy. It allows for complexity in that it retains those variables that may become useful at an unknown moment.

Eisner (2006) claims that our ability to see in arts-based research the things that the critic claims to be present is a potential assessment of that research. Critique can alter our perception. The degree in which we are able to recognize the meanings purported to be present may give insight into the success of the research. In this spirit I will invite readers to look to their own ability to see in my research the kinds of meaning I invite as I elaborate the renderings I have described above. This depends also on my ability to persuade readers to see the inferences and connections I have drawn from my experience.

Is It Good Pedagogy?

In an evolutionary frame in which the world is perceived as emerging rather than determined, "learning is understood to be dependent on teaching, but not determined by it" (Davis, 2004, p. 23). This view accepts the idea that one person cannot force another to learn. It also highlights the notion that a teacher can facilitate and enable student learning. Thus, learning is dependent upon many things, and one of them is teaching. It is in this understanding that student learning is dependent on teaching that I point to student learning as a measure of the success

of a teacher. Because teaching is not deterministic, student learning is an imperfect measure, but one that may be good enough for readers and viewers unfamiliar with my work to judge its value. In the spirit of complexity I offer two questions relating to two nested levels of complex systems. What did individuals learn? What did the class as a whole[4] learn? In both cases I question the significance of the learning. Throughout my writing I have documented student artworks and understandings through photography, informal interviews, and personal reflections. These subjective observations illustrate the presence and character of learning at both the individual and class levels. Student artworks are the best measure of the success of the curriculum. Student artworks can be interpreted and evaluated according to the criteria previously discussed. I acknowledge that students may experience great learning and growth without walking away with successful finished artworks. That kind of growth is not addressed in this study.

Readers or viewers who judge the value of my research can look to the degree to which they are able to arrive at new understandings through my own art, the art of my students, and my writing. They may also look to the way my art, my students' art, and my writing fit into the existing traditions with their respective modes of evaluation.

[4] I do not mean all the individuals in the class. I am referring to the separate complex entity that is the class, which has the ability to adapt, respond, and arrive at emergent conceptions as a collective (see Davis & Sumara, 2006, p. 14).

CHAPTER 4

THE CURRICULUM AND DISCUSSION

Curriculum Design and Relationship to Complexity

Community Culture

In recognition of the complex and unique nature of my class, I offer a brief overview of the community context. My class was part of Mountain Ridge Junior High in Highland, Utah. Having been raised in Utah County myself, I would describe the area as affluent, conservative, and predominantly Mormon. At Mountain Ridge there is a feeling of support for the arts in general. The various music programs at the school are successful and engage students even through summer classes. The junior high is a feeder school to award-winning high school music programs. The community values the arts generally but lacks formal education in the visual arts specifically. There is currently no formal art training offered during the summer months. Although many students begin private music lessons in elementary school, the same is unusual with regards to visual art training. I have often wondered what kind of artists would come out of a community that values the visual arts in the same way this community values music.

The school sponsors an annual art show for which it allocates a $1,600 budget. The show is open to all students and faculty members. There are usually around 200 entries split between 2D and 3D categories. Artists from the community judge the show, and prizes are awarded at an artists' reception. The art show is held in the spring each year and helps to raise the profile of the art program.

The art rooms in the school are large, with high ceilings, student lockers, and eight sinks on an island in the back of the room. A kiln room, storage room, and darkroom sit between the two art classrooms. I believe these facilities are a constantly present display of endorsement of the visual arts.

Because the school is situated in an affluent community there is no lack of funds for student art supplies. In addition to the mandatory lab fee charged to each participant, students purchase art kits with most of the tools and media required to complete each course. Over the six years I have taught at Mountain Ridge, I have had access to funds to slowly build a vibrant photography program, which includes a darkroom with equipment, and both film and digital SLR cameras.

The art consumed by the community tends to be representational and usually religious. Most artworks you see in homes are prints of paintings from a handful of Mormon artists, often working in a religious vein, typically about Jesus in particular. Other common styles and subjects include landscapes, drawings and photographs of Mormon temples, and images of family. Of course there are many exceptions, and I list only generalities. There is very little access to current contemporary practices that might be found in larger cities. The public is generally unfamiliar with installation, conceptual art, and postmodernism. Abstraction is often viewed negatively. There seems to be a strong drive toward illustration by the lay public. For example, if I tell someone I am an artist I might be asked if I have ever illustrated a book. This is apparently viewed as a measure of my success as an artist.

My 26 students were 9th graders, most of whom had had at least one or two art classes with me previously. I did have three students who were placed in my

class without having taking the prerequisite Art Foundations 1 course. Of the 26 students, 14 were female and 12 were male. The class ran from January through May 2013.

Decentralized Control

Ideas and knowledge flow through the network of society. As understandings are altered and passed around, they travel between individuals that might be considered nodes in a network. I have previously described a few important types of networks. During this semester I wanted to promote the idea that my class was a decentralized network. This is in contrast to a centralized view of a classroom in which a teacher is standing as the sole guard and distributer of knowledge. One of my primary goals in treating my class as a complex learning system was to decentralize control of the class.

If my class is already a complex system as I have previously stated, then it should already demonstrate such characteristics as decentralized control. This is indeed the case. As one example, the social structure of the class and school are complex and decentralized. As a teacher I artificially impose structure and control to achieve my desired ends. I do not need to require a social pecking order for one to arise in the classroom. Decentralized control is already present. As Davis and Sumara (2006) point out, “The question is whether or not that condition can be meaningfully brought to bear on the development of concepts and interpretive possibilities” (p.146). This is what I hoped to do. I sought to further decentralize control of learning in my class through self-grading and autonomy in media. I also introduced the use of evolution as a methodology for creating a series of artworks.

This was intended as a constraint within which students would have great freedom. It was hoped that the constraint would actually enable a higher level of learning.

Self-Grading

I had a few ideas about how I would respond to complexity thinking in my classroom before I began and had already begun making changes in that direction. One of those changes was to allow students to grade their own projects. The book *Drive: The Surprising Truth About What Motivates Us* by Daniel Pink (2009) had a significant influence on the way I had been running my class. Pink argues for rethinking the way we conceive of motivation in contemporary life. Rather than the enforced consequences and rewards that behaviorists might call for, Pink thinks that autonomy, mastery, and purpose are the way to address motivation. For Pink, *autonomy* refers to allowing an individual to direct his or her own choices. *Mastery* refers to the desire people have to improve in things and work towards excellence. *Purpose* is the feeling that your actions matter in some way, that your work has meaning on a larger scale.

By incorporating these principles into a workplace or classroom one might achieve greater job satisfaction, intrinsic motivation, and even improved creative output. I decided to try it in my class. I started by teaching the concepts of autonomy, mastery, and purpose to my students. I began letting some classes of students choose their own grade for assignments. My hope was that by releasing my control of student grades I would be allowing students to arrive at emergent and unexpected results that were not teacher determined. In an attempt to measure their progress, I prepared a worksheet students could use for goal setting and

sought to meet individually with students to set and review goals while talking to them about their work in a studio-visit[5] format. The worksheet included a place for students to determine their purpose in my class.

Although I have used them in many different classes, the worksheets never worked quite as I hoped. One problem was my own lack of persistence in encouraging or requiring students to use them. Another major problem was the time investment required to meet individually with each student on a regular basis. Though some of my classes are small, many are not. I usually have more than one class each semester that exceeds an enrollment of 40 students. Goal tracking is something I will return to in the future, but I did not measure its use by students in the Art Foundations 2 course that is the focus of this study. Allowing students to determine their own grades on projects is something I did use.

When I began studying complexity I perceived a harmony between Pink's concepts and the educational applications of complexity fleshed out by Brent Davis and his colleagues (see Davis, 2004; Davis & Sumara 2006; Davis, Sumara, & Luce-Kapler, 2008). Both Davis and Pink identify the inadequacies of behaviorism as the dominant psychological model of our time. They also both look to the potential for unpredicted creative responses in systems that are less centralized than traditional organizations.

At the beginning of the semester I held a discussion with students about how they wanted to be graded. The students wanted to be graded on effort. They also wanted to be graded on aesthetics, but not on someone else's aesthetic. They also

[5] A studio-visit is an opportunity to have another artist come to your studio and give you feedback on your work.

expressed a desire for feedback from me as the teacher. Using their input, I came up with the following grading method.

After each critique students would turn in their newest artwork, their most recent iteration. On the back students graded themselves on a four-point scale, or they could just give themselves a letter grade. Students were to grade themselves on whether they used their time well and whether they worked through problems they encountered until they reached a state of resolution. I wanted to avoid asking them to grade themselves based solely on time because an artist can spend a long time on a work without ever resolving the composition. Part of being an artist is reaching a state of completion in which the problems have been resolved.[6]

A major problem with teacher-determined grades within an art classroom is that it reduces students' willingness to take creative risks. Rather than seeking new meaning-making opportunities in their art or investigating ideas of personal interest, students become producers of the teacher's aesthetic. This may not be avoidable even without teacher-determined grading, as the teacher tends to be the major link between students and the larger network of art-worlds. However, teacher-determined grades formalize the teacher's control over the aesthetic discourse of the classroom. A second possible problem with teacher-determined grades is that they serve as an extrinsic motivator, which might disrupt a student's intrinsic motivation toward art making (Pink, 2009).

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[6] I am not claiming that artworks must always demonstrate complete unity. I refer to problems in the artwork's ability to create a space for the viewer to make new understandings.

Student opinion was generally favorable toward self-grading. Christian, a student, observed that self-grading allowed students to take risks in their art without fear of it negatively impacting their grade. This is as I hoped. Students did not grade themselves on skill exercises. These were given credit based on completion. Because students were grading themselves per-project rather than per-term they still needed to complete the artworks and exercises in order to receive a good grade in the class.

A negative side effect of student-determined grading is the lack of feedback from the teacher. I hoped to be able to continue to give significant feedback through critiques and individual interaction. In many forms of grading the grading can lack specific feedback, instead providing students with an overall grade without an understanding of where the grade came from. I hoped to be able to keep the specific feedback strong through these other avenues. In practice this was difficult. Although I do feel that I gave a lot of feedback, I wish I had been able to provide more. The number of students in the class is perhaps the most critical factor in limiting individual feedback.

One common view of grades is that they should reflect student learning. A final argument in favor of student-determined grades is that the creation of new meaning is an important potentiality in art. To interfere with a student's ability to freely explore new possibilities through hegemonic grading can possibly interfere with this critical learning opportunity. On the other hand, art has developed with a rich history of skills, styles, and techniques. To ignore teaching these would be to

ignore a defining aspect of the world of art. This was my reasoning in keeping completion-based skill grades as part of the system.

Autonomy in Media

In each of my classes students have an opportunity to purchase an art kit that is specific to the class and that comes with the major supplies and media that will be required for projects during the semester. In an attempt to decentralize and to help students take ownership of their learning, I decided to get input from students about what supplies they wanted in their art kits. The class decided that the major element in their kits would be oil paints and oil painting supplies. I had never before worked with oil in a junior high class. I was unsure about how it would go, but I was also excited. It seems to me that students tend to create artwork at a level proportionate to the quality of supplies they are working with. Throughout the semester students had great freedom in the use of a variety of media that I made available in the classroom. They were also allowed to explore other media and bring things from home.

Neighbor Interactions

Complex emergence relies on the interaction of entities that are constantly co-adapting and restructuring. At the level of the class, we were responding and adapting to interactions with other classes within the school and with other schools (through a district art show for example). At the student level, students were influencing and interacting with each other. In an attempt to maximize these interactions, students were allowed to move freely about the room and to work in different areas. During class critiques, students were exposed to the work of all the

other students and gave and received direct feedback. Students who were influenced by things outside of class were invited to share them with students inside class. For example, Elise saw a show in Park City in which a sculptor was using Legos. She shared photos of the works. Brendan created a sculpture from Legos. These kinds of neighbor interactions may always be present within a class; I tried to observe and encourage them.

Positive and Negative Feedback Loops

Feedback loops occur when part of a system's output is returned as an input. This can create positive loops that amplify certain behaviors or negative loops that extinguish behaviors (Davis, Sumara, & Luce-Kapler, 2008). Such loops are instrumental in an immune system's complex adaptation to diseases (Mitchell, 2009). In art, such loops are ever-present, as art has evolved through the various "isms." These art styles tend to grow and expand in positive feedback loops. Such loops are easily seen in the fads and interests of my junior high students. I wondered if I could use feedback loops in an intentional way in the classroom. The discovery of mirror neurons has given a physiological basis to the way that humans imitate things that other humans do. From yawning to smiling to empathy, mirror neurons may be responsible (Davis, Sumara, & Luce-Kapler, 2008). A teacher's excitement about a subject has a huge impact on the excitement level of the class in general. I have always had the ability to get students excited about things through my own dramatic actions. I hoped to be able to do so in this class and to encourage positive feedback loops in characteristics that I hoped would be amplified. In this way I was asserting influence in the class (on students' aesthetic perception, for

example) without mandating a specific outcome. Students were simultaneously influencing me in the same way.

Critiques

The primary formal feedback mechanism in the class was the class critique. In a schedule determined with students, critiques were held once a week with half of the class participating on alternating weeks. Critiques were often long. It wasn't unusual for a critique to last the better part of an 80-minute class period. Critiques gave students an opportunity to take responsibility for their work, to give comments and suggestions to others, and to be influenced by the work of others. I found that after the students had experience they were more willing to communicate in critiques, but some students seemed engaged only when we were speaking of their own pieces. Still, critiques became strong enough that I was comfortable on two occasions with allowing the students to run their own critique while a substitute was present. From the feedback I received these went well.

Although I hoped that students would be skilled enough that I could partially remove myself from critiques, I rarely did so. Students were typically anxious to get to work on their own projects, and some viewed critique time as an intrusion on their own work time. Often, in an attempt to speed the critique but retain value, I would be the primary driving agent in the conversation. This is consistent with the ideas of Barabasi and Fuite (as cited in Davis and Sumara, 2006), elaborated by Davis and Sumara (2006).

> As Barabasi develops, a decentralized network will decay into a more vulnerable (but informationally efficient) centralized network if stressed.

> Working from this suggestion, Fuite has hypothesized that the tendency of educators to perceive of time as a scarce resource may be one of the main reasons that the most common organizational strategy in the contemporary classroom is the centralized network, with the teacher at the hub and the individual students at the ends of the spokes. (p. 88)

Variables

Throughout the curriculum I wanted to expose students to a variety of artists, styles, tools, and techniques so that they would not be creating art in a vacuum. We often began class periods discussing the work of individual artists. On some days I would begin a segment of *Art 21* before class, and students could begin engaging with it as they entered. As the semester went on, I found that there wasn't enough time to expose students to as many different modes of art making as I had hoped. The demands of their projects and critiques served to fill the bulk of class time.

Enabling Constraints

Complex emergence occurs within systems with constraints or rules. Davis and Sumara (2006) explain:

> Complex systems are rule-bound. Whether at the sub-cellular or super-species level, these unities are subject to imposed constraints. Some constraints are dictated by context, others by the structures of the unities, still others through co-implicated action of agents and setting. Regardless of source, however, the common feature of these constraints is that they are not prescriptive, but proscriptive. They are not imposed rules that one must obey

in order to survive, but conditions that one must avoid to remain viable. (p.147)

Enabling constraints are constraints imposed on a learning system that might facilitate emergence in a particular direction. As an artist I have recognized the advantage of working within such limits that allow me to develop unexpected solutions. Indeed, this has been a major motivator for me to use systems as a method of creation of artwork.

I stated above that the social structure of a class is already decentralized. It could be said now that any constraint, including centralized teacher control and the rules that are connected to it, can function as an enabling constraint in the complexivist sense. Looking with the right lens, one could claim that most any class activity is a constraint imposed on a decentralized system. To clarify then, I am not claiming that these constraints do not already exist in my classroom. Nor am I claiming that emergent learning is not already happening in my classroom. I am seeking to discover if consciously manipulating these variables and observing the resulting effects can lead to new understandings or different kinds of emergent understandings. Furthermore, it is important to clarify that proscriptive and prescriptive constraints vary to a large degree, but the difference may be largely a matter of perspective. Requiring a whole class to make a drawing of the same tiger seems fairly prescriptive. But from another angle, proscribing all subjects but tigers is proscriptive. Nevertheless, the latter example seems more open to emergent interpretation.

Genetic Paintings

In looking for an overarching constraint to impose on my artist-students, I looked at the artwork I had been making myself. My readings in complexity had turned up evolution as the quintessential example of emergence. I also read about the methodology of genetic evolution being used to construct computer programs that execute specific tasks (Mitchell 2009). Mitchell describes programming a virtual robot to clean a virtual grid. Simple rules are given to the robot, which is scored based on the robot's success in completing the task. Robots that score above a certain mark become parents by having their rules split and combined in new ways. This is done many times over with new combinations of rules also being created through a small chance of mutation (randomly changed rules). Over many generations, the robots evolve to show great efficiency in completing the task. I soon began thinking of using the same processes to evolve art. Internet searches showed me that such artistic inquiries were being undertaken already. I knew that to achieve a level of complexity within my art, I would need a massive population of artworks. This would necessitate working digitally, which was not something I wanted to do. Instead, I decided to use basic genetic evolution to inform a system I would use to create a small number of hand-painted works.

Each painting was made using acrylic on gessoed and cradled panels measuring 11" x 11". The imagery in each painting was determined using a system. In the system a *new parent* is a painting that has fresh visual images. Combining visual images from two parents made a *child*. One painting is chosen from each generation to be a parent for the succeeding generation. The second parent is

always a new parent made with fresh images. This was done to keep the total number of variables or images from stagnating.

New parents were created using the following system. I rolled dice to determine a dictionary page number. Rolling more dice specified which word on the page I would use. I searched the word on Google Images. I rolled one more die to determine which image would be selected. Dice also determined the total number of images in the parent.

Children were created using a different system. A die determined how many children would be in each generation. A separate roll determined how many total images would exist in each child. The images in the parents were numbered, and dice rolling selected which of the parents' images would be present in the child. Additionally, there was a one-in-four chance that a mutation would occur in which a new image would be introduced using the rules for new parents.

Outside of the system I had leeway to compose and paint the panels in any manner. The paintings were often ugly, but the overall system was interesting to me. Eventually I found myself bored, as much of the creative side of the work was completed in developing the system. The execution did not hold my attention beyond 12 panels. Eight of the panels were displayed as part of the show *E Plurabis Unum,* curated by Namon Bills, in the Tippets Exhibit Hall at Utah State. Although *E Plurabis Unum*[7] is often used to reference political unity among disparate factions, I thought of it in terms of the evolution I was studying. Millions of predecessors change and develop over time to create an individual. From many, one. It makes for

[7] *E Plurabis Unum* refers to one coming from many.

an interesting analogy to the changes the United States has undergone since its genesis.

Figure 4. The eight panels that showed together in *E Plurabis Unum*. These eight panels were selected from multiple generations.

Evolution as a Constraint

In choosing an overarching constraint that could drive the curriculum for my Foundations 2 class, I selected the methodology of evolution. However, I did not want my students to be stuck with as rigid a system as I had used. My system for evolution would have required thousands of generations before things began to complexify. This could be avoided by relying on the complexity of the class itself. So, with my students I backed off the structure and defined their evolutions more loosely. I determined that each student would create a series of work over the semester. Each artwork would be labeled a *generation*. Each generation would be

evolved from the previous generation. No specific structure mandated how this would occur, but I would give loose guidelines based on my readings of Carroll (1988), who discussed art as a cultural practice that has evolved through amplification, repetition, or repudiation of existing conceptions of art through history. Students could choose any characteristic of their art to amplify, repeat, or repudiate. It is not a coincidence that this evolution of artworks is consistent with the common practice of artists working in series. I hoped that the development of work over time would result in refined, matured, and expansive results.

Curriculum in Practice

On the first day of class, students were assigned to create a completed artwork before the second day. This idea, which comes from the software company Atlassian (Pink, 2009), is called FedEx because the results had to be delivered overnight. Students had access to a large variety of media and could choose any subject or style. I was very open about the ideas I had for the curriculum and even explicitly taught some of the complexivist principles that informed the course. On the next day of class, we held our first critique. The process of evolving work over the semester was discussed, and a critique schedule was created. At this point students understood the major enabling constraint and driving structure of the curriculum for the semester. I will now describe Elise's and Christian's work as examples of student evolutions. Two more examples are displayed without discussion in the appendix.

Student Evolution: Elise

Elise chose to make her Fed Ex piece (which became her first generation) in response to music. A quiet girl, she was certainly one of the students who put in the most effort. One thing I have noticed in taking art classes myself is that the instructor's expectation that I work is the most valuable part of the class. Elise came to a similar conclusion. She said:

> Having to have a new piece of artwork ready every two weeks was definitely a new task for me--usually I don't have a ton of spare time to draw or paint, especially during the school year (…). Another reason for my not doing art projects very often before this class was that I simply didn't have any ideas of what to paint. This semester, I was basically forced to come up with something, which was definitely a positive thing. (Written reflection, May 23, 2013)

While she was working, Elise listened to music, producing a playlist for each piece. In addition to popular musical forms, she was inspired by her participation in the school's band and listened to that music as well.

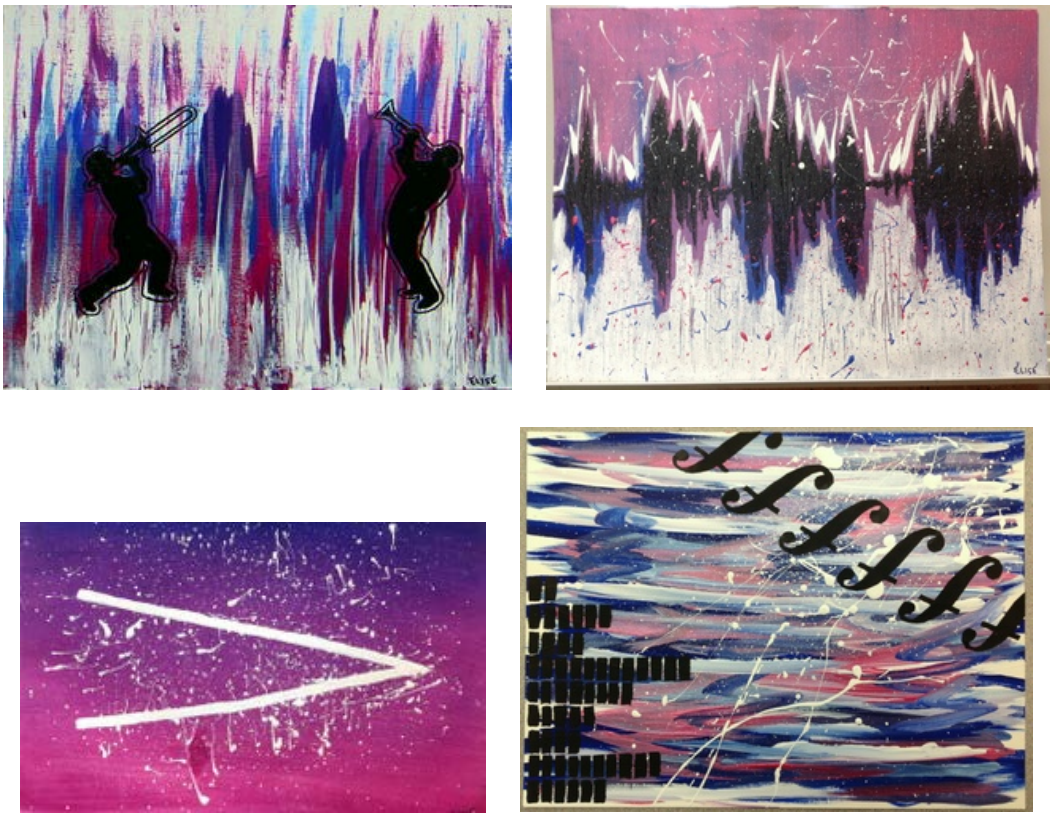

Figure 5. Elise's generations one (top left), two (top right), three (bottom left), and four (bottom right).

In her first four generations Elise chose to keep the same color scheme. She was working in acrylic on gessoed paper. The first two paintings reference sound waves, while the third and fourth draw symbols from musical notation, specifically forte and decrescendo. Her third generation (with the decrescendo) was the weakest, and she struggled to come up with her fourth. She writes that at that point she had "artist's block" and that "just the thought of painting stressed (her) out," which was something she hadn't experienced before in this context (Written reflection, May 23, 2013). The challenge must have been a positive thing because generation 4 was her strongest piece to date.

Figure 6. Elise's generations five (top left), six (top right), seven (bottom left), and eight (bottom right).

Elise's remaining five generations exhibit a desire to explore different directions. Students had different levels of patience about sticking to one form. Elise never left her theme of music, but the paintings begin to show wider variety. Generation 5 proved to be quite literal and influenced by a Jack Johnson album cover, generation 6 was likely influenced by iPod advertisements, and generation 8 is kind of a surreal illustration. One of Elise's best pieces is her final generation, which required more time and was made on panel. Using reeds from her own instrument and borrowing others from friends, she accessed the medium of found objects with no recommendation from me. Her composition is fresh and inventive,

seeming to leave behind some of the cliché allusions (such as the Jack Johnson album cover) included in her previous four generations.

Figure 7. Elise's final (ninth) generation

Student Evolution: Christian

When students were given the Fed Ex assignment, I gave them access to any media I had available. In particular this included much nicer papers than junior high students typically use. Christian received a 10" x 11" piece of Stonehenge printmaking paper. On a snowy day he placed the paper on the floor of his bus for 30 seconds or so. Students walked on it with their wet and slightly muddy feet. The dried result became Christian's first generation. The resulting image is a visual record of that particular time and place. It is somewhat parallel to a photograph. For his second generation he tried something similar but tried to increase the visibility of the result by drawing dots back over the top. This concept was improved in generation three when he shaded the footprints in graphite, outlined them in ink, and then erased all the graphite back out. Generation four expanded on the idea

with a filled in shape in the background. Christian then left that direction, apparently bored of the conceptual nature of the pieces and the lack of traditional media manipulation. Conceptually these early pieces represent some of the very best work produced in the class by any student.

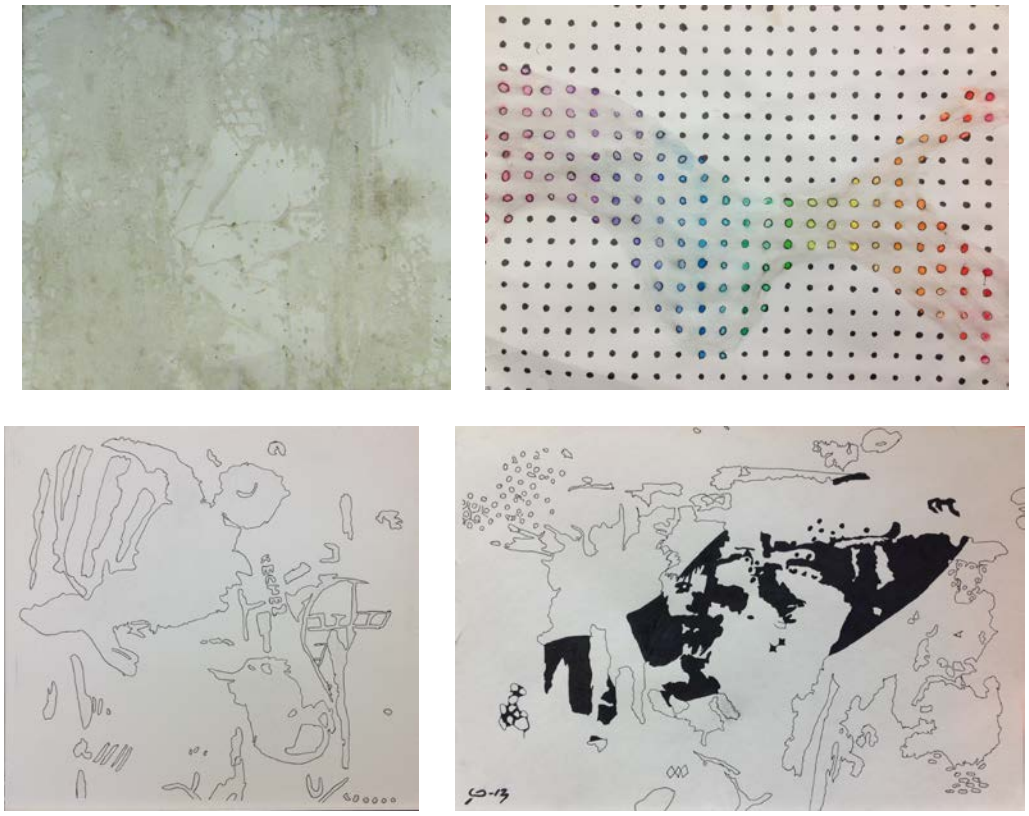

Figure 8. Christian's generations one (top left), two (top right), three (bottom left), and four (bottom right).

Christian seems to enjoy artworks that demonstrate conceptual elements. During the class postcard project[8] he set about a unique way of determining a recipient. Using street view on Google Maps he found an image of a randomly selected home which had an open garage door. The interior of the garage was rather

[8] Students created artwork on postcards. These were to be mailed to unsuspecting and often unknown recipients.

messy. Christian figured out the address, put it on his finished postcard, and noted that the owner needed to clean their garage. Although I found this humorous, I asked that he change his course so as not to cause offense, particularly because he had put my classroom on the return address. These conceptually strong artworks surely influenced the other students in some way, but no one ended up following Christian's lead in their own art.

Formally it was a different story. Christian developed a technique that other students appropriated. In an oil painting, Christian used a scratch-tool to remove the top layer of paint and achieve a negative-line. He used this technique in at least three pieces, including his final artwork of the semester.

Figure 9. Christian's first experiment with scratching (top left), his scratched postcard (top right), and his final artwork of the semester.

The Evolution of Art **Installation**

As an a/r/tographer I originally thought I'd participate in the class just like the students. I expected to simply make art that evolved over the semester and to participate in critiques just like everyone else. I hoped that this would help my students to consider themselves to be on a similar level to me artistically and in terms of our decentralized class. Although I did include my work in class critiques on several occasions, I eventually added more structure to my work than simply

participating in the evolutions being produced by the students. I planned and executed an interactive installation that would sit in our school's commons area, an open area at the center of the school by the front office.

The central feature of the installation was a hexagonal pillar built from wood and hardboard. The pillar stood eight feet tall, and each of the six sides measured eighteen inches wide. Each side was reinforced to be able to hold an 11" x 11" cradled panel. Below the spot for each panel was a slot through which coins could be deposited into bowls held on a shelf on the interior of the pillar. The pillar was first installed during our school's art show with five panels, each with a different artwork that I had created. The sixth side held a sign that described how the installation would evolve. Viewers voted for their favorite piece with coins. The piece that received the most money would become the parent of the next generation of artworks. Each panel in the new generation was created in response to some characteristic of the panel selected to be the parent. After the first generation, the parent of the current generation was placed on the sixth side above the instructional card. Five new artworks were made that built off some characteristic of the selected parent. The pillar was first installed at the end of April and remained on display through May when school ended. Over the course of the month four different generations were displayed, which made a total of twenty unique panels. However, I consider the installation as a whole, including its interactive and dynamic nature to be the artwork. It is by considering the whole installation together that I hope to create openings for meaning making.

Figure 10. Installation view of *The Evolution of Art* in the commons area at Mountain Ridge.

Generation 1

For the initial set of five paintings, I wanted to provide a variety of styles within the constraint of small 2D artworks. The first painting I completed was actually one of the panels from my *E Plurabis Unum* collection mentioned previously. I imagined passing genetic information from that original set of paintings onto this new evolution. One painting I knew I wanted to do was a grisaille portrait of our school principal, Mark Whitaker. I thought students might enjoy recognizing the likeness of their principal in a painting. I included a nonobjective piece that I had painted that same semester before choosing to make the installation. For the last two pieces I wanted to branch into other things I've observed students are interested in. One is a painting of Hogwarts Castle from *Harry Potter.* It is painted in a loose illustrative style. The final piece is a graphite drawing

of an original super hero named Vorceris whose pose is patterned on Spiderman. I often observe students making graphite drawings of fictional characters.

Figure 11. The five panels that formed generation 1 in *The Evolution of Art.*

Generation 2

Students, faculty, and visitors voted by coin. The grisaille portrait of Mark Whitaker was selected as the piece that would inspire a new generation of panels. I considered any aspect of that parent panel to be a seed for one of the new panels. I wanted to avoid getting stuck painting the same thing over and over, so I included some significant variations. Using a computer and a drawing tablet, I made a line drawing from an unused photo from my photo shoot of Mark. After printing it I used spray adhesive to attach it to the face of the panel. I also painted another grisaille portrait, this time of a small girl on a swing. My daughter served as the model for that painting. For a third panel I used the same pose of Mark and altered it so he appeared to be an airbender from the Nickelodeon television series *Avatar: The last Airbender.* This is a series that many students know and enjoy. The symbol on the head would be instantly recognizable. For an ink drawing I used the approximate silhouette of the parent panel to scumble a non-objective scribble. The last panel is a gesso transfer of the photograph I took for the grisaille portrait of Mark. The image is repeated nine times.

Figure 12. The five panels that form Generation 2, along with the parent selected from generation 1.

Generation 3

Even though I consider it to be one of the worst paintings I have made, the painting of Mark as an airbender received the most votes in the second generation. For the third generation I made an image of another faculty member, a technology teacher,

as an airbender who is glowing in the *avatar state*[9]. It is a photograph heavily edited with digital painting. A third airbender was painted using oil paint and patterned on a Lego man's body. Recognizing that I should use Mark as a model again, since he was the model for the first two selected parents, I asked him to pose as a different fictional character. Digitally adding a lightsaber turned him into a Sith Lord from the Star Wars franchise. Pulling from the grisaille portraits in earlier generations I painted a new one of a small boy with an arrow tattooed on his head. The last panel in this generation is a nonobjective painting that uses the same color scheme as the parent painting.

[9] The *avatar state* is a point of spiritual unity where the character manifests a connection with his previous incarnations. The avatar's eyes and tattoos glow white.

Figure 13. The five panels that form Generation 3, along with the parent selected from generation 2.

Generation 4

The image of Mark as a Sith Lord with a lightsaber was selected to be the parent of the fourth generation of panels. Again I tried a different faculty member, this time myself as a Jedi wielding a green lightsaber. Having portrayed my boss as an evil

villain, I thought it was fun to portray myself as a noble hero next to him for the school to see. Continuing the Star Wars theme I tried to make a drawing of an imperial soldier on a *speeder bike,* which is a one-man hovering vehicle. When the drawing turned out poor I tried painting with gouache, which I am not familiar with. Finally I sanded the surface. In so doing the edges were sanded down to the hardboard. This created an effect that looked like craft-cards made by scrapbookers. The connection prompted me to paint a single orange line and a yellow flower at the top of the image.

The third panel for this generation was inspired by pixel-art and early low-resolution video games. I created a version of Mark holding a lightsaber with few pixels and enlarged it. Continuing the idea of Mark as a Sith I created a new image of him using *force lightning*[10] instead of a lightsaber. Again I wanted to branch out rather than having all of the images based on Star Wars. I selected a less well-known fictional character, Vin, from the book *Mistborn* by Brandon Sanderson (2006). Vin is portrayed wearing the distinctive mistcloak made of ribbons of material. I drew the image with Nupastel on mat board. Although I did not create a fifth generation of panels, this drawing of Vin was selected via voting and would have become the parent of the next generation.

[10] In the Star Wars universe, *force lightning* appears as electricity coming from the hands of a Sith.

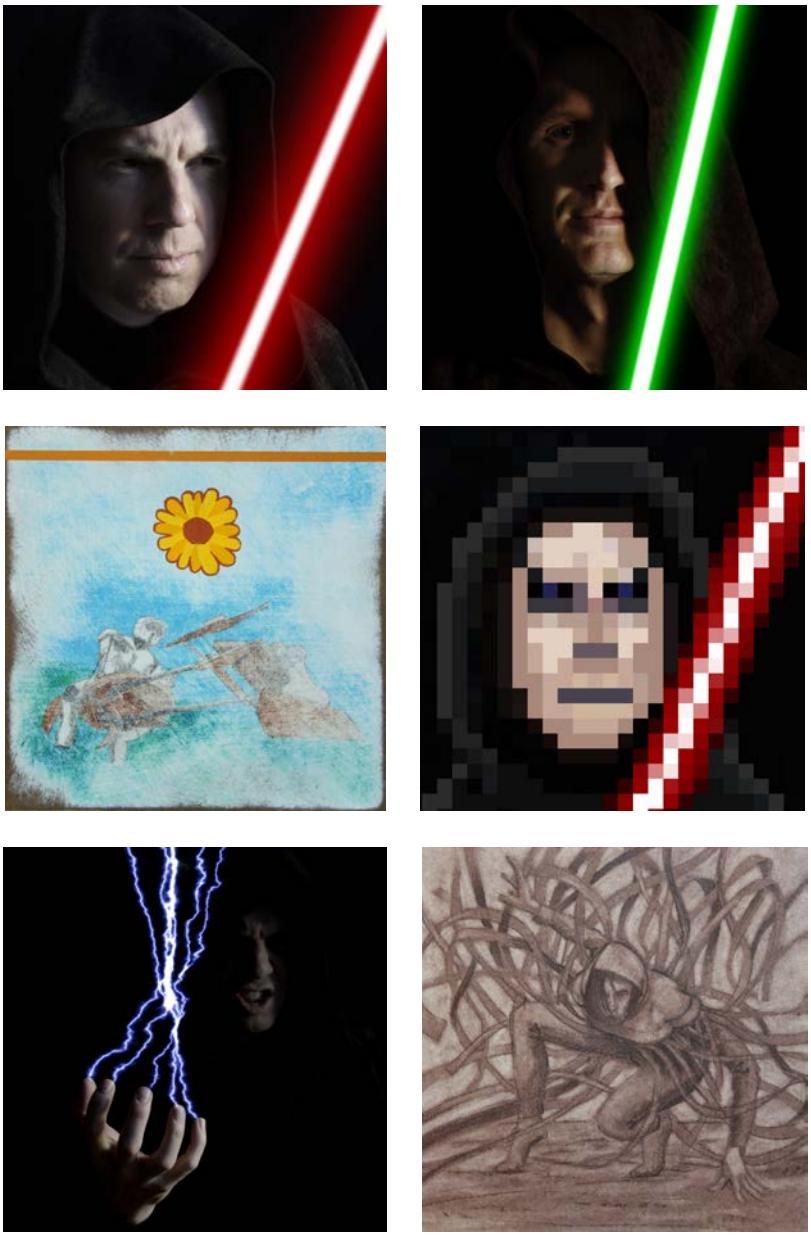

Figure 14. The five panels that form Generation 4, along with the parent selected from generation 3.

Understandings derived from this installation are offered in Chapter 5.

CHAPTER 5

UNDERSTANDINGS

Throughout the semester, through my art making, and through my writing I have arrived at new understandings. Here I outline some of those understandings that come in part through the a/r/tographic renderings, which are contiguity, living inquiry, metaphor and metonymy, openings, reverberations, and excess.

Decentralization and Ownership

I have mentioned previously that in one way of thinking the environment of the school is already decentralized. Looking back at the class, I believe that the complexivist understanding of a decentralized system was really a metaphor for the desired structure of the class. I attempted to remove myself from being the dictator and controller of the class and instead walk beside the students as a fellow learner. In this I was successful. An experience might illustrate.

The annual art show is a source of much stress and anxiety for me as a teacher. For the past two years I have sought for student participation in setting up the art show. This is a great learning experience for the students and is a great help to me. The first year we got some participation, but not as much as I hoped. This year I strongly encouraged my Foundations 2 students to be there. Having put a lot of work into their entries to the show, they seemed willing to help take ownership of its installation. First they assisted in matting all of the student entries. On the day we were to install the show, I discovered that I had scheduled the installation concurrent with a school accreditation meeting. I was assigned to lead a team for the meeting and could not miss it. Quickly, before the meeting, I gave the students a

brief overview of how we had set things up in the past and hoped they would be able to keep a little busy until I could finish my meeting and join them. When I finally finished, I was blown away to find that the students had stepped in and completely organized the show without me. The students had had no problem taking the initiative and installing the show on their own. The show was hung in a little over an hour in its entirety. That is the fastest it has been done, and most of the work was done without me. I cannot claim that this is a direct result of decentralization, but I do wonder at the effect it may have had. During the semester students appeared to be comfortable expressing their own ideas and exploring new directions in a way that I haven't witnessed previously as a teacher.

Emergence

It is expected in any art class that students will influence one another. With this curriculum I hoped to encourage such interaction. It was hoped that students would mimic each other's successes in positive feedback loops. Emergent structures could result. An example of this occurring is the use of an oil painting scratch technique, which I had never seen used. Christian had been exposed to scratch art previously. This semester he tried oil painting for the first time. Transferring the technique between the two media, he tried painting a black area on the painting and scratching it off to achieve a negative line. This transferring of knowledge between two separate activities is an important part of the creative process. Johnson (2010) uses the word *exaptation* from evolutionary biology[11] to describe this. Several other

[11] An example of exaptation from evolutionary biology is the use of feathers by birds for flight. It is believed that feathers were originally developed for controlling temperature and only later became useful for flight (see Johnson, 2010, p.153).

students had previously been working with line. Two boys began experimenting with Christian's technique. Together they developed a use of line that I had never taught them (see figure X). It was an emergent technique.

Figure 15. In an oil painting, Christian (left) developed a technique of scratching off a thin layer of paint to reveal the color below. Bryson (right) and Brad (bottom) each appropriated the technique for their own purposes.

Self-Chosen Directions

My major motivation for affording students so much choice in subject and media was a belief in a nature of art making that includes originality and autonomy. It often seems that school projects amount to little more than glorified crafts. I hoped that students would produce legitimate artworks over the semester. One good thing that came from this is that students investigated artistic genres that I have not spent much time with. The most notable of these is illustration. Many

students expressed an interest in illustration. As an undergraduate student I had been trained in the studio art department at Brigham Young University. I often felt a tension between the illustration and studio departments. The tension existed between students there, and my perception was that this had filtered down from professors who consciously or subconsciously asserted their superiority over the opposing discipline. This is something I desperately want to avoid in my own classroom. Rather, I want students to understand the various directions art can take them and the various meaning-making strategies that they may use in a given discipline.

The evolving art curriculum allowed students interested in illustration to pursue it. Ryan expressed an interest in digital painting and chose to develop his skills in that direction. The Internet allowed him to find good instructional videos about techniques and tools he would need. Although the fine art side of the various visual art worlds may not consider his artworks significant, they seem to be solid offerings from a junior high student to the discipline of illustration (see Figure 16).

Figure 16. Ryan's second generation. Ryan had acquired a Wacom drawing tablet the previous year after seeing mine in use. Learning from books and Internet tutorials, he developed his digital painting skills.

The Challenge of Freedom

With my attempts to decentralize the classroom came more freedom and autonomy for my students. Although it came with benefits, it was hard for students. For some I believe it hindered their growth as artists. During this course I accepted late work without docking any points. I actually do this with seventh graders too, and they continue to turn things in on time because it is what is expected. They have developed the habit. But this freedom was difficult for Bryson. He writes about procrastinating work when he got stuck and then rushing through to get it turned in. In a review he wrote about the class he suggests enforcing a late-work policy that includes some flexibility but is not open ended. He wrote, "If this had been in place when I took the class I would be more motivated to turn things in on time and not late." Of course I was dealing with a boy who has been trained to respond to extrinsic motivators. While I hope the design of the class allowed students to develop a response to intrinsic motivators, I feel it could have been better balanced at bridging their previous experience with this new one.

Many other students talked about a desire to have more formal and structured assignments or exercises. I had always intended to include this, and indeed I did teach in this way, but because I was not strict in the specific expectations of such exercises, students viewed them differently. It seems that I crossed the line into too much freedom. Gude (2013) cautions against the belief that students must be completely original. Students should not be expected to create new meaning-making systems. Instead we should recognize that "quality art and quality art education are made in the context of previous artmaking practices, art

education curriculum ought to be structured to carefully introduce students to conceptual, aesthetic, and technical methodologies by which various artists have generated meaning" (p.14).

With a curriculum where students evolve their own concepts, things become very open ended. This was a problem in a couple of different ways. Without such structure as Gude described, I found students would often visit the art that was familiar to them. This sometimes included Disney characters or Spiderman. Students were not allowed to copy complete compositions, but they were allowed to draw from any source they desired as long as they altered the composition significantly. Sometimes it still felt like plagiarism. In the best cases, students moved away from copying towards creating unique compositions that were truly their own (see figure 17).

Figure 17. Like many students, April expressed a preference for illustration. Although some of her work was little more than copying someone else's image (left), she developed the ability to combine multiple reference images, including photos she captured herself (right).

Brandon is a student I had not had in class previously. It seemed he was not ready for the freedom that came with this curriculum. Brandon was frequently

found sitting and doing nothing. His art does not reflect a strong sense of maturity, purpose, or effort (see figure 18). The evolving art curriculum was loose enough that one might consider it to be project-less. Gude (2013) claims that this is an ideal goal of art education, but she points out that most students are not ready for it. She states, "When students are not introduced to a wide range of meaning making strategies (and encouraged to analyze and re-purpose strategies they absorb from popular culture), they tend to fall back on hackneyed, kitschy image-making techniques" (p. 6). I did try to introduce students to such a variety of strategies, but perhaps their introduction was too informal. The success for students was somewhat inconsistent.

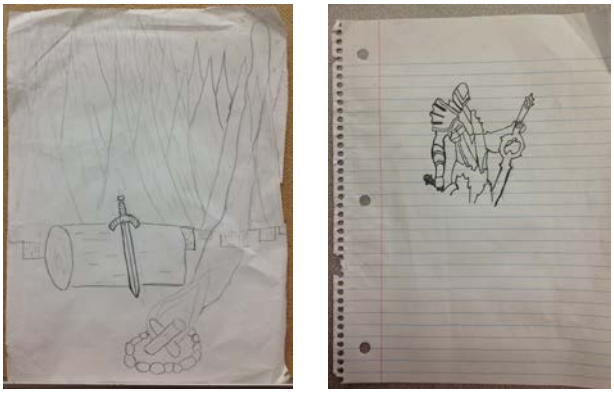

Figure 18. Brandon never really explored media beyond pencil, pen, and white paper. He did not spend as much time working in class as many other students. 2nd and 5th generations are shown.

Within complexity it is recognized that there must be many unsatisfactory developments surrounding the emergence of new things. Nick was in a situation similar to Brandon's. Nick had also never had a class from me and frequently failed to participate in critiques and discussions. He began working in a similar direction,

with pencil on paper making drawings of games and fantasy characters. Not wanting to determine what art he should be making, I allowed him to continue and tried to give meaningful feedback. Eventually his work developed into a style that was surprising to me, but one that I quite enjoyed (see figure 19).

Figure 19. When Nick began combining ink with dark-gray pastel, I thought he was working with incompatible media. Rather than tell him so, I let him continue, expecting him to come to this conclusion on his own. Eventually I found I had grown accustomed to the mix of media and found it aesthetically interesting. He had altered my aesthetic taste.

My Class as a Learning System

I have mentioned that an exciting characteristic of complex thinking is the possibility of conceptualizing larger-than-human structures as learning systems. Considering the entire class to be a learning entity can possibly bring to light unique understandings. Such understandings are difficult to identify from my personal level, nested as I am within the system of the class. I can imagine the class changing and adapting to outside influences such as other classes within the school and artistic practices from the community, but I did not monitor or measure those influences in any quantifiable way. Requiring the class to complete a task all together might have given a method of measuring learning and adaptation at the

class level; however, I did not implement any such activities. No external threats jeopardized the class, situated as it is within the relative safety of the school. The actions taken by the class to install the school art show were the most easily observed manifestation of the system responding to an input. It seems that a study would require different design to come to more meaningful understandings in response to the learning system of the class as a whole. My descriptions of the context of the school and the artistic values of the community are an attempt to identify ways in which the class adapts as a whole.

A second reason that observations are difficult at the level of the class is that learning occurs more slowly as larger nested systems are considered. Just as evolution occurs much slower than immune responses, so too class adaptations happen more slowly than individual learning. This, coupled with the short length of the course, inhibits observation and perhaps reduces the value of considering class-level adaptations.

Understandings from *The Evolution of Art*

I consider the entire installation of *The Evolution of Art*, including the pillar, the interaction with the viewers, all twenty panels, and the coins placed in the slots, to be summed together as the artwork. This artwork, taken as a whole, has meaning and value for me. In my view each individual panel is not as successful as a stand-alone artwork. They could, however, be viewed as individual pieces. In this way the installation demonstrates nestedness. Individual artworks are working together to create a grander and more significant work in a way parallel to the nestedness of

complex systems. While this was an important characteristic of this installation individually, such nestedness occurs throughout the systems of art in the world.

Artworks are commonly nested within art shows that follow themes. The context of an artwork within a show changes the way it is perceived, while the artwork simultaneously changes the show itself. On a different level art shows might be combined in a large gallery or museum. Or multiple shows could exist within one city, each influencing and being influenced by one another. The nestedness of *The Evolution of Art* serves as a metaphor for the complex nature of the art worlds.

Art evolves over time. Some think that those with money have often driven art's evolution. My installation *The Evolution of Art* was driven in a similar way. The installation showed that people who voted with bigger coins were swaying the vote away from being a popular vote. For example, about 39 people voted for the painting of the baby with an arrow tattooed on his forehead from generation three. About 15 people voted for the photo of the principal as a Sith Lord. Those who voted for Mr. Whitaker voted with larger denominations of coin, and so that panel was selected as the parent of the next generation. The history of art has also generally followed those with money.

So what does this mean in a junior high art curriculum? I have previously described the aesthetic tastes of the conservative valley I teach in. This aesthetic does seem to be driven by the affluent members of the community. For example, in Utah Valley one of the most obvious displays of wealth is Thanksgiving Point. This is a location that was built by one of the wealthiest couples in the area. It includes gardens, a farm area, movie theatres, and a golf course. The most fancy gardens

require an entrance fee and sprawl with a manicured landscaping that is reminiscent of classic European gardens. In the heart of this emblem of prosperity a whole series of huge bronze sculptures is being installed. Each one is a narrative and representational depiction of the life of Jesus Christ. I share this as an example of the particular aesthetic being promoted by the affluent members of the community. These influences surely impact the art of my students.

When I was making paintings for *The Evolution of Art* I found myself being swayed by my junior high's aesthetics. Of course, this was partly in response to the design of the installation in which I was required to make variations of the favorites. It was also partly because I wanted students to enjoy the work. The more abstract works tended to receive less money. Illustrative pieces did well. It is also notable that students responded very well to images of the principal, someone they knew. From the beginning of the installation I found myself making panels that I hoped would resonate with student interests. This was at least partly in hope of more student participation.

My perception of student votes is that they voted for things they thought were cool (such as the Avatar), skillful (such as Mark's representational portrait), or fun (all of the images of their principal). These same values might drive student production within my classroom. The prominence of fan-art in the work of many students could be related (see figure 20).

Figure 20. Emily's 5th generation. Some students engaged in fan-art, and several students spent time drawing Disney characters. Here Emily included geometric structures in an attempt to alter her composition from the original.

The school community was not used to an interactive installation. The custodians seemed anxious to have the pillar gone so that they could more easily clean the floor. Students and adults failed to participate to the degree that I had hoped. Many students I spoke to did not understand how it worked until I told them explicitly, even though they had passed the installation multiple times a day for weeks. I imagine even more students simply never gave it a serious thought.

The installation did serve to raise awareness of art to some degree. As I look to intervene at multiple nested levels of my school, such an interactive installation takes on pedagogical importance. I try to be an example of what an artist might be, to show my students a possible way of living and inquiring through this unique creative communication. Each time I display my own artwork for students to view, I do so with the hope that they might experience on eye-opening connection to what art can be and how understandings can be reached. This installation also involved adults in the school. The principal was engaged and possibly self-conscious of all the portraits that hung of him. Some parents and teachers participated in the voting. In

a small degree the installation affected the community outside of the walls of the school.

I frequently talked to my Foundations 2 students about the installation and showed them things I was working on. I sought feedback. I let the students further influence my aesthetic as they are participants in the school culture this installation was serving. Students in the class saw me make about four artworks each week. In the class most students were themselves making just one artwork every two weeks. Thus, I tried to show students that making art is a choice and largely a matter of priority.

The system of evolution for the installation did not include enough variables or generations to literally evolve emergent forms. Rather, the system of evolution simply served as a metaphor for the evolution of aesthetic taste in a person, in a community, or in an art world. This installation could have been improved by running for a longer period of time.

The Evolution of Art reflects attitudes and preferences of the community where it is displayed. If the same installation beginning with the same five panels were shown in a different location, the selected works would be very different. It would take only a change of the first selected panel to create an entirely different evolved result over the course of many generations. The choices we make as a social collective affect the evolution of art for all the years to come. It is interesting to consider how the visual side of our culture would be different if the social collective had made different choices two or eight hundred years ago. This brings to mind the complicit nature of one's participation in art.

Every artist and consumer is shaping and defining the face of art. Our choices will inform the visual state of the world for all following generations. This is one of the strongest understandings I have gleaned from my a/r/tographic inquiry. Just as Davis and Sumara (2006) point out that "complexity thinking compels researchers to consider how they are implicated in the phenomena that they study" (p. 15), complexity thinking also compels artists and teachers to consider how they are implicated in the structure and formation of art.

Figure 21. A student considers her vote in *The Evolution of Art.* The coin slot is visible below the panel.

Recommendations for Future Courses

I regularly change the way I teach my Foundations 2 class in an attempt to improve it and keep it fresh. In the future, I will make the following changes. Students often develop unique skills and techniques. Right now those skills naturally influence other students. I plan to give more time for students to teach

each other through demonstrations or even required exercises. I believe this will positively impact the student-teacher as well as the class as an entity.

I plan to add more structure to projects and exercises. Although I did not use grading rubrics for finished artworks for fear that they would be deterministic, I believe rubrics might effectively be used to teach particular skills. Thus, exercises might be assessed by rubric, while artworks might be self-graded. I hope this will give students the structure they desire and raise the level of craftsmanship or material literacy within the art program.

Impact on My Identity

This course of study has strongly influenced my perception of art and education. It has also dramatically changed my worldview. I find myself looking at education and art with a complexivist lens. Less expected is the way this direction of study has affected my view of politics, religion, and the culture of the Internet. I frequently consider ideas that I encounter now with a complexivist perspective. I look at the ways societies and systems are creating knowledge and power relationships in ways identified by social constructivists. I have reflected on my personal beliefs and on my actions as a parent. I try to look for the many variables that affect outcomes rather than attributing effects to a single source. I recognize that my worldview will continue to change, but the change it has undergone during this study has been significant relative to other similar spans of time in my life.

Conclusion

In conclusion I summarize the answer to my original research question, “How might a study of complexity thinking affect the curriculum of my class and my

identity as an artist". I think that in the end complexity served as a collection of ideas that disrupted my pedagogical and art-making practices. A study of complexity thinking has led me to use evolution as a methodology for making art. I have built a curriculum in which my students do the same. I have restructured my class in ways that might allow me to observe emergent behaviors and ideas. I have attempted to create art that affects the school culture outside of my own classroom. I have identified the complicit nature of my role as an artist and art teacher in the ongoing evolution of art itself.

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APPENDIX

Two Examples of Evolutions

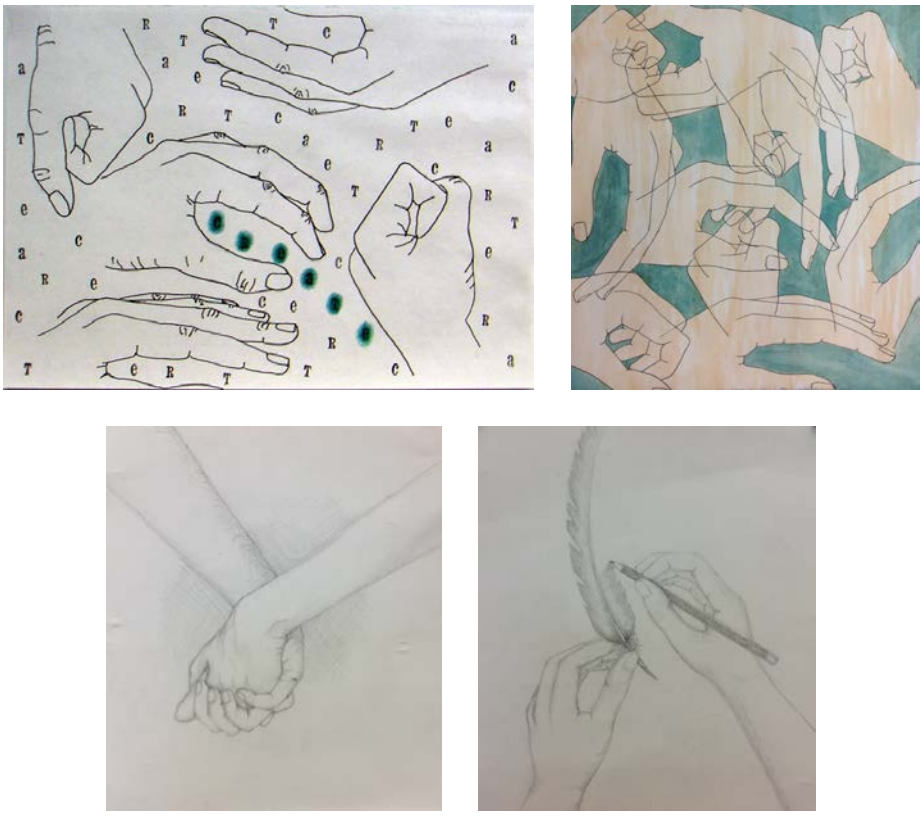

Figure 22. Danielle's evolutions 1-4.

Figure 23. Danielle's evolutions 5-9

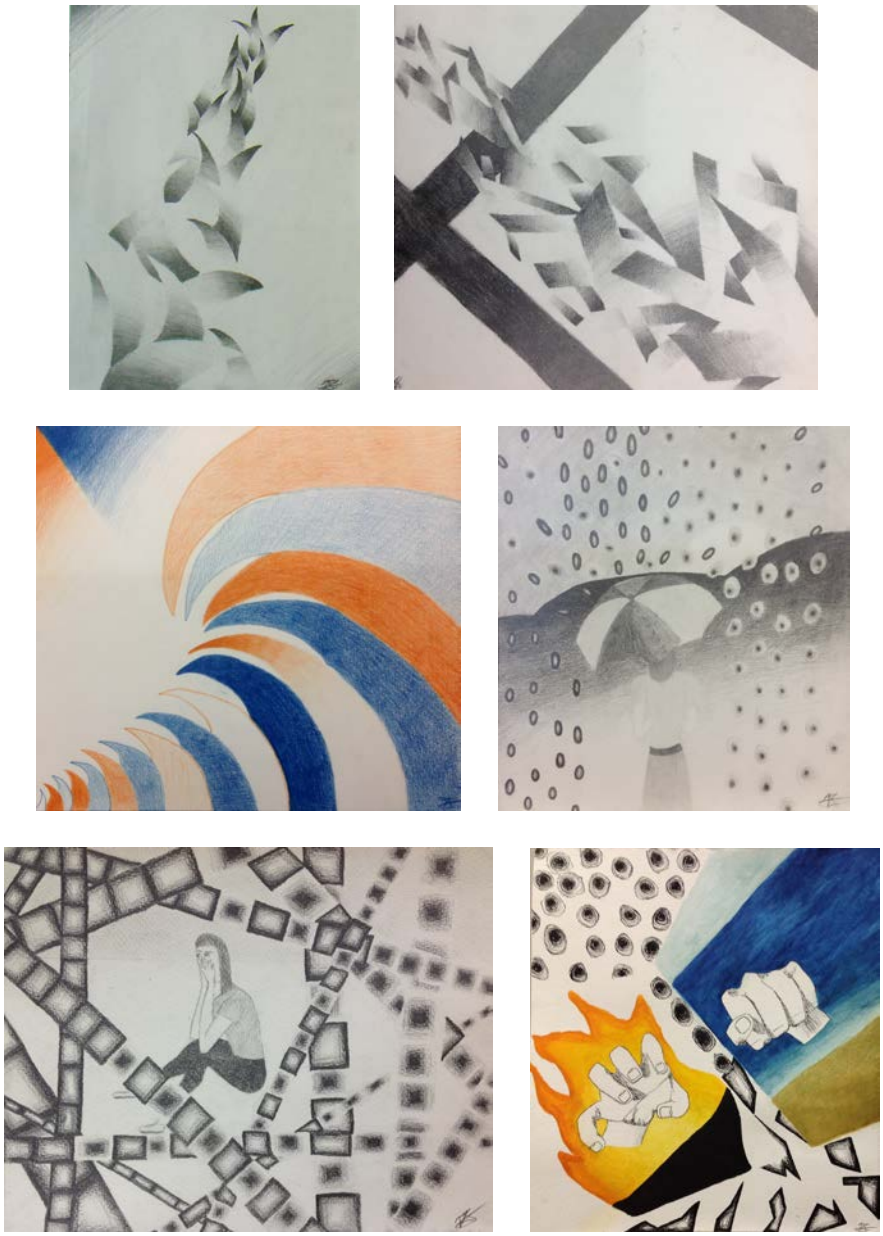

Figure 24. Kaitlin's evolutions 1-6.

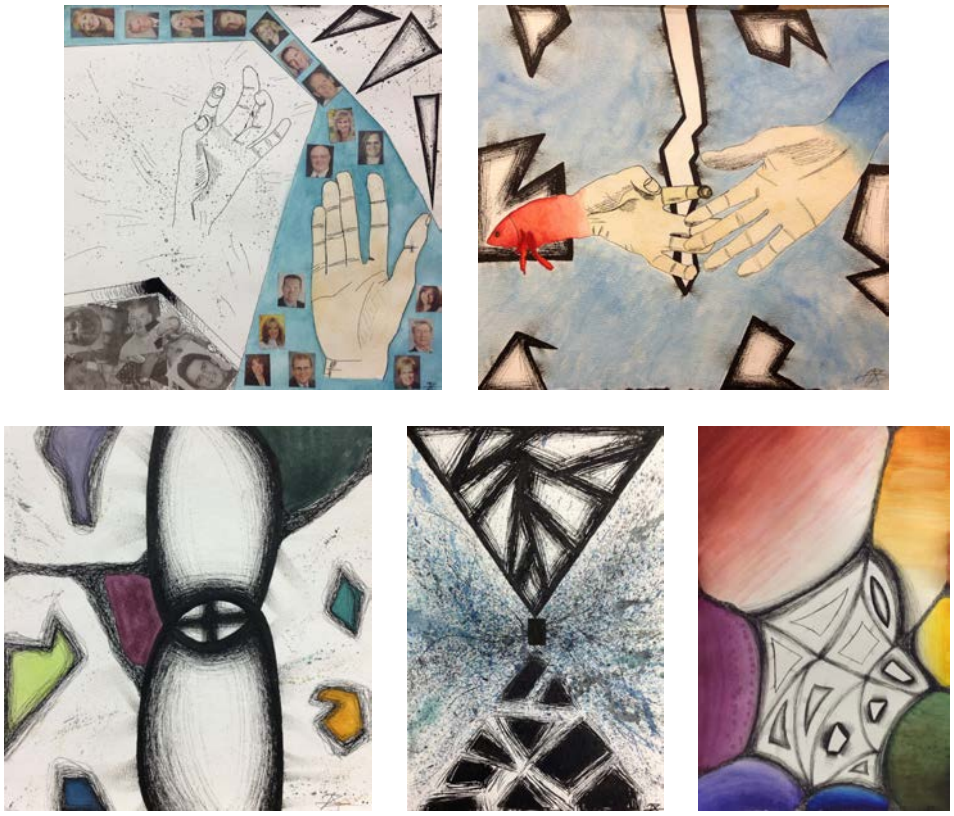

Figure 25. Kaitlin's evolutions 7-9.