The Artful Struggle for the Integration of Computers in Schools

by

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Abstract

Studies over the last ten years suggest computers aren’t being used to their full potential inside schools (Abrami et al., 2006; Smeets, 2005; Suronta & Lehtimaki, 2004). Findings often recommend some combination of professional development, increased technical support, and the development and acquisition of user-friendly software to remedy the situation. While any one of these options may help in the short term, this thesis argues that, even in combination, none of these solutions get to the root of education’s problem with integrating technology. Policy purports that simply inserting a computer into a classroom will open up new possibilities for learning, however in order to successfully integrate new technology in a way that is beneficial for both students and the teacher, what is needed is an approach to learning that will foster a creative and engaged learning environment.

Using a phenomenological perspective that draws from my experience helping teachers implement computer technology and my artistic practice, this thesis will explore what began as a hunch, that there might be something to an artist’s approach that makes using technology more navigable. This approach, which is transferable to other environments, can foster meaningful learning. By developing a manner of approach that is by nature creative and leads to an unfolding process for learning, rather than programming for desired outcomes.

This thesis draws broadly from four sources: Christopher Alexander’s *The Nature of Order: An Essay on the Art of Building and The Nature of the Universe*, Aristotle’s *Nicomachean Ethics*, Merleau-Ponty’s *Phenomenology of Perception*, and my memories from my Introduction to Painting class in art school.
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“Modern technology touches on almost everything vital to [hu]man existence – material, mental, and spiritual. Indeed, what of [hu]man is not involved?” (Jonas, 2003, p. 191)

Prologue

From 1999-2005 I taught multi-media art and digital animation at a children’s art school. I also worked in the public school system with primary teachers, helping them develop and integrate New Media projects into the curriculum. The school boards felt teachers were having difficulties using the computer as anything more than an encyclopedia or a typewriter and they wanted to unleash the creative potential of the computer. They felt that teachers needed some help in applying multi-media programs and incorporating concepts using digital means within their curriculum. Along with helping teachers implement a multi-media project, I had a secondary role in assisting them to become more comfortable developing their own e-learning and ICT (Information Computer Technology) strategies in the classroom. It was while working in this capacity that I was struck by a phenomenon that has become the basis of this inquiry.

When I went into the classrooms I often found teachers quite reticent to use computers in general. Many of the teachers I worked with exhibited a wide array of emotions not normally expected of an educator, such as self-doubt and frustration when they were faced with using technology in the classroom, especially if the use of technology went beyond simple point and click, or word processing. I found it alarming that teachers, for the most part, were so obviously frustrated and tired of being forced, as they saw it, to

1 A good number of studies over the last ten years back up these feelings by suggesting computers aren’t being used to their full potential inside schools (Abrami et al., 2006; Smeets, 2005; Suronta & Lehtimaki, 2004).
use technology. I also found it alarming that there seemed to be little concern about the far-reaching implications these emotions could have on the culture of education. Specifically, I wondered if these types of emotions had become normalized in one's teaching practice. In a moral sense, how would this affect the future of technology use in the classroom?

It became quickly apparent that if I was going to help teachers become comfortable using certain software in computers I would first have to assure them that the computer could be part of their experience in teaching, that it could be a valuable experience, and that it could open up possibilities for learning. But still, I often left the classroom wondering what was missing in educational practice and policy that would put teachers in such a predicament in the first place – a predicament that was wrought with emotion and that appeared, to varying degrees, to strip them of their dignity. I began questioning exactly what I was witnessing and why it was manifesting itself in such a visceral way. Was it the result of something that had been handed down, like fickle policy? Or are teachers just simply poorly trained in how to use technology? Or is the educational structure such that a computerized classroom is too much, and teachers are thrown off balance?

I was also left questioning why I seemed to be able to walk into this structure and manage. My technical training with computers was by no means advanced. I felt I did not possess an understanding of how to use a computer beyond a few, very specific art programs, which in most circumstances were not installed on the school computers I was required to use. I didn’t know any programming languages other than a basic knowledge of HTML and a rudimentary understanding of Javascript. On top of this, I am not formally trained to work in a school. Although I have taught full time for six years at an art institution for students aged 5-19 years, I am not a certified teacher. So why could I work in this formal
structure while the teachers, even those who had computer experience, seemed to struggle at the prospect of using computers in this setting?

I am not suggesting that I alone was managing in this structure. I had colleagues who did the same thing as me and dealt with the same obstacles in the classroom. The only discernable quality we had in common, that the teachers we worked with did not share, was that we all identified as artists. However, while we collectively identified as artists, we were a diverse group, schooled in different disciplines. We were a collection of painters, animators, actors, musicians, writers, poets, etc. This idea that a group of artists could somehow manage to some extent inside this educational structure seemed significant and has led me to look at the phenomenon I witnessed from two perspectives. Looked at one way, I noticed the negative emotional response of many teachers when faced with using a computer. Anything more than a fancy typewriter in their classrooms seemed to be negatively affecting many of them in their ability to work. Looked at from the other side, I noticed that artists seemed able, at least emotionally, to navigate inside this new, quickly changing structure. If our attempt at using technology did not work as planned, or if we had technical difficulties or failures, we did not respond in the same manner as most of the teachers we worked with. Our sense of being, our dignity was not affected. We simply moved on – accomplishing our goals in a different way. We seemed for some reason, to be willing, or maybe it was able to adapt when confronted with unforeseen circumstances. But for many of the teachers we worked with this didn’t seem to be the case when the computer was added into the classroom. At the first roadblock they would become frustrated, stop, and be unwilling to go on – the addition of the computer seemed to offset their poise.

I began to wonder if there might be something present in the artist’s approach to using technology that made the move towards a creative and experiential computer
integrated classroom more reasonable. Could there be some *technique* or *method* in an artist’s process, regardless of discipline, that was different from persons who do not consider themselves artists? Could there be a generalized difference in training, provided by and present in the fine arts that actually made working with technology easier, or more manageable?
Introduction

This inquiry will look at how a creative approach, which may be an artist’s approach, makes steering through a technological environment more navigable. In particular, I am going to examine how a creative experience can take place in a classroom that incorporates technology. I will advocate that in order for this to be possible, our classrooms need to become sustainable living structures. Living structure, according to Christopher Alexander (1977, 2005a, 2005b, 2005c, 2005d), is based on the idea that people should be involved in the design and building of the spaces where they work and live in order for these spaces to be meaningful – not merely be handed a key, or shown to their desk. I believe this is the essential ingredient for teaching with technology, especially if we want students to have a creative experience. I will explore the idea that teachers do not need to be given explicit instructions (professional development) on how to use specific technologies; rather, teachers need to be educated – offered the allowance for self knowledge to emerge through the integration of self with knowledge (Noble, 2002). Through education, teachers will be able to possess the autonomy necessary to invite and design new technological approaches into their classroom and curriculum. This is the only way technology will reach the intended goals of promoting creativity and transformative learning practices in the classroom.

It seems we are at a stage in our development as human beings where we must critically challenge why and how we are developing our recipes for learning with technology. How are we integrating computers into our classrooms? How are we making sense of it all?

I will organize the chapters of my thesis into four Factors. These four Factors are each necessary ingredients for developing a creative and experiential space. The four Factors are as follows: a living structure (material); the ability to adapt (mental); an element of the unknown or the unpredictable (spiritual); and finally a desire to make things whole (human).
Many large-scale studies answer one question: are computers being integrated in a manner that fulfills the initial promise for transformative learning? Study after study indicates the answer to this question is no (Abrami et al., 2006; Smeets, 2005). However, while these studies generally find the computer being used for nothing more than information retrieval and word processing, when asked teachers are often found to still believe the computer could be a great benefit for learning (Smeets, 2005). But for some reason, ability and belief at this point in time are still nowhere near each other on the integration spectrum.

Recommendations are forever being made for better software, professional development, sustained technical support, etc. – all of which create an over-arching dilemma for school boards, researchers, and teachers as to which external solution has the best chance of reversing the current situation.

Dissanayake (1992) writes in *Homo Aestheticus*, history illustrates that any changes in the use of technology are often only successful when initiated by the individual and fully embodied. Change occurs when persons accept the philosophy behind the technology (Barnes, 2005). From this perspective we can see that any external solution – a solution imposed by someone other than the teacher – *may or may not* work. The necessary ingredient for success is not of an external nature; rather, successful teaching with computers will only occur when teachers believe in what they are doing and this will only occur when the experience is an embodied one. Put another way, teachers need to develop a relationship with the computer on their own terms.

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2 The annual Horizon Report (The New Media Consortium & EDUCAUSE Learning Initiative, 2008) also recognizes and consequently recommends the need for mastery of underlying concepts in conjunction with diverse technology literacies rather than the acquisition of specialized skill sets dependent on specific technologies.
This idea of teachers developing a relationship with the computer on their own terms is a rather thorny one in today’s educational environment. As I will elaborate in more detail in Factor II *Our Ability to Adapt*, Alexander (2005d) and others argue that in order for deep adaptation to occur it is vital that teachers have a certain amount of autonomy.3

My goal is to describe a technological environment that can support creativity through, with and for experience. I will be using a hermeneutic phenomenological approach in which I will build upon my experience as a painter and as a teacher. The approach I take in this endeavour is key if I am to understand how a structure can support creativity.

Thus, instead of trying to answer the question *how can we plan for creativity when integrating technology* – a question that would result in some sort of method for structure – I am better off addressing creativity as the *intention to do something in a particular way*. Rather than trying to define what a creative experience is and how to *do it or teach it* using a computer, a more productive way is to nurture a structural process that allows for ideas to travel between human and machine from concept to realization in a manner that is not prescribed. By looking at four *Factors* that I believe indicate a creative experience can take place – Factors that are common to any creative experience – I hope to show how this could be practical. (However, I must quickly add that *can* does not always mean *will*).

By breaking down the creative experience into Factors, I will unpack the meaning behind the term creativity itself and transform it from a vague and disputed cognitive term that most often refers to a product or an *object* into a philosophical *objective*. In this context creativity is not a desired object that is only recognizable after the process has occurred,

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3 Alexander (2005d) attempts to empirically explain this phenomenon for successful living in a way that seems, at first, outside reason. However the “elusive I” – Alexander’s somewhat awkward attempt to put a name to our need as human beings to allow ourselves a deep personal connection with all matter in our environment – does try.
neither is it a method for process. Rather it is a manner in which we approach any process. This manner of approach strives for but is not defined by goals; rather, it is defined by the level of self-efficacy of those in the process. In other words, this inquiry is not about the ability to produce necessary and desired results from which a tangible method, or tool can be constructed and then administered. The thing that is unique about thinking of creativity as a manner of approach is that it could just as easily produce, undesired results as desired results.\textsuperscript{4} It could be argued that this manner for approach I am proposing seems problematic for education. Most, if not all policy and structure developed for education is based on constructing methods or guidelines that lead to a desirable outcome – not a 50/50 chance of a desirable outcome. However, I hope to show that taking chances when educating with technology works better in the long run than relying on so called tried, tested and true methods that train learners to use technology. Educating with technology and training to use technology are two very different things. The former is embodied, while the latter is simply acquiring a set of skills.

A Bricolage Perspective

Rather than try to fit the phenomena (my hunch that there is something in an artist’s approach to technology that is more conducive to creativity) into one theory for learning I will draw from elements of a multitude of theories. In this way I am not implying a certain a priori nature, or a presupposition of what nature is. My intention is not to promote a theory of learning, or a series of abstractions for knowledge in order to solve a problem. My aim is

\textsuperscript{4} This is much like Seymour Papert’s (1980) constructionism of trying, testing and playing, which builds on Jean Piaget’s earlier work. Papert was part of the team that created Logo and Lego Mindstorms, an interactive learning tool for children. A professor at MIT, Papert is one of the earliest proponents for children learning with computer technology.
quite different. My aim is simply to understand the nature or the essence of the link between the phenomena I have observed – the link between teachers’ response to technology and the artist’s approach to technology. By understanding this nature I will try to find meaning and value for teaching, value for the arts, and a place for creativity within the structure of the 21st century classroom.

I did initially worry that perhaps my over active imagination distorted or exaggerated my memory of being in schools, perhaps I read between the lines too much. However, in phenomenology research begins with the researcher’s own experiences and memories. The process is grounded in our consciousness and all memories are seen as valuable starting points and valid data for the inquiry.

Anything that presents itself to consciousness is potentially of interest to phenomenology, whether the object is real or imagined, empirically measurable or subjectively felt. Consciousness is the only access human beings have to the world. Or rather, it is by virtue of being conscious that we are already related to the world. (van Manen, 1997, p. 9)

By building on my own experience as an artist and educator and drawing on the thoughts and theories of current research, cognitive science, cultural studies, architecture, painting, and film I will become a bricoleur as I conduct this phenomenological inquiry from my first-person perspective (Smith, 2005). I will examine the phenomena of creative integration of computers into the classroom from a multitude of perspectives within the framework of the four Factors necessary for creativity to flourish.5

Because the research involved in this thesis is going to be presented from a multitude of perspectives, it will follow the method of bricolage (Denzin & Lincoln, 2008). Building

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5 David Edwards (2008) writes about the idea-impact space of artscience – where scientists and artists break down longstanding barriers between the two and encourage idea translation – creativity. An artscience lab as opposed to an art or a science factory, “does not separate learning from experience” (p.18). In the idea-impact space of an artscience lab artists and scientists create the technological revolution together.
understanding in a bricoleur fashion will better inform me of the nature(s) of the phenomena. A bricoleur approach can be thought of as a way to learn and solve problems by trying, testing, and playing around (Papert, 1980). This seems an appropriate approach for this inquiry. After much thought I cannot really see any other way to broach the phenomena, in all its quiet and not so quiet intricacies, without scrutinizing it from many perspectives. Because, as I am about to describe, I am going to be constructing this thesis from a bottom-up approach instead of top-down, the idea of bricolage fits my purpose well. By bottom-up I mean that the way I am going to proceed will begin in my own experience of painting. Through this first person perspective I am going to build each section of this thesis from my position “upward and outward” (Dewey, 1934) towards a deeper understanding of the phenomena and the issues surrounding integrating computers in our schools.

Interspersed throughout, I will remember my first painting class in college aptly titled, Introduction to Painting. I feel there is a strong comparative link between my experiences inside classrooms that attempted to integrate technology and the process I went through learning to paint in that first class. I will describe some of the projects we did, how we interpreted our work, and how we learned to see like a painter.6 In other words, how we came to be individuals who approach things in a manner that I believe is creative.

**Introduction to Painting:**

I use the phrase ‘see like an artist’ because that is exactly what our instructor told us he was teaching us to do. Not to paint, but to see in a manner different from the way we had been taught. More than skill, he told us again and again the most important thing at this introductory stage was to re-learn how to see, how to **

6 The painting instructor used the terms *see* and *think* interchangeably, there was no difference in his mind. Sensual vision and sensual thought are equally experienced emotions, using all parts of the body and mind to simultaneously experience the world.
think I realize now what he meant was to think about what we saw and engage. Skills like dexterity of brush stroke, style, colour, even form to some extent would come with practice and thought. Practice was just a matter of committing and doing it. But we hadn’t a “hope in hell”, as he said, of becoming real artists unless we learned how to see. We needed to learn how to re-look at everything – how to work toward vision.

If I revisit the opening quotation of my thesis from Hans Jonas’ (2003) essay Toward a Philosophy for Technology and replace the word technology with art I read a statement that resonates deeply. The original quote reads like this:

“Modern technology touches on almost everything vital to [human] existence – material, mental, and spiritual. Indeed, what of [a human] is not involved” (p. 191)?

The revised quote reads:

Modern [art] touches on almost everything vital to [human] existence – material, mental, and spiritual. Indeed, what of [a human] is not involved?
Chapter 2: Literature Review

Terminology

Innovative jargon [in education] is abundant. The day begins with Ad Com (administrative communication) which – fancy name, same old thing – is known elsewhere as “homeroom.” (Oettinger, 1969, p. 138)

Introduction to Painting: The Still Life

The first assignment in my “Introduction to Painting” class was a basic colour theory project based on Johannes Itten’s theory.7 We painted a still life several times using different mixing techniques and different colour combinations on the colour wheel. The instructor talked about colour and form as we painted. He did not, however, critique any of our work while we attempted this first project. But he talked the whole time we painted – about painting. He talked of the relationship forming between ourselves, and the still life we were painting. The relationship he said was manifesting itself through our relationship with the paint. He talked about the banality of our subject matter and how the goal of the painter was to transcend the banality – the painting was not really about the objects we were painting. He told us stories of the painter Giorgio Morandi and of the Dutch Still Life genre of the seventeenth century. I think at this point in my life I had heard of Claude Monet and Vincent Van Gogh, as their images were ubiquitous, on everything from coffee cups to calendars, but never of Morandi nor the Dutch Still life movement. Morandi, he told us, had painted the same collection of vessels – jars, bottles, etc – for thirty years. This seemed outlandish to me as I painted my third rendition of this still life. My eyes were sore from the focus I had been placing on our collection of objects.

7 Johannes Itten (1888-1967) developed a colour wheel/theory titled, The Art of Colour (1969) based on his teachings of introductory colour at Bauhaus. Itten’s new theory allowed for the subjective experience of feelings associated with objective colour. For example, to say red is hot or blue is cold is to see colour the way Itten developed it. He felt that colours had emotional and psychological values attached to them. Through this idea he was the first person to develop colour combinations rooted in contrasts of hue. Itten first trained as an elementary school teacher and then a painter. He painted in an expressionistic style.
I was trying very hard to ‘get it right’ for the third time – once was hard but three or four times was torture.

The idea of painting this still life for thirty years was unfathomable. I thought Morandi must have been extremely boring.

The Terms for Transformation

I will begin by exploring some of the definitions for terms that I will use often in this thesis. These terms have specific relevance to computer integration: e-learning, technology, creativity, education, and training. For the sake of clarity the specific relationship each of these terms have with pedagogy, and what they might afford learning, will be reviewed.

These terms bring with them broad overarching assumptions attached to definitions that, when trying to pin them down, are at best, fugitive. This is especially true when trying to place them within the context of a computerized classroom. Postman (2007) thinks that if we are careful about recognizing differences in our language we will be able to make better use of emerging technologies. “[I] think we have to pay a lot of attention to the new words that we’re using in the computer age. McLuhan speaks about using a term like "iron horse" for a train. By calling a train an iron horse, we delude ourselves into diminishing the significance of the new technology” (Postman, 2007).

What is E-Learning?

Essentially the term e-learning means using computers in a learning environment, in this case, a classroom. But trying to tease out anything more specific can be frustrating. It is an extremely vague term and can encompass many different forms of learning. The Centre for the Study of Learning and Performance at Concordia University published a wide-scope review of literature on E-Learning in Canada entitled, A Review of E-Learning: A Rough Sketch.
of the Evidence, Gaps and Promising Directions (Abrami et al., 2006). The Canadian Council on Learning (CCL), the funding body for the review, provided the following definition for the term E-Learning.

[E-Learning is] the development of knowledge and skills through the use of information and communication technologies (ICTs) particularly to support interactions for learning with content, with learning activities and tools, and with other people. It is not merely content-related, not limited to a particular technology and can be a component of blended or hybrid learning. (Rossiter, 2002)

On the education blog halfanhour.blogspot.com, blogger Stephen Downes (2007) asked his readers, most of whom are either directly involved in educating with technology as teachers or have some vested interest in the subject, to comment on the above report. For the most part, the comments were fairly critical, centred around the over-generalization and confusion surrounding the term e-learning.

At best, e-learning is an umbrella term. The only common denominator I can see is that e-learning will use at least one, if not many electronic technologies for learning. When I use the term e-learning in this thesis it is with the understanding that it is an umbrella term that encompasses a multitude of computer-based technology.

Before the term e-learning became widely used, the concepts behind using technology in education went through several incarnations. Beginning in the 1960s the educational software being developed was referred to as CAI (computer-assisted instruction) or CAL (computer-assisted learning). This type of instruction obviously predates the Internet and thus was more subject specific, project based learning. Patrick Suppes (1967), a leading developer of CAI, lists three examples of CAI use with three levels of interaction. One of the simplest was individualized drill-and-practice systems (Suppes, 1968). The computer was used in conjunction with the curriculum. Concepts and ideas were still handled conventionally by the teacher, but review and practice drills of the concepts and ideas being
taught were executed with the computer. These drills were presented, evaluated, and scored by the computer, not the teacher. Each student carried forth on an individualized basis. A second deeper interaction between student and computer was *tutorial systems* used in elementary reading and mathematics. This iteration both presented the concept and helped the student develop the skills for understanding similar to the drill-and-practice technique.

The third and deepest interaction was called *dialogue systems* (an unrealized application at the time but the precursor to simulation). This interaction allowed the learner to “conduct a genuine dialogue with the computer” (Suppes, 1969, p. 44). Conceptually this was considered to be the deepest interaction a learner could have with a computer, however, the technology was not able to work yet, at this level.

At the time CAI was not used very often, and it was found to be not very effective. In general, the use of computers in education through CAI/CAL has been sporadic. A great deal of effort was expended with little general impact. Many of those academics that took part in that earlier crusade are now cynical about the effectiveness of computers in teaching. (Dempster, 2007)

Out of the CAI model came the CMI (computer-managed instruction) or instructional learning systems developed in the mid 1970s. This type of model was essentially the same as the one that came before it, as both are composed of subject-based programs developed to provide drill and practice exercises (Dempster, 2007). The key to both of these models is that there was a movement conceptually away from teacher as human towards teacher/tutor as machine. There are differences between CAI and CMI, though. The most significant is the slight movement from the student to the administrator or teacher. Besides drill-and-practice and everything CAI offered, CMI could also refer to organizing student files and developing instruction along with evaluating student test scores and keeping records of student progress.
A third software design developed in the mid-eighties was called CEI (computer-enhanced instruction). This design was quite different from CAI and CMI. It required the teacher to be involved in planning and helping to carry out learning activities. This design for educational software was geared toward more open learning – learning that is more user directed and motivated, not based entirely on didactic principles (Dempster, 2007).

Much of the educational software now available and the philosophy surrounding this software, still falls into one or all of the above categories, but now it is all fitted neatly under the heading “e-learning tools.” However, it should be stressed that the reality seems to be that even though computers are more robust in terms of what they can offer and easier to use, most schools still predominantly use computers for word-processing, information retrieval and linear drill based projects (Smeets, 2005). As Laferriere, Lamon & Chan (2006) describe, this is not using the computer to its full potential. “These uses of technology may be important initial steps; but they fall short of the tremendous potential of technology for re-conceptualizing and transforming classroom-based teaching and learning” (p. 76). It seems that while we have conceptualized, as early as the eighties CEI (computer-enhanced instruction), the reality is that most teachers in Canada are still working, in a sense, from the CAI (computer-assisted instruction) or CMI (computer-managed instruction) model. All of the above models do have an element of success attached to them. However, the success is always anchored in a set and rigid design. When the design does not work it fails entirely and a new design, or slightly changed design is developed.

**Introduction to Painting: The Still Life**

Our instructor throughout that first class told us some of the history of Still Life in painting. The genre can be traced back as far as antiquity; however, it wasn’t until 17th century Holland that the still life was given
the status of being truly worthwhile subject matter for the virtuous painter. Still lifes became very popular. There were a few reasons for this. Chief among them was Dutch people’s tradition of taking pleasure in the everyday world. The objects included in the still life were always wrought with meaning and symbolism (Carr-Gomm, 2000). For example, a skull, a lamp, or a candle indicated the passing of one generation to the next; a watch or clock might indicate time running out; extravagant objects might indicate the luxury and materiality. One type of still life within the genre known as Vanitas, referred to the vast emptiness of the world and the emptiness of possessions. These paintings are extraordinarily beautiful yet dark in meaning. A painted feast of food and treasure might be very realistic, with fruits, gorgeous flowers, cheeses, breads, etc. But the addition of an insect, bug, lizard or some rodents reminds the viewer that everything is perishable and easily tainted or lost. The still life genre in painting has always ebbed and waned in terms of value, sometimes the genre is felt to be inferior to high art, while at other times the genre is revered.

It is not difficult to imagine the challenges teachers have had to face over the last twenty years as each type of software was designed for a different conception of how to teach. When one attempt didn’t work as first envisioned another method was developed to replace, or to solve the previous method’s inefficiencies.

While much research over the past twenty years purports that technology will transform learning into a creative endeavour that will be grounded in problem-solving and knowledge building many studies find, especially at the primary level, very little change has occurred in either learning or teaching practice since the advent of the computer in schools since the late sixties (Hedberg, 2006; Laferriere, Lamon, & Chan, 2006; Richards, 2006; Smeets, 2005). Even in the sixties claims of radical transcendence of learning far out weighed the cautious, small step approaches that were actually taken. For example in a Scientific American article from 1966 Suppes made grandiose predictions for the role of the computer
in education. He predicted that “in a few more years millions of school children will have access to what Philip of Macedon’s son Alexander enjoyed as a royal prerogative: the personal services of a tutor as well-informed and responsive as Aristotle” (Oettinger, 1969, p. 178).

However, in reality the computer has not taken on the role of a well-informed and responsive tutor, at times new technology seems more like a babysitter. There are many reasons being thrown around that try to explain why the computer hasn’t lived up to these sorts of expectations. Some studies point to a lack of teacher training in teachers’ college to adequately equip teachers with the necessary skills to embark on new learning practices in their future classrooms (Koehler, Mishra & Yahya, 2007; Richards, 2006). Others make the case that what is needed is sustained professional development to keep teachers abreast of the latest technology (Laferriere, Lamon & Chan, 2006; Ross & Welsh, 2007). And others still claim that problem-based learning pedagogy is the only way computers will be integrated to their full potential (Pritchard, 2007; Smilksteen, 2003).

The finger has also been pointed at E-learning materials developed with “single mode pedagogy” in mind (Robberprecht, 2007). Essentially what single mode pedagogy means is that computers are just replicating what is already being done in the classroom – rote memorization and didactic learning.

At present e-learning seems to be an amalgamation of various web technologies that replicate the strategies available in the face-to-face classroom. Metaphors through which these components of e-learning create similar relationships to face-to-face contexts include discussion forums, online assessment and textbooks. (Hedberg, 2007, p. 175)

However, Hedberg (2007) believes that as a tool, “technology affords much more than the elements available to the individual classroom teacher” (p. 175). In other words,
technology could offer something unique to a classroom, but it hasn’t been used in this way so far.

Regardless which reason resonates as the most plausible, there is an overwhelming consensus that while computers, and the technologies they enable, are being integrated there has been little change to classrooms and how learning is taking place within them.

According to Plante and Beattie’s (2004) survey of Canadian elementary and secondary school principals “most teachers possessed the required technical skills to use ICT for administrative purposes such as preparing report cards, taking attendance or recording grades, while fewer had the necessary qualifications to effectively engage students in using ICT to enhance their learning” (Abrami et al., 2006, p. 25). This coincides with a large-scale study out of Australia where over 20,000 students and 800 staff were asked about their e-learning experiences and responded, “e-learning was little more than the provision of information” (Richards, 2006, p. 171).

**Introduction to Painting: The Still Life**

All of us, with the exception of a few mature students, were fresh from rural high schools where art was, for lack of a better explanation, a fun and crafty past time. Most of us considered ourselves to be the artist of our high school and expected to be revered in the same manner in this class. At the end of the first class we were asked, as is often the case in art classes, to put our work up on the wall for critique. Many of us were quite proud of what we had accomplished. For many of us it was the first time working from life in a classroom setting, if you can call a still-life, life.8 It was also the first time that many of us had used oil paint or worked on an easel. We were working like real artists. It was extremely exciting.

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8 The French translation of still life is *nature morte*, which literally means, *dead nature.*
Many articles have been written and research studies conducted that have the goal of developing practical applications that will enable the use of technology in classrooms in a way that can open up possibilities for learners. For instance, a study conducted by the Canadian Educational Standards Institute (CESI), entitled, *Technology in Canadian Independent Schools: A Report on Effective Practice* finds, “this generation of students is a digital generation; today’s curriculum and methodology need to change to address these digital learners” (Christopher & Kee, 2006, p. 55). Findings like this abound in research that claims with an almost religious fervor that possibilities for learning are opening up, or changing both with and because of technology. But like the study above, the findings are often so vague they really don’t offer any practical applications or pedagogical strategies for teachers to integrate technology and make changes (Bell, McCoy, & Peters, 2002; Hofmann & Dunkling, 2002; McKenzie, 2002; Nelson, 2001; Noble, 1999).

*Introduction to Painting: The Still Life*

*We watched him walk by our work a few times observing, but saying nothing. Then he grabbed a garbage can, walked back over and proceeded to rip our new paintings from the wall, one by one, and stuff them in the garbage. He then turned to us and told us they were terrible. Then he left the room. We were stunned. We all left that first class questioning not only our abilities and our desires, but our self worth. It was terrible. We felt humiliated. Our instructor, we would soon realize, was a very demanding and unorthodox teacher.*

*Technology*

When I refer to technology in this study I mean computers, the software they enable and the means through which we interact with them as an “extension of human faculty” (Hansen, 1997). It is important I make this distinction since terms such as technology,
digital, and even computer can conjure up different meanings depending on the context and how the terms are used.

I must also describe what I mean by technology when I refer to its use in a classroom. Specifically I need to address what technology is supposed to do in a classroom. The term technology is a noun that refers to certain types of objects; however, it also implies a certain kind of action. I’ve defined what I mean by the noun technology: computers and software. But I haven’t yet dealt with how this technology is used and the different meanings attached to how we use this sort of technology.

Moreover, I need to be clear about the perspective I am taking in defining technology because, as I am about to show, there is more than one way to think of technology in regards to how it should be used and trying to pin down one definition is difficult. For my purpose, while I am not speaking of any software in particular, I am thinking of programs that either claim to be creative, or have the expectation of being used in a constructivist fashion within an educational experience.

Seymour Papert (1998) defines two ways – he calls them wings – that action is generally applied to technology, especially in terms of education. The “two wings of technology” are information and production. The information wing of technology means using technology to gather information, share information, and communicate. If a person is using the Internet as a source for gaining information about things in the same way they would a book, they are resting on the information wing of technology. The experience is very cerebral. The production wing of technology, on the other hand, refers to the actual reconstruction of something using information. A good example of the production wing of technology could also be a book, the difference is that in this case the user would be the author (the maker) of the book. While authoring a book is also a cerebral exercise it takes on
a body – a certain physicality – as the author starts with nothing and builds something.

Taking information and transforming it into something new, like the hypertext, *Patchwork Girl* by Shelley Jackson (1995) would be an example of the production wing; the Internet is used in a productive way. I think of the production wing of technology as going beyond just using the Internet to include things like: animation programs, painting programs, three-dimensional building programs, music, video editing programs, etc., while the information wing is much more single mode – predominantly but not entirely about the retrieval of information from the Internet.

This dichotomy between learning through information and learning through production is not new to educational contexts. Papert asserts that while the information wing seems to be increasingly dominant in education that uses digital technology, the reality is that the information wing has always been dominant in education, regardless of the technology being used. Digital technology just makes the dichotomy all the more visible.

Burns and Durran (2006) question this seeming lack of actual production in New Media education. What they see as being predominant is what they call point and click usage of the Internet, where users surf for information and sometimes play educational games; the computer becomes a dispenser of sorts from which learners acquire information and knowledge. They address what they see as a lack of motivation by teachers to move beyond that of receiver to producer. They suggest “that the technologies of production can be tools of anatomy, which children can use to undo the fabric of media texts, pulling them apart to see what structures hold them together” (p. 274). They further that this type of anatomical work logically compels the student to re-assemble the material, manipulate the medium and, by implication, understand its structure. Throughout this process there is an underlying flow of creativity as each re-assembly will be an interpretation of the anatomy. Thus the structure
which emerges out of the previous structure would acquire in the process both logical and emotional means of transport to understanding. “An interest in intellectual structures could develop as opposed to those that actually at present do develop in the child, and the design of learning environments that are resonant with them” (p. 161). The approach necessary to support this robust transport would undoubtedly have to be creative.

Burns & Durran (2006) argue that the space between “domestic camcorder use and professional video and film work is exactly the space education is best suited to occupy” (p. 274). What they mean by this is that through education the opportunity lies for truly transformative learning to take place. This can happen when learners are encouraged to develop their critical faculties, not just repeat tasks but rather take them on and move out from them. In order for this to occur the computer needs to be more than just a point and click information retrieval box or a tool that replicates pre-technology classroom strategies.

The problem, as Papert (1998) sees it, lies in the reactions or feedback occurring in structures and how they get dealt with. The tradition of pedagogical practice in the twentieth century is steeped in methods that stem from the informational side. One reason that education seems to be falling for informational strategies being developed in software designed for the classroom is simple: the informational side is better known and teachers, policy-makers, even students are more comfortable with it. Schools trying to integrate computers revert to this wing (informational) because it is congruous with the traditions in education, and also because it is easier to measure.

Papert believes this dichotomy of the two sides of technology, the information and the production side, goes unrecognized, for the most part, in education and in much research. The conflict between the two is unseen, almost invisible.

In this inquiry I am concerned with how technology can be used in the production
wing. Emphasizing this side of technology use seems the only way to approach computer integration if the goal of technology in the classroom is to provide a creative, transformative experience for learners.

**Introduction to Painting: The Still Life**

I left class that day completely perplexed and very down. I had been in classes before where teachers were unhappy with the overall student work, but I had never witnessed a teacher literally throw out everybody’s work. I wondered how the rest of the class felt. At this point nobody knew each other well enough to ask, since it was only the first class.

**Creativity**

Much of the policy and thinking that supports the use of computers in classrooms purports that using the computer could be, in fact *should be* a transcendental experience for learning. In other words, it will be an experience for learning that will transform how we think and learn. Many of the expectations floating around policy, research and reports are sweeping and vague and read something like this: "*With computer integration students can successfully enhance their learning, increase productivity and promote creativity through the use of technology tools in directed and independent learning activities*" (Greater Essex County School Board, 2004). The articulation of this statement and vernacular that is used varies slightly from policy to policy and research to research but most seem to hold common a romantic anticipation that using the computer in classrooms will achieve more than just learning. It will be an enlightening and creative experience. These romantic expectations have been uttered with regularity by optimists and proponents of technology in the classroom since computers first came into the consciousness of education. The expectation is that proper use of the
computer will nurture perciipient, creative individuals who can dynamically problem solve and become robust contributors who will participate in constructing a knowledge-based society (Barney, 2004; Clements, 1991). But what does being creative mean?

The contested nature of *just what creativity means* makes it very difficult to program for or measure. On one hand it seems creativity is thought to be an intrinsic part of a deep learning process; while on the other, creativity seems to be embodied in product, a creation in which all parts work harmoniously. Christopher Alexander (2005a) uses the example of a flower to make the distinction between the *parts* that *make up* the whole and the importance of recognizing the *character* deep within the *whole as informing* necessary parts which may seem similar yet are in fact individual unto themselves. In nature, he said, “parts are induced by the whole and created by the whole. The whole is not created out of them. The flower is not made ‘from’ petals. The petals are made from their role and position in the flower” (p. 88).

In other words the whole and the parts are not separate, but play both roles in terms of character arising from the tension between the many parts.

This example is common, especially in the arts. In painting the saying is identical – no one part of the painting should exceed the whole. One section of life where this common example does not seem to have a place is in an educational structure. In classrooms this idea seems to get forgotten.

Stuart Moulthrop (2007) writes about changes in learning that interactive software and video games purport in his essay, *Learning, change, and the utopia of play*. “The future of cultural production, and of learning, may well require highly independent, aggressively creative knowledge workers, yet the methods and assumptions of such people run strongly counter to dominant economic interests” (p. 51). Any notion of creativity or transformative learning runs counter to the educational institution. Edwards (2008) furthers that one reason
schools don’t do enough to promote creativity is that institutions are still divided and support the gap between science and art. According to Edwards, the desire for creative knowledge workers that Moulthrop talks about is blocked by the institutional reality. “[W]e have schools (teachers, administrators, alumni) that do not do enough to teach creativity” (Edwards, 2008, p. 15).

Suoronta and Lehtimaki (2004) surveyed close to a thousand second and third grade students in Finland. They were interested in children’s innovative computer use at this age – both in school and out. Their findings indicated that computers were not being used in an innovative fashion in schools. Instead, innovative and creative uses of the computer were found to be in the home. They further noted the following:

The current educational system is a relic from the industrial era and is based on the same logic as much of the paid labor in industrial society: the division of work into small tasks and functions, whether educational or work related. Subject-based school curricula are modeled on the division of labor and promote an understanding of reality as things and phenomena that are clearly separated from one another. (p. 76)

Suoronta and Lehtimaki’s findings indicate just how complex educational institutions are and how difficult they are to change. An educational structure does not change easily, even if all involved have the best of intentions. Waving a magic wand does not make it happen.

The term creativity gets plunked too often opposite rote learning, each sitting on either end of a learning continuum with emphasis being placed on one or the other, depending on the current trend education has chosen to follow. However, the elements of rote learning and creative learning must both be at the heart of education (Oettinger, 1969). By separating them and favouring one over the other creates an imbalance and a division in learning – a polarity. This polarity develops a sense of extremism and alienation in classroom practice instead of cultivating a healthy tension between the two. We try to set up a situation
in classrooms where the necessary parts to generate pre-determined learning goals are present – all the while keeping a close watch that the process leads to satisfying assessment and evaluation goals, which lately has come to be compulsory creativity. Thought and research surrounding computer integration tend to think of a creative experience as something that is made up of composite parts that come together at the expense of, or exclusive from rote learning. But is it really?

In her effort to clarify the nature of creativity Swanton (2003) asks this question:

*Is creativity to be evaluated in terms of its products, or in terms of expression* (p. 162)?

This question has been asked and answered by many psychologists, with some in the product camp and others in the expression camp. Some argue that process has little to do with the product; and thus, the product alone is or is not creative (Glickman, 1976). While others, like Maslow (1968) for instance, think that to be creative one needs to be hardworking, critical, and a perfectionist. This could be argued in a broad sense to be part of process in general, not just creative process.⁹

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**Introduction to Painting: Meet the Monster**

The second day of my first painting class was probably the most difficult class to walk into. Everyone filed in quietly. The instructor was there in the middle of the room waiting for us, armed with a slide projector. I was scared of him. Once everyone was present, he began to tell us a story about a monster. The monster he described was called Painting.

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⁹ As well, Maslow (1968) does not find the nature of creativity to be very kind on the psyche of the individual, citing people like VanGogh, Byron, and Cezanne as examples of creative people who were not psychologically healthy. While Maslow does make an interesting connection between creativity and the psychological health of an individual it could be argued that the psychological maladies of a creative person may have more to do with an impoverished existence in a society that undervalues the creative worth of these individuals instead of this connection he makes between creativity and an unstable psyche.
Swanton (2003) prefers to think of creativity as, “a mode of moral acknowledgement which informs a wide range of virtues, just as does love and respect” (p. 161). By using a creative approach that is not a method this approach can become a “mode of moral acknowledgement” (Swanton, 2003, p. 161) or a way to acknowledge or recognize that one is acting morally, directed towards virtue. I would like to expand on this characterization of creativity. While I like Swanton’s description of creativity, for my purpose of our natural existence should be added to the definition. Any description of creativity would then read as follows: creativity can be described as a mode of moral acknowledgement of our natural existence.

Using this definition, creativity is the way in which we navigate within any process, through any process, and change any process in a moral and natural way. Regardless if the path chosen leads to a desirable or undesirable outcome, the mode of moral acknowledgement is that creativity intentionally strives for genuine and real value in experience. This intentionality will draw from any experience and further the quest. The outcome is not static. It is not an end, something from which everything leading up to it will be judged as having been right or wrong. Of course, this manner of approach always strives for a desirable outcome or result, but the space is created for failure. The chance of failure, which I will explain in more detail later in both the Living Structure and Our Ability to Adapt Factors, is vital to any creative experience. In this vein, failure or success is not an outcome. It is not an end point. Neither of the two is defined as desirable or undesirable. Failure and success are merely two resting points for reflection in learning. They each possess value and integrity.

Regardless if one believes creativity to be a product, a process, a metaphoric dream or some combination of the three, it is at best a nebulous term, and hard to pin down. Attempting to employ technology by claiming a creative experience, whether as a metaphor or for real, may very well be a great idea. But any change in pedagogy that does not have an
obvious connection or association to the existing structure, in this case of teaching in the classroom environment, belies both a past and a present attachment to the nature of the classroom. All new attempts for learning must be intrinsically internal to all involved (Alexander, 2005a; Dissanayake, 1992; Barnes, 2005).

Creativity as Metaphor

Creative, creativity, and creation are all concepts that are being used as metaphors for learning within schools. But this is problematic for institutions. Metaphors for learning have the function of helping us understand more deeply just what direction learning should take. They also, however, flavour this direction. As Barton says in Talking About Literacy (1994), “[m]ost of language relies on metaphors, most words and relations between words are metaphors. One reason why the use of metaphors is so prevalent in schools, especially in conjunction to computer integration and learning, is that we need metaphors for talking about things which are not concrete” (p. 17).

Creativity is only one of a myriad of metaphors being thrown around as theorists and researchers try to make sense of the role technology is playing in our schools. The very nature of creativity, in a cognitive sense, relies on a certain sense of spontaneity combined with extreme craft and hard work (Glickman, 1976). But when the term creative is used in much of the theory and research surrounding computer integration it reads as a spontaneous and fun way learners can make sense of technology, and yes, learn much more than before. However, the term becomes sugar coated as some of the darker aspects of creativity such as hard work, a dose of perfectionism, and a healthy dab of angst get left out. These dark characteristics are vital components of creativity. When left out the definition of creativity is
flattened and becomes a stereotype. In this case the stereotype is being used to convince teachers, parents, school boards, etc. that technology will help learning.

If I say my bank manager is a snake, everyone within earshot will think my bank manager is not to be trusted. This metaphor derives its meaning by oversimplifying, and stereotyping what it means to be a snake. Using the snake metaphor in this way reduces a very complex species to a simple stereotype. Just like the snake, creativity is also a very complex idea that gets reduced to a simple stereotype when used to illustrate what is expected to happen when teaching with technology.

The superhighway is a great example of how the meaning of learning with technology was flavoured by metaphor in the mid-nineties. How can you teach in a knowledge-intensive society? “[T]he Superhighway has considerable potential for the delivery of learning and instruction” (Riding & Raynor, 1995). The superhighway metaphor may not seem disturbing at first glance; however, those that use this metaphor couple the learner on the superhighway with an individualized learning environment. Education is on the cusp of revolution and this revolution will be fast. “The new technologies associated with the Information Superhighway are likely to bring changes in learning and the work-place comparable to those unleashed during the Industrial Revolution” (Riding & Raynor, 1995). The projected learning espoused by this metaphor is one of a collaborative experience where the teacher’s role has

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10 Since the Old Testament the symbol of the snake is synonymous with evil. Its wisdom is the guile of the devil. Before this the snake symbolized medicine in Greek mythology and was considered to have a great zest for life in Egypt, because nobody survived the bite of the Asp, the snake came to symbolize invincibility (Carr-Gomm, 2000).

11 Nam Jun Paik (1932-2006) considered by many to be the first video artist coined the phrase, electronic superhighway in a report he was commissioned to write in 1974 for the Rockefeller foundation. This phrase eventually became known as the information superhighway. “If you create a highway, then people are going to invent cars. That’s dialectics. If you create electronic highways, something has to happen” (Paik, n.d.).
diminished from teaching to encouraging. While the superhighway metaphor may be compelling and vibrant image-wise, it doesn’t really help us understand the technology. The same goes for many other metaphors flying around technology – dinosaurs, spaceships, creativity, etc. The function of a metaphoric device is to help us understand, but while many metaphors conjure up interesting and colourful images they don’t serve us any deeper by extending our understanding of just what kind of learning can be realized with e-learning, or how to teach deep meaningful and creative content with computers in the classroom. Instead of using creativity as a metaphor, creativity should be thought of as an approach, and again, I must stress that an approach is not a method.

Education vs. Training

Finally I want to define two terms that are often found banging about inside schools, research, and policy and are often taken to mean the same thing: education and training. Many of the studies that find teachers not using computers to their full potential conclude that there is a need for teacher professional training or teacher professional development. However, none of the studies recommend that teachers should be educated to better prepare themselves for a future of quickly changing technology. But is training really what teachers need? Do teachers only need to acquire a set of skills so computers will work for them – and the problem will be solved? Noble (2002) defines education as being the opposite of

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12 The image I conjure in my head when confronted with this metaphor is what disturbs me. I see a radically suped up school bus, spoiler and all, careening down a major freeway at top speed. If there is a speed limit, it has long been surpassed. Inside, the bus is crammed full of kids having a great time. I am not distressed at the image of a school bus converted into a Formula One racing machine but the image becomes distressing when I realize the bus does not have a driver. The teacher, in my image might be able to command the curves and corners on the highway but if she is present in the image, which sometimes she is and sometimes not, she is gleefully in the back encouraging her students to keep on. The bus seems destined to crash at any given moment.
training. It is “the utter integration of knowledge and the self, in a word, self-knowledge” (Noble, 2002, p. 2). Training, on the other hand, does not go beyond acquisition of a set of skills and “entails a radical divorce between knowledge and the self…to become operational, only in a context determined by someone other than the trainee” (p. 2). If we listen to Dissanayake (1992) teachers must philosophically accept that the technology is something they need to learn, and further to this, embody the learning involved – to be educated.

The computer and the human, whether we like it or not, are in a very tight relationship with each other. From all aspects of our society – social, physical, economic, psychological, even political – our relationship with technology is at times sticky, and sometimes one-sided, but at this point is seemingly indelible (Hayles, 2007).

Introduction to Painting: Meet the Monster

He explained to us that to be a painter at this time (it was the late eighties) was next to impossible unless we somehow killed the monster – rid it from our backs. He alluded that being a painter today was the equivalent of being a soldier in some war. Unbeknownst to us we were in a David and Goliath battle,¹³ where each one of us was David¹⁴ and Goliath was a muddle of all those painters that came before us.

¹³ Goliath, a Philistine warrior, is known for his huge stature and strength. David, the future king of Israel, on the other hand, seems sorely out strengthened by this gargantuan. The story of this great battle can be found in the book of Samuel in the Old Testament, and the Quran (although the story is less emphasized). Art history, movies, games, and stories often use the premise of this battle as a metaphoric base due to its untiring popularity with people (Artbible, 2001).

¹⁴ Arguably, one of the most recognizable art pieces of all time in the Western Art historical canon is Michelangelo’s David (1504). The 17 ft. ideally proportioned marble sculpture (Greek classical style) depicts the young king nude standing in contrapposto (asymmetrical posing where the shoulders and hips are turned in opposition to each other) style. It is widely thought this sculpture to be a representation of the moment David decides to enter into battle with Goliath – the moment between conscious thought and conscious action. Another interpretation sees this sculpture a representation of David in reflection after having just slain Goliath. Michelangelo sculpted David believing the soul of the sculpture to be
Goliath was this horrific mishmash of da Vinci, Carravaggio, Picasso, Monet, Velasquez, Goya, the Holbeins, Pollock, Vermeer, etc. We sat in awe, spellbound by his story. Most of us had never heard of most of the artists he listed, but through his description they began to grow in size and began to take on the garish features one would attribute to a monster. Our goal, he said, was first to fight the monster but then, hopefully with a lifetime of work become the monster. The monster was something to first overcome, but then somehow become, if that makes any sense. While our goal, he said, was to remove the monster from our path, rid it from our backs, it would be a war that would last a lifetime. I remember looking around the room and seeing my own thoughts reflected on many of the faces around me... wasn’t painting supposed to be personal expression, where there was no right or wrong? I remember wondering if I was being taught by a mad man. This whole experience up to now was so out of my comfort zone. But no one dared speak. We were all well aware already that our comments wouldn’t be welcome, not yet anyway. Besides, we were all still smarting from the last class – our first. The class where everybody’s work was trashed - literally.

inside the block of marble. This way of working, that the idea of David was already inside, and the sculptor’s role was to uncover what was already there is called disegno, the concepts of which are based on the idea that sculpture is the finest form of art because it mimics divine creation (Artbible, 2001).
Chapter 3

Factor I For A Creative Experience: Living Structure

Introduction to Painting: Meet The Monster

I can’t fully remember the details of the ‘monster story’ but it was dramatic and he was very convincing. I think most of us were considering dropping out at this point – a few did. One part of the story I can’t forget is the part where we must feast on this monster. Right. So we kill the beast then eat it again and again. Apparently, with each new painting the monster would come back to life and we would repeat the action. This guy really seemed off his rocker. This experience felt like some sort of radical religious experience. It was freaky, much like those holy-roller shows that air on Sunday mornings with people chanting, crying, being cured while a man at the pulpit berates them with the gospel. I felt like I was being converted but I wasn’t sure to what.

Memory 1

Working in many different schools at one time afforded me the opportunity to observe the diversity of technology present in schools. At the time, there was a great push within school boards to standardize each school in terms of making sure they had the same level and amount of technological resources. But still, the reality was that resources varied greatly from school to school. It wasn’t uncommon that in one week my artist colleagues and I would be in as many as three different schools. Each school was based on the same principles for learning, yet each would be completely different in terms of learning environments and technological resources. Some had mobile laptop carts while others worked with outdated computer labs. I soon realized that neither the quality nor quantity of technology necessarily mattered in
terms of student learning. One school in particular comes to mind where the technological resources were greatly lacking in comparison to the others. The projects we were about to implement had to be re-vamped to accommodate the outdated technology but we still had to accomplish our goals. Immediately one might think that the project had to be simplified to run in these outdated labs, but this was not the case. In fact, the level of problem solving that was needed in these outdated labs created an electric learning environment.

Introduction

A living structure, is the overarching vital Factor necessary for creativity to occur. The other three Factors: Our Ability to Adapt, An Element of the Unknown or the Unpredictable, and The Desire to Make Things Whole work together to maintain the Living Structure. If the processes within a structure are incongruent, creativity will be compromised and demeaned through the breakdown of one or all of the Factors. As I will show, there is an incongruity in education. This incongruity is not as it first might seem – causally related to the advent of the computer in education. Nor are the processes of teaching and learning causally to blame. Rather, we need to look at how we develop and implement structural strategies for learning on an institutional level. Teachers are being asked to work with prefabricated strategies that have been formed elsewhere and they aren’t allowed to grow within the structure, or build the structure themselves. Research has recently come to the conclusion that educating in the 21st century has become unbalanced and is not working with technology due to the inability of teachers to become innovative with their pedagogy in order to achieve regular creative experiences using technology (Chen, Hung & Wang, 2007). I believe the reason they are unable to become
innovative with their pedagogy is precisely because they are being forced to work within the parameters of prefabricated structures.

The aim of this chapter is to show how the advent of the computer has thus far not been a good match with teaching practice. But more importantly, this chapter will highlight how teachers are unable to adapt their pedagogy in the context of this new technology-rich environment using traditional methods that are based solely on outcomes that can be objectively measured. By highlighting this, a clearer picture can be painted as to what is happening in the classroom, what has happened, and how, by recognizing structural imperfections in the classroom, pedagogical practice and educational software might better work towards achieving a learning space that can be conducive to creativity.

Introduction to Painting: Meet the Monster

Then the teacher turned down the lights to give a slide presentation. He very methodically put a face to this many-faced beast. We were introduced to the work of all the artists that he had mentioned and more. The paintings he showed us were astounding in their technique. The artists were immediately heightened, in my mind, to a level beyond anything I could imagine. These artists were so good at painting. Thoughts of the first class came back to me, as we viewed these slides. No wonder he threw our work in the garbage. It was less than nothing compared to this. I didn’t think I would ever be able to paint that well. He asked us to remember our work from the previous week. How embarrassing. I looked around and saw I wasn’t alone in my feelings of inadequacy. The whole class was blushed with embarrassment. We glowed in the dark as we stared into the eyes of our monster.

Definition of Well Constructed

A sound structure can be thought of simply as a structure that is well constructed.
Something that is well constructed will work well in its environment and with its environment. It fits. We rarely say that something we consider to be of sound construction doesn’t work well. Basically, something that is constructed well is very efficient in its design and in its practical application. For example, a well-designed house is more than just a shelter constructed from top-grade materials. It also will be practically efficient. That is, a well constructed house will be efficient in terms of heating – warm in the winter, cool in the summer. It will be efficient in terms of delineation of space – the stove won’t be in the bathroom. It will be efficient in terms of plumbing and electricity, etc. A well constructed house seems obvious and understandable. It is sound.

**Definition of a Living Structure**

If we replace *sound* with *living*, structure becomes not quite as clear in meaning and thus harder to define. Living structure, like sound structure is also well constructed. However, the definition of *living* in living structure, while including sound in its definition, goes beyond the physical soundness of structure to include the senses in its measurement. This measurement through the senses Alexander (2005a, 2005b, 2005c, 2005d) argues is just as observable as concrete empirical facts. However, the senses or feelings hold little value in western societies. A good example is the difference between a house and a home. If a well-constructed house is also aesthetically pleasing, you will want to be in the space; it will

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15 The senses were often depicted in still life paintings of the 16th and 17th centuries symbolically. Inclusion of the senses acted as a reminder of the lack of humility of the material world. For example a painting with a lute = hearing; with flowers = smell; etc.  
16 I use the word aesthetically with a bit of trepidation. While I am not explicitly referring to aesthetics in this thesis, I believe there is an implicit aesthetic thread that runs throughout.
feel and act like a home\textsuperscript{17} as you imagine or intuit what a home should be. Transferring the house/home example to a learning environment, however, is not as easy. It becomes confusing, with many voices chiming in with different opinions as to what makes a well constructed learning environment. Add a computer to the example and the voices multiply and grow in magnitude and the example becomes even more confusing. This is because a learning environment, unlike a house, seems to be, by nature, abstract. While a classroom, like a house, is built of bricks and mortar or wood, a learning environment is built by ideas and thoughts. Most of us would consider this to be less concrete. But is it? Alexander would say no. A learning environment is a human-made structure, just like a house and ideas are as concrete as bricks. Alexander develops the idea of a living structure as being just as observable as a house or a classroom. But this type of observation, which he argues is empirical by nature, must be observed through the senses – our feelings. The only problem we might have in observing a learning environment is that we have, as western humanity, spent the better part of four hundred years training ourselves not to use our senses as an empirical observational tool. Thus we might have a tough time being able to gauge whether something is well constructed or not (Alexander, 2005d). We’ve trained ourselves away from measuring the degree of life inherent in structures. We’ve trained ourselves to not trust this type of measurement because we think it is subjective.

\textsuperscript{17} I use this example of the well-designed house specifically because Alexander goes on at great length about the necessary qualities that makes a house more than a shelter, especially in \textit{A Pattern Language} (1977), but also in \textit{The Nature of Order} (2005a, 2005b, 2005c, 2005d). I have neither the time nor the space to fully give this example justice in this thesis, but I highly recommend reading his descriptions for good house design.
**Introduction to Painting: Meet the Monster**

Recognizing the monster, recognizing our battle, and facing it head on was going to be our second assignment. As a class I can remember we were pretty much broken. We seemed in no shape or form to enter into a battle of this magnitude. I think, at that time, we all felt sure of our imminent defeat. The idea of shaking a monster from our backs that was so good at painting seemed unlikely. This monster was huge. But we were faced with no option. Our assignment was for each of us to pick one painting by one of the old masters he had mentioned in the previous class and reproduce it exactly. The painting we picked had to be a portrait and it had to have been painted between the fifteenth and mid-nineteenth centuries. No exceptions. No landscapes. No modernist work. No work before the high renaissance, or after Romanticism. And no Mona Lisa.

**Self-Conscious, Unselfconscious, and Accretive:**

**Human Processes That Maintain Structure and Preserve Life**

Alexander (2005b) believes that we need to always ask a fundamental question when attempting to form a structure that supports complex nature. When designing, planning, and constructing anything – “ecosystems, buildings, communities, objects, computers and computer software” – we must ask whether we are doing it “the right way to produce sufficient complexity, and does what we are doing have a chance of success” (p. 180)?

Alexander says we often design things that are finite and allow no room for life to emerge. We forget how to live within structure. In earlier work, Alexander (1964) defines

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18. The history of the portrait harkens back at least as far as the Romans, more likely the Egyptians. Funeral portraits – paintings (head and shoulders) of common folk from Rome still survive. Portrait can mean an interpretation of pretty much anything. One can paint a portrait of a person, animal, or object. Different eras place different emphasis on where our gaze is directed. (Encarta, 2007)

19. The *Mona Lisa* (1502-1506) by Leonardo da Vinci is probably the most recognized face in painting. da Vinci achieved an overall sense of harmony throughout this painting. He seemed to make an otherworldly link between her, as we can see by her smile and the make believe nature behind her.
three distinct processes that naturally occur in structure. These three processes are observable in human existence and are derived from nature. They are: unselfconscious, self-conscious, and accretive. All three are able to afford the greatest degree of life; one is not better than the other. However, a very important point to remember is that each of the three processes can equally disintegrate the life of a structure if the process is designed as the product.

Structure is one of those elusive over-arching terms that is championed when a system works efficiently, and blamed when the opposite occurs. The term is used a lot, under many different circumstances, and has many different incarnations and meanings. By delineating the three processes, the over-arching term of structure will be broken down into more specific easy-to-see types. By extrapolating each of these structural processes, understanding of structure can become more than a material framework for operations to soldier under. All structure employs some process or combination of processes for operations and these processes maintain and promote adaptation in the form of re-structuring.

These three processes allow for a greater understanding of how the computer is being used, but also can be used in the classroom. From here, consideration can be given to where our process needs to change in order to afford a more complex relationship with the computer. I'll begin by describing the unselfconscious process.

**Unselfconscious Process**

An unselfconscious process does not rely on explicitly formal rules to build the skills or to teach the skills needed in order to survive. However, this does not mean that there are no rules. There are, but they are more likely to be unspoken, as the process is based in large part on repetition and habit as opposed to innovation. This is not to say innovation does not occur. It simply means any change occurs only after successive failures within the process or
structure. Change is never willful in that it doesn’t occur without need, or as change for the sake of change. For example, unselaneous cultures embed each skill needed for cultural habits in myth and legends. The unselaneous process is characterized by fast reactions to single problems, or *failures* in the structure. This process allows for minor, seeming inconsequential augmentations and adjustments to the structure instead of abrupt far-reaching ones (like we will see in a selaneous process). Changes have local impact only, and over a long period of time the system adjusts *step by step*. It is a gradual process based on immediate action. Since the minor changes happen at a faster rate of change than the culture as a whole, equilibrium is constantly and dynamically re-established after each disturbance, through the immediate action of the individual within the culture (Alexander, 1964).

There is directness to the unselaneous structure. Alexander (1964) says, “there is no deliberation in between the recognition of a failure and the reaction to it” (p. 50). In other words, when a misfit or a problem is noticed, change is immediate in order to turn the misfit into a good fit. Failure and correction go side by side. This is the primary definition of adaptation. Alexander uses the example of an igloo melting in the sun to make his point.

Think of the moment when the melting snow dripping from the roof is no longer bearable, and the man goes to do something about it. He makes a hole, which lets some cold air in, perhaps. The man realizes that he has to do something about it – but he does not do so by remembering the general rule and then applying it (“when the snow starts to melt it is too hot inside the igloo and therefore time to…”). He simply does it. And though words may accompany his action, they play no essential part in it. This is the important point. The failure or inadequacy of the form leads directly to the action. (p. 49)

Alexander argues that the unselaneous process has a homeostatic (i.e. self-organizing) structure that produces well-fitting forms even in the face of change. (As we will see, in the selaneous process this homeostatic structure has been broken down, making poorly fitting forms almost inevitable.) Although, by definition, there are no explicitly
articulated rules for building in the unselfconscious process, there is usually a great weight of unspoken, unwritten, implicit rules that are, nevertheless, rigidly maintained by culture and tradition. These traditions provide a base of stability, but more than that, a viscosity of resistance to all but the most urgent changes – usually when a form fails in some way (Alexander, 1964). When such changes are required, the very simplicity of life itself, and the immediacy of the feedback (since the builder and homeowner are one and the same) mean that the necessary adaptation can be made immediately, as a one-off. Thus the unselfconscious process is characterized by fast reactions to single failures combined with resistance to all other changes. This process allows individuals to make a series of minor, incremental adjustments. Changes have local impact only, and over a long period of time the system adjusts subsystem by subsystem.

**Selfconscious Process**

A selfconscious process or structure relies more on formalized rules and less on tradition as the necessary element to repair a misfit in the structure. For instance, if something goes wrong with some aspect of my computer I quite likely will not be able to fix the problem partly because I did not build the computer – I have no tradition to fall back on to fix the problem. I must find someone who would be considered, in a traditional sense to be a builder, someone who knows the general patterns the computer follows in its make-up, i.e. the technician. This person or persons is more likely to be able to fix my problem. I cannot fix most of the problems that might occur with my computer, so unlike the unselfconscious structural process a quick, immediate reaction is not possible. This is because the materials to fix the problem are not easily available and the problem is beyond my knowledge. That is, any knowledge I might have that helps me fix the problem is not
necessarily easy to see or figure out. Thus problems can quickly begin to accumulate. For example, if my computer begins making a strange whirring sound and crashing once in a while I realize the computer has a problem – it is failing. I have no idea why this is happening but I might look online at tech help sites to see if I can find the root of my problem. Even if I do find the solution to my problem, the solution is quite likely too complex for me to fix it. So I call tech support. Tech support may be able to help me over the phone but I may need to bring my computer in for repair because tech support cannot readily fix it. If I did have to bring it in for repair I may not be able to get an appointment for a week. Meanwhile, I keep using my computer knowing there is a problem, not knowing how to fix it, but knowing I will soon be taking it to get fixed. The whirring sound and the crashing become no less random but more frequent and other problems begin to crop up. The computer will not read DVDs anymore. Lines appear in my word documents. The computer keeps falling to sleep. I realize there is most likely a link to the problems and that my computer needs desperately to be fixed but I have no control in the matter.

All that I can do is watch the problems manifest in greater number and greater frequency and wait for my appointment. All the while I realize I probably should not be using the computer until it gets fixed, but I cannot afford a new one and I cannot afford to not use it. The accumulation of problems requires far more drastic action because they can no longer be dealt with individually. They have to be dealt with in a group. Thus the elements that drive the construction in an unself-conscious process to maintain an equilibrium or balance have all but disappeared. In the self-conscious process, equilibrium, if reached at all, is unsustainable without external help. Sitting in front of my failing computer I have little control over whether the structure in which I am working is balanced or not. Barring going back to school and getting a degree in computer science along with some sort
of technician certification, any actions I could take to fix my computer would likely be futile without technical support; I am completely dependent on outside help.

In the selfconscious process, culture changes at a rate that outpaces the rate at which individual adaptations can be made. One needs a lot of technicians readily available in order for this process to work and sustain the intended structure.

**Accretive Process**

The accretive process in structure is a process of acquisition whereby changes occur in succession and grow through the addition of external solutions. When a problem occurs in a structure using an accretive process you simply acquire a solution and add it to the structure. The accretive process is common in business practices. For example, companies that contract out certain elements of the business are, ostensibly, working in an accretive manner. Rather than fix a problem in house the business contracts out the problem for another organization to fix. Like the selfconscious process, problems that arise are not solvable in an innate fashion, as they are in the unselfconscious process.

The accretive process reminds me of how anti-virus software works. The potential that a computer will contract a virus is great enough that we seek out software that will protect it. Once the software is on our computer we are often reminded and asked to download a latest version or plug-in to further protect the computer from viruses that keep mutating and threatening the computer. Likewise, open-source software tends to be accretive to some degree. Open-source is based on a convergence of users building on each other’s work. Wikis are another example of this process – they are built using an accretive process whereby users create content, edit content, read content, and comment on content.

The accretive process lends itself to customization. Ordinary people trade and share
customizations as easily as they trade and share recipes. Customizations generate programs for individual use. The interesting thing about the accretive process in a software setting is that the end-user has been brought into the design process, creating a whole new range and variety of opportunities. The process then becomes not just accretive but draws from elements of both the unselfconscious and the selfconscious structural processes to sustain equilibrium.

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I don’t know if one can relate to the fear and panic we were experiencing at this point, if one does not paint. The overwhelming weight of this assignment was greater than any I have ever carried. The idea of doing this was colossal, and it seemed an insurmountable task. I think in the back of our minds we assumed that the classical paintings from the sixteenth to eighteenth century were done by almost non-humans. They are that good. These paintings, if you are not familiar with them are extraordinarily realistic. They were painted before photography. This made them even more impressive. The amount of skill and technique required to do this type of painting seemed like a gift of unbelievable talent, coupled with a lifetime of practice. But what were we to do, other than do as we were told? So I picked the painting of a cackling old woman with an owl on her shoulder holding a beer stein aptly titled, *Malle Babbe (The Witch of Haarlem)* painted in 1630 by Franz Hals, a Dutch master from the early seventeenth century. The old woman is sitting at a table, presumably

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20 The painter David Hockney (1937- ) recently argued that artists were using concave mirrors (the precursor to camera obscura and camera/telescope) as early as the 1430s, to trace the drawing of their paintings. Until this claim it was generally accepted that the camera obscura technique was first used by Vermeer, in the 18th century. Hockney’s allegation might explain the seeming ‘overnight’ jump from low to high renaissance (Fendrich, 2002).

21 The emergence of Dutch painting (still life, landscape, portraiture, and genre) is regarded by many as one of the most interesting phenomena in the history of Western art. Underlying the essential realism of Dutch art, is an allegorical view of nature that provided a means for conveying various messages to contemporary viewers. The Dutch Calvinists were a moralizing people. While they enjoyed the sensual pleasures of life, they also recognized the
in a bar as there is a beer stein on the table. She seems quite drunk – drunk and poor. I could relate to this, so I chose it.

**Post Descartes: Embedded Relationships**

According to Alexander (2005b), a structure that is living is governed by its *wholeness* whereby all parts are generated and shaped correctly in direct relationship to all other parts within the whole of the structure, regardless of process, or combination.

Alexander (2005b) explains that this “dependence on wholeness” where the self is part of a system outside itself seems like an objection to the Cartesian method that views all matter outside of the self as inert. But Alexander feels that it actually is an addition more than an objection to Descartes because, while Alexander does not view all matter outside the self as inert he does, like Descartes, believe that all matter including the self can be empirically and objectively observed.

Alexander (2005d) has devised a method of empirical observation that sensually measures the degree of life within a structure. This method is based on the recognition of fifteen properties for transformation that are present in all *living structures*. These fifteen properties are empirical in nature in that they are observable but, as he says, the fifteen properties do not pretend *a priori* that all matter around us has no life. The following is a list of the fifteen properties that Alexander has observed and recorded in spaces and structures he has deemed living structures. They are in no particular order: *Levels of Scale, Strong Centres,*
Alexander (2005a) derived these fifteen properties by asking himself this question: “Can we find any recurrent geometrical structural features whose presence in things correlates with their degree of life” (p. 144)? As Alexander tried to answer this question he began to realize that while the fifteen properties are important and are recognizable, they are not in fact the fundamental crux of the theory, rather they are empirical indicators that living structures exist. They can be used much like a check-list to indicate the degree of life in living structure.

**Perception of Primary and Secondary Sensible Qualities**

Where Alexander breaks from Descartes, or at least extends Cartesian thought, is when he describes how these properties are to be observed. The observations are based in feelings and intuition. Alexander breaks from Descartes in his acknowledgement of the importance our senses have in shaping our ability to perceive. The properties, Alexander puts forth, come from his own observations of architecture over the last thirty years. They are deeply rooted in the senses, and may be seen as contrary to Cartesian theories of perception of primary and secondary sensible qualities in consciousness, matter, and space.

A more thorough look at Cartesian perception will be addressed in the following chapter. For now, I will work from Alexander’s idea that through our senses we derive meaning and form relationships with all that is around us including space, and these relationships form a structure governed by wholeness. Alexander admits his methods become quite different from Descartes’. For instance, his claim that all matter is *not* inert
takes a great leap from the Cartesian presupposition to the contrary. All matter within space, he argues, is embedded in relationships, and all relationships in space, including the relationship between the self to the matter within space, will have less or more degrees of life depending on the relationship that is nurtured. The nature of this relationship is measurable through observation of the senses alone.

Thinking back to elementary school provides a good example of embedded relationships common to many in Canada. For instance, in my school like many elementary schools, classrooms were, for the most part, identical. They each consisted of thirty or so student desks, a teacher’s desk, and blackboards – one at what must have been designed as the front of the room and one on the right hand side of the room flanked on either side by a door to the hall. Windows spanned the length of the left hand side of the classroom with shelves underneath for storage of books, supplies, and projects. At the back of the room there was usually a bulletin board with student work and such pinned up and possibly a table or more shelves. Teachers decorated their rooms to varying degrees but generally the spaces were pretty much the same. But even though they were mostly identical some rooms possessed more life. Students recognize this life as young as even six, seven, or eight. The teachers in the rooms were different, of course. Some were considered to be better teachers than others and this might be one reason some classes had more life. Certainly the classes I remember as being the good ones – the ones where I wanted to be and learned a lot – did have a lot to do with the teacher. That is undeniable. But I also have fond memories of the classroom itself – the space, the desks, the blackboard, etc. The memory is complete only if I include all of the elements from that time – the teacher, fellow pupils, the smells, the physical classroom. The memory is brought together by my recollection of that space, and the space is brought to life through the interactions that took place in that space and my
present day reminiscing. Alexander (2005d) writes that we need to think of space as “some sort of pliable material, which itself comes to life more and more, as the field of centers gets more and more developed there. This is the different part. This is where the new idea differs from the old” (p. 327).

In other words, my memory of my past classrooms is brought to life through and with my experiences in present day classrooms. The two are inexorable.

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To make it easier for us our instructor told us that we would paint these reproductions in black and white only. We would not have to worry about colour. We would work from a black and white reproduction of our chosen painting and re-create it in black and white, exactly. He also showed us how to use the technique of camera obscura. This technique is an early photographic form that many painters had used since at least Vermeer. Instead of using a still life we set the photographic renditions of our chosen painting as the subject and traced the drawing of the painting. Not having to worry about the drawing was a great help. Our instructor rationalized the use of camera obscura because the project, he said, was to be about the act of painting alone, besides none of us could draw well enough, he told us, to get beyond the drawing stage. Thus, no drawing. No colour. We also weren’t going to paint these in class. They were to be our homework for the following class. That was fine by us, since painting in front of this guy was terrifying. We spent the class preparing our canvasses, tracing the work we were about to reproduce and listening to our instructor’s diatribe on the expression of a single brushstroke and its integral relationship to the whole painting.

**MaterialMass Void MaterialMass Void MaterialMass Void MaterialMass Void**

Alexander’s main argument is that life can be observed in a manner that is empirical in nature and puts the self into the space, as part of the space rather than separate as in the
dissociated Cartesian view. Living structures can and do occur empirically. However, all living structure, governed by wholeness is created through an unfolding process. This process, as it changes, preserves the structure through what Alexander (2005d) calls “fields of centres” (p. 327).

Going back to the example of a building for a moment, Alexander (2005c) states that, “what we are trying to do is to form a complete densely packed system of centers, both in the space (void), and in the solid structure (the material mass of the building)” (p. 196). Our relationship and relatedness to matter and space comes about through being effected/affected and having effect/affect on the other centres around us in the given space where they co-exist (2005b, p. 31). The space, which we don’t see, forms centres between the objects in the space. The objects at this point are the positive centres; the space banging about in between the objects at this point are the negative centres. Together they weave a pattern. Another good visual at this point, and one Alexander uses, are Persian or Turkish rugs with their intricate designs. The design itself is positive, while the spaces created in between also read as an intricate design. The way you choose to look at it defines which design is positive and which is negative, but rest assured neither could exist without the other, and both actualize themselves as both positive and negative. The actualization from design to finish with the positive and negative in mind is a living structure. We recognize it as a creation, which really just means we acknowledge that the whole space was used with each part contingent on each other part for the greater good of the whole. This in turn, indicates that the Factors for creativity were present.

22 Another great example for reference is the artwork of M.C. Escher (1898-1972). Escher was fascinated by the logic of space and the geometry of space.
Many books and research studies claim the digital generation will be one of creativity and experience (Buckingham, 2006). This generation of learners will be required by the very nature and speed with which technology changes to quickly acquire new skills, adapt to new environments and offer solutions based on creative means. Past methods, namely the acquisition of a finite set of skills and rote memorization will be obsolete and unnecessary in this environment (Davis & Carlsen, 2004). The implication then is that this generation of learners, coined the digital generation, will need to be productive; that is, they will need to be able to construct and disseminate problems rather than just memorize information in order to function in our world. But does this implication match how educators believe they should teach; and, more so, been taught to teach? Furthermore, how can traditional classroom learning contribute to the process that is required by creative technologies to, in fact, enable the creativity they purport to be capable of? These questions need to be addressed because the quest for a living structure cannot be so simple as developing a new structure that is fabricated entirely in its design and then implemented on top of an old structure as a solution. What I mean is we cannot just purchase a new way of learning to replace the old. Much research suggests “that a ‘change in mind-set’ is needed for teachers to realize what they can do, and do better, with new technologies” (Cheng & Myles, 2003, p. 29). While it might be accurate to say that a “change in mind-set” is required in teaching we cannot expect teachers to blindly without good reason change their minds and their teaching methods to fit new strategies developed for technology implementation. Rather, like Papert says, we need most of all to deal with the structures that are present and developing in education. Papert (1980) refers to the computer as the “Proteus of machines. Its essence is its universality, its power to simulate” (p. viii). His book, Mindstorms: Children, computers, and powerful ideas (1980) was profound in its attempt to develop a new perspective, from which
educational structure could grow.⁴³ This structure he argues is contingent on “creating the conditions under which intellectual models will take root” (p. viii). In other words not from the perspective of how to download something (information), but instead, how to make something (production).

Likewise, most research that exists favours information over production in e-learning (Abrami et al., 2006). This is especially true in the public school systems where innovative programs based on constructivist theory are being tested and used outside the school’s learning environment in community centres, and after school programs.

As an example, Mitch Resnik, a colleague of Papert and a professor at MIT, and his colleagues have been implementing a research project entitled *Lifelong Kindergarten* in both Singapore and America. *Lifelong Kindergarten* is a robotics and programming based software that allows children to create interactive games and build robots. In both countries, they met with resistance when trying to incorporate this program into the regular school curriculum. At MIT Resnick gave a presentation about the experience. He began by showing a slide with three words: computer, paintbrush, and television. He asked which two terms the audience deemed most alike? His point was that the paintbrush and computer have more in common than the television and computer. If we really want to make the most of computer technology for education and learning we need to start thinking of computers more like paintbrushes and less like televisions. However, in most schools computers are used more

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⁴³ Papert was deeply influenced by some of Jean Piaget’s lesser-studied work (work Piaget did as an epistemological scientist, rather than his more popular work as a cognitive scientist). Papert (1980) was interested in Piaget’s laws for structure and how they could be used as laws of learning. In particular, how they could become intellectual structures that emerge out of one another and how, in the process, they could acquire both “logical and emotional form” (p.vii). Piaget defined structure as an observable arrangement of separate entities which all adhere to the following ideas: 1.The idea of wholeness; 2.The idea of transformation, and 3.The idea of self-regulation. These laws of structure are intrinsic within structure yet they do not necessarily make something structured.
like televisions for didactic teaching and learning. They are used for the most part for delivering information, not as a tool for creating, designing and constructing things. They are not being used as a tool for expression. He goes on to say that the way we think about education and learning is the reason why we have not been able to integrate technology in an enriching and robust manner (Resnick, 2006).

Resnick’s presentation was being given as part of the Soapbox Series at MIT. This is a series set up to showcase work being done involving computers, kids, and learning. Two problems were brought up in regards to *Lifelong Kindergarten*: one by Resnick himself and one by an audience member. The two problems approach the notion of creativity and structure from two different perspectives.

**Problem 1: Will the Structure of Schools Adapt to Include Creativity?**

The first was a problem Resnick has been finding as he and his colleagues attempt to try out their software. As I mentioned already they have been implementing *Lifelong Kindergarten* in Singapore schools through a deal with the Singapore government – schools that are trying to educate students to match the needs of the workforce. Businesses in Singapore have been arguing for systemic changes to the educational system. These changes are needed they argue because the trained students coming out of Singapore schools have not been adequately equipped to handle the work environment. The future workforce needs to be able to think and act creatively and be able to problem solve. So the government brought *Lifelong Kindergarten* into the classrooms of Singapore in an attempt to remedy this. However, in the follow-up consultation with both government and business leaders there were still the same complaints – students weren’t able to problem solve and think creatively.
The robotics and programming software was having little effect on students’ abilities in this regard.

Resnick then went to the schools to talk with teachers and administrators about this and what he found was that the school structure had not changed since the implementation of *Lifelong Kindergarten*. Teachers said they didn’t have time to work with the programs on top of everything else they had to teach the students. So *Lifelong Kindergarten* was relegated to an after school activity and was not part of the so-called ‘real’ learning and instruction of the day.

Resnick has found the same reception in America and consequently does not even approach schools anymore. All involvement with kids is done in after school programs. As he said at one point in his presentation, the goals and priorities inside our schools do not make room for the intricacies and intensity that this type of computer learning requires.

**Problem 2: Can We Actually Fabricate Creativity in a Broad Sense?**

After Resnick had given his presentation a Q&A followed. Most of the questions and comments were very positive, praising the work coming out of MIT. The final question, however, proved troublesome, yet hit the nail on the head, so to speak about computer integration in general. The person (who did not identify himself) started with a statement. “I see what you are doing as one good initial step, a step that starts a revolution” (Resnick, 2006). The person was referring specifically to the robot building. Resnick had shown many examples of children’s robots: a radio shoe, gerbil house, a cat with a light sensor – when you pet the cat, light is blocked and the cat meows – and many more. The person then asked: “we see the first project and maybe the second but with this software what is the tenth project or what is the fifteenth (Resnick, 2006)?” He further questioned Resniseck, by
asking “if we look at creativity in a broad sense is this software really creative…can it lead to software being developed that allows for creativity in a broad sense” (Resnick, 2006)?

Resnick was not able to clearly answer the person’s question. Unfortunately it came down to Resnick admitting that it is the teacher’s responsibility to make the experience a creative one. So, if the software was not found to be, in a broad sense, really creative – it wasn’t the software’s fault; it was the teacher’s.

These problems when looked at together make using technology in a classroom, in a creative and experiential sense, seem pretty much impossible. Integrating computers forces us to address deeper, more significant problems within the structure of education that many have argued have been present for the better part of the last century. Namely, our educational structure is split. One side works towards measurable product instead of process.

Alexander (2005b) feels we must ask whether we are designing our structures to allow for complexities to emerge, by stating, “ALL the well-ordered complex systems we know in the world, all those anyway that we view as highly successful, are GENERATED structures, not fabricated structures” (p. 180). This again goes back to the previous examples whereby all structure must occur and evolve naturally, even human made structure. This idea of generated structures as opposed to fabricated structures is not really considered in education.

All structures do need to start with some sort of base but this base should not read as a formula. Fundamental to Alexander’s theory for design is the conception that the first steps in any design process, regardless of scale, create the form for the development of the structure and that these first steps count for the most. In painting this is referred to in the under-painting stage. The stage where the first brushstrokes are placed on the canvas is where the gesture for the painting or the form finds itself. No matter how much paint goes
on top of the gesture, without it the painting is considered dead. It may seem hard to believe if one has never painted, but a painting that works always has a very strong underlying gesture to it. And this gesture always occurs in the beginning. Alexander deems the gesture in design, just like in painting, as the necessary requirement for future transformation, and fundamental for generating living structure.

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*A single brushstroke, be told us contained all of the information necessary to communicate a complex thought.* He illustrated what he meant by showing us close-ups of portraits by Rembrandt and Vermeer, where a nose, or a chin, or a pupil was defined by one stroke. He showed us where the artist had with one quick stroke defined a whole area of a face and comparatively how the speed and pressure of the stroke gave the particular emotional characteristic of the person the artist was portraying. He talked about loaded brushes as opposed to dry brushes. How the brush might be loaded with more than one colour or value in order to connote a highlight with all the intricacies of a shadow to give form to the spherical shape of an eye, for instance. He showed us where areas had been built up while others had little paint in order for the painting to breathe. He implored us to not look from out to in, but the other way around. Start thin and work to thick. Begin with the gesture and work from there. Never paint one part of the painting at the expense of the rest. Always paint the painting as a whole. Every brushstroke he said was its own but also integral to the whole of the painting.

Forcing teachers to teach using technology starting from a set of external principles, of which they have had no experience and not giving them the time to gain experience, has compromised not only their ability to adapt to the situation, but their ability to maintain their own centres within changing structural process. In other words, the profession of teaching
has been jeopardized, not because of the computer, but because of the system set up to integrate computers.

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The instructor then sent us to the library to explore the time period of the artist we had picked. We were to write a page or so giving as much information as we could find about the living conditions of the time, the geographic location of the artist, the artist’s life and any information we could find on the subject of the painting. He wanted us to try, as best we could to understand why and where this painting was created. He said this information would help in understanding the choices the artist made in painting the picture. He wanted us to try to be the artist when we painted it, to better understand the relationship required to paint a masterpiece.

The issue of structure and degrees of life is very complex. Every structure is made of other structures overlapping and creating a complex pattern that is in itself a structure. While every structure has some degree of life, the degree of life is not necessarily consistent across the board for all structures at any one time. Each structure as it becomes more or less living affects all the other structures within the complex system. Thus each structure alone and in conjunction with each other strives for equilibrium. It is within this striving for, not the maintenance of equilibrium where the greatest degree of life can be experienced. But how is this to happen in a classroom, within an educational structure where both technology and pedagogy are expected to co-exist in a pre-determined fashion?

The answer won’t be satisfactory to someone who is used to being given a set of rules to follow: the teacher must develop a relationship with the computer. And, as everyone knows, relationships don’t follow rules. They are complex, mysterious, transcendent and
banal, all at the same time. There is no rulebook. However, you can approach a relationship
with an open-mind. You will need to adapt and change, but not so much that you lose
yourself in the process. If teachers were given the freedom to approach technology in this
way – in a way that doesn’t negate their past learning styles, but allows them to incorporate
them and learn new ones – they would be able to strive for equilibrium. This would give
them the freedom to incorporate the technology as they see fit, but also give them the
freedom to experiment with the technology without fear of repercussion or failure that
maintenance implies. Only if they feel like they have this freedom to strive, and the structure
of the classroom and policy is not so rigid that it is forcing them to maintain a certain path,
will the classroom be a living structure where computers can be used and incorporated in a
creative manner.

**Introduction to Painting: Meet the Monster**

*I don’t remember doing the research into Franz Hals’ life but I know I did it because I remember while
preparing to paint thinking about the old woman I was about to re-paint. I knew she would have been
considered mad in seventeenth century Holland. She was a social outcast as symbolized by her being in a bar
and by the way she was dressed. The fact there was an owl on her shoulder characterized her as a witch. I
wondered if she really was. There was a glint in her eye that seemed more intelligent than crazy. This made
me wonder if maybe Hals had wondered the same thing. The painting was very loosely painted (painted
quickly) which was peculiar for that time period.24 But the way he painted her eyes and the owl made me

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24 In 17th century painting Hals’ fluid, quick style was extremely unorthodox. Better known
of the time was Rembrandt whose seamless, smooth painting style – where the eye was
fooled to believe it wasn’t painted with a brush but miraculously appeared on the canvas –
contrasted greatly the work of Hals. Rembrandt was about perfection while Hals attempted
to capture moments in time – the gesture/character. The work of Rembrandt is much more
broadly known today but Hals’ style was revered and left an indelible mark on how the
wonder if he recognized something more in her. She looked like she might be an interesting person to talk to, or at least party with. She seemed to be laughing. Judging by the contented expression of the owl on her shoulder I thought she must be kind-hearted. But I could feel the monster in the space between us. I will never forget the night I began my reproduction. In fact, my experience of that night and the following morning is one I often still refer to when I begin a painting.

Impressionists painted what they saw (National Gallery of Art, n.d.a; National Gallery of Art, n.d.b).
Chapter 4

Factor II for a Creative Experience: Our Ability to Adapt

Introduction to Painting: Meet the Monster

I was terrified to begin. Looking around I noticed many were in my predicament. They were showing it in
different ways: some messing around, some talking about it, or talking about anything but the task at hand.
I stared into the eyes of this woman and thought, ok let’s start. I consoled myself with the fact that I wouldn’t
have to worry about colour on top of everything else. I tried to remember the advice the instructor had given on
starting thin: lay the gesture of the painting first and then begin to build upon that. A growing contingent of
my classmates said they were going to forego the gestural stage, claiming that starting at the end would be ok
for this project because it was only a reproduction. The instructor would never know. I kind of agreed with
them but the wrath of this man was such that I didn’t think I would be able to sleep if I didn’t follow his
directions exactly.

Some of us played by the rules and began with an under-painting, while others began to reproduce exactly
what they saw in the final painting.

Memory 2

The first step in working with teachers to develop technology-based projects
always entailed a component of selling the virtues of teaching with technology. Even
teachers who considered technology a benefit to their curriculum seemed to feel that
the project we were proposing was above what their students and they could
accomplish.
When I would first meet the teachers I was going to work with I found that I was asked questions that seemed wrong from my perspective. On first listen the questions seemed normal enough: *what do I need to do?, what does this do?, how does it work?, or how do I use it?* Of course everyone has questions about how to use something they are not familiar with, but in this instance a few things stuck out that made them troubling. It was disturbing to witness well thought out lessons immediately thrown to the side when technology was added to the mix. The teachers seemed to exchange their lesson for a lesson in technology. Right away I noticed how quickly any chance the teacher might have of forming a relationship with technology through their lesson was lost. Questions of a consumptive and didactic nature would always arise and take over. The teachers often seemed most concerned in learning ‘the project’ that the software was developed to ‘do’ instead of using the software in a way that worked for them. In order to generate a more complete lesson I would try to get them to think about what they wanted to teach first, and then think about how the technology could be used. I would ask them what their plan was. What did they want the students to learn and how were they thinking about doing it? These questions were often answered with a blank or confused stare. It seemed that the computer became a demigurge to the lesson – overtaking the original lesson, often times at the expense of the original lesson.

When Action is Forced

When Alexander (2005b) writes that every part of every space must in itself also exist with a strong centre in order to maintain the wholeness and life of the space, he means that if one component within the space becomes isolated and does not contribute to the
existence and life of the whole all the component parts will be affected. This can be jarring, possibly devastating for the existing patterns for action taking place in this space. The result could denigrate into a complete break down of the social space of both the component part and the whole.

This Factor will examine the social and personal space inside the technological classroom and how to gauge adaptability within structure based on observing the human emotions within. One of the central themes that emerged for Alexander (2005a, 2005b, 2005c, 2005d) was the contrast between thoughts and feelings. That is, “between the image of architecture as it was supposed to be and the reality of human feelings as they actually are” (2005d, p. 278). What he decided was key is that any attempt at change in structure must include human feeling.

In this Factor, I will examine how the emotion of shame is one of the ways to gauge how well teachers as a profession are adapting. Specifically I am thinking about shame in terms of how the ancient Greeks used it – as an indicator of a good person. Only a good person can feel shame – someone who is not good, cannot. Therefore, shame is an emotion only felt by a good person.

**Introduction to Painting: Meet the Monster**

At first I thought I had made a mistake in choosing to begin with an under-painting. I had never done one before and felt very uncomfortable. After a short time of trying to lay in the shadows my painting looked a mess and nothing like the final result I was striving for. My heart was palpitating, I couldn’t bear how terrible my painting looked. I looked around the studio - many seemed to be having trouble. I decided to go home. I hid my painting hoping no one would see it and thought I would re-start the whole process in the morning.
Step-by-Step Unfolding Shapes Shape Living Centres

Our ability to adapt is a vital component in preserving a living structure and it is a key Factor for creativity. In order for a space to be alive and able to support its inhabitants in a vibrant and positive fashion everything in that space must be focused on maintaining a strong relationship with everything else (Alexander, 2005c).

As mentioned, I am going to address the role emotions play in how we adapt. As Alexander (2005b) would say, our emotions are what keep everything in check. We feel our way through unfamiliar processes. The emotions we experience at any point in adaptation are how we gauge how we are doing in the process of adapting. As well, the emotions experienced during our gradual adaptation within the structure fundamentally change the direction of the adaptation first, and then the overall structure. Emotions become part of the dialogue in generating patterns – a feedback or a reaction for us to reflect on before, during and after a pattern’s formation (Alexander, 2005). They tell us what needs to be done, as we develop. They indicate the wellbeing of the structure we are working in.

Shame

Today the emotion of shame is generally viewed as the feeling that results after deliberate wrong action and it is associated strongly with guilt; we are guilty of deliberate wrong action and therefore feel ashamed. There are two psychological definitions attributed to shame in contemporary North American culture: 1. Shame is an emotional response one has when social norms are being violated; and, 2. Shame is experienced when a violation of inner values occurs that are associated with the ego’s ideal (Jacoby, trans. 1994, p. 21). The way the ancient Greeks used the word shame relates to the second definition. Konstan (2006) writes in The Emotions of the Ancient Greeks, “[s]hame was a vigorous emotional category
for the ancient Greeks.... Although it has tended to be suppressed in contemporary American society, or else treated as a morally deficient emotion (we are ashamed of shame), writers in classical Greece saw it as fundamental to ethical behaviour” (p. 110). Aristotle (trans. 2005) defines shame as being “a kind of fear of disrepute, and it has an effect similar to that produced by the fear of something horrible (1128b).

**Introduction to Painting: Meet the Monster**

I came back to the studio as soon as it opened in the morning. It was the weekend so I would probably be alone for at least a few hours. I retrieved my painting without looking at it and set up my paints. Still without looking at it I did something our instructor had recommended. I walked to the other end of the studio to give myself distance and turned to look at the painting. What I saw surprised me. The distance offered me the opportunity to look at it as a whole. What had looked like a bunch of garish splotches up close came together at a distance and I could see the woman sitting at the table with the owl on her shoulder. It didn’t seem the mess it had the night before. It was still nowhere near the finished painting but it was on its way. The monster stepped aside a moment as the old woman, on her side of the table, and I on the other side, smiled. I felt a surge of inspiration. Unfortunately, it was immediately followed by a paralyzing fear. My new fear was that I would wreck what I believed to be a somewhat successful under-painting. I sat there for at least an hour staring at this woman, the witch of Harlem. I reflected on what I had done the night before and tried to plan my next step. Basically, I was trying to garner up the courage to carry on. My instructor’s voice came into my head. “Do not become precious with your work. This is the kiss of death.”

**Ontario’s Ministry of Education Public Policy Memoranda**

**Professional Development**

The self of the teacher came under great scrutiny in the nineties through policy and
major structural changes to the classroom. Likewise, major structural changes were threatening her profession. Research from the late nineties suggests that teachers were under-prepared to integrate technology into their instruction in a meaningful way (Bauer & Kenton, 2005). The most tangible reason why technology integration wasn’t happening was simple: teachers did not know how to use a computer very well. While this reason is logical, I believe there is a second reason why teachers were under-prepared, one that has been given less consideration. The second reason is that teachers were being told if they taught using this tool (the computer) learning would be better than it was before (more creative, transformative and experiential). However, I think teachers realized that this tool cannot accomplish this on its own. Whether this realization was, and is made consciously or unconsciously their reticence to use these machines could be seen as a recognition that they would not achieve these ends merely by using this tool. That teachers did not know how to use a computer goes without saying, but couple that with being forced to teach when you don’t know how to teach what you are teaching, and the issue takes on a deeper meaning. Teachers were put in a position where the methods for teaching had changed, as had the goals of teaching – seemingly overnight.

To show how the tool is often touted as being the solution, at the expense of the teacher who has to use the tool, I will use as an example how educational policy in Ontario has changed over the past 17 years. A comparison of two documents published by the Ontario Ministry of Education, one in 1991, and the other in 2006 (Ontario Ministry of Education, 1991; Ontario Ministry of Education, 2006) reveals how policy was, and is, not consistent in defining what kind of relationship should form between the teacher and technology – at first technology is seen as the dominant force and the teacher is noticeably absent, but later the teacher seems to be back in the equation, but what exactly her
relationship should be with technology is not clearly articulated and it still seems as if technology is the prime factor.\textsuperscript{25}

In 1991, the Ontario Ministry of Education’s policy championed the computer as opening the door to the future for the student. The teacher was momentarily forgotten. Mention of the teacher was limited to one line stating that money used for purchasing computers and peripherals like scanners and printers could also be used for professional development (Ontario Ministry of Education, 1991).

To be fair it appears that early on the Ministry may have felt that integrating computers into classrooms meant little more than raising the large funds needed to acquire them – that the transition would be smooth. By simply adding computers across the curriculum, quality learning would follow with no implications to the make up of the classroom in terms of social/cultural values and the self-efficacy of teachers. This, however, has not been the case.

These expectations and projections were first released on May 31, 1991. Policy/Program Memorandum No. 113, concerning Integration of Computers Across the Curriculum states that:

The Ministry of Education is committed to the integration of computer technology into the curriculum for the purpose of providing learners with enriched learning experiences, individualized instruction, and the acquisition

\textsuperscript{25} In 1992, the Ministry put out another set of guidelines for computer integration. In this document the Ministry does begin to address the role that teachers play in education (i.e. to teach) as well as the need for skills, however there are no explicit attempts to address teacher concerns about computer integration, and any attempts that are made are so vague that they are impossible to discern (Ontario Ministry of Education, 1992). In addition, a document put out by the Ministry in 1995 illustrates the speed with which policy was trying to integrate computers in the classroom. “Technological education is now part of the core curriculum for Grades 1 through 9…. Programs must help students to understand that technology is a force for change and enable them to develop the attitudes and values they need to meet the challenges it presents” (Ontario Ministry of Education, 1995).
of skills that will allow them to use the technology effectively and with confidence. (Ontario Ministry of Education, 1991)

The vernacular used in this first document implicitly devalues the teacher, replacing her with the computer. The language used in this early policy emphasized computer integration above the learning potential offered by either a computer or a teacher. Value traditionally placed on teachers in policy as the vital means of achieving purposeful, quality education was redirected or substituted by the Ministry in 1991 – not with the computer but because of the computer.

In addition the Ministry clearly implied how quickly they wanted teachers to adapt to the computer in their classroom, “[s]tudents should come to see the computer as an integral part of everyday life” (Ontario Ministry of Education, 1991). But how the teacher was going to adapt with expediency, and what her role was in the proposed changes was not addressed anywhere in the memorandum. Nor were the changes to the culture and philosophy of education, and how these changes to the environment might affect the character of the teacher and how she teaches and for what end.

It seems reasonable when faced with this situation that a teacher could very well find herself questioning not only her role in education but her very character in relation to virtue, in relation to her social status, in relation to her context. The choices a teacher makes define her character. If these choices are wrong, or do not lead to the intended end, her character will be questioned. The policy wanted change to happen quickly – perhaps more quickly than the individuals inside the structure were able to adapt.

By 2006, policy had done an about turn, championing the teacher and clearly stating that the computer will not replace quality education - that the teacher’s role is vital (Ontario Ministry of Education, 2006).
The Ministry set up three strategies for teachers to keep in mind when using computers in their classrooms. However, these strategies still don’t address how the computers and subject matter can work together. Nor do they address how teachers should proceed in right action.26 In addition, the policy still implies that the integration of computers is the only measure of success.

The Ministry did caution that many of the software programs available to teachers were “of poor quality and dubious value to the learner” (Ontario Ministry of Education, 2006) and emphasized that what was important was maintaining good teaching practice. “The quality of teaching in the classroom is of primary importance, and then the appropriate use of quality programs can enhance student motivation, learning, and success” (Ontario Ministry of Education, 2006). But while this might seem like an about-turn in policy – recognizing the importance of teaching practice and attempting to right a wrong – the policy still ends with the goal of successful integration. Policy about computer integration might seem to be more compassionate in 2006 to the role of the teacher, but essentially it has not changed since 1991; its newest phase uses the teacher as the means to the end.

The attempt to integrate computers has effectively designed a classroom that puts the emphasis on one part of the classroom at the expense of all other parts of the classroom. This has jeopardized the overall life of the structure, which in this case is the classroom.

**Introduction to Painting: Meet the Monster**

*My instructor’s recommendation to stand back and look from a distance had been right. He had told us that a painting had to communicate when one was standing in close proximity and from afar. From a distance one*

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26 To be clear for the case of teaching, right action in this section refers to going forth and conducting action—in good conscience. This may or may not mean following guidelines or rules depending on whether they could be followed in good conscience.
could see the whole picture, which would engage the viewer and draw her in to the parts of the painting that make up the whole – like the brushstrokes, edges, and colour. He told us that a painting, regardless of style consisted of an under-painting, a mid-painting and a finished work. At each stage the painting must work as a whole. This is vital to the eventual life of the work. The role of the painter was to maintain this wholeness throughout the process. A good painter is forever going back and forth between viewing and painting. I was beginning to realize this.

Virtue = Actions and Feelings

One of the first lessons a painter must learn about composition in painting is that no one part of a painting will be painted at the expense of the others. What this means is that the painting must be painted together. For instance, if my goal is to paint a bar room with a table, a chair, a woman sitting on the chair with an owl on her shoulder, her hands idly atop the table where a beer stein sits – laughing at some joke off the picture plane – I must paint it together as one piece or the composition will not work together. It will not breathe. It will not work if I set out to paint the owl in its entirety, then move on to the table, then on to the woman, the beer stein, etc. What will happen if I work in this manner is I will produce a painting of parts, all of which are paintings in themselves but not together part of one whole. The relationship between the bird and the woman will not exist because they were painted separately. They are each stuck in their own time and place. It will be the equivalent of having one canvas with many paintings on that canvas, but it will not maintain as one painting other than by virtue that they are all housed together on one canvas. In a sense, the first lesson of painted composition falls into the unselfconscious process explored earlier. The painter is not so much the creator or the inventor of new forms when painting, rather the painter becomes an agent for recognizing misfits between forms and making the changes
necessary to ensure vibrant, healthy relationships between all elements of the painting, in this case the overall scene. As Alexander (1964) says, “[t]he forms produced in such a system are not the work of individuals, and their success does not depend on any one man’s artistry, but only on the artist’s place within the process” (p. 59).

**Introduction to Painting: Meet the Monster**

I worked throughout the day and remainder of the week on the reproduction. It had been a very tumultuous week since that morning when I felt I had ‘got’ the gesture. Getting through each step had been terrifying. I forever felt I had no idea what I was doing, that I was in way over my head. Each new stage in the painting required me, or so it seemed, to lose sight of my subject. It was like each step required painting Malle Babbe again from scratch. Each step was built on the previous one but each new step was entirely a new set of brushstrokes as I strived for a new, more articulated portrait. It seemed that in order to successfully get to each new step I had to completely paint over what I had previously accomplished…this was extraordinarily stressful. I would think one part was looking good, but then realize that I was on the brink of losing another part of the painting. Then suddenly with no warning I would see the Malle Babbe again and think, ‘ok, there she is. I must be on the right track’. And each time I saw her she became a little clearer. It was weird. I really began to feel like I knew her. It was kind of like when you first meet someone and then over time, get to know that person better. The more information a new friend divulges about herself, the more detailed she becomes. After awhile the memory of the person you first met is unrecognizable to the one you now know. I was having the same experience with the Malle Babbe.

**A Sense of Duty Leads to Shame**

Policy tried to integrate computers into the classroom initially through a sense of duty (the policy has been written, therefore you must follow it), but one that ultimately did
not allow those involved, especially teachers the time needed for adaptation. Policy is steeped in the Kantian tradition of providing maxims\textsuperscript{27} to follow for right action. There is a sense of duty attached to policy: if these maxims are followed the required end will be achieved because I did the right thing. It is a way of guiding adaptation. But this approach has run into problems with computer integration and the teacher essentially became undutiful. This happened for two reasons: 1. The intended ends of policy (full integration of computers in classroom and curriculum) were not being met. Quite simply, teachers were not following policy, and 2. New technology was changing more quickly than the culture (both policy and teaching) was able to adapt.

It seems reasonable when faced with this situation that a teacher could very well find herself questioning not only her role in education but her very character in relation to virtue, in relation to her social status, in relation to her context. It seems equally reasonable then to state here that she quite possibly found herself, or at least could find herself, in a place of shame. In other words, policy developed for computer integration has created an inclement environment for teaching. The teacher was not able to adapt quickly enough to the technology that was being introduced into her classroom. This, in turn, has the effect of negatively affecting her self worth, the impact of which can be witnessed on an emotional level.

\textsuperscript{27} "Act only according to that maxim whereby you can at the same time will that it should become a universal law" (Kant, 2005, 4:403). In other words, Kant maintained that a practical way for discerning right/moral action from wrong/immoral action is to apply any intended action to the test of universality.
Introduction to Painting: Meet the Monster

The night before class everyone was in the studio working — trying to finish. Our reproductions were in different stages of completion. I looked at Malle Babbe. In fact I spent most of that night staring at her trying to finish but not knowing how. Some of my classmates were in ‘supreme panic mode’ as they struggled to finish. Nobody seemed to have any idea what ‘finished’ meant. Consequently the studio was packed with fretful discussion about the next day’s critique until well into the early hours. I noticed that those from the first night, who had rationalized skipping the under-painting stage seemed to be in the deepest trouble at this stage with their paintings. There was something wrong with these paintings I couldn’t put my finger on. Some of them looked ok up close but didn’t hold up from a distance. Some were ‘stiff’. Discussions started to emerge. We started to strategize how best to un-stiffen the stiff. We all tried to help out. But we were all still new to this and to each other. So we didn’t feel comfortable candidly commenting our thoughts on each other’s paintings. Jokes about the garbage flew around as we collectively tried to finish. I remember one of my fellow students who was trying to paint a nobleman holding a glove (I can’t remember the title of this painting or the original painter) was having a terrible time with the face of the man. Somewhere along the line with only one or two brushstrokes he had transformed a very dignified gentlemanly face into a fairly demented looking individual. It was difficult to look at without bursting into laughter. The expression of the man now seemed like one of those candid photographs that catch you in a less than flattering facial expression. Somebody said that the man now looked like one of the seven dwarfs in a dignified suit after a car crash. It was pretty funny.

Aristotle (trans. 2005) is quick to point out that shame is not a character trait but a feeling, because one who experiences disgrace or shame often exhibits so by blushing or other manifestations related to the body (1110a-1119b). This discernment is important in

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When a painting is critiqued as being stiff it generally means that while technically everything is painted well the painting seems dead. The paint sits heavily on the canvas.
order to understand that shame is a feeling that is only characteristic of a virtuous, good person, because a bad person doing shameful things would never feel shame (1128b).

However, Aristotle also points out that shame, should never be felt by a good person, but if shame is an adequate description of an emotion, it can be felt only in a good person. To be clear, a feeling of shame is not characteristic of a good person, since it arises from bad actions (actions that should not be done) and it makes no difference whether some actions are genuinely disgraceful, while others are only believed to be so – neither should be done, so no shame should be felt (1128b). But Aristotle makes one exception that almost seems to forgive bad actions in the otherwise good person. He states:

[I]t is for voluntary actions that shame is felt, and a good person will never do bad actions voluntarily. Shame might be a good thing conditionally: if a good person were to do this, then he would feel disgrace; but this does not apply to the virtues. And if not feeling shame and disgrace at doing disgraceful actions is bad, that does not make it good for someone to do them and then feel shame. (1128b)

Aristotle seems to be saying here that while shame is a terrible result of wrong or bad action, a good person, and only a good person, would feel shame. Again, in North America we generally do not think of feelings of shame as being equitable with good, but in the Aristotelian sense, shame is only felt by a good person who feels she has (or is) engaged in some sort of wrong action. There is, on occasion, reasons that might make a good person act badly and result in shame. This could be applied to teachers working under policy. A virtuous person may feel shame when following orders they know to be wrong or at least not wholly correct.

**Introduction To Painting: Meet the Monster**

*We all arrived early for class and put our work up in preparation for the imminent critique that would tell us how successfully our battle was going. Were we fighting the good fight with this formidable monster? The*
instructor came in and without a word to anyone walked up and down the wall where our monstrous attempts hung side by side. On his first sweep he removed the originals we had put up with our reproductions for comparison. Now only our paintings hung. He didn’t speak. Everyone’s eyes followed him, looking for any change in his stature that might indicate something, anything as to what he was thinking. But he was pretty much unreadable. Time stood still.

Shame as an Indicator of a Need for Change

The goal of the teacher is to help her students learn. That is her ‘end’. But the policy written by the Ministry in the early nineties, made it seem that essentially she was being taken out of the picture. It is still in the policy that students will learn. But upon closer scrutiny it could be construed that learning is no longer the goal, or the end; it has been replaced with computer integration. Learning is now an activity for assessment. It is stated that if computers are successfully integrated, enhanced, meaningful learning will occur. Learning then, measures how successfully the computer has been integrated.

Alasdair MacIntyre (2006) warns that the distinction between virtue and skill is being obscured by policy that works from a different agenda than those who the policy is written for. He says virtues become understood as “prescriptions for habit-formation in the interests of achieving effectiveness in this or that particular role” (p. 116). Cuban (1998) states that simply asking the question – what are your goals? – is far trickier a question than at first it might seem. This seemingly simple question is tricky because “there are many over-lapping and conflicting goals embedded in practitioners’, administrators’, and policy-makers’ desires for more and better use of computers in schools” (Cuban, 1998). Konstan (2006) states that “virtues, as understood in the past enabled us to identify the ends towards which good
individuals are to direct themselves, and virtues, unlike skills, direct us only to good ends” (p. 110). In other words, skills are replacing virtues.

This question, concerning goals is still plaguing us today. One observation in a research report that looked at computer integration in Canadian Independent schools seems to allude to the overlapping and conflicting goals mentioned by Cuban and MacIntyre.

Too often, change has been slowed or misdirected by administrators and curriculum leaders who look for a software magic bullet to solve their problems. The result is that many programmes and systems change, not to be more effective, but rather to meet the demands and limitations of the software package purchased. (Christopher & Kee, 2006, p. 93)

Oppositional feelings are our bodies’ way, Alexander (2005c) would say, of gauging how right our actions are, i.e. does this feel right? If the answer is no, then we generally change our action in order to try to make that question answer in the affirmative. While policy in general may be ripe with good intentions as it governs our actions, it can also become problematic, sometimes even paralyzing.

In social structures informed by role compartmentalization the ends of each role have already been to a remarkable degree socially and institutionally predetermined, so that virtues come to be understood only as more or less effective means to the achievement of those predetermined ends, that is, as socially relevant and effective skills. (MacIntyre, 2006, p. 116)

As the vernacular of the documented policies invoked by the Ontario Ministry of Education in 1991 and 2006 showed, policy concerning professional practice in education replaced virtue with skill. Working towards virtue is contingent on actions and feelings. In contrast, a set of skills is based solely on rules for action. Emotions, feelings, hunches, etc. are vital to virtue and do not even enter the equation with skill. The teacher may be virtuous, but the system does not acknowledge her virtuosity if she does not follow the guidelines. Because of this, teachers’ reactions and feedback to guidelines and policies offer research a window of opportunity. If integrating computers into classrooms required nothing more
than acquiring a set of skills it would have been accomplished already. The reticence teachers are exhibiting, along with negative emotions beyond frustration, indicate that the reason teachers are unable to adapt smoothly and quickly rests in the Ministry’s mixing skill with virtue.

Book III of Nicomachean Ethics begins with Aristotle (trans. 2005) stating virtues are concerned with actions and feelings (1110a). MacIntyre (2006) says virtues become understood as “prescriptions for habit-formation in the interests of achieving effectiveness in this or that particular role” (p. 116). Emotions of the individual in these settings sometimes work in opposition to the prescriptions. They become the feedback.

The intended end of the teacher has always been to teach meaningful, quality content in a manner that promotes the engagement of learning. We can assume this.29 If the teacher experienced shame, the sense of shame that she experienced may have been a result of deliberate wrong action. For instance, if the teacher knew that the content she was obligated to teach did not engage and promote learning but she taught it anyway because she was obliged to do so, this is a deliberate wrong action because the teacher knows it will not lead to the intended end. So maybe the teacher, working as a virtuous agent, felt shame as a reaction to a system that she did not see as working towards the right ends for her students yet one that she was obliged to follow.

I also think that if a teacher refuses to use technology it can also be an indication that she is a virtuous agent. The choices a teacher makes define her character. If these choices are wrong, or do not lead to the intended ‘end,’ her character will be questioned. But from the

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29 I make the assumption that to be a teacher means to promote a positive and transformative change in another person to help them learn.
perspective of the teacher situated in an environment where her ‘end’ has suddenly become unclear – what are her goals, to teach or incorporate technology? – if she stops it is an indication of the virtue of her character for this reason. If the end is unclear, the path in front of her is not one of virtue or not necessarily one of virtue. Therefore she is exhibiting virtue if she does not blindly lead her students down this path – a path that may not be virtuous.

**Introduction to Painting: Meet the Monster**

Finally he stopped his slow march back and forth. He stood silent for a moment. Without turning he began to talk about how we needed to work together – we needed to be each other’s support. There would be times while painting where you lose sight. It was the responsibility of each of us to ensure that we recognized in each other when these times occurred and let each other know. He said that the artist alone in his studio is a myth. We were all in this together. He used major art movements as proof. Did we think that Pollock was alone in his endeavor? How about Matisse or Picasso? He seemed a little preachy. In my inner cockiness I was already ranking myself in competition with my classmates. I thought mine looked pretty good in comparison to everyone else. As if he read my thoughts he told us to not let our egos direct our actions. He then began to berate us with critique, not only about our paintings but about our camaraderie with each other as well. As he critiqued he removed around half of the works from the wall and threw them in the garbage can that one of my fellow classmates – the one who painted the demented man with glove – graciously provided. He said the only reason these failed – and they did terribly, he was quick to add – was because we were not working together and making sure that everyone’s painting was working by critiquing each other along the way. He said that there was no such thing as individual skill, in his mind, at any level. Those with tossed work would have to start again. The rest of us were to do it again as well, along with our tossed work classmates. He said it was up to us, either everybody moved on or nobody. And then be told us we would all do it twice more on
top of this. But the final two would be done using complementary colour combinations. Wow. While half of us 
had not had our work thrown to the garbage, it felt like we had. He said we had better start communicating 
with each other, or this might be a long year.

Are they learning anything?

From the outset of computer integration in the classrooms teachers have been left in 
the dark as to pedagogical best practice within a technological environment. A good example 
of this is contained in, Yes, But Are They Learning Anything, an interim report from the 
Kingston Regional Pilot Test Centre, part of the Schools, Computers, and Learning Project 
(Blackstock & Miller, 1989). An interview with a grade one teacher revealed that teachers 
wanted and were willing to integrate computers but it was glaringly clear in the case of this 
teacher that her idea of what she was integrating and the reality of the software she would be 
using were very different. The researchers found that the grade one teacher, Sharon, was 
willing to incorporate technology, which she assumed had been designed to work seamlessly 
with her curriculum.

Sharon was unsure as to how she would incorporate the ICON computers 
into her reading program because the content of most software was 
unknown at the time of the initial interview. However, her aim was to 
integrate the computers completely into the normal curriculum. At this stage 
of the SCL (Schools, Computers, and Learning) Project, she assumed that 
software, congruent with notions of literacy development, was available. 
(p.16)

The findings of this report indicated the expectations teachers had for the 
technology were very often incongruous with the reality of the software, especially in terms 
of the teachers’ prior practice. The researchers found that teachers did one of two things. 
Either they stopped using computers all together, or they attempted to modify their 
curriculum and practice to fit the software.
Teachers enter such situations with expectations. One of these expectations is that software will work either in the way they have envisioned or have been told, and it will be congruent with normal teaching approaches. If they do not find software that matches their needs then several options exist. At one extreme, teachers may simply abandon the use of computers or relegate them to minor roles in their teaching. At the other end of the continuum, it may be that teachers will modify their teaching to match the available software.

Even though this research took place in the 1980s, the findings of the report indicate a problem that seems to still be plaguing teachers nearly twenty years later. The phenomenon of teachers being left in the dark in terms of pedagogical strategies and designs has not changed. In fact, one overwhelming finding of the Canadian Council on Learning is that more energy needs to be directed towards teacher training, professional development, and instructional design to help teachers integrate technology into their lessons. This problem is not going away. If anything it is being exacerbated with time (Abrami et al., 2006).

Going back to the SCL report it would seem that instead of abandoning computers altogether it would be more beneficial for teachers to modify their teaching to match the available software. However, this statement also implies several problems. First, this statement implies a reversal of roles between the teacher and the technology whereby teaching is determined by technology. But secondly, and more importantly, the use of the word modify seems to imply that what the teacher has to do is relatively insignificant. In fact, the term modify in the above report is a bit of a misnomer. It would be better to replace it with the term adapt or change, two similar terms that mean to modify yet connote a deeper, more widely felt effect. Using a stronger word of similar meaning would be a better fit because the modifications a teacher might find herself making would be much more than a slight alteration and would intrinsically effect the structure of her class. The technology referred to in the above report,
and the technology of which I am writing about, requires more than a small modification, so it is reasonable to assume then, the effect on the class was and will be a big one. The fact that the findings from the SCL report still resonate today, almost twenty years later proves the modifications needed were anything but slight. Perhaps the hope of administrators, and policy-makers over the last twenty years has been that the teachers would modify their practice to integrate the computer with ease in order to achieve the ends of creativity and experience. But this has overwhelmingly not been the reality in many circumstances.

*Introduction to Painting: Meet the Monster*

*We were beginning to form a very strong bond with each other. I suppose it was partly due to our instructor's insistence that we must. But it also was because of the class itself. The instructor was so intense and demanding I think we needed each other for support and camaraderie just to get through it. We all had full course loads. This was only one class, but this class became our focal point. The painting studio became our home in a sense. We would spend much of our time in the studio working together on our never-ending painting assignments and on other homework from our other classes as well. The painting studio was the headquarters for our war against the monster. The monster we were realizing was in every course and as a group we strategized how best to beat it on all fronts – not just painting. In hindsight it seems weird just how close and supportive of each other we became in that year. I mean, we were for the most part a group of revered individuals. Most of us had been the art stars of our high schools and as I've already said, individually we all felt we were special and expected the same type of reverence in art school. We each walked in thinking we were generals, only to be handed a gun and sent to the trenches.*
Adaptability and Living Structure

Dissanayake (1992) writes that change only occurs when initiated by the individual and is fully embraced. She, like Alexander believes that in order for any structure to live the individual must be fully involved. As Alexander (2005c) puts it:

Suppression of people’s involvement in the shaping of the environment is not only wrong, above all it is needless interference. Participation need not be threatening to administrators. It does not wrest control from the people who must have control. Rather, it is a humane process which – when done right – can allow people to consolidate their needs in a coherent fashion which helps everyone. (p. 262)

Adaptation seems simple enough to understand in this light. Everyone knows the basic tenet of Darwin’s *Origin of the Species.* Through natural selection the strong will survive. In the collective consciousness of society this is widely accepted and seemingly straightforward. But how do we maintain strength or adapt in the face of unknown factors?

There doesn’t seem to be a lot of common knowledge, or concern for our ability to adapt to digital matter. Digital matter has no fixed material form. That is, in the traditional sense we were able to at the very least pin point the materiality of that which we were attempting to adapt to. With digital matter this is not so assuredly agreed upon, especially at decision making levels.

While it seems that computer scientists, engineers, even policy-makers in education seem to be thinking of achieving a sense of wholeness, this wholeness does not consider the personal self in this process, “the consciousness, and the vital relation between self and matter…in a practical or scientifically workable way” (Alexander, 2005d, p.17). Alexander writes about the “elusive I”. At first he seems to be referring to what is commonly accepted as spirituality, maybe even religion, but this is not where he is going with this idea of finding our self within all that matters around us. What he really is getting at is the personal nature
of our relationship with all matter in space. This personal relationship feeds and informs our ability to adapt.

The teacher in a digital classroom must be given the freedom to adapt to the technology that is now part of her environment. Imposing a structure upon her in the form of policy that does not include room for the teacher to grow and adapt – and instead puts forward expectations that must be met – runs the risk of creating a stagnate classroom, rather than a living structure. The teacher must be recognized as an integral part of the living structure. I believe that if we witness shame in teachers who are wrestling with how to make their digital classrooms work it is an indication that teachers are virtuous agents who are struggling within a structure that is not living. Instead of treating shame as if it is something to be embarrassed about, or hidden, it should be recognized as an indicator that teachers are not being given the room to realize their ability to adapt and then actualize it.

**Crushing Creativity**

At this point I have argued that the possibility of a creative experience in the classroom can be crushed because of two things: 1. If the structure imposed on the situation (the classroom) is not based on the living structure of the classroom, teachers will have an incredibly hard time keeping their heads above water in this environment, let alone offering a transformative learning experience; and, 2. As a direct result of this, the individuals inside the structure are not able to adapt to the changes taking place in a generative step-by-step way that could be considered nature-preserving, and at the same time, recognizable as being part of a pattern. In the next Factor I will argue that what is also needed to invoke a creative experience is an element of the *unknown or the unpredictable.*
**Introduction to Painting: Meet the Monster**

Somehow we survived the seeming never-ending painting project where we first met the monster, and were able to move on—一起，as a class. We did many small projects throughout the course. We painted in many styles. We did impressionist still life and landscape, fauvist interiors, pointiliste landscapes, expressionistic interiors, and many more. These projects were all small, in class projects. But with each project our instructor seemed to just talk and talk endlessly about how we look at things, and then, how we make sense of what we see. Depending on the project, he would often tell us great stories of the most famous of the artists whose style we were replicating. We heard stories of wars and revolutions and partying and debauchery and jealousies. From the neoclassical heroic painter of the French Revolution David’s (1748-1825) near miss with the guillotine due to a stomach ache,30 to the development of Cubism through the simplification of architectural form jointly created by Picasso (1881-1973) and Braque (1882-1963), to Matisse (1869-1954) sending his children to live with his in-laws because he couldn’t afford to feed them, to Warhol’s (1928-1987) synthetic diet of pills. It was really quite fantastic. He told us that every part of our existence, our situation must come into the painting. The painting, if good, was always more than just a picture. It was more than just a still life. Inside the still life was the artist’s full interpretation of everything in the artist’s life. It had to be this way or the painting would not be believable. It was hard to understand what he meant. It was hard to see a war or revolution in a pretty potted plant.

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30 David’s friend and co-conspirator Robespierre was seized at the National Convention of the Committee of Public Safety of which he was the self-appointed head/dictator in the upheaval of post-royal France. People had had enough. It is reported David had yelled to his friend “if you drink the hemlock, I shall drink it with you” (Art in the Picture, n.d.). David was scheduled to attend the evening session of the convention but fell ill with a troubling stomach (not due to hemlock) and did not attend. As it turned out, had he gone he was scheduled to be apprehended and executed along with Robespierre. David’s fortune landed him in prison for ten years, where he created some of his greatest works (Art in the picture, n.d.).
Chapter 5

Factor III For a Creative Experience: An Element of the Unknown or the Unpredictable

Introduction To Painting: Magic Realism

Our third big project in this class, the instructor told us, was to paint an abject painting. By this he meant a photo realistic painting. Our instructor, we quickly realized, despised photographic realism in painting. I remember how he suspected, and rightly so, that many of us would find what we were about to do to be the pinnacle of painting. For most of us, being from small rural places, the only paintings we had seen growing up had been paintings that tried to be photographic. The closer a painting was to a photograph the better. The greatest compliments a painter where I was from would bear were things like: “wow, that looks just like the photo of Grandma at her eightieth”, or “wow, it looks more real than the picture”. To paint was to make something as real, or if you were really talented, more real than a photo. Our instructor said this was precisely why he was making us do this project. He realized where we were all from and, as he said, in order for the conversion from hick to avant-garde to really take bold we needed to realize that the photographic painting is just an illusion of life but not life itself—ever. Furthermore, he assured us we would all succeed, as long as we followed his directions exactly. This was not a difficult painting to paint. In fact this was not a painting at all. He referred to it as nothing more than paint by number—a recipe for a picture.

Memory 3

In almost every instance the teachers expressed concern that the technology we were working with was too advanced for the project/lesson and learners. Partly, this seemed related to the open-ended nature of the technology that was being introduced. While the projects/lessons were pre-determined we (the artists) tried to factor in open possibilities for students to explore. The idea of not knowing exactly
what was going to be produced was always intimidating for the teachers, and for us as well, in a good number of circumstances.

Introduction to the Unknown and the Unpredictable

With this memory in mind, the following principle is the foundation of this section.

“[S]ome of the most crucial steps in our mental growth are based not simply on acquiring new skills, but on developing better high-level resources to help us select which already existing skill to use” (Minsky, 2006, p. 212). In other words, instead of focusing on acquiring new skills, like how to use certain software for instance, we should be developing our ability to critically think about education and technology that may, or may not, need the teacher to acquire new skills. In other words, we shouldn’t use technology just because it is there.

What I will be arguing in this section is that an element of the unknown or the unpredictable is an essential Factor for creativity because it forces process over product. When one is not sure how to proceed, how something might proceed, or where the ending will be, the only way forward is to jump in and work through the process. While doing this, there is no way of knowing what the end product will be, so one has to focus on the process – not the product.

The Demiurge of the Unknown

To explicate this factor, I will draw on Merleau-Ponty’s work on perception. Merleau-Ponty was a phenomenologist who trained as both a psychologist and philosopher. His critique of philosophical and psychological theories of perception from an existentialist

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31 Minsky prefaces this statement by attributing it to Seymour Papert.
phenomenological background, opened the door to alternative ways of perceiving and understanding perception. Perception in both philosophy and psychology is dealt with from either an empiricist or intellectualist perspective. You have to experience it or rationalize it. Merleau-Ponty believed both of these perspectives to be flawed. His life work, especially *Phenomenology of Perception* (1962), attempts to radically shift an over-arching description/solution for embodied experience as it pertains to consciousness, how we perceive, and what this means for living. Essentially, Merleau-Ponty re-examines the discourse surrounding our perception in a manner that reconfigures consciousness towards thinking of it in a pluralistic nature.

*Phenomenology of Perception* (1962) is an objection to the rationalist definition of perception. The rationalist definition of perception, in a broad sense, isolates the self from the world and places the self in the privileged spot of being manager of all that it perceives. Merleau-Ponty argues that perception does not lie solely in the mind of the perceiver, but rather is found in a living connection between the body, mind and the object that is being perceived. To illustrate this distinction he describes a documentary from 1946 in which the painter Matisse is filmed drawing a flower from his garden (Gilmore, 2005; Norris, 1982). The camera filmed Matisse in slow motion as he drew the flower. With the camera rolling, the viewer witnesses Matisse hesitate before he starts. Upon seeing the footage Matisse explained what he was doing:

> Before my pencil ever touched the paper, my hand made a strange journey of its own. I never realized before that I did this. I suddenly felt as if I were shown naked – that everyone could see this – it made me deeply ashamed. You must understand this was not hesitation. I was unconsciously establishing the relationship between the subject I was about to draw and the size of my paper. *Je n’avais pas encore commence a chanter.* (Bois, 1990, p. 46)

In this hesitation where Matisse finds himself, we witness the nascent beginning of a relationship between the artist, the subject, and the paper. This hesitation cannot be
explained so simply as Matisse was busy finding a solution to the problem of how to replicate a flower on paper. I would be willing to bet Matisse is not sitting there in that moment asking, *what do I do here?* Neither is he consciously asking, *what is the solution to this problem?* What Matisse claims he is doing is *establishing a relationship between the subjects* (flower/himself) and the space (size of the paper), the perceiver/perceived (himself/flower/spectator). This example illustrates Merleau-Ponty’s belief in an existent subject – a belief in direct argument with Descartes’ proclamation that all matter is inert. Matisse also implies a fourth element to this relationship, his plain and simple *desire to communicate.* He had not yet begun to sing. However, through the formation of his relationship with the subject, the space and the perceiver (himself), Matisse was confident that a song would resonate beyond what was immediately apparent – a flower, a piece of paper, and an artist.

Matisse’s desire to communicate the essence of the flower from his garden can only truly be done through establishing a relationship with both the subject (matter) and the paper (space). The key to this communication is two-fold: 1. The subject is *not* Matisse, nor the flower, nor (in this case) the camera. The subject is the relationship between all of these elements in combination and, 2. The relationship between these elements is not wholly predictable.

**Introduction To Painting: Magic Realism**

*Our instructions were to make a composition collage of mediated images – all photographic – and transfer the image/collage to our canvases, all of which were built to 3’ × 4’ dimension and then paint it. While we got everything ready our instructor talked endlessly about how what we were doing did not, in any way constitute a painting. Regardless of his disregard for the project we were all very excited to paint realistically. I remember thinking of this painting as a potential Christmas present for somebody, before we even started.*
He kept repeating that what we were doing was not really painting. He said there were at least three very important reasons for this.

Descartes believed there is no sensible quality that can be attributed to physical objects. For Descartes, all sensible qualities that might seem to be the attribute of a physical object really only exist in the mind of the perceiver. The Cartesian explanation for perception is one in which judgment presupposes perception. But in Matisse’s explanation above, he is making an argument against judgment-before-perception as he explains to the viewer that he was not hesitating in order to judge before beginning, rather his hesitation was documentation of himself involved in a liaison with the disparate parts – a completely different act from judgment. As he forged a relationship between subject, size of paper, and his desire (his intent) to render the flower, Matisse did not attempt to make meaning objectively through memory or any other means. Nor did he simply take what he could take from the subject and then base his drawing on comparative calculative measures that he had predetermined, based on past similar experiences, would lead him towards the probability of a well-painted flower. This is not to say that memory did not play a part, but the liaison was not solely based on these methods.

Instead, what Matisse argues he did was establish the beginning of a relationship between the subject, the size of the paper and his intent. From here the process could begin with all things considered. One might think that the product of perception, in this case, is obvious – the final drawing of the flower. But while this is a product of perception in this instance it may not be the only one. Could not the resultant chanson also be considered a product of perception? What about the film of Matisse rendering the flower from his garden? The experience is no longer just Matisse’s, but ours as well. Matisse’s reflection upon
seeing the film is yet another product of perception. Dennett (2002) warns that asking the question: “what is the product of perception?” (p. 492) is a dangerous way to go about defining perception. As he says, it “gets one off on the wrong foot” (p. 492). Trying to answer this question runs the risk of presupposing a single perceptual product and moment from which perception takes place. We eliminate an element of the unknown from any attempt at a creative experience because we already know the product, and perceive how we will get there. As well, by presupposing a product for perception we enter what Dennett refers to as the “Cartesian Theater” (p. 492). What Dennett means by this is that even though Cartesian dualism has been to some extent dismissed there remains one aspect of dualism which we do not seem to be able to rid ourselves: a tiny theatre is still in our brain where one part of our self observes everything coming in, as it comes in, (like sense data). The observer self of ourselves then decides what to do, and how to react to the data (Dennett, 2002).

Accepting that the meaning of perception is perhaps impossible to nail down in terms of product is very important in order to better understand how both an empiricist/intellectualist perspective and a phenomenological perspective miss the mark in conceiving a perceptive act when they think of perception as a product. We usually describe perception as a product. We are constantly attempting to harmonize our world, but we are going about it the wrong way. We are doing this by focusing solely on ourselves and our abilities, rather than the relationship we are forming with everything that is around us. This need we seem to have to define perception in this narcissistic, self-centred way that only looks at ourselves is problematic on many levels. Namely, there is an increased chance for crisis and critical breakdown in structure if and when an unknown element is thrown in the mix.
Introduction To Painting: Magic Realism

The first reason he gave as to why this project was not going to produce a real painting had to do with interpretation. He told us to look at the collages we had made with the mediated images. I had only been able to find a landscaping magazine, so my collage had bricks, trees, flowers and I think some lumber and sky — it wasn’t very compelling subject-wise but I had made a fun and quirky composition. If I were to describe the composition I would say it was surreal in its influence. Some people had collaged in faces of models and movie stars. I was still smarting from the memory of having to paint the witch of Harlem, Malle Babbe, three times to dare get near another face. This image we were reproducing was already done, he said. We were about to see what it was like to be a factory. Basically, he said that all we were really going to be doing was blowing up an image of something that already was. There was no interpretation involved in this process.

Somebody courageously pointed out that our second painting project — the one where we reproduced an old master portrait — had also been an attempt at an exact reproduction. That project, he said was a reproduction of an interpretation of a person, and thus required interpretation of the interpretation in order to understand it. Furthermore, he said that our reproductions of the old master portraits had been about understanding how to work with paint and eventually colour. It had been the equivalent of learning a new language - one we had never heard before.

Merleau-Ponty’s Phenomenology of Perception

Perceiving the Existent Subject of the Object (Negligible Density)

Monika Langer, in her book entitled Merleau-Ponty’s Phenomenology of Perception (1989), states, “that all knowledge takes place within the horizons opened up by perception, that the primordial structures of perception pervade the entire range of reflective and scientific

Surrealism followed the Dada movement in its ant-rational stance. However, surrealism was more light than Dadaism, more concerned with emerging theories surrounding consciousness and especially the subconscious, Freud, and dreams.
experience, and that all forms of human co-existence are based on perception” (p. xv).

Merleau-Ponty’s criticism of classical theories for visual perception both enlighten our current understanding of how we perceive all matter and offer a better view from which we can begin to consider matter and space as not inert, especially to further the integration of the computer in the classroom. By doing this I am able to further argue for the overriding idea of this section, that an element of the unknown and the unpredictable can be a desired part of process. Learning in this light acknowledges the relationship between two existents, the perceiver (subject) and the perceived (object). In turn, possibilities for how this relationship can manifest, and the patterns of production are infinite, including a multitude of ways for problem-solving through creative means.

While he initially followed Husserl’s work in Phenomenology, Merleau-Ponty rejects Husserl’s bracketing of existence in the subject alone (Plomer, 1991). Bracketing was one of many stages developed by Husserl as a process for exploring intentionality and consciousness. Bracketing is suspending all empirical and metaphysical presuppositions. Merleau-Ponty felt this still negated the possibility to adequately analyze perception in this way because objects of perception do possess some phenomenal qualities. Merleau-Ponty (1962) states in *Phenomenology of Perception* that, “[the subject of] perception and its object necessarily have the same modality of existence” (p. 25). For perception to be possible then, the subject of perception cannot just be viewed as an abstract construct in the mind of the perceiver. A unification of meaning, or experience can only be possible if the object of perception is also an existent (Plomer, 1991).
**Introduction To Painting: Magic Realism**

This led him to the second reason of why this was not a painting. Not only was there to be no interpretation, which right away made it lifeless, but we would be painting a surface and nothing more. That is, he explained that we would not be looking through ourselves; rather, we would be replicating a machine’s vision in a machine-like way. I remember trying to understand what he was saying but everything flew right over my head, and by the empty looks and rolling eyes I witnessed when I looked around, over my classmates heads as well. The third and final reason that magic realism, as he was calling it was not a painting had to do with the method we would be employing. He said this project would have a recipe. If we followed the recipe we would achieve a magically real painting. This didn’t seem a problem to me. I remember thinking this might be a good thing. I had felt so near to being out of control throughout most of this course – a recipe might be a welcome antidote.

**A Historical Look at the Educational Context for a Computer**

In 1980 a conference was held in Reston, Virginia titled, *National Computer Literacy Goals for 1985*. The papers presented at this conference, along with discussant remarks published in 1982, are a fascinating historical read that illustrates the inchoate beginning of computer literacy in North American schools. These papers also archive how little has really changed in thought and theory regarding technology and education over the last twenty-four years. One striking observation, as an example of what has not changed is the inability of educational structures to be rid of the myth that product is more valuable than process. The expectations then, just as now, pay lip service to process yet lie in product. Robert Taylor of Columbia University stated back in 1980, “the idea of computer literacy itself is a reaction to a situation. You have to watch that you don’t get all wrapped up in that terminology. Rather what do we want to teach human beings about computers” (Van Dyke, 1987, p. 87)? Taylor
goes on to state that what is key to learning is a return to process. He writes:

Most of our educational activities of the last few centuries, particularly since 1900 in this country, have been oriented towards measurement based on testing and therefore have tended to shortchange process, and its possible role in human education in favor of the end-products. I think the computer gives us a new way to deal with the possibility of incorporating more attention to process in the whole educational activity. (p. 87)

Like Suronta and Lehtimaki’s (2004) finding that current educational structures are nothing more than a relic of a past and in great disrepair, this statement yet again indicates the conundrum that educators find themselves in. They are in a system that dreams of process and experience, yet justifies itself through measurable, materialistic, and rational product; process is short-changed and viewed as a mechanism outside of the self. Henri Bergson (1911) writes in Creative Evolution that “[t]he essence of mechanical explanation, in fact, is to regard the future and the past as calculable functions of the present, and thus to claim that all is given” (p. 43). But claiming all is given denies a desire for gaining a wholeness of structure based on exploration of uncharted territories that Alexander, Aristotle, and Merleau-Ponty all maintain as being integral to the creative experience. The wholeness of structure as described by Alexander can only be interpreted through conscious experience that analyzes perception from a phenomenological perspective, not as an ontological consequence.

**Introduction To Painting: Magic Realism**

Whether our instructor thought the painting project real or not we were all very excited to begin. I had always wanted to be able to paint realistically. My natural style had made this difficult as everything I did had an expressive quality to it. This made doing photographic realism next to impossible. We were given a list of instructions to follow. They read something like this:
1. Under paint each image with lights first, don’t go too dark too soon with the initial washes of either umbre or ultramarine.

2. Once the darks and mid-tones are in, let dry.

3. Once dry, glaze the appropriate colour over the appropriate image using very thin glazes.

4. In between each glaze let paint dry fully.

5. Each image will probably need approx. 15 – 20 glaze layers.

6. Once the colour glazes have reached the desired saturation and have fully dried scour your image for the lightest highlights. With thinned white + a tint of blue or yellow manually put in highlights. Be careful not to allow brushstrokes.

7. Let dry. Put a final clear glaze over the whole picture.

How we perceive ourselves and how we perceive ourselves within a given space, the intentionality of our consciousness in relationship to both the objects and the space itself, will directly effect how we maneuver and deal in it. Any conflict is relational, and whether it is known or unknown, predictable or unpredictable it must contribute to this idea of the gestalt of the whole. It is the striving for wholeness, the intention of consciousness, which is, in itself creative. And, in order for creativity to occur there must be the room for an element of the unknown and the unpredictable. The unknown and the unpredictable can only exist in a space where the past is not the present. In other words, the occupants of a given space move by perception first and judgment later, not the other way around. “In the same way we shall need to reawaken our experience of the world as it appears to us in so far as we are in the world through our body, and in so far as we perceive the world with our body” (Merleau-Ponty, 1962, p. 206).
Moving by perception first, instead of judgment makes the unknown and unpredictable elements at any given time, in any given space less likely to completely de-rail an existing system. The fundamental importance of maintaining strong centres at both the local and general levels is vital for sustaining a living structure. Alexander (2005b) explains this again and again. Furthermore the space is forever forming and reforming itself through these centres. Alexander’s example of a chair in the middle of a room illustrates nicely what he means by this. If we imagine a chair in the middle of a room we recognize the chair as a strong centre. That is, we notice the shape of the chair, its softness or hardness, we imagine sitting on this chair and imagine how it would feel. The chair is in the space of the room and both exist for the other: the room is empty except for the chair – the chair fills the room. There is a mutual dependency between the two, yet they both are noticeably their own centres on their own. The chair being a localized strong centre within the general centre – the wholeness of the room. The chair can be defined by its wholeness. What Alexander is attempting to show in this example is that while the chair is defined by its wholeness it is also defined by it relationship with its surroundings. To show this Alexander adds to our vision of this chair in the middle of a room a large piece of scrap iron tied to a rope, hanging from the ceiling of the room directly above the chair. The piece of scrap iron hovers just above the seat of the chair. This changes the wholeness of the centre for the chair, the room and the piece of iron.

Alexander (2001b) writes:

New centers, formed by the scrap iron, have meanwhile become more salient. New configurations have become more vivid, old configurations are less vivid. As a result the chair itself has changed. Its wholeness has changed, because the system of centers is altered: if I view ‘the’ chair as defined by its wholeness, the chair itself has changed. (p. 298)
What is most interesting about this example is the idea that wholeness is in constant flux – it is constantly changing. So while it might seem ridiculous to think that the chair in our living room is constantly changing and being redefined, one only has to place different objects on and around the chair to see that our consciousness reconfigures the wholeness of the chair in relation to that which is around, or on the chair. Alexander furthers:

Although it could seem like a small revision of terminology to see the world like this, it is a profound change of consciousness of the world as a whole it recognizes that wholeness is a very subtle structure, changing all the time, and vulnerable to very small encroachments in its surroundings. What we see as the physics of the chair, its mathematical structure, is not constant and fixed. It is changing, subtly, all the time, as influences from the world around enter the picture, and modify the relative salience of different centers in and around the chair, thus forming, reforming and altering wholeness which was ‘the chair’. (p. 298)

Imagine if one were to ask – how does it work? – while viewing a chair in the room. A quick and obvious answer might be something to the effect of well, you sit on it, or it is a place of rest, or a place to read, etc. One might even demonstrate how to use the chair. It seems easy enough. But how does one answer if Alexander were to sneak up and lower a large piece of scrap iron to hover just above the seat of this chair? The question how does it work becomes a much more difficult one to answer.

Is it a stretch of the imagination to think that a similar piece of scrap iron was metaphorically lowered into late twentieth century classrooms? Describing a classroom seems simple enough. It is a place where learning takes place through an evolving interaction between teacher and students and students and teachers. The teacher works from a place of knowing to impart knowledge to students. Now describe a classroom with twenty-five or thirty intelligent machines (Hayles, 2007) hovering over the seat of every desk. Just as the chair would be challenging to sit on with a newly acquired piece of scrap iron hovering above its seat, so too might a classroom be challenging to learn in with a crowd of computers
hovering within it. At the very least, we must view both the chair with scrap iron hovering above and the classroom crowded with computers as needing a new approach, one that strives for some sort of harmony within the space.

Like Bergson, Alexander’s desire for life in buildings relies heavily on this recognition: that an element of the unknown and the unpredictable can be present only when we don’t pretend that all matter within a space, and space itself are neutral, as machines that possess no sense or nature of their own – *that all is given.*

The properties that Alexander identifies as being present in any living structure manifest themselves in any organization as a geometric unification and re-unification of space. When we recognize the harmony that each part brings geometrically to the whole, namely each part works with each other striving to first maintain the whole and then striving to create the whole, this *harmony-disturbance-harmony* cycle ignites empathetic understanding leading towards an objective whole that is inclusive. Empathetic understanding occurs in the senses as they happen, but is not necessarily based on what has already happened.

Alexander’s notion of patterns precisely illustrates the phenomenological quality present in how we perceive what is around us and make new meaning. It is in the recognition of patterns, not as they form, but as they reform that we begin to see more clearly the picture of what the phrase, the *gestalt of the whole* means. How our perception manipulates and distorts within what is known, and what is not known, while reforming something new between the two strives for the gestalt moment.

Throughout this process there is an underlying flow of creativity as each re-assembly will be an interpretation of the anatomy (Burns & Durran, 2006). The pattern emerging requires both logical and emotional means for understanding and maintaining the balance of the structure.
Introduction To Painting: Magic Realism

My bricks, my sky, my trees, and grass were so real it looked like you could walk right into the scene. It truly was a photograph, and... Oh my god I hated it. That week we all caught up in our other classes. This process was like being a cog in a wheel. Once again our instructor had been right. Painting photographic realism was not anything like any other painting style we had attempted. It was boring. Still, some of my classmates liked the results, and were happy to finally know how to do it. Nobody's work was trashed that week. Our instructor told us all to keep this piece close by. We would need it in the future. He said in the future when we would be in our own studios, painting a big ugly monstrosity, some distant relative would most likely come by to see our work. And when they began to guffaw and compare our work to their five year olds kindergarten works, we could quickly pull out Project 3 from Introduction to Painting and say 'oh yeah, let's see your five year old do this.' He was kind of joking, but not really.
Chapter 6: Conclusion

Factor IV: The Desire to Make Things Whole

Introduction To Painting: Abstraction

Painting an abstract painting was to be our final project for the introduction to painting class. For the first time we would be painting a fairly large painting. Everyone’s painting had to be at least 4’x 4’. Other than a consideration for size, a time limit of one week, and a strict warning that he would not even look at a work that had any representational qualities to it – the painting must be completely abstract – we were free to paint. Like always be showed us a good number of abstract works. From early modernist attempts at abstraction, to colour field, to geometric abstraction of the seventies and the re-birth of action painting in the eighties. He told us that what we were about to do was make a non-objective work. Our goal was not to depict some thing; rather, through colour and form we would create a relationship – we would create the essence of something, the relationship with space, form, content, and colour – we would create a painting. We were all very excited at the prospect of working large and being able to paint what we liked. Finally, it seemed, we were truly going to be free to paint however and whatever we wanted as long, of course, as it was not representational – as long as we did not in any way depict an object in space. Our job was to direct our attention to painting itself. To paint for painting’s sake.

Memory 4

I always left the classroom with an overwhelming sense that rich learning was not happening, it was not naturally occurring, there was no vitality in the space. It often felt as if we were just patching a hole in a bucket of water only to have another one open and more water drain out. I suppose in one way this might make sense, since my colleagues and I, working as Media artists, were there for precisely this
purpose: to help teachers patch holes in their leaky technology use. On one particular afternoon as I left one of the schools I had just been working in I made a list in my mind of the common traits I had noticed over the past year in all the schools I had been in.

The list went as follows:

Each school, each teacher, and each class were unique. I could observe certain themes but each time was a unique experience.

Regardless of the technology, be it advanced or rudimentary, all of the teachers were reticent to use it beyond a level or two below their comfort level.

All of the teachers expressed concern and trepidation over our projects thinking they were too complex and difficult for their students to complete successfully.

All of the teachers needed a certain amount of convincing that they could use technology in a constructivist fashion without knowing every possible scenario or outcome; they could take a risk.

Finally, all of the teachers needed to be convinced to varying degrees that using technology was not an end in itself. The risk did not rest in the technology but in the ends of learning. Technology was not really the focus, learning was…or maybe, our ability to thrive at any cost in this environment was the focus.

Re-visiting Three of the Four Factors Necessary for a Creative Experience

I began by delineating the Factors that I feel are necessary for creativity to flourish.

The first, Living Structure, acknowledges the intrinsic nature of the environment in which we live and work, and how this nature cannot be artificially manufactured. Nature is not a measurable entity from which to work; rather, nature is the ever-changing process of living.
Thus it is not the nature of human existence that requires assessment; rather the structures we make can and should be assessed to ensure our nature is thriving.

In the second Factor, *Our Ability to Adapt*, I dealt with what I had observed as teachers’ negative reaction to computer integration. Teachers seemed unwilling, angry, even scared. However, I believe what I was actually witnessing, was shame. Not shame as it is commonly used today, as an indicator of a bad, or guilty person (you should feel shame or you feel ashamed because you have done something wrong), but shame in the Aristotelian sense – as a character trait of a good and virtuous person. In other words, shame can only be felt by a good and virtuous person – a person who recognizes that their actions have not, or are not, leading to virtuous ends. In this Factor, I stressed how policy had replaced virtue with skill and ultimately replaced the ends of learning with the successful integration of computers. The emotions of teachers are a way to gauge how well they are able to adapt in their environment, but emotions also act as a *safeguard*. That is, our emotional response to and within structural changes indicates the wellbeing of the structure, through reaction and feedback of the senses. This reaction can be either negative or positive – both are valuable feedback. Furthermore, the feedback does not indicate whether the structure is living or not, *what we do with the feedback does*. For the purpose of this inquiry I dealt only with the notion of negative feedback, or feedback in reverse.\(^3\) Emotions indicate how well individual component parts within a whole structure are adapting, and to what degree they are able to adapt within the structure. If teachers are experiencing shame, as a result of feeling unable to work in the environment they are being told they *should* be able to work in, it is an indication

\(^3\) I concentrated on negative feedback because that was, overwhelmingly, what I witnessed. This has also been the finding in numerous studies that have looked at technology integration in the classroom (Abrami et al., 2006; Hansen, 1997; Laferriere, Lamon & Chan, 2006; Smeets, 2005).
that one of the component parts of the whole is not leading towards the intended end of the structure.

The third Factor, *An Element of the Unknown or the Unpredictable*, like the other two, is an essential Factor for taking a creative approach to learning, yet we seem to wrestle the most with this one. By virtue of this Factor’s name alone we can see why. It is easy to pay lip service to developing learning strategies that emphasize process over product at any cost, however, the reality of just what that entails, - leaving room in design for an element of the unknown or the unpredictable i.e. challenges or possibly even failures along the way, - is unrealistic in our current educational environment. However, this Factor above the others expresses the necessity for not basing our perception of objects as being merely projections of our own intentional consciousness. Perceiving based on pre-determined actions that will reap determined results is defined as the Cartesian perspective, which renders all matter inert. The Cartesian manner of looking at the world – separating the mind from the body, the self from the space – does not allow for relationships to form between the self and the objects in the environment. It is within this space whereby an element of the unknown or the unpredictable is always present, where the self not only becomes part of the transformation of structure, but begins to recognize patterns forming between all matter, including the self, with the space.

Without the ability to recognize and engage in the pattern formation of a structure, meaningful learning can really be nothing more than acquisition of information.

*Introduction To Painting: Abstraction*

*For the preparation of the abstract painting our instructor showed us many abstract works through a parade of slides and print reproductions. He had us initially stretch paper $15'' \times 17''$. We then sectioned the paper*
off into ten equal sized rectangles. Using small brushes and a myriad of other tools from erasers to scissors, he had us practice. He wanted us to make quick small sketches of abstract paintings. While we worked on our sketches he talked endlessly about abstract painting. He told us the history of Abstraction, and why the need to paint for paint’s sake had come about. And how this need arose in the early twentieth century, but that abstraction found its roots earlier, with the impressionists, with the advent of the camera. He told us the needs of the artist in the twentieth century shifted from depicting the external to the painter internalizing the environment and through only line, colour, composition and texture the artist was non-objectively and non-representationally depicting all that was around. The painting then became the experience in its own right – occupying its own space in the world. He told us about Action painting (more commonly known as Abstract Expressionism). He talked about the colour field movement that followed the action painters. How these painters like Rothko, Motherwell, Still, Diebenkorn and Frankenthaler limited even line in their paintings. He told us of the great exhibition entitled, Post Painterly Abstraction that toured the U.S. These artists were intent on ridding art of all extraneous language, or rhetoric. Thus these paintings were often only colour, large, sometimes huge, areas of colour butted together. The brushstroke became unnecessary chatter and often was left out. The more he talked, the more this exercise seemed simple. If in doubt, I thought, I could just splash a big red square and call it colour field. Our instructor for the first time seemed quite excited by what we had done. He stopped at many and made positive remarks. He told us that if we did our large abstractions as we had these small sketches be would be more than impressed. Any mark seemed a good one and everyone quickly made ten stunning little abstract pieces. It seemed so simple. So simple, in fact, we became bored by this element of the project and began to lose focus. However, while we were doing our quick sketches our instructor talked endlessly about the large size of the canvas he was requiring us to use. He told us that no matter the size of the surface, the properties for creating a successful painting were the same. To truly paint any painting an equal amount of heart and mind must go into it. Otherwise, the painting would not function.
The fourth and final Factor, *Our Desire to Make Things Whole* is all Factors simultaneously working within the experience to create an ever-growing pattern of wholeness and meaning. It is about having the ability to take risks and chances and look at the whole from different perspectives.

Geometrically, when things make sense the whole shape (gestalt) is observable and felt. In contrast, when things do not make sense we are caught in a partial shape (atomist), one we desire to complete. The desire to make things whole can be thought of as something we cannot help but possess.\(^{34}\) We must make sense of whatever it is we are engaged with. If we engage, we forever desire to understand.

Underlying the impulsion to act in an experience is, what Alexander calls a light, or brilliance. This light becomes more or less resonate depending upon our commitment, and focus within the experience (Alexander, 2005d). Alexander calls this the *luminous ground* of our experience, where the whole of our actions is revealed, where the experience, by its very nature, *is* creative. He is quick to point out that the unfolding process necessary for living structure, the life in the structure, like the luminosity in the ground is created through the process itself. The light resonates stronger through a recursive action of thinking, feeling, and sensing upon which the process of unfolding seems to reveal the whole, not as a predetermined unveiling, but as an observable emergence. This process is much like the process a painter uses when painting.

The artist works at the whole, which exists and then asks himself, at each step, what has to be done next, to intensify the light. The extraordinary thing is that while working, if we half close our eyes and look at the half completed work in a passive and receptive state, we can *answer* that question. That is, the color which will produce light comes to my eye by itself, presents itself to me.

\(^{34}\) Gertrude Stein (1931) wrote that we cannot help but to connect two nonsense statements side by side; we must connect them because we need to make some sense of them – it is in our nature to do so.
autonomously, arrives in me without my effort. (Alexander, 2005d, p. 172)

Alexander goes on to explain that the ability to make oneself passive enough in order to effortlessly accept the colour is where we generally have problems. In this case, being passive implies action, much like listening does. Our ability to rid our minds of all that defines us, in order that we focus and immerse ourselves in the process of revealing the whole of our project is our challenge.

Sixty years earlier, Gertrude Stein also realized the effort required and the challenge humans have when attempting to overcome the ego in order to truly engage the creative act. When asked what makes a masterpiece a masterpiece she remarked that the dissolution of identity was the only discernable quality present in the creation of a masterpiece. The masterpiece is the result of a discussion between nature, human mind, and identity. “Identity is recognition, you know who you are because you and others remember anything about yourself but essentially you are not that when you are doing anything” (Stein, 1984, p. 149). In other words, it is at the moment when one is not looking through any one perspective, from any certain identity, or from a collection of memories, that one can actually see. She furthers, “I am I because my little dog knows me but, creatively speaking the little dog knowing that you are you and your recognizing that he knows, that is what destroys creation. That is what makes school” (p. 149).

Introduction To Painting: Abstraction

Any painting that is painted favouring one part over another would at best be merely decorative. While a decorative painting may seem pretty at first glance, it would have no staying power. It would not be art for it would not pass the test of time, which according to our instructor was some sort of truth serum of integrity.
where fashion wasn’t welcome.35 We had no idea what he was talking about. But judging by the impassioned way in which he spoke, our old fear of monsters were beginning to swell again.

My original goal coming into this inquiry was to examine the entirety of e-learning and why it is, or isn’t working. I found this quickly leading me to what has really been the crux of this work – the link between creativity, art, science, and technology and our need to recognize this. The hunch I had, that something in the artist’s practice made working with technology more navigable seemed to back up this link.

Robinson (2006) defines creativity as being the process of generating original ideas that have value; more often than not, the value of these ideas is brought about through the interaction of different disciplinary ways of seeing things. Robinson furthers that creativity is diverse and individual but most importantly, to be creative we must be prepared to be wrong. Our existing educational system is one where students are prepared only to be right – wrong is failure, right is success. “We stigmatize our mistakes” (Robinson, 2006). Thus creativity is very difficult to program for in our existing structure. In fact, creativity, or the idea of educating with unpredictable outcomes, outcomes that may be deemed right or may be deemed wrong, cannot survive in our current methods for teaching without great changes to the structure and, more importantly, to the values that we hold strong for teaching and learning within this structure.

35 The art critic Robert Hughes (1993) writes about painting, “[t]here is no great work of art, abstract or figurative (and especially none figurative) without an empirical core, a sense that the mind is working on raw material that exists in the world at large, in some degree beyond mere invention. Painting is, one might say, exactly what mass visual media are not: a way of specific engagement, not of general seduction. That is its continuing relevance to us” (p.8).
Many of the statements in education that use the term creative or creativity do so in a manner that implies we can achieve creativity and that it is right. Creativity is a product, a whole. Swanton (2003) writes that creativity should not be viewed as a virtue in itself; we might be better to think of creativity as a manner of moral recognition “that informs a wide range of virtues, just as does love and respect” (p. 161). Thinking along these lines we become aware that anyone participating in any action may be doing so in a creative fashion. Maslow concurs in *Toward a Psychology of Being* (1968) when he ventures that, “creativity is an aspect of the profile of all or virtually all the virtues” (Swanton, 2003, p. 161). Along these lines, a teacher can be creative and a doctor can be creative; anyone can be creative in any action they embark on. “Creativity pervades the good life, and informs goodness in all our roles” (p.161). What makes Swanton’s take on creativity so especially important for my purpose is her attempt to address creativity within moral philosophy. That is, she takes the objective of creativity down from the shelf and places it firmly on the table for accessibility. By positioning creativity within contemporary moral philosophy, where it has sat overlooked for a good long time she moves it from the realm of the esoteric to everyday life.

**Introduction To Painting: Abstraction**

*He reckoned the best way for us to begin to understand any of this was to work large. By making our canvases the size of our bodies we would have no option be said but to fully engage in the piece – with our minds and our hearts. Working large, he said, would force us out of the familiar. He brought up the monster again. This time he said, with a wild look in his eye, we would be wrestling the monster to the ground. We wouldn’t be able to rely on our old tools, we would not be able to work this large using a half-inch filbert brush, like we had in the past. Our instructor said that the point of working large was precisely to gauge our ability to adapt new tools into our practice. So he recommended we all hit the hardware store and find new...*
tools to paint with, tools that matched the size of our canvas. Even with all of his talk about time, minds, and bodies I think we all thought this project was going to be a piece of cake, after all, the project required no representation. There was no right or wrong. How could there be? All we had to do was put a few marks on a canvas and call it something like ‘Untitled No. 453 and voila! - a perfect abstract painting. How hard could it be to paint a non-representational painting? We all wanted to impress the instructor – show him that we could do this on a grand scale. He wanted big. We went really big. The stretched canvases ranged in size. I think the largest was a whopping 9’ x 8’. Mine was 6’ x 6’ which seemed massive for a shy girl. I was really excited to work on a square. The studio space was transformed into what looked like a cubicle office space gone wild. But even though we thought it would be a simple task, nobody started painting right off. Maybe we were savouring the beauty of the white canvases or maybe we were actually a little tentative to start. He did say this would be another altercation with the monster. While we had already met repeatedly with this monster throughout the course we were still very respectful of how quickly and precisely this monster seemed to be able to raise its ugly head and soundly kick our ass. Somebody suggested we all get together one evening and work at once. Everybody was quick to agree. Our final painting assignment was going to be a painting party.

Throughout this inquiry, I collected my memories of my first painting class. I wrote these memories prior to analyzing each Factor and built out from there. I did this because it seemed the right way to proceed; if there was indeed something to be found in an artist’s method it seemed appropriate that I first analyze the artist’s method. So I remembered as much as I could about the class where I first learned to think, to see with an external technology – paint. As my analysis of each Factor began to take shape I began to sense an overwhelming connection to both my analysis and interpretation of the theory I was using, as well as my nascent understanding of how my painting class had taught me a different way
to learn. Alexander (2005d) writes in the prologue of The Luminous Ground that we need to forget how we have been taught to live in order to remember how to live in a manner that is empirically living. This is what my instructor’s pedagogy seemed to be. While his methods sometimes bordered on bullying his intent was to force us to forget, in order to learn.

**Introduction to Painting: Abstraction**

We completely bombed the abstraction assignment. We knew before the instructor even said a word. He stood before our work, wide-eyed and shaking his head. While bombing a painting assignment was still considered equivalent to being dipped in acid, the acid seemed to be neutralizing somewhat over time. By now we fully trusted our instructor, and knew that our failures might result in a trip to the garbage can, even a stern lecture. What made bombing an assignment bearable was that we also knew that he truly believed failure was part of the process. It was our attitude that made the difference. If we were willing to learn from our mistakes, engage and move on, regardless of what happened next our instructor was there for us. Those who weren’t willing to move on and engage had long since left the class. These missteps the rest of us made and worked through along the way, were not forgotten but neither were they exploited. Instead our mistakes and missteps became part of the fabric of our class, they became humorous stories, which served to develop a strong bond with each other. As usual on this particular day, one of my fellow painters/classmates walked straight up to the instructor before he had a chance to say anything and handed him the largest of the garbage cans. The instructor smiled and told us to get to work (meaning re-do the assignment) and turned and left.

Just like in Factor II: Living Structure, The Desire to Make Things Whole is not about achieving an ultimate end, or conquering a level, rather we must always ask whether the design of our structure will allow for complexities to emerge. When Papert and his
colleagues began to develop the program Logo in 1968, they did so imagining a learning environment in which students would devise their own path of discovery through desire, action, and reflection (Gillespie, 2004). Papert designed a problem-solving environment that could individually be explored by the student, all the while nurturing a deep engagement between learner, technology, and subject. Meanwhile the teacher in this environment moved from using didactic methods for teaching to working alongside her students, facilitating and maintaining her students’ relationship with the technology, through her own discoveries.


I see Logo as a means that can, in principle, be used by educators to support the development of new ways of thinking and learning…. During the 1970s, we had demonstrated that children of almost any age could learn to program in Logo under good conditions with plenty of time and powerful research computers…. I have seen hundreds of elementary school children learn very easily to program, and evidence is accumulating to indicate that much younger children could do so as well. (p. xiv, xvi, 13)

The Logo programming language was developed as a way in which learner’s ability to learn knowledge would be reinforced. Probably the most unique aspect of Papert’s thinking is his insistence that a language or a program that children can learn – like Logo – does not have to lack functionality for expert users (Papert, 1980).

Much of the research surrounding the effectiveness of Logo as a productive learning tool, especially early on, found the problem of implementation rested in the monetary cost of equipping the schools with the adequate technology. But, while money may be one part of

36 Papert has been a vocal proponent for rethinking the structure of schools and how they should work. Based on his work in the Epistemology and Learning Research Group which he founded at the MIT Media Lab Papert developed further the work of Piaget on Constructivist learning theories. Specific to his theories and research is a focus on new technologies and the impact of new technologies on schools, teachers, and learners (Feurzig, n.d.).
the reason why Logo wasn’t more widespread, it seems pretty clear now that the philosophy behind applications like Logo are simply not being embraced in educational settings. They don’t fit into what Papert (1980) has dubbed education’s “technological infrastructure” and this is the main reason why it didn’t take off. The Alexanderian mantra from Factor II appears to fall on deaf ears in education, “ALL the well-ordered complex systems we know in the world, all those anyway that we view as highly successful, are GENERATED structures, not fabricated structures” (Alexander, 2005b, p. 180). Schools seem to be, as Papert says they are, stuck in the informational wing of technology at the expense of the production wing. The imbalance is not new, it just becomes more visible when using technology. Robberprecht (2006) states, “linear learning designs – whether custom designed or commercial learning systems – dominate e-learning education” (p59). We can further that linear learning designs dominate education, e-learning is just one component.

An online article on the blog Boingboing, commemorating the fortieth anniversary of Logo talks about the direct engagement to computer programming Logo afforded young learners. The author of the article, Doctorow (2007), asserts that by programming with Logo a relationship, or fluency develops with technology in a manner that allows the learner to discover and develop higher cognitive skills in the technological environment. The first person testimonials in the comments section of the article were in complete agreement. One comment in particular stood out as especially poignant:

*When I was in the 2nd grade (in 1990), we were taught LOGO. By the time I was in high school, the standard computer class involved learning to use MS Word and other consumer apps. When I was 14, I found that change frustrating. Now that I have a degree in CS and have taught programming in a university class, I am appalled at how the standards of computer literacy have changed. Students can work their computers, but they have no idea how to make the computer work. Bring back LOGO!* (Doctorow, 2007)
Logo and programs like it were attempting to keep the pendulum moving to and fro to include a give and take – not away from information in order to favour production but striving for balance between the two. Alexander (2005c) writes that every part of every space must in itself also exist with a strong centre in order to maintain the wholeness and life of the space. We can apply this thinking to the current imbalance between the two wings of technology. Both are vital but if one component within the space becomes isolated and does not contribute to the existence and life of the whole all the component parts, each with their own centre will be affected. This can be devastating and result in a break down of the social space of both the component part and the whole. A positive space, on the other hand, recognizes each component, not as remote but as integral. But when the pendulum and components remain remote, statements like the following seem rhetorical, “[t]echnology is changing the ‘what’ of learning by introducing new concepts, techniques, and tools for understanding and also making the world – for inquiry, design, creative expression” (Pea, 1998).

Throughout this inquiry, I’ve tried to implicitly offer a thread of humility whereby my observations have not tried to moralize or teach about best practice when integrating computers into classrooms. Rather, I have questioned how we can more fully experience the environment designed by the addition of technology in a way that is meaningful and transforming, because I think we can. I have attempted to explore the space we might find ourselves in when everything clicks as it does when we are creating. I think back to the last point on my list of common traits in classrooms I visited: The risk does not rest in the technology but in the ends of learning. Technology was not really the focus, our ability to thrive at any cost, in this environment was and I realize that, likewise, in my Introduction to Painting class the risk did not rest in the paint and brush but in me and my
classmates’ ability, at any cost, to thrive there. To thrive in that class we had to trust our instructor as he forced us sometimes very harshly,\(^{37}\) sometimes not, to build a relationship with technology (paint), and work towards what Aristotle would call pleasure. Pleasure as Aristotle sees it is not a pleasing feeling bred out of passive observation. (In this case, Aristotle is using the term passive in the more commonly understood way, implying no action). Aristotle (trans. 2005) views pleasure as an equal portion of experience and production. He states:

> So long, then, as the objects of intellect or perception, and the faculties of judgement or contemplation, are as they should be, there will be pleasure in the activity. For when that which experiences and that which produces the experience remain similar, and are in the same relation to one another, the same thing naturally comes about. (1175a)

The computer has been touted as a space/object/subject/I that is going to transcend how we teach, how we learn and accelerate us into the next grade of cognitive awareness and abilities. Our experience using the computer for learning will be creative, it will be pleasurable. However, while I think Papert, Alexander, Aristotle, Merleau-Ponty, my first painting instructor, and my fellow artists would agree with me that our experience using a computer should, like all endeavours we embark upon, strive for pleasure in the Aristotelian sense, I don’t think that this definition of pleasure is what most have in mind when they hear that using the computer for learning will be creative and pleasurable.

**Introduction To Painting: The Last Class**

*Walking down the hall into the last painting class, I remember, feeling a mixture of excitement and regret.*

*The year had been extraordinarily stressful – at times terrifying – but I also recognized then, just as I do now*

\(^{37}\) By today’s standards and guidelines for proper etiquette in a classroom my painting instructor would fail. He would be considered abusive and probably fired. This is a very hard fact for me to reconcile with and I have not been able to make sense of it yet.
that the sheer amount of learning that took place in that studio was immense. It transformed me. The idea of it ending left me with a deepening sense of loss. It was a week later, and we had re-painted the abstract paintings. As my classmates and I made our way in the studio we all stopped. Every piece of our work was put up salon style around the room – even the extremely embarrassing very first still life paintings had been fetched from the trash. He wasted no time in starting what was probably the most intensive critique I have ever had to go through. As a group we went around the studio and dissected our process through each project and everybody’s work in relation to everyone else. He pointed out where we lost our focus, and conversely where someone’s focus momentarily spiked beyond his or her abilities. He showed us where we were beginning to develop our own voices in terms of style. He pointed out, like always our weaknesses, where we needed to work harder at staying focused. The most amazing aspect of his critique style was that every element, the colour, the composition, the subject, the stroke, the materials, the style, and I could go on and on, was referred to and treated as a living being in the room. These pieces were not a representation or simulation of life but life itself. On this day, I realized that what he did, was to invite each of us, individually and collectively, to become a contributing part of this conversation, about this life.

What I learned generally in art school and what I learned intensely in this painting class was to always strive for wholeness. I was lucky enough to be taught by someone who I now realize understood what it means to strive for a living structure, that our emotions are a gauge of our ability to adapt and that we need to always work with the knowledge that the unknown or the unpredictable is not lurking in some corner, waiting to pounce, but is waiting to engage and should be engaged. This approach to learning is a creative approach. This is the approach we need to take if we are to have much success with technology.

We need to, at each step, stop and ask, has my action (even if small) made a positive difference to the whole? "By asking this question, again and again for each new speck of
color, for each brushstroke – and by working I gradually make progress towards the kind of thing which has some value, and which has the seamless unity which reflects the I” (Alexander, 2005d, p. 172). This process is creative in its approach in that it keeps structure living by morally engaging the self with all matter, one moment at a time, where the process required to keep the structure living is likely to change depending on the circumstances. Our adaptive skills are honed by this unpredictability as we strive for the moment of clarity – and then start all over again. For the unfolding process to naturally occur, the selfconscious, unselfconscious, and accretive processes must be woven into this recursive mode of learning, as needed. By allowing this we will be able to see how more meaningful engagement can be reached using this manner of approach, a creative approach. When Gertrude Stein (1984) stated that it was the loss of identity that made producing a masterpiece possible, I think she was speaking directly to this moment of gestalt, within this notion of a living structure.

There are so many things to say. If there was no identity no one could be governed, but everybody is governed by everybody and that is why they make no master-pieces, and also why governing has nothing to do with master-pieces. And that is why governing is occupying but not interesting, governments are occupying but not interesting because master-pieces are exactly what they are not. (Stein, 1984, p. 156)

I think partly what she means here is that the difference between governments and masterpieces is in the singular didactic machine-like focus of governing bodies in general, and ourself specifically. Is there something to the artist’s method that makes navigating in a technological environment more navigable? Not actually. It has only to do with the approach
one takes to learning new skills. Creativity, as an approach, is something that should be within everyone’s reach, especially in education. Unfortunately much of the software designed today can best be described as nurturing the machine by making it work (Christopher & Kee, 2006). Making the machine work creates the illusion that we are achieving our goal of heightened percipience through a creative approach when in fact we are merely patronizing our teachers and students by designing condescending software that limits functionality under the guise of user friendliness and pleasure. If we are to reasonably achieve all that we expect from education, offering the greatest “degree of life” (Alexander, 2005a) for all that travel through it, we might be well served to re-think how we design learning technologies and for what purpose we need technology.

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38 Joseph Beuys (1921-1986) believed anyone could be an artist. To be an artist had nothing to do with being trained in a certain art discipline i.e. painting, piano, sculpture. Beuys defined anyone an artist who was exceptional and was full of commitment in their vocation i.e. a good plumber committed to her craft, did her craft well (took action), and with pride to be an artist.
References


