Self-Directed Learning in the Age of Digital Networks: The Learning Patterns of Knowledge Workers in the Knowledge Economy

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Abstract

This dissertation presents a qualitative analysis of the self-directed learning patterns of knowledge workers within the context of digital networks. The study seeks to address some tensions that exist among educational perspectives on the use of digital networks for learning. Namely that digital networks provide more 'authentic' learning experiences by virtue of its quasi immediate access to information for problem solving as well as its more tailored information gathering affordances. On the opposite spectrum, digital networks are said to be diluting critical instincts, 'herding' users into like-minded groups and even impairing certain crucial cognitive features. In order to shed light on the debate, this study interviewed eight individuals of the knowledge working community who perform an occupation for which they have no formally recognized certification—therefore creating a natural context for self-directed learning. The assumption was that these individuals may possess tacit skills to harness and/or mediate the features of digital learning. The participants of the study were asked to provide a 'recipe' or a list of 'ingredients' for effective self-teaching as well as describe, in general, their learning journeys. The interviews were then analyzed using a qualitative methodology to let emerge a dialectal account of the themes that surrounded this experience. These themes were classified using Bouchard's (2009) four-dimensional framework of learning autonomy. The model aims to characterize the elements of autonomy through the conative (motivational), algorithmic (mechanic), semantic (interpretive) and economic dimensions. While recognizing that motivation and mechanics have been the main focus of most educational research of a learning account, the Bouchard model also includes the role of "meaning making" or the new interpretive implications of rich media as well as the mediating role of economics as a new dimensions that emerged due

to digital networks. The results yielded a more comprehensive portrait of the issues that surround learner autonomy as well as a nuanced characterization of the notion of 'value' of learning.

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Foreword

"HAL: I am putting myself to the fullest possible use, which is all I think that any conscious entity can ever hope to do."

Hal the super computer from 2001 A Space Odyssey

When I was young I wanted to be a veterinarian. Then I wanted to be a filmaker, a social worker, a computer programmer, a dancer, a musician and the list goes on. Then, I got a little older and I didn't know what I wanted to be--until I did a presentation on Ridley Scott, the filmmaker. My teacher's only comment was "you got some teacher in you." It was not a terribly exciting prospect at the time, but I figured if I did English as a second language I could travel. Today I am a multimedia instructional designer. What? Wait. What? It's an occupation that didn't exist at the time I was studying. And I didn't get there right out of school either. When I first started teaching it was 1998. I was a high school ESL teacher. Not quite as bucolic as teaching in Mallorca, but it was a start. Keeping the kids engaged was a crusher—not at all like in the movies. "Oh captain my captain" was sinking with the ship. Enter ICT's (information communication technology). That was when I started getting interested in my own job. The projects I designed were quite innovative and garnered some interest from the press—back then. Of course, in order to teach it, I had to learn it myself. My Web savvy students along with the ICT technician at the school pointed me to a couple of online tutorials on HTML programming and in a couple weeks, I had my very own online adventure game. It didn't feel that hard. But when the doctor diagnosed me with a burnout and put me on leave for six months I figured I may have gone overboard.

Today I am an eLearning specialist. But the transformation from ESL teacher to

digital pedagogue was a difficult journey indeed. After I left my teaching job, reality soon set in. Multimedia schools were extremely expensive and I needed to work. Since I had time (what with being unemployed), I decided I could do it myself. As empowering as that may sound, in reality it meant walking up, day after day, in my one bedroom apartment, same walls, same coffee mug, with my computer and a couple of do-it-yourself books. Most days I felt like throwing my beloved computer out the window. Where was this relationship going?

Having navigated in the rough waters of self-directed learning myself, and having literally starved for my art, I know all to well the connection between learning and socio-economics. ICT are professed to have unleashed learning and empower us to take our destiny into our own hands. But historically speaking, this power was preceded by a huge change in the job market—a matter of circumstance rather than choice really. New jobs have been popping out of nowhere for the last 25 years, and those who had the expertise to perform them rarely came out of schools—there was no time. What's more, ICT's not only created jobs, it transformed existing jobs. Pretty soon, everybody had to adopt technology. Like it or not. The good news for educationalists is it presented a new ripe crop of self-directed learners ready for the picking. This is the subject of my thesis: self-directed learning in the age of digital networks. My aim is not to simply report on the emerging learning patterns but also tie the learning journeys to the strong socio-economical undercurrent that may have colored these journey

CHAPTER 1: The Research Problem and Question

Background

When asked to describe the secret of his success, Steve Jobs quoted Wayne Gretzy and said "I skate to where the puck is going to be, not to where it has been."

In the 1991 Speech from the Throne, Ray Hnatyshyn the 24th Governor General of Canada said that "in the dawning knowledge age, how well we live will depend on how well we learn" (cited in Rubenson & Walker, 2006). Twenty years ago the Governor was setting the scene for a new economic frontier. How can we turn knowledge into power? Information and communication technologies (ICT) are now woven so tightly into the fabric of our lives it may be difficult to chart *how* and *what* has changed. New occupations have been created, and are still appearing, company hierarchies are flattening (Barabasi 2004) and workers are seen less as career citizens of a company and more as "knowledge capital", encouraged innovate and invent in the moment. As Castells puts it, the networked society makes "labour dissolve its collective entity into an infinite variation of individual existences" (2000, p. 507). Thus it would appear that the ubiquitous availability of knowledge is changing our self-concept as workers and learners. Many in the 30 to 70 age group, who witnessed its appearance, had to hit the ground running in learning new technologies, software, and even entire professions in order to respond to job market needs. Moreover, ICTs did not simply affect technology jobs, computers, software, and the Internet are now woven into just about everything. How are we coping with all this change? We are learning—some for survival more than choice. But because institutions can't keep up with the pace of change, learning is more

likely happening in a self-directed and autonomous way—all in the nebulous space that is digital networks.

It stands to reason that digital connectivity is creating major paradigmatic shifts in epistemology, learning theory, and the sociology of education. Bouchard (2013) posits that informal autonomous learning is indeed taking an important slice of the learning space and it would appear that the link between self-directed learning (SDL) and living well does in fact emerge. In 1985, Brocket showed a positive correlation between self-directed learning readiness and life satisfaction and more recently Guglielmino and Guglielmino (2011) have shown there is a consistent positive correlation between gross national income per capita and gross domestic product per capita and self-directed learning readiness. "This new knowledge economy will rely heavily on knowledge workers. ... Just as unskilled manual workers in manufacturing were the dominant social and political force in the 20th century, knowledge technologists are likely to become the dominant social—-and perhaps also political—-force over the next decades." (Castells 2002, p.3). Knowledge economies have become a distinctive feature of high-income countries (Castells 2009, Bouchard, 2006) and those who are able to tap into the power of the network are indeed the fortunate ones. However, with all this speed, we are led to wonder how effective the learning really is (Kop & Bouchard, 2011), and just who is left behind.

Governments around the world have poured multi-billion dollar policies and created high tech and high skill agendas to encourage adults to live, work and learn with ICTs (Selwyn and al, 2006). The commonly held belief is that technology is more than capable of taking care of education. But Selwyn et al (2006) suggest these claims are

creating a false illusion of empowerment and that some, even many, may be falling through the digital cracks. Already the list of skills required for self-directed learning is long. Moreover, the flip side to the connectedness rhetoric heralds the dangers of information overload, mind control, misinformation, radicalism, power struggles, even elitism (Mejias 2009, Castells 2009) as well as the erosion of basic learning skills such as concentration and critical thinking (Small & Vorgan 2008, Carr, 2011). If this is true, then among those who are surviving, or perhaps even thriving, in the ICT woven world, what do they have to say about learning? Said in more controversial terms, what is the shop floor knowledge worker's recipe for turning knowledge into value?

In order to explore this issue, this thesis will investigate the possibility of an emerging phenomenon, in the form of the connected knowledge worker. The objective of the investigation is to define, with sufficient clarity, the various themes, concepts and dimensions that affect learning experiences in the age of digital connectivity. Thus the questions this thesis is asking is:

How do knowledge workers describe their learning experiences within the context of digital connectivity?

a. What triggers the need to self-teach?
b. What are the learning processes?
c. How are the resources being used?
d. How is SDL affecting their socio-economic reality?

The working hypothesis is that those who are able who navigate in digital networks effectively have a tacit recipe for orchestrating knowledge and economics. Be it by obtaining better jobs or a better balance between all the aspects of their lives, or being

more true to their inner selves in terms of career choices, they may hold an uncharacterized power that is key for survival in the knowledge economy. In order to establish a somewhat objective context for self-direction in learning, participants will be recruited on the basis of performing an occupation for which they did not study in, but for which there exist some form of official training certification, thus creating a hefty body of knowledge to be acquired and applied. The participants will also be chosen on the basis of being part of the knowledge working community. First coined by Feregrino (1959), the 'knowledge worker' encapsulates the notion of individuals who use their ability to act and communicate with knowledge within a specific subject area. In other words, they use their expertise and insight to solve problems, influence decisions, prioritize and strategize. Sadler and Klavet (2008) further specify that this is different than intellectual property created by artists and scientists, knowledge workers by contrast create new knowledge by combining existing knowledge and solve problems by associating information to concerns.

Justification

Digital networks are introducing a both exciting and intimidating variable into the learning landscape. Some of the excitement could be attributed to the hypothesis that the Internet is offering a heightened learning experience by virtue of the freedom the environment offers. The Internet allows users to wander, to connect with people and to be more deliberate about the knowledge areas they want to explore (Lucas & Moreira, 2009). What's more, digital networks afford users the tools to let learning occur at almost the exact moment it is needed for real life circumstances. It also offers various forms of knowledge inputs (video, text, hyperlinks, etc…) and can thusly cater to individual

learning styles more easily. Thus with freedom, speed and tailored content, digital networks are bridging a long-standing tension between the 'what', 'when' and 'how' of learning in traditional learning contexts. Said differently, individuals do not have to wait for a work or life situation to apply knowledge that was stored previously. Nor do they have to struggle with learning tools that are not adapted to their learning style. With digital networks, the dynamics of learning and knowledge acquisition is potentially flipping. Now the situation motivates the learning as opposed to first acquiring knowledge and then hopefully finding an application later in life. Therefore it is fair to assume that the learning experience may be more satisfying and useful.

Conversely, the freedom, timeliness and adaptability of learning are pitted against quality. Though connectivity makes learning more effortless, quick and personalized as well as include power of the collective, all this freedom requires responsible and enlightened consumption. Researchers as early as Spears and Mocker (1984) and more recently Clark and Mayer (2008) have demonstrated that although self-directed learning may *feel* more motivating and efficient, many of those who embark on learning projects without guidance demonstrate gaps in the metacognitive knowledge to build proper learning strategies and reach optimal goals.

The other less common educational theme that warrants examination under the new light of digital networks is the notion of 'value of learning' and/or 'value of knowledge.' Indeed economics and learning are forming a increasingly important alliance and thusly may be affecting some of the more classic dimensions of learning—such as motivation, goal setting, planning, evaluation. Moreover, under the umbrella of value, one can splice the question into more nuanced perspectives, such as value for what

(career advancement, better salary), value for whom (for the individual, for the company or even for the government). In the end, who is benefitting from the affordances of digital networks for learning and is this a desirable outcome?

Guglielmino and Guglielmino (1988) also take the philosophical position that self-directed learning has become a necessity rather than simply a personality trait or a matter of personal choice. Networks are the new morphology of the knowledge economy, and the spread of network logic changes the fundamental principles behind productivity, experience, power and culture (Castells 2000, p.500). Learner autonomy is definitely at the forefront of the themes explored by the education community (Ponton 2005, Bouchard 2009, Boucouvalas, 2009). According to Bouchard, "the central aspect of learner autonomy is the control that the learner exercises with the various aspects of learning…" (2009, p. 93). But with autonomy comes ambiguity. One of the ambiguous aspects is the difficulty in surveying just what is going through the mind of the individual at the moment a learning episode is occurring. Unlike a more controlled learning exercise, autonomous learning can be sporadic, informal and occur in a series of episodes over the course of time. Thus it can be difficult to recall all the elements at play. Despite these limitations, preliminary work shows context and environment are still seminal in determining success in a learning project (Bouchard 2009, Boucouvalas, 2009) but many of the aspects in the affordances of connectivity remain uncharacterized.

Indeed, there is a palpable tension between those who view digital connectivity as a learning gold mine and those who see it as a bottomless pit. Regardless, for most in the knowledge working community it is an essential tool. Effective learning is survival, thus it is the responsibility of the learning community to re-visit some of the basic questions

about self-directed learning within this new context.

As the literature will demonstrate, many of these aspects have been reviewed and studied extensively within and outside the presence of digital networks. Also as the literature will demonstrate, researchers generally concentrate their efforts and interests on one of the dimensions at a time. Spears (1988) even advocates a "clustered" approach to research—no doubt to avoid conceptual ambiguity or triviality. But within this new digital and socio-economical context Bouchard (2009) makes a strong point that in order to understand the patterns of autonomous learning, one must attempt to examine all the factors that influence the learning journey and seek to understand how various elements are intimately interrelated.

Let's take for example a composite of several of the participants in this study. Let's say you studied as an engineer but find there is more work in online marketing. The closest related degree would be a hybrid between computer science and management, both of which would be too lengthy and unnecessary to respond to job requirements. In discussing the job with some friends (over the Internet and in person) you determine that simply learning some code language and understanding online marketing logic would suffice. You consult some peers in the field (that you found via social networking tools) to recommend the most reliable blogs, video courses and discussion forums for learning the basics. Then you design a prototype project to practice what you learnt. You make a few connections with peers to help troubleshoot some of the problems you encounter along the way and eventually, you feel proficient enough to apply for an entry-level job. The company you work for seems open to new ideas, so from there you continue learning about online marketing and find ways to combine both your engineering knowledge and

your marketing knowledge to develop new products.

In this example alone, several dimensions are at play. Outside of the learning experience itself, the individual has many personality traits that contribute to the instigation and success of the learning task--confidence, autonomy, foresight, etc. Then the individual plans the learning path by first discussing the idea to determine the best possible route (course, mentored, autonomous etc.), then researching the basics, then building a projects and solving problems. Should this individual have different personality characteristics, he/she may not have chosen such an autonomous path. Next, the individual makes use of a variety of different teaching media and network connections, both evaluating their relevance and acquiring the knowledge within their specific output formats. Next the individual interprets, synthesizes, connects and analyzes the various information sources and creates his/her own 'brand' of knowledge suitable for the goal. Therefore there is an interpretation or 'meaning making' phase that helps process, internalize and produce a personalized form of knowledge. But without knowing 'who' (personality) is interpreting the meaning, 'how' (mechanics) they have come to gather this information, understanding 'what' (semantics) of their conclusions are becomes totally lopsided. Finally, but certainly not least, the economic impetus behind the project is not only the trigger for the learning project, but also one of the aspects that help influence the learning path. Why go self-directed instead of formal, because it is faster and cheaper and the value of official recognition is not that important. Why learn online marketing at all if you have a degree in engineering? Because the potential for work is greater and could contribute to more security in life. Moreover, combining engineering and online marketing may create a new job niche for which you could

become an early expert and could create more wealth.

The illustration above serves to justify why Bouchard's (2009) insists that looking at a learning experience in its entirety does in fact tell a much different story than clustering elements in a vacuum. The point is that taking any one aspect away from the other would not do the description of the learning endeavor justice—especially not in the context of digital networks where learning and economics are developing a much closer relationship. Thus, in an attempt to break from the more typical forms of analysis found in the literature that would explore each dimension separately, the data gathered and portrayed in this study will attempt to let emerge all aspects of the learning experience and hopefully reveal a more integrated portrait of how knowledge workers survive and even thrive through learning. It will also cross-reference the themes that emerge to verify and characterize the attributes of each dimension.

CHAPTER 2: Review of the Literature

Introduction

"*my god I just learned how to eat an elephant, little bite by little bite and chew well*"
Participant in this study

Assembling and consolidating the literature for this project proved a both interesting and frustrating experience. It behooved me to gather an otherwise eclectic list of sources in seeking to understand the new socio-economic context of knowledge workers and the impacts on learning. In terms of knowledge fields, the literature review layers several different areas. The challenge in selecting a logical sequence in which to present these fields is quite like the subject of this thesis—they are attached in a network of interrelated subjects rather than in a linear continuum. But as the format requires linearity, I will begin by reviewing the literature on self-directed learning seeing as it is at the heart of the study. Once we move into the realm of learning in the context of digital connectivity, the SDL literature will be intertwined with the literature on informal learning and learning self-efficacy. Emerging from this, more important focus will be given to the personality traits associated to self-direction as well as the literacies involved in using ICTs. After drilling down into the depth of learning theory, we will return to a more birds eye view of the general literature on the nature of digital networks and the new socio-economic context it creates. In a metaphorical sense, I will take the reader into the SDL forest to then look at the trees and then fly you up above the forest to show you the world in which the forest lives.

Self-directed learning before digital networks

SDL literature is interesting because it challenges commonly held assumptions

about learning. Traditionally speaking, when we think of learning we automatically connect it to teaching and teachers. But to the SDL researcher learning is first and foremost about the learner. SDL research wants to learn about learning in its most natural, tacit and implicit context. We are obviously not empty vases. We simply have to observe babies making their first connections about how the world works to see that we have internal, inherent abilities for learning. But these abilities don't just disapear as we get older. In fact it stands to reason that we should only get better at it.

It is difficult to chart when research on SDL began. Some of the earliest works cited by Candy (1992) date back to 1830 when Goerg Craik published a book on 'self-education'. But the evolution of the species itself is proof that individuals learn above and beyond what they are taught. Confessore (1992) even advance that self-teaching is not simply a characteristic of the human condition, but the very thing that defines it.

Why do adults learn? Pure and simple this is the question that is central in Houle's book 1961 book Inquiring Minds. Short and succinct, Houle wrote the book out of a series of lectures on adult education he prepared for the Knapp Professorship at the University of Chicago. At the time, some 30 years ago, Houle had very little literature to prepare these lectures. Therefore with no conscious hypothesis in mind, Houle interviewed 22 people who were deemed avid learners. Candy (1992) reports that Houle interviewed the participants on a number of aspects of their lives: backgrounds, upbringing, life experience, interests and attitudes toward education, especially self-education. This method was a huge break away from traditional research frameworks that were rooted in quantitative analysis. The interviews were a pioneering enterprise into

qualitatively analyzing a complex interplay of why, what, and how adults take learning into their own hands. Some of his findings have been seminal in adult education research.

The most significant insight is a three point typology articulating the motives behind self-learning. According to Houle, adults are either goal oriented, learning oriented or activity oriented. And despite its aura of new insight, according to Candy (1992), the typology is remarkably similar to a much earlier work by Charles Knight in 1864 which states that "there were necessarily different estimates of value of scientific or literary studies, whether "for use," or "for delight," or "for ornament" (1864, Vol, II, p. 133). Perhaps unbeknownst to Houle, his typology was certainly coining something that was pondered and considered by the erudite.

The other important finding Houle brings forth is the idea that there is a large chasm between what educators think learning is about and what learners think learning is about. Houle noticed that educators build courses mainly around the "echoes" of what comes back to them from what *they* said in the classroom. In other words, educators listen for the notions they deem important as knowledge points. Houle makes the point that the individual motives of the participants rarely seem considered in traditional learning frameworks. Moreover, motivations for learning are not static entities. For example, an activity oriented motivation can rapidly change to goal oriented within the lifecycle of a learning endeavor. In other words, one could learn gardening for pleasure as a starting point, but out of that may devise a project or even get a job which in turn may make further learning goal oriented. Houle advances that educators seem more concerned with concepts of adult education that affect their own personal practice rather than speculating on the motivations of their participants. According to Candy (1992) this

is a remarkably contemporary idea that precursers the notion of the educator as a "facilitator" or in Houle's terms an "ally" in establishing value of continuing education on a societal level.

And finally, the third important insight brought forth by Houle is the fact that the antagonist of continuing learning is "not apathy, as many would like to believe, but outright opposition, and opposition from places where it counts most—from the family, associates, and friends who surround the person (p.46)"

In the 60's and 70's learning theory was undergoing major paradigmatic changes. 'Constructivism' and its affiliate 'discovery' learning were shedding new light on the role of the teacher, suggesting that teachers should act more as facilitator or a helper to learning than knowledge pools meant to fill the empty vessels that were their students. Adult education followed in this trend with notably Malcom Knowles ideas on 'andragogy', a term he coined, which emcompasses the "art and science of teaching adults" (1967). Knowles urged teachers to recognize and leverage the knowledge and experience of adult learners. He encouraged teachers to organize lessons around a more active and less structured participation scheme (1975), thus letting the students seek knowledge for themselves and use problem solving skills, preferable collectively, to find solutions. Following suit with the constructivist Piaget, Bruner and Papert, Knowles placed a lot of emphasis on the teacher's role in creating a supportive and encouraging climate fostering mutual trust.

In the "teach a man to fish" family of ideologies, Knowles is a strong advocate of self-directed learning as an essential life skill. Knowles (1975) advances that self-directed learning is commonly defined as " a process in which individuals take the initiative with

or without the help of others in diagnosing their learning needs, formulating goals, identifying human and material resources, selecting appropriate learning strategies and evaluating learning outcomes" (p. 18). Learning is about empowerment : "Individuals who take the initiative in learning, learn more things, and learn better, than do people who sit at the feet of teachers possibly waiting to be taught…"(1975, p. 14). Of course to consider all adults as equally active, critical and competent self-directed learners is a theoretical ideal, in reality each individual possesses different readiness patterns (Long, 1991). For this, Knowles devises a list of nine competencies ranging from cognitive, inter-personal and personal (Long, 1991).

Knowles' (1975) study of andragogy provided foundational concepts that guided much subsequent research on self-directed learning: (a) self-directed learning assumes that individuals grow in skill and need to be self-directing; (b) learners' experiences are rich resources for learning; (c) individuals learn to perform evolving life tasks; (d) an adult's natural orientation is task or problem-centered learning; (e) self-directed learners are motivated by various internal incentives, such as need for self-esteem, curiosity, desire to achieve, and satisfaction of accomplishment. "They enter into learning more purposefully and with greater motivation. They also tend to retain and make use of what they learn better and longer than do the reactive learners." (p. 14). He advances that self-directed learning is more in tune with our natural processes of psychological development. "An essential aspect of maturing is developing the ability to take increasing responsibility for our own lives - to become increasingly self-directed" (p.15). Of course as a pioneer, Knowles' work has received criticism for its idealistic nature, its lack of practicality in knowledge based fields (e.g. technical knowledge) and certain omissions in

learning processing, but as a contributor to the self-directed and andragogical rhetoric, Knowles is a corner stone.

Tough, also a staple in SDL research, got interested in gaining a holistic portrayal of how individuals learn in post-academic settings. Tough's (1979) research involved obtaining information on "a series of related episodes, adding up to at least seven hours" where "more than half of the person's total motivation is to gain and retain certain fairly clear knowledge and skill, or to produce some other lasting change" (p. 7). Tough defines "a learning project" as a "major, highly deliberate effort to gain certain knowledge and skill… … initiated for highly practical reasons: to make a good decision, build something, or carry out some task related to one's job, home, family, sport, or hobby" (p.1).

Some of the ground breaking findings emerging from his study are that the typical individual undertakes at least five major learning projects per year and that an average of 500 hours per year (or almost 10 hours per week) is spent on learning projects. Tough findings also reveal that 80% of learning projects are self-planned. Like Knowles, Tough's research declares that the most common motivation is related to an anticipated use or application for knowledge or a skill. And perhaps the the most significant finding that Tough puts forth is that informal learning is a very social phenomenon-- an average of 10 or 11 people may be involved in learning a single learning project.

Tough most certainly saw the gaps in the research on adult learning up to date. He made it his mission to understand "how the learning proceeds in its natural form" (1978, p.289). Convinced that adults do a considerable amount of learning without the aid of an instructor, he set out to uncover the underpinnings of self-learning. Through his research,

he also established a research protocol using un-structure interviews (much like the ones used in this current work) to collect more spontaneous and tacit information. In contrast to Houle, Tough brings forth that most learning projects are in fact goal-oriented. Also, he found that adults seem to prefer SDL for its flexibility in pace, learning style and of course low cost. Following suit in the non-interventionist trend of the 60 and 70's he uttered resistance toward the notion of the instructor as a purveyor of content and urged the learning community to shift their mentality toward learning facilitation and shed the more autocratic methods

Tough's goal is not to annihilate traditional forms of education altogether, but to shift the balance of power. He advances that the "adult learning projects" truly reflects the power of the adult is his/her own learning. Adults have the power to decide and conduct learning endeavors—something that was perhaps implicitly known, but was never fully explored. Tough exposed how important SDL skills are to the working individual in demonstrating how some training, especially technical, can become quickly dated. Tough advances that self-learning should be an expectation in the working world and that imparting proper skill training and learning climate should become an imperative.

Through Tough's some 200 interviews (1967), several foundational contributions and characterizations are made. Namely that substantial learning occurs in SDL mode and adults devote considerable time and energy to self-learning. Tough demonstrated some of the mechanics behind SDL projects—such as the notion that adults do not learn in isolation. In fact, up to 20 individuals can have a hand in aiding and consulting the adult learning in his/her leaning project. Also, that a variety of sources are used in self-

teaching including some formal training. And finally adults with the greatest proclivity for SDL are usually surrounded by a collaborative and facilitative climate. Some of the major reasons for SDL were reported to be: staying or preparing for a job, tasks or problems related to job, learning for personal responsibilities, improving a broad area of competence, learning for interest, or general curiosity. Thus unlike traditional forms of education, SDL stems from a different set of assumptions—usually a question, or a goal, a desired outcome, an intention or a desire. As Bonham (1991) puts it adult learning project start with, "a foggy point of entry". Following the prompt for learning, the project will comprise a series of "episodes", using a variety of sources (books, videos, speeches, articles) and collaborators used to help refine and plan the learning strategy and goal.

Tough does advance a more cautious note to his findings. Although he assumption is that everyone, even children, undertake learning projects, individuals are not all equal in their metacognitive skills. According to Tough, learning projects are highly complex, rarely linear, and comprise a delicate set of tasks and not all learners are equally skilled at undertaking their own learning.

Tough still sought to get a more specific picture of just what individuals were doing where acquiring new knowledge on their own. In attempt to remedy participants' lack of metacognitive language, Tough devised a highly structured interview schedule comprising 12 teaching tasks (see Annex 1). Participants were asked to review the tasks and analyze their own learning experiences. Tough (1989) Tough was highly criticized for using this method of questioning because the tasks were considered as a somewhat bias form of probing or prompting for information. He points out that the data collection

is inadvertently limited to what the participants can recall and are willing/capable of revealing. Still, Tough contributed numerous insightful suggestions that led to future research. Aside from the operationalization of the 'learning project', as well as a qualitative mode of inquiry, Tough also suggested that learning evolves around four major milestones: purposing, planning, executing and judging. In turn, Tough revealled that many of the self-teaching tools and techniques echo those of traditional learning. Is this a cultural bias or simply that both mirror natural learning processes? The question is still open.

In an interview with Donaghy (2005), Tough reflects that at first he didn't really know what questions to ask about self-directed learning. He remembers approaching people he knew and simply asking "tell me about learning something. Tell me your stories." He says that he was impressed about how competent people were in designing their learning.

In an attempt to remedy the more arbitrary nature of the research methods used to date, Guglielmino (1977) doctoral dissertation is probably one of the more cited and utilized tools in the literature. In it, Guglielmino created the "Self-directed learning readiness scale" (SDLRS). This tool remains even today as one of the main tools in measuring various population for their SDL potential. It has generated correlative data on SDL readiness and life satisfaction (Brocket, 1985), learning style (Okabayashi, Torrance, 1984), distance learning success (Pachnowski, L. M., Jurczyk, J. P.) personality, (Lounsbury et al., 2009), SDL and income (Guglielmino & Guglielmino, 2011) and has been used in hundreds of other studies. Through Guglielmino's (1977) SDLRS, Guglielmino slices eight categories that describe a self-directed learner:

1. Openness to learning opportunities
2. Self-concept as an effective learner
3. Initiative and independence in learning
4. Informed acceptance of responsibility for one's own learning
5. Love of learning
6. Creativity
7. Future orientation
8. Ability to use basic study and problem-solving

It is worth noting that the above categories are mainly concerned with the psychological disposition of the learner. As later research will demonstrate, much more is involved in determining a SDL endeavor. Still the SDLRS has been tested and confirmed for its validity and reliability in showing readiness (McCune, Guglielmino, Garcia, in Long et al. 1990) and remains today as one of the few quantitative tools in the field.

In paralell, Gibbons et al's (1980) explored SDL using a rather different data sample. They surveyed the autobiographies of individuals who became successful in fields they did not study in--for example Walt Disney, Virginia Wolfe and Malcom X. The stories provided insight into the psycho-social morphology of these individuals across several dimensions: personality, environment, competence, learning strategies, attitudes etc. From this analysis, Gibbons extrapolated several common elements that connect to the more general theory of self-directed learning. Aside from pedagogical and cognitive aspects, Gibbons also exposed that personality, upbringing and work environment seem to play an important role in predicting the outcomes of SDL (see Annex 2 for complete list of dimensions).

This concurs with Spear and Mocker's (1984) work that relate the importance of familial values of learning, supportive work environments and personal support on the impacts on motivation and success in learning. Their work revealed that individuals who were brought up in a family who values education, or more specifically provided examples self-directed learning, were more likely to possess the inclination and drive to learn autonomously. Moreover, Spears and Mocker found that work environments where workers had more latitude and trust tented to have more SDL endeavors. These became important findings to counter assumptions that personality alone was the main determinant of SDL.

After the wave of positive and empowering self-directed literature generated by Knowles and Tough, Spears and Mocker (1984) were some of the first researchers to set the pendulum in the other direction. They found that self-directed learners were not always the best people to plan and decide the best path to learning. Unlike their predecessors, they found that most learning endeavors were rather chaotic and that planning was more accidental than deliberate. Spears and Mocker questioned how learners could possibly know what to learn if they were not fully aware of what they didn't know. They also tackled a pending criticism in the literature to date, which was who to ask. Thus far, Spears and Mockers' predecessors limited their test subjects to mainly university graduates from relatively comfortable socio-economic backgrounds. Spears and Mocker chose research subjects on the basis of not having a high school diploma. The result of their questions led them to focus their research effort on the environment as one of the most relevant determinants of learning success.

To Spears and Mocker, learning is not a linear process but is structured by the environment surrounding the individual—what they coined as "organizing circumstances." Therefore, Spears and Mocker suggested that in some cases much of the learning potential could be lost because of limited opportunities. Within the concept of 'organizing circumstances', Spears and Mocker identified four key contextual elements that influence the learning affordances. The first is when learning is expected. In this case, individuals simply relied on the new circumstance to provide learning opportunities, such as on the job practice or even training. The second refers to a situation where learning is not expected but occurs accidentally by observing other colleagues. The third occurs when a series of learning events build on top of previous knowledge and skills and eventually create a new competency. Finally the fourth organizing circumstance occurs over a longer period of time where an individual's accumulated life experiences, at first seemingly isolated, may come together in a singular purpose.

Spear and Mocker acknowledge that there may be more types of organizing circumstances than the ones they have identified, but their findings reveal that the above four are the most common. Spear and Mocker's contribution to the thinking around self-directed learning is seminal in drawing attention to the more haphazard aspects of a learning experience. In turn, their findings lead to questions about the quality and completeness of learning outcomes as well as gaining a proper understanding of the environmental aspects surrounding learning endeavors.

Not unlike Spear and Mocker, Brookfield (1986) invests concern in the quality of the learning above the individual's perception. For Brookfield (1986), critical reflection is a central theme in planning and determining the outcomes of self-directed learning

projects. He holds a dual perspective in advocating the wealth of self-directed learning, but with a few pre-conditions. One of Brookfield's contributions in putting theory into practice is delineating three ways of classifying learning:

1. Instrumental learning: which refers to task-oriented and problem solving based learning.
2. Dialogic learning: which requires some form of critical understanding of what others mean when communicating
3. Self-reflective learning: which entails developing an understanding of ourselves and any dependencies or inhibitions.

Through these guidelines, Brookfield aims to help Human Resources Development (HRD) personnel and interested self-directed learners utilize these guidelines to better to push the experience to a more fruitful level. The purpose is to ask the right questions at the onset of learning. In other words, determine the purpose of the learning task to then be more aware of the learning approach. Brookfield places considerable emphasis on the importance of the "learning network" and a more dialectical style to autonomous learning. In a way, Brookfield raises the line sight of the adult educator's role in encouraging: "…self-directed, critically aware individuals capable of imagining and then realizing alternative ways of thinking and living" (p.68)

At this point the research oscillates between qualitative and quantitative analysis. In the quantitative spectrum, Oddi's (1986) Continuing Learning Inventory (CLI) is another tool design to provide more concrete performance indications related to personality. Oddi first reviewed the literature to create an exhaustive list of personality traits related to learning. She then clustered them into three main dimensions:

1) Proactive versus reactive drive: focuses on the individual's ability to persist in a learning endeavor without obvious external reinforcement
2) Cognitive openness versus defensiveness: consists of self-regulative behavior, self-esteem, self-confidence, engagement, openness to change, adaptability and tolerance of ambiguity
3) Commitment to learning versus apathy or aversion to learning: covers aspects such as attitudes toward learning and the potential of engaging in learning endeavors for pleasure

These dimensions could then illustrate how individual readiness to SDL can be depicted on a continuum of personality attributes.

Also in the family of measurement tools Ponton et al.' (2004) Appraisal of Learner Autonomy (ALA), wants to shed light on major dimension the SDL predictors: 'autonomy'. According to Ponton et al., autonomous learning is a behavioral trait that draws on four factors: desire, resourcefulness, initiative and persistence. For each of these factors Ponton et al. characterized components that would help assess the behavioral traits that are necessary of autonomous learning. Translated into inventories, these components are, the Inventory of Learner Resourcefulness (ILR), the Inventory of Learner Initiative (ILI), the Inventory of Learner Persistence (ILP), and the inventory of Learner Desire (ILD). When these inventories are combined that yield the Learner Autonomy Profile (LAP).

As the body of work around SDL grows, the need to develop a global compendium of the research to date is tackled by Long et al (1988, 1989,1990, 1991, 1992, 1993, 1994, 1995) in eight volumes assembling selected papers by high profile

contributors such as Guglielmino, Confessor, Caffarella, Tough, Hiemstra, Brokett and Bouchard. Although it goes beyond the scope of this review to summarize each volume, some to the more insightful and enduring ideas are that self-teaching or self-directed learning may be a new topic for scientific inquiry, it is *not* a new phenomenon. However, the assessment of the field is that self-directed learning remains "weakly conceptualized, ill defined, inadequately studied, and tentatively comprehended" (p.1).

Other major issues tackled by Long et al. deals with: the history of a 'project', the definition and conceptualization of SDL, the validity and reliability of the measurement tools to date and the implementation of educational settings. In perusing the roots of the concept of a 'project' various aspects that are inherent to the term are exposed--namely that a project, learning or otherwise, implies conscious deliberation and self-direction. In turn, by conducting inquiries on learning projects per se, it dissociates other, more informal or incidental learning, that could be taking place. Tremblay (1992) points out there is a lot of "semantical wavering" when referring to the various realities of self-direction in learning. The realities are broad and can include formal (as in distance education) and informal learning occurrences. According to Long (1989) self-directedness can be defined on different levels:

1) On a social level: the level of isolation and support system
2) On a pedagogical level: all the meta-cognitive knowledge and abilities the learner must utilize to performing the learning task
3) On a psychological level: the mental activity of the learner

For Long, the critical element in placing the learning experience on the SDL continuum is the amount of autonomy the individual has in influencing his/her own learning process.

From these levels, special attention is paid to the psychological dimension. Bonham (1989) even goes so far as to say that SDL is a learning style in and of itself that encompasses a list of personality traits and psychological dispositions. Therefore if it is a learning style, it can be identified and measured. Bonham (1989) looks at the various quantitative tools developed in the field—namely the SDLRS and Oddi's OCLI. Her conclusion and criticism of the tools centers around that both tools measure a propensity for learning in general, as opposed to self-directedness per se. Through the lens of the SDLRS and OCLI the opposite to the skilled self-teacher is not an unskilled learner, but a non-learner.

For Long, the many question remain unanswered with regard the phenomenon of SDL. Is SDL a goal related to the intrinsic capabilities of the individual or is it a process related to the extrinsic aspects of learning? The two main underpinning concepts in these questions have to do with ownership of the learning endeavor and the assistance sought to accomplish it.

But as the stereotype would dictate, although the researchers are left with more questions, the practitioners are given more tools to facilitate learning. Long et al provide considerable nourishment for HDR and adult education practitioners in establishing the importance of self-teaching values in the workplace, providing multiple options for learners at different points on the continuum of readiness, establishing an evaluation process, revising teaching materials to suit self-teaching, and fostering an adequate support system.

As the research on SDL evolves, a trend to devise more clearly articulated clusters or attributes to self-teaching unfolds. Candy (1991) defines autodidaxy as "the individual,

non-institutional pursuit of learning opportunities" (p. 23) and suggests that continuous learning is a process in which adults manifest personality attributes of personal autonomy in self-managing learning efforts. According to Candy (1991) SDL has two main components. We can talk about the process of SDL and/or the outcomes of SDL. Firstly, a process-oriented analysis of SDL refers to the mechanics of formal and informal learning. In other words, where the motivation originates, the design of the learning experience, how the experience unfolds and how it is evaluated. Conversely, the outcome-oriented descriptions of SDL reference the more psychological and philosophical characteristic of self-direction--one which can mature and develop as a result of multiple factors in an individual's psycho-social constitution. Said differently, the outcome-oriented notion of SDL leans towards characterizing the individuals who take part in SDL as opposed to how, mechanically speaking, learning occurs. Although the categories Candy propose may seem overgeneralized and relatively nebulous, what Candy is inadvertently affirming is that in order to understand SDL and avoid analytical triviality, we must first attempt to untangle the dimensions it involves in order to analyze them within their categorical framework.

Brockett and Hiemstra (1991) advance that self-direction is best regarded as a continuum of characteristic that exists to some degree in every person and learning situation. They specify that self-direction does not necessarily mean isolation from traditional forms of education. A self-directed learning project can involve various activities and resources, such as reading, participation in study groups, internships, electronic dialogues, and writing. Even teachers can have a role in SDL, through discussions, finding resources, evaluating results, and promoting critical thinking.

SDL research is getting both more refined and more scattered. Researchers are working in parallel to one another and are not always aware of what everyone is doing (Caffarella & O'Donnell, 1987). In an attempt to consolidate and review the SDL literature to date, Hiemstra (1994) surveyed the literature and extracted five major findings: (a) several instruments for measuring some self-directed learning aspect have been developed; (b) self-directed learning readiness has been associated with a various performance, psychological, and social dimensions; (c) most self-directed learning research is qualitative; (d) definition and application of techniques are being devised; (e) a coherent self-directed learning theory is still not available. Hiemstra is very inclusive in his the description of SDL components and research, and his survey is more about the more intangible aspects of SDL. In point (b) and (d), Hiemstra demonstrate a looseness around what could be at the heart of any proper understanding of SDL, namely the person and the mechanics. Moreover, there is little up to this point on the economical dimensions of SDL. What of those who turn to SDL because there is simply not enough time to get formal training, or because of inadequate education, or because of losing a job? It would seem logical that point (e) is yet to be articulated.

Historically speaking, just as Hiemstra pointed out, SDL has been explored mainly in a qualitative way. Studies have revealed some of the analytical categories, or ingredients so to speak, in SDL endeavors: time investment, performance, skill, psychology, personality and environment materialize as being relevant aspects in understanding independent learning. However, insight into the phenomena may possibly tap into a more natural, cognitively truer form of learning that could possibly transcend learning theory to date. It may also be, as Lucas and Moreira (2009) point out, be a

fundamental element in the life of all individuals as it empowers and mobilizes. However, one of the overwhelming realities of SDL research to date is the lack of some sort of attributed grounded theory. Perhaps there are so many variables that it is simply impossible to extricate an objective theory. Or perhaps general learning theory is enough to capture the phenomena. One this is for sure, adding the digital dimension brings on a whole new network of complexities that are now inextricably joint to learning. Bouchard (2009) advances that SDL that occurred before digital networks has mainly concentrated on what he terms the 'conative' dimension of learning, namely all the elements that live outside the learning project itself (motivation, personality, context, etc.) and the 'algorithmic' dimension, namely all the mechanical aspects of learning (goal setting, pacing, selecting material). But what the reader will see with the next sections is that digital networks do indeed introduce new dimensions in the learning sphere. New media takes learners away from linear materials such as books and classes and confronts individuals with new forms of messaging such as video, hyperlinks, social networks blogs, etc. which, according to Bouchard, must be considered for their new 'semantic' dimension. And finally, according to Bouchard, the very value of learning should be questioned. Who is gaining value from learning, for what purpose is the learning valuable? These aspects Bouchard classifies as the 'economic' dimension of learning which is now inseparable from understanding learner autonomy. With this first layer in place, the next sections will explore how these dimensions emerge in the digital learning literature.

Self-directed learning after digital networks

"*Societies have always been shaped more by the nature of the media by which*

men communicate than by the content of the communication" (McLuhan, 1967, p. 8).

At the 6th Annual Conference on Network Learning, Sadler and Kalvet presented NETIS (Network for Teaching Information Society), a consortium created to help institutions teach others how to use digital technology for learning. They claim that the raison-d'être of the consortium is, among other things, because "citizens will need empowerment in information technology in order to live full civil lives …" (2008 p.758). In turn, self-directed learning has been described as a survival skill in response to the rapid pace of change in modern society (Caffarella, 1993). In fact, some researchers claim that 70% (Tough, 1979) to over 95% (Livingstone, 1999, cited in (Rager, K. B., 2009) (Davis, Bailey, Nypaver, Rees, & Brockett, 2010)(Guglielmino et al., 2005) of our learning occurs outside of school walls.

The emergence of digital networks is a rather bewildering phenomenon. No sooner that an idea appears in one's mind than it can be posted to the network. "The boundaries of human life and machine life are blurred, so that networks extend their interaction form our inner self to the whole realm of human activity, transcending barriers of time and space" (Castells, 2009, p.24). Through digital technology, we exist primarily not in body, but in mind and we learn not in classrooms, but through electronic devices. In a way, it feels a bit surreal to be connected to so much so easily and to exist in so many places at once. As Weiser, known as the forefathers of 'ubiquitous computing', predicted: " the most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it" (1991, p.91).

Digital networks are essentially composed of Web pages, publications, individuals and groups, which are nodes in the network (Jones, 2004). Nodes link to one

another through common interests and values and as a result create interest "clusters", called hubs (Barabasi, 2002, Jones 2004). Hubs such as Nature.com or Internet Movie Database (IMDb) offer one-to-many type communication (called web 1.0) whereas hubs such as YouTube, Facebook, Linked-in (called Web 2.0) offer many-to-many type communication. There are also hubs such as leaders in a field, respected individuals, in other words, people who hold credibility. These hubs create information "flows" (Castells, 2009), accessible via computers and mobile devices, in which people can read, communicate, socialize, ask questions and provide insight. Both people and information are intimately intertwined to create a new learning landscape where people connect to pages, pages connect to people and people connect to people to communicate and learn. But despite the infinite possibilities Bouchard (2013) reminds us that, "networks are not to be construed as omniscient depositories of infinite knowledge, but rather as the space where understanding is constructed through our interaction with a world of fluid and numerous possibilities" (p.4).

Bauwens (2005) posits that digital networks are responding to a new cultural, even psychic, need to counter the capitalist mode of production with an alternative political and social movement. He says that digital networks stand as a "permanent alternative to the status quo, and the expression of the growth of a new social force: the knowledge worker" (cited in Mejias, 2009).

Bouchard (1998) postulates that the explosion in technology and global competition has shifted economic prospects to the development of a knowledgeable and well trained workforce and that the intangible inner resources of the workforce have replaced material assets in defining wealth. What's more, according to Bouchard (2006),

the economy of developed countries is relying increasingly on knowledge-driven activities as their economic pillar and with the removal of trade barriers, manufacturing is slowly being transferred to countries that can offer cheaper production cost. This leaves innovation and design as the main economic product offered by the information technology dominated countries. This concurs with Benkler (2006) who observes that the economy is shifting from an industrial information society to a networked information society. Turning knowledge into value is becoming a key skill and terms like "human capital" are economic paradigms that serve to illustrate that how being able to wield knowledge can bring power.

As Bouchard (2006) advances: "human capital is situated at the frontier between economics and human learning." (p.164). And Barabasi points out that networked intelligence is causing people to move from company to company and "…companies aiming to compete in fast paced marketplace are shifting from a static and optimized tree into a dynamic and evolving web" (2002 p. 202). Networks are the new morphology of the knowledge economy, and the spread of network logic changes the fundamental principles behind productivity, experience, power and culture (Castells 2000, p.500).

"The new economy is organized around global networks of capital, management, and information, whose access to technological know-how is at the roots of productivity and competitiveness." (Castells 2000 p.502). There is indeed a paradigmal shift in the industrial world. We are now in what most claim to be the 'knowledge age' (Castells, 2009) as a result the 'knowledge worker' provides value by creating new knowledge.

Bouchard provides other insights into the human capital theory in that he intimates that creating a policy based on knowledge excludes other types of contributions

and establishes a knowledge elite. He says that regulations applied to traditional production-oriented economies cannot be applied to knowledge economies thus we see the emergence of "natural monopolies." "Good economic progression cannot be separate from good political governance" and the challenge of policy makers is to create policies that are inclusive of both the knowledge economy and the social economy (not-for profit organization, cooperatives, credit unions etc.). Placing investment solely on knowledge industries may not only curb economic growth, but may marginalize a large part of the community. According to Bouchard, the vocation of adult education should be devoted to redressing social inequities rather than investing in "marketable" education and although the human capital theory has triggered effervescence in creating economically viable programs, Bouchard cautions that valuable social issues could be lost.

In the same vein, Selwyn (2010) raises the question of whether the Internet is really an instrument of empowerment or simply a tool to make the already powerful more so. He is cautious in espousing the transformative rhetoric of digital networks and education. Instead he advances that the thread of thinking should be more structured around what has stayed the same as well as the potential discontinuities triggers by connectivity and dis-connectivity. He also questions whether digital affordances actually transforms existing social structures or simply adds on to them.

Of course networks are far from new. Barabasi (2004), a physicist specialized in network theory, reminds us of the powerful potential of network communication by describing the spread of Christianity. Castells intimates that "human thought is probably the most rapidly propagating and influential element of any social system" (2009, p.29) and Watts and Dodds (2007) claim that more than facts, it is the opinion of individuals

that influences what we adhere to. Selwyn adds to this train of thought in saying that "the notion of (dis) connection underpins the organization of all aspects of human life, from the biological to the social to the economic and technological" (2010, p.90) Finally, Stephenson (as cited in Kleiner, 2002) coincides with this notion and advances that experience has become the "surrogate" for knowledge. Thus one of the strengths of networks in learning is that it connects us to each other. Said differently, the affordances of web intersect two important ingredients in our knowledge needs: speed and finding the right 'knowledgeable other' (Bouchard, Kop, 2010).

Castells and Tubella (2007) confirm that a growing number of people, particularly young people, feel increasingly autonomous vis a vis the institutions of society. In the same vein as Bouchard, they identified six statistically independent dimensions of autonomy: personal, entrepreneurial, professional, communicative, sociopolitical, and bodily. In each dimension, they found a direct correlation between the level of autonomy in each and the intensity of Internet use. This leads to the conclusion that digital networks are indeed contributing to autonomy-building. However, advocates of autonomy in education seem inclined to do so because autonomy is equated with empowerment and emancipation. Does the autonomy provided by digital networks have the same resonance?

Let us turn for a moment to those who grew up surrounded by this technology. How different are they to the later generations who adopted it gradually? Although it goes beyond the scope of this thesis to expose the research on the 'net generation', it merits a quick mention that among the many theories concerning the "net generation" (those born after 1982 as per Oblinger & Oblinger, 2005), many studies are uncovering

that age may be less important than exposure to technology in determining distinctly different learning patterns (for example Bennett et al. 2008, Margaryan et al. 2011, Kvavik, 2005, Caruso & Kvavik 2005, Cameron, 2005, Buckingham, 2008, Van den Beemt et al., 2010 and Jones et al., 2010). And according a Pew study (2010) although millennial (those aged 18-33) surpass their elders online when it comes to communication and entertainment related activities, those aged 34-45 and older are more likely to engage in several different *types* of online activities. Oblinger & Oblinger's (2005) conclusion is that "age may be less important than exposure to technology" in determining distinctly different learning patterns. Given the inherent need of using technology in the workforce the 30-70 year old worker could indeed be considered another type of "digital native".

It seems increasinging clear why the digital dimension of learning is becoming the talk of the academic town. Castells (2000) tells us that toward the second millennium of the Christian era the technological revolution transformed the social landscape of human life. Impacting profound changes in economics, politics (e.g. contributing to the collapse of Soviet statism), this movement has increased individualism and diversification by decentralising power and increasing networking. Castells (2009) posits that technology has unleashed the power of networks and transformed information and communication.

As Bouchard (2013) highlights, common definitions of learning and knowing are being challenged within the context of networked learning environments. It has also affected the rhetoric surrounding the act of learning. Terms like 'social learning', 'informal learning', 'personal learning environments', 'incidental learning' are now common in the education technology vernacular and serve to capture a more complex phenomenon than the forms of learning that occur inside the traditional learning

classroom.

Amid the various characterizations of informal learning and SDL, Schugurensky (2000) untangles it best in making a distinction between "intentionality" and "awareness". He advances that not all learning is intentional as we are not always aware that we are learning. Under the umbrella of informal learning, Schugurensky devises three conceptual categories of learning: self-directed, incidental and socialization. Within these conceptual categories intentionality and awareness are the key elements that determine the variations in learning experiences. This is illustrated in the table below:

Form	**Intentionality**	**Awareness (at the time of the learning experience**
Self-directed learning	Yes	Yes
Incidental	No	Yes
Socialization	No	No

Table 1: Schugurensky's three forms of informal learning

Therefore, self-directed learning, as opposed to informal or incidental learning, is a deliberate act that assumedly carries a goal, practical or otherwise, whereas other more unplanned forms of learning may not be methodical. In fact, the literature will reveal that SDL in and of itself has many synonyms. Tremblay (2001) reported at least ten expressions referring to autonomy in learning. Things like self-teaching, self-instruction, self-learning, self-regulated learning all refer to what Schugurensky would describe as a deliberate act of learning.

Candy (2004) published an extensive report on how the digital world is affecting self-directed learning. In it, he asserts that indeed there is an intriguing symbiosis between self-teaching and digital technology. Candy advances that there are four

fundamental approaches to viewing the issue:

1) Exploring whether the amount of self-teaching has changed
2) Exploring whether a wider or different type of learner is now engaged in SDL
3) Questioning whether there are some non-trivial changes in learning dynamics
4) Exploring the different ways ICT provide in evaluating learning

With these perspectives in mind Candy asks the more general question of weather the general composition of self-directed learning has changed with regards to its earlier findings. He explores the question through the lens of six main themes that according to Candy encompass the main aspects of digital networks.

1) Connectivity: having access to digital networks through devices and services
2) Competence: being able to find and use knowledge. In other words, information literacies, basic ICT literacies and digital literacy
3) Content: having access to quality information. In other words, the information sought should not be locked away (reference to the creative commons and open source movements)
4) Credibility and confidentiality: feeling confident that the information is credible and that you can easily access it through technology
5) Capturing information: search engines and tagging
6) Collaboration: the ability to use and participate in knowledge co-creation

These are what Candy calls “threshold conditions” for people to engage in online learning. For Candy, these dimensions are interconnected and are all factors that play a role in creating digitally competent learners. Within each there are barriers to learning, but for Candy, by overcoming the barriers, there is “undoubtedly and unprecedented

amount of information available in the digital domain… …and we are in principle on the threshold of a new dispensation with regard to learning" (p.143). Candy points out that technologies are becoming seamlessly woven in work, leisure, shopping, banking, and social activities. In turn, Candy surmises that learning and other life activities such as entertainment and social interaction may become interwoven and less clearly defined within their instances.

Candy pays little attention to the psychological and socio-economic dimensions involved in self-teaching. Moreover, Candy does little to situate his thoughts in the overall body of knowledge on SDL—thus the portrait he paints feels somewhat incomplete and superficial. Still as a pioneer in the field, just as with his 1991 book on SDL, this more recent report does get the proverbial ball rolling in thinking about the contextual changes introduced by ICT as well as some of the questions we could be asking.

Digital networks and learning theory

A part from being a great 'directory' of any and all kinds of information, digital networks provide access to a network of people. And where information alone fails, peers can sometimes take us further. This has sparked renewed interest in Vygotsky's Social Learning Theory which posits that learning occurs by "scaffolding" knowledge within supportive environments (Zainuddin, A.S., Abdullah, A., & Downe, A. G., 2011). In the Vygotskian view, learning is a knowledge building process that occurs both individually (where we can) and collectively (where we can't). Said differently, the 'scaffold' is the metaphor representing the social co-participation needed to support the structure underneath.

But can this access to collective brains actually make our own brain, or at least the need to carry knowledge with it, obsolete? 'Distributed cognition' is a relatively experimental idea brought forth by Siemens (2005), that attempts to advance the notion that digital networks are creating an environment of 'connected intelligence' (Kerchhove, 2009) where learning is a shared interactive process occurring across many minds and we no longer have to store information in our brains but simply know how to access it. According to Siemens, knowing 'where' (as is where to find the information) is becoming more important than knowing 'what'. Despite any concrete evidence to support the phenomenon, according to Bouchard (in press) the question is not necessarily to look at whether we carry more or less information in our brains, but to look at how it has transformed our relationship with "how we know".

Dede (2008) contends that the crux of the epistemological shift introduced by digital networks lies in the fact that knowledge no longer resides with a single expert or institution. The collective and self-regulating properties of the Internet are gaining ground as the true knowledge reference and data no longer has to reside in an individual—it can reside on a computer server (Siemens, 2004).

"Chaos is a new reality for knowledge workers" (ScienceWeek 2004, quoted in Siemens 2004) and digital networks are creating several new trends in epistemology and learning. According to Siemens, networked learning occurs in "nebulous environments of shifting core elements." He contends that many people may change fields in the course of their lifetime and informal learning plays a major part in work-related learning (even replacing formal learning). He observes that learning is occurring in a variety of ways—through communities of practice, personal networks, and through work-related tasks.

Learning and work related activities are no longer separate. He advances that 'know-how' and 'know-what' are being replaced by 'know-where'. He says that learning is no longer about acquiring information but making connections between "data sets". Siemens claims that the amplification of learning, knowledge and understanding through the extension of a personal network is the epitome of what he calls 'connectivism'. Unlike constructivism, which describes learning as the process of "meaning-making" through gathering and interpreting data, chaos states that meaning exists and requires connection to access it.

Siemens and Downes (in Siemens, 2004) presented connectivism as a new theory of learning that addresses learning in complex, social, networked environments. Siemens and Downes propose the following principles on which adult learning in the connectivist view rests on:

1. Learning and knowledge rests in diversity of opinions.
2. Learning is a process of connecting specialized nodes or information sources.
3. Learning may reside in non-human appliances.
4. Capacity to know more is more critical than what is currently known.
5. Nurturing and maintaining connections is needed to facilitate continual learning.
6. Ability to see connections between fields, ideas, and concepts is a core skill.
7. Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
8. Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality.

9. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

In Siemens and Downs' perspective, learning theories like behaviorism, cognitivist, constructivism do not reflect the full spectrum of the learning possibilities that can occur in digital networks. According to Siemens, connectivism integrates the principles of chaos, networks, complexity and self-organization theories. They say that learning is no longer about acquiring information but making connections between "data sets".

> "Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision."(Siemens 2004, p.4)

Of course in this scheme, participation is key, and Siemens and Downes (2009) have highlighted the importance of four types of activity for successful learning: (a) aggregation of information, (b) remixing and reflecting on the resources and relating them to what people already know, (c) repurposing: creating something of their own, and (d) sharing their work and activities with others.

There is much criticism of connectivism as a learning theory for its lack of rigor (Bell, 2011), but Kop and Hill (2008) credit Downes and Siemens with having proposed an epistemological framework for networked knowledge, which in turn provides the philosophical basis for the connectivist learning framework. Given the theory attempts to reflect the knowledge distribution and morphology afforded by networked intelligence, Bell (2011) contends that connectivism may be describing a phenomena more than a

learning theory.

Candy (2004), does not attempt to reinvent the wheel when it comes to learning theory emerging from digital learning tools. His perspective is rooted in the cognitive psychology theory of 'schema'. Candy advances that learning occurs by assimilating information into personal "frameworks": personal constructs, concept maps, cognitive frameworks schemata, worldviews, meaning structures, personal models etc. Britt and Gabrys (2001) concur with this in saying that integration occurs by integrating information into existing structures--making connection between prior and new. According to Candy (2004) one of the interesting characteristics of online learning is its synergy with cyclical rather than linear processing. Said differently, concepts and knowledge can be visited and re-visited whilst building new knowledge structures around central themes. According to Candy, online learning seems to lend itself to a self-reflection component which oils the cyclical process by directing the trajectory back to important themes and building on those themes as more understanding is acquired. Ranger (2009) concurs with this vision in surmising that we are learning the same way we always have: "the brain, a pattern-finding organ, seeks to create meaning through establishing or refining existing neural networks; this is learning" (Wolfe, 2006, p. 35, quoted in Ranger, 2009 p.26).

The concept of the brain as a neural network in and of itself is also considered through the theory of 'connectionnism' which supports the hypothesis that the brain processes information by attributing certain values to synaptic nodes (Marcus, 2001) increasing or decreasing the likelihood or attractiveness of various types of knowledge over others (this model is also used in computing network algorithms). Thus our neural

circuitry functions more by virtue of the importance we give to a node as opposed to its content.

This contrasts with a competing theory of 'symbol-manipulation', which hypothesizes that information is processed mainly through interpreting symbols—thus placing the emphasis of information processing on its nature and type as opposed to its importance in our knowledge framework. Marcus argues that both are required to understand the larger question of what constitutes the 'building blocks' of knowledge.

Granic & Lamey (2000) claim that the self-organizing system of the Internet has the potential to catalyze major shifts in cognitive styles and beliefs. Some evidence posits that learning digitally may be increasing our cognitive flexibility ((Spiro & Jehng, 1990) and creating major epistemological shifts (Dede 2008). Small and Vorgan (2008) say that "daily exposure to "high technology" (computers, smart phones, video games, and search engines) is altering our neural pathways at a speed like never before. Along with UCLA neuropsychology and neuroimaging experts Bookheimer and Moody, they hypothesized that the stimulation generated in new media is altering the brain's neural circuitry in an important way. They studied both computer-savvy and computer-naïve subjects to find that the while performing Google searches, the computer-savvy subjects used a specific network in the left front part of the brain, known as the dorsolateral prefrontal cortex which is the part of the brain that allows us to make decisions and integrate complex information for a short period of time. The computer-naïve subjects showed minimal activity in that part of the brain, but after five days of Google surfing, those subjects had developed activity in the same brain region.

According to Small and Vorgan, the high-tech revolution is putting us in a constant state of "partial attention." This differs from what is commonly known as multitasking in that partial attention does not have a productivity goal. It simply puts us in a state of constantly scanning for any type of contact at every given moment. The authors surmise that there is a sense of self-worth and control in maintaining constant partial attention and it can even lead to a hormonal boost of energy levels and short term memory. However, unrelenting digital connectivity can actually impair cognition and create a "brain strain" that can leave people fatigued, irritable and distracted. Despite the dangers in overuse, the authors contend that the digital revolution is improving our ability to process large amounts of information and rapidly decide what is important and not. Through the brain's elasticity, they claim that we are customizing our neural circuitry for rapid and incisive spurts of directed concentration.

Moreover, Small and Vorgan cite research findings from the San Diego State University to show that teenagers may be losing the ability to recognize emotions. From the lack of exposure to body language, tone and facial expression, their brains seem to be pruning the excess synaptic connection that develops empathy during puberty. What's more researchers at Tokyo's Nihon University found that avid video game players appear to suppress frontal lobe activity, which is the section of the brain associated with reward, attention, long-term memory, planning, and drive. Thus on the one hand, exposure to interactive media is improving the speed with which we process information, but on the other may be affecting our ability to appreciate emotion and to retain information for long periods of time.

Bouchard (2011) hypothesizes digital networks are not really changing the nature of knowledge or learning, but may be affecting our epistemic maturity (Perry, 1970; Kohlberg, 1984; Baxter-Magolda, 1992, as cited in Bouchard, 2011). Bouchard recalls Perry's (1970) claim that adults go through observable stages of epistemic development—dualism, multiplicity, relativism and commitment. Bouchard advances that "those who argue that the interactive Web produces a new kind of knowledge are simply observing that Web 2.0 interaction socializes people into attaining Perry's third stage, "relativism"" (2001, p.291). Said differently, the Web is exposing us to multiple perspectives as well as how ideas morph with time and context, thus as learners, we must develop our sense of relativism in order to collect and assess knowledge.

Bouchard (2011) advances that the changes introduced by digitizing networks may not be as ground breaking as we think. Network enthusiasts are discovering what scientists have argued since the Enlightenment:

> "that knowledge will always remain an approximation of the unknowable because of the limited capacity of the human mind to apprehend the empirical, and that this approximation can be perfected through dialogic experience much better than by solitary speculation". (p. 290)

Said differently, Bouchard claims that the nature of knowledge collected by a network of people is not a new development in the history of knowledge. We are simply discovering the consequence of the "natural" properties of networks, which is to increase our "dialogic" opportunities.

Hwang et al. cite several sources to support the importance and necessity of "authentic activities" if effective learning is to take place (Resnick, 1987; Collin, 1989;

Price & Rogers, 2004; Looi et al., 2010,cited in Hwang,et al 2011). Hitherto 'authenticity' encompasses a viewpoint that advocates learning should ideally connect to real life application for it to be properly assimilated. A more purposeful and problem-centered effort, the learning that occurs as a result of informal learning is more likely to carry internal incentives rather than meet an academic criterion. Herrington, Oliver & Reeves, (2003) have found that authentic learning carries the potential of heightened motivation and the propensity to persevere despite initial disorientation or frustration, as long as the exercise simulates what really counts—the social structure and culture that gives the discipline its meaning and relevance. According to Herrington, Oliver & Reeves, this form of learning not only proposes relevant problem based learning, but also allows individuals to make connections to the community of the discipline.

Boekaerts and Minnaert have scoured the literature to articulate exactly what attributes of informal learning are likely to heighten the learning experience. Eleven comprehensive attributes of informal learning were identified:

1. The learning process is described as dynamic, deliberate, self-discovering, self-determined, open-ended, non-threatening, enjoyable, and explorative.
2. Learners use a number of self-regulatory processes spontaneously, such as self-initiating learning and self-monitoring progress.
3. The intrinsic motivation encompassed in informal learning facilitates self-regulatory processes.
4. Most informal learning is framed in a social context that uses social cues that are highly relevant in cooperative learning activities.
5. Learning activities are loosely organized, learner directed, and mediated by peers

who often share the same values, attitudes, interests, and beliefs.

6. Informal learning situations utilize (realistic) objects, materials or settings that are highly contextualized.
7. The experience is more qualitative than quantitative, more process oriented than product oriented, more synthetic than analytic
8. It is unhurried, self-paced, and open-ended with relatively few time constraints.
9. Even when there is a kind of curriculum (e.g., a tour in a museum to discover the ancient Greeks), it is a flexible, signifying that the structure is non-linear and bottom-up.
10. There is no compulsory, individual testing or assessment procedure, but rather a collective, informal type of assessment or self-assessment based on feedback.
11. Set goals tend to be broader which may result in considerable variability in what gets learned.

According to Boekaerts and Minnaert it is these attributes that give the impression that learning is more effective and connected knowledge is making this more easily available. This concurs with Bouchard's (2009) and Boucouvalas' (2009) ideas that the learning environment, learning context, and the connections people make during learning are important determining factors in the success of self-directed learning journeys.

Indeed there is a palpable excitement on the part of educators who espouse the notion that autonomous learning is a 'stronger' form of learning. Educational thinkers as early as Plato described the ultimate school as one where people who have reached the highest level of knowledge (the philosophical level as per Plato) simply meet and converse with each other in order to learn—because their knowledge needs have gone

beyond books and teachers. Illich (1971) proclaimed that self-direction is the ultimate learning outcome. It seems odd that some educationalist seem so eager to remove themselves from the equation. Why? Perhaps effective authentic autonomous learning encapsulates the maximized cognitive potential of humans and provides a clearer characterization of what the tools are required to counter the barriers to learning. And what about the barriers? There is a heavy flip side to the benefits of networked learning and a large body of literature that exposes digital networks as a possible deterrent to learning.

Digital networks and its barriers to learning

Carr (2011) claims that the Internet is reducing our ability to concentrate--that it draws our attentions in only to scatter it. He observes, anecdotally, that the Internet may be impeding our deep learning and thinking. Also, he claims that we are retaining less and taking much longer to absorb information than if we were to do so in a linear fashion. Carr (2010) exposes research that shows that people who read text studded with links understand less than those who read traditional linear text, that people who watch busy multimedia presentations remember less than those who absorb information in a calmer more focused manner. Britt and Gabrys (2001) add that non-linear reading requires high levels of building links between concepts in several ways. Moreover in researching secondary school and college students, Gardner (2007) found that the students were unable to make conceptual connections with notions that were abstractly related to things previously learned.

This concurs with a concern raised by Candy (2004) about the depth of the learning experience and the amount of discernment it takes to filter information. Candy

advances that learning through the Internet can lead to "shallow reproductive learning" (p.55). What is reproductive learning? According to Candy it falls in the family of 'approaches to learning' of which there are three types:

1) Deep approaches: where the learner demonstrates a serious interest in a topic a seeks to develop an underlying understanding of the general principles and meaning structures behind the topic
2) Surface or reproductive approaches: where the learner is required to simply memorizes knowledge sets or skim the surface to gain quick insight
3) Achieving approaches: where learning deliberately fulfill the minimum requirements to get some from of official recognition

According to Candy, ICT create a temptation to lean toward surface approaches learning, perhaps even unbeknownst to the learner. Conversely, Candy also advances the opposite perspective in questioning whether placing learners in contact with actual people may feed a propensity for deeper learning. For Candy the question hangs in the balance.

Clark and Mayer (2008) posit that learner control can be effective only when individuals are able to make accurate decisions about their learning needs. According to Clark and Mayer, although we may feel we have a good sense of what we know, the accuracy tends to be poor (Stone, 2000, cited in Clark and Mayer, 2008). They call this poor "calibration" which basically measures the level of confidence one has on a given learning endeavor correlated with the actual learning results. In other words, self-assessment of learning performance can be a poor indicator of performance. They found that only those who display a high degree of metacognition seem to display good results self-teaching. Moreover, according to Clark and Mayer, aside from educators, for whom

the research reveals a high degree of metacognition, it would appear that many of us have a rather poor sense of our learning needs. Thus with no one to filter the good from the bad, the fears of falling into an abyss of chaos and becoming nonsense zombies abound.

Barabasi (2002) advances that despite the high volatility of networks, they are not purely chaotic. He claims that social and digital networks are governed by a power law in which the more links grow out of a given node the more other nodes will gravitate toward it. Barabasi observes that preferential attachment in power laws is the "patent signature of self-organization in complex systems" (2002 p.77) Barabasi calls this phenomena a "rich get richer" system that is typical of what he calls "scale-free" networks. Granic and Lamey (2000) advance that activity (i.e. information creation, knowledge sharing, socializing etc.) tends to stabilize around coalitions which can be linked to cognitive schemas. They say that "these coalitions, in turn, constrain one another in a coherent interpretation of inputs". Perhaps the inference is that digital networks work more like a jam session than a cacophony--nodes will be attracted to and accepted in the networks in which they recognize the music and play the same tune.

Castells (2009) cautions that we can fall into somewhat tainted view of the world by gravitating toward information that confirms what we already think. Castells provides an example of how powerful disinformation can be in reporting that in 2006, during the Bush administration, 50% of Americans believed that Iraq was in possession of weapons of mass destruction, when in fact it was shown to be false. Castells advances that we are "cognitive hoarders" or "cognitive misers" of information that suits our predisposed judgments. We are considerably more reluctant to accept knowledge that challenges our

beliefs and convictions. If this is the situation, it certainly provides a strong case for incorporating critical media literacy throughout school curricula.

Castells continues with the concept of popularity in networks, he characterizes the 'attractiveness' of a communication cluster as a set of common goals which somehow simultaneously ensure unity of purpose and flexibility (2009):

> "The relative importance of a node does not stem from its specific features but from its ability to contribute to the network's effectiveness in achieving its goals, as defined by the values and interests programmed into the network"
> (2009, p.20)

Bouchard (2013) calls this a "close-knit tribalism that encourages adherence to self-proclaimed truths" (p.3) which raises the underside of network morphology in that it is not the quality of the knowledge that attracts popularity, but the fact that the source simply confirms what we already know.

Mejias devotes much of his research to exploring the limits of digital networks. Although he acknowledges that the Internet and its benefits for knowledge construction and sharing are plentiful, he also sees how it is creating inequalities and elites. He denounces the so-called 'socialism' of the Internet and describes it as a "decentralized network structure superimposed over a centralized network structure" (2009). This technical concept parallels the social phenomena of digital connectivity. Mejias says that through the Internet we have created a "heterotopia" in the Foucault sense. In other words, through the Internet we have created an alternative environment in which we have replicated the same capitalist interplay as in the real world, thus confirming that we cannot break away from capitalism. Mejias goes so far to say:

> "Big companies are plucking the fruits of P2P (peer to peer) collaboration in order to reinsert them into the market as commodities." (2009)

In other words, digital networks are implicitly turning its users into the products they sell to advertisers and media groups.

Mejias says networks are not just metaphors we use to describe the world, but they are tools we use to frame the world or actively organize the world and shape our social reality. Mejias says there is a danger that networks create people who cannot think outside of the network. Nodes on the network can only see other nodes, thus any knowledge or person who/that is not on the network is not seen--or for all intents and purposes, does not exist. Thus Mejias speculates that our social reality is being mediated through "nodocentric" filters. Thus despite the popular notion that digital networks are horizontally organized (i.e. no hiearchy) and offer freedom of thought to everyone, he hypothesizes that whatever does not conform to the networks' organization scheme will be left outside. This joins the idea expressed earlier that network clusters form around common values and interest in which case opposing view points or ideas are not likely to penetrate. In turn, one could infer that the small world phenomena of networks may also be producing 'small minds'.

The other potentially damaging aspect of the Internet, is the possibility of privacy invasion. With the seemingly endless openness of the Internet and its chaotic dynamism, also comes opportunities exploitation. The Economist (2010) reports that one trillion dollars were lost to cyber-crime in the U.S. last year (bigger than the drugs trade)--a portion of which was attributed to personal data theft (e.g. bank accounts, credit cards, identity). With this in mind, it seems somewhat paradoxal that we are willing to share intimate details about ourselves with our network when we wouldn't do it with our next-door neighbor. What is it about the digital dimension that makes us less guarded? There

are several theories on why the threat of privacy does not hinder digital networks from flourishing. From the psychological perspective Granic and Lamey (2000) claim that our digital presence allows us to create multiple selves that emulate each part of who we are. We are more ourselves on the Internet than in person. Each part gets more fully expressed. From a social perspective, Mark Zuckerburg, co-founder of Facebook, recently said that "privacy is no longer a social norm" (Kirkwood 2010) and Grohol, also a psychologist, claims that ease of use will even trump privacy concerns when it comes to accessing information. Grohol hypothesizes that we inherently take the path of least resistance when it comes to getting tasks done and although he has no empirical data to support his observation, it is easy to apply this assumption to the knowledge worker who may have no choice but to exist in the digital realms if they want to stay competitive and employable.

Another elusive aspect of the human morphology that plays an important role in what attracts us to information outputs is emotion. “The affective side of learning is the critical interplay between how we feel, act, and think. There is no separation of mind and emotions; emotions, thinking, and learning are all linked” (Rager, K. B., 2009, p. 71). In turn, a learning situation that conjures an emotional experience is more easily retained that something that leaves us indifferent. However, according to Ranger emotion can be “a double-edged sword, with the ability to enhance learning or impede it” (p. 40). Ranger advances that in periods of intense emotional response, neuroscience suggests that our ability to access higher order problem solving skills is diminished and less efficient.

Damasio (1994) also studies the intense role emotions play in our decision making process by way of his ‘somatic marker’ hypothesis. The theory explains at great

length the factors at play in what is commonly known as our 'instincts' or said differently what feels right or wrong. Indeed the new trend to consider emotion as an integral factor in rational thought or knowledge. Bandura(1986) expresses this in a slightly different way through his Social Cognitive Theory which represents learning as a three-way interactive model linking learning, the individual, and the environment which in turn "recognizes the influential causal contribution of thought processes to human motivation, affect, and action" (Bandura, 1986, p. xii).

Wesch (2009) has done considerable work on exploring the effects of new media on society and culture. In a talk given at the Personal Democracy Forum social media networking conference in Manhattan, Wesch proposed a meta-analysis of YouTube to uncover the nature and quality of the material being produced with social media tools. He introduces his analysis by basing himself on Neil Postman's concept of "media ecology." In his book Amusing Ourselves to Death Postman considers George Orwell's Nineteen Eighty-Four and Aldous Huxley's *Brave New World* to compare early speculations about the future. In the Orwellian version, the "truth" is controlled and concealed and in the Huxleian version the truth is drowned in irrelevance because humans are too busy pursuing their hedonistic distractions. In Postman's and Wesch's perception, we are closer to Huxley's version. Wesh paraphrases Postman to intimate that media are environments, they are not simply tools or means of communication, but mediate our "conversations".

Castells advances that there is a subtle but potentially potent power struggle that digital networks have intensified—that of controlling minds. He posits that understanding power relationships requires: " characterization of the network society in its main

components: production and appropriation of value, work, communication, culture, and its mode of existence as a spatiotemporal formation" (2009, p. 26). Castells advances that the ability to control minds inherently relies on the ability to control communication. Thus part of understanding the impact of digitize networks and knowledge relies on seeking out what or who is defining the sites we connect to and characterizing the underlying rhetoric that creates the flow of knowledge—or said in more Castellian terms, what is defining the value and how we are appropriating it.

Marshall and Rosette (2011) advance that among the "good list" of networked knowledge concepts such as collaboration, de-centering and democratization are among some of the qualities researchers like Collis & Moonen (2001, as quoted in Marshall & Rossette 2011) ; Duffy & Kirkley, (2004, Marshall & Rossette as quoted in Marshall & Rossette 2011), Cross (2007, as quoted in Marshall & Rossette, 2011) and Siemens (2005, as quoted in Marshall & Rossette, 2011). But although this may seem so on the surface, Mejias (2009), Castells (2009) and Barabasi (2002) raise the counter claims that the digital networks are doing the opposite and creating opportunities for mega-monopolies which in turn provide easier routes to control information and minds. In fact, when digging to find the owners and managers of the major sites and servers, digital networks are in actuality owned and defined by a handful of people. But does ownership truly give the power to the owner?

Castells (2009) talks about "walled gardens" to posit that whilst we may feel that the Internet is free and uncontrolled, most sites are actually owned and controlled by network operators with specific business interests. Barabasi (2002) and Castells (2009) talk about the "small world" phenomena of networks and demonstrate how many of the

business and media heavyweights end up sitting on each others board of directors as a result of network logic. Thus large multinational companies are really run by a handful of people. Castells reminds us that the Internet "pipes" are in fact privatized and may even "supersede the state in earning public approval of legislation" (2009 p.28). Implicitly, networks work on an inclusion/exclusion logic and Castells intimates that "competition may also take a destructive form" by disrupting the information flows of competing networks (2009, p.20). In other words, small world logic can be a double-edged sword—it may make information travel fast, but it can be orchestrated. Thus instead of cultivating collaboration and democratization, digital networks can also cultivate one-upmanship, propaganda and scandal politics.

Of course these media and business giants cannot overtly control what you post on Facebook. When you are behind your keyboard, you feel completely free to unleash your inner activist and few can stop you. The influence of network monopolisation is much more subtle, but highly potent. Consider Bush's war on terror campaign. Within this framework, Castells reports a number of media related tactics to feed the belief that the United States was at high risk of terrorist attacks. From nurturing the beliefs that Iraq is in possession of weapons of mass destruction (which is a proven myth) to hiring actors to pose as journalist and post 'viral' videos of Bush as a the hero and protector of the American people. Castells talks about the "Murdochisation" of the media to characterize a market driven journalism thriving on ratings rather than the truth--thus scandals are the stock and trade of the media. Even the CBC has seen an increase in economically themed programming ever since the Harper government is in place. Bouchard articulates that :

> "in such an "information-rich environment", the new currency is the awareness of the information seekers; we are therefore witnessing the rise of an "economics of attention" in which the attention grabbing value of any message outweighs the actual value of its meaning or intention" (p.292, 2011).

In essence it means that much of what fuels the information on the Internet may be influenced by the economic need to drive traffic to the site you are consulting. How much is true or inflated? Although digital networks feel free and democratic, the media giants still hold much of the subtle momentum over the information that is disseminated.

Digital networks may seem decentralized and unmediated, but as it has been observed, there is an underlying power law that provides some organization. This notion adds another important analytical category to consider in this research: that of critical network literacy. Said differently, if we flock to nodes with which we share values and interests and we flock to nodes that are already popular, how sharp are we in evaluating the quality of information? There is a possibility that all this 'cyber noise' is making us more critical by virtue of the fact that we must self-mediate, but there is also the possibility that we are getting duller and more duped into a clique effect. Indeed, Bouchard (2009) 'semantic' dimension helps isolate and concentrate on the cluttered and complex process of interpreting meaning over digital networks and the 'economic' dimension prompts thinking into exactly what is becoming valuable. What is the conclusion? Yes there are sinister elements in this unmitigated learning environment (as with any environment populated with people). What does it take to survive? The next

section will explore some of the discussion around the tools for learning autonomously in digital networks.

Digital networks and what it takes to survive

The barriers to learning in digital environments are plentiful and rather worrisome. There is indeed a sea of 'cyber noise' or 'cyber garbage' one has to sift through in order to find their nuggets of golden information. Setting aside whether this is making us smarter or duller, the question is what does it take to get the most of out of affordances of digital networks? If learning is now tied to survival, and learning is also tied to the digital networks, then ultimately digital networks are tied to survival. Therefore, SDL is hypothetically no longer a luxury bestowed onto learning aficionados, or even a choice among many different types of learning journeys. SDL is an essential skill. Thus what are some of the known components of the skill?

First, research seems to lead us back to some familiar pillars—namely personality. As a predictor of learning self-efficacy, it seems paramount. The literature abounds with multiple studies on just who the self-taught are and what common personality characteristics are shared among them (see Annex 3 for full list of personality traits from SDL literature). In fact, as said previously some researchers feel that SDL is a personality trait in itself (Torrance & Mourad,1978). But within this broad frame, certain more mainstream traits seem common.

First there are the Big Five (Lounsbury et al., 2009). Based on a sample of 2102 college students, learner self-direction was found to be significantly related to four of the Big Five traits: agreeableness, conscientiousness, emotional stability, and openness—as well as four narrow personality traits: sense of identity, optimism, tough-mindedness, and

work drive (Kirwan, Lounsbury, & Gibson, 2010).

In one study, higher levels of self-directed learning were found to be related to extraversion and intuition (Leitsch & Van Hove, 1998) and intuition and judgment in other study (Johnson, Sample, & Jones, 1988). In a more descriptive approach, Lounsbury et al. (2009) create a portrait of the self-directed learner defining them as people who have a firm sense of identity, experience higher levels of life satisfaction, have higher levels of vocational interests for investigative, artistic, enterprising, and conventional occupations, and are more likely to be conscientious, well-adjusted, optimistic, self-actualized, intuitive, hard-working, and open to new experiences. In light of the above, the self-directed learner seems to carry some typically strong personality traits—someone we'd like to know.

Along with personality, and perhaps even a sub-category, there is self-regulation. Self-regulated learning refers to the abilities required in monitoring and controlling one's own cognitive performance before, during, and after a learning episode. According to Dettori and Persico (2008) SRL covers the pedagogical, social, emotional, motivational, cognitive and meta-cognitive aspects involved when individuals learn to control their own learning processes. Self-regulation includes elements of planning, goal setting, strategy implementation, summarizing, and monitoring one's progress (Azevedo, 2005, Winne& Nesbit, 2009, Zimmerman, 2008, in Dettori & Persico, 2008).

Schraw, Kauffman, & Lehman (2002) partitions the construct into three components they referred to as knowledge, metacognition, and motivation. Knowledge included facts, concepts, and schemata related to a particular learning task. Metacognition refers to knowledge and regulation of cognition (Brown, 1987, in Kauffman, 2004).

Knowledge of cognition consists of knowledge about oneself as a learner as well as the conditions that constrain learning. Dettori and Persico's (2008) advance that there are three key SRL indicators: (1) the learners' abilities to plan, monitor and evaluate their own learning process (2) the learners' abilities to cope with cognitive, meta-cognitive, emotional and motivational challenges imposed by the learning process and (3) the learners' abilities to practice the above both in individual study and in a collaborative learning context, be it face-to face or at a distance.

In other words, regulation includes a wide variety of general skills such as goal setting, planning, implementing strategies, monitoring, and evaluating one's learning. Social psychologists posit that unconscious factors may affect self-regulation in important ways (e.g. Kruglanski, 1996, Markus & Wurf, 1987, in Boekaert & Minnaert, 1999). Moreover, desirable and undesirable self-conceptions are very influential, not only because individuals tend towards desirable and avoid undesirable goals, but also because they tend to choose activities that support how they view themselves (Boekaerts & Minnaert 1999).

Basically the psychological dimension to SDL in digital environments is much the same as earlier literature on the subject. Claims that not much has changed in terms of the psychology of learning rest comfortably stable within this aspect. After all, it is still us—humans, good and bad. But psychology is only one aspect. What about the more mechanical side of gathering, making sense and even creating knowledge? Is there a recipe for good surfing? Some tangible skills?

This is the question Gagliardi et al. (2009) hoped to answer in questioning oncologist use of ICT for research and learning. Their findings revealed a four-step

learning process: identification of the learning need, deciding whether to pursue a learning task, acquiring new knowledge and applying what was learned. They detected and increased use of text-based or explicit knowledge using the Internet, but also consulting colleagues for experiential or tacit knowledge. Some of their findings revealed that most surgeons consulted published information first and then followed this up by consulting more "tacit" information from local or distant colleagues. Figure 3 illustrates the general process emerging from the study:

Figure 1: Adaptation of Gagliardi et al. "Self-directed learning process and outcomes"

Gagliardi et al. chose to work with cancer surgeons because of the inherent need of self-teaching to keep up to date. The interviews showed that indeed convenience and accessibility influenced choice of information source. The Internet was often consulted first, and searching took place at home after business hours. Often, 'codified' information (documents and articles) were crossed reference with what the researchers term 'tacit' information coming from consulting colleagues. Some of the barriers of SDL included very basic searching skills such as knowing what question to ask or where to find the trusted sites and sources.

This concurs with Bouchard and Kop's (2010) point that travelling from node to node or from blog to blog may indeed expose individuals to many points of view but that to adopt significant knowledge, learners will most likely turn to a "knowledgeable other" to solidify learnings. And Castells would agree that one of the challenges of using the Internet for learning is finding the right information. The term 'mining' for information is often used to describe the process by which we sift through massive amounts of resources to find the gems we need. As Castells advances, information on the Web is in a constant

state of construction and re-construction and that more than acquiring knowledge, the key to being in the "information flow" is knowing which "flows" to connect to (2009). "The information age is increasingly organized around networks", says Castells and the "pipe is more important than the content within the pipe. "

Indeed, it was mentioned that cognitive ability and personality or a predisposition for sociability and likeability may be factors in successful learning endeavors in the online world. But beyond the psychological and mechanical aspects of learning in digital environments, there are more technology and research related skills that aid in bringing a learning endeavor to fruition. Things like knowing how to search, how to filter disinformation, how to stay current, how to be critical and how to transfer what is learnt into other knowledge areas are key abilities. In the literature these skills are reflected in the notion of 'literacies'.

Traditionally, literacy refers to the ability to read and write, or in other words, transcend symbols into meaning, but more recently the notion of literacy has exploded into many different spheres related to occupation, ease in using digital technology, sub-cultures etc. Candy (2004) advances that literacy is more analogous to different intelligences as in Gardner's (1993) notion of intelligences. In the same way it has been suggested that that there are multiple literacies, including visual literacy, media literacy, critical literacy, numerical or statistical literacy, musical literacy, film literacy, cultural literacy and so on. More closely related to the use of technology, Candy refers to a study conducted by the West Australian Department of Training and Employment (Market Equity, 2001, cited in Candy 2004), to qualify exactly what it entails to be 'computer literate'. The components are:

- awareness of day-to-day computer applications;
- functional ability to use a computer to carry out basic tasks;
- ability to use online computer applications to good effect without supervision; and
- awareness and understanding of the broader social and ethical issues surrounding computer and Internet usage

In addition to IT literacy, 'information literacy' serves to capture the more subtle skill of evaluating and deciphering information. According to Webber and Johnson (2000, cited in Candy 2004) most definitions of information literacy have the following elements:

- effective information seeking;
- informed choice of information sources;
- information evaluation and selection;
- comfort in using a range of media to best advantage;
- awareness of issues to do with bias and reliability of information; and
- effectiveness in transmitting information to others

And what about the ability to decipher information amid the 'chaos' of the digital environment as the connectivist Downes and Siemens would describe it? Or as Castells would put it, being able to identify and connect to the right 'flows' of information. Could these also fall under the umbrella of literacies? Or how about being able to transform knowledge into value or power? Else the astuteness it takes to decipher some of the power relationships at play behind the digital scene and how these can come to taint the information being disseminated. Behind the seemingly free and decentralized shroud of knowledge and information being offered through digital media could there be a more

sinister side that we need to be aware of? Mind control? Propaganda? The current underlying social rhetoric certainly seems to be laying a strong tendency toward capitalist gain and commodification. Is this by choice or are we somehow being herded in this direction?

When it comes to getting a thorough overview of the rhetoric surrounding the concept of literacies, especially those introduced via the digital and social networking dimension, Pegrum (2011) is comprehensive. But more than a review of the new literature surrounding the digitally-related literacies, Pegrum interlaces his rendition with a critical analysis of the themes that surface as a result of digital networks. Themes like 'information overload', quality vs. quantity, socio-political codes, scattered concentration and emotional stress due to continued connectivity are explored via the lens of literacy. Ultimately Pegrum's article takes the form of a call to action in articulating exactly what is needed, cognitively, socially, technically and psychologically, to assemble, interpret and make meaning over digital networks. As Pegrum puts it "we should not be duped by the sight of fingers flying across keypads or keyboards. We will fail to realize how sparse digital literacy is with youth" (p.10)

Within a more global category 'digital literacy', popularized by Glister (1997, cited in Pegrum, 2011), is the ability have a critical eye in consulting, evaluating and creating information over digital networks. It requires one "to recognize and use that power, to manipulate and transform digital media, to distribute pervasively, and to easily adapt them to new forms" (Jenkins, 2009). From this bore the concept of 'multiliteracies' proposed by the New London Group (2000, cited in Pegrum). But within these concepts hides several more subtle abilities that warrant identification if digital literacy or

multiliteracy is to be achieved. Since these terms have emerged, literacies have multiplied and gotten more complex. As Pegrum puts it, there are “swaths of literacies” that serve to capture digitally rooted skills. The table below summarizes all of the literacies presented in Pegrum’s article, as well as the implications Pegrum proposes to educators and educational planners.

Literacy	Description	Implications for educators	Source (as cited in Pegrum 2011)
Print literacy	The Web remains a reading and writing space, thus the ability to hold and audience's attention and presenting arguments convincingly and coherently.	Teach students to express themselves clearly and eloquently. Help students develop a public identity via blogs, wiki, and discussion forums.	None cited
Texting literacy	Netspeak or textspeak (more appropriately called "txtspk". For rapid textual expression. Like short hand.	Teach students when and how to swICTh from textspeak and more cursive forms of written expression. What Pegrum calls a "codeswICThing" approach	None cited
Hypertexting literacy	The ability to amplify and highlight points for interest in a message while being aware of the possibility of distracting the reader.	Teach how to punctuate a text with hyperlinks to lend credibility to certain concepts and include a level of reader autonomy.	Weinberger (2009a)
Media literacy	Maps out how traditional and digital media and advertising work to capture attention and stay top of mind	Help develop a critical understanding of the underpinnings of how we can be influenced by media and advertising. Help students see through the sleek designs.	None cited
Physical literacies	Not well described in Pegrum's article. From Wikipedia, it relates to the acquisition of physical competence and understanding of how being physically active promotes a better		Sandford, 2009

	quality of life.		
Technological literacy	The ability to use Web 2.0 software and other software	Requires sensitization and practice in being adaptable and open to learning new technological tools	None cited
Code literacy	The ability to read and write computer code	Those who posses this may be able to sideswipe the communication "templates" imposed by participatory sites as well as understand censorware imposed by certain governments. Entails a teacher training component to help combine their knowledge to students who are already code literate	None cited
Search literacy	Knowing how to use keywords to get results. Understanding how search algorithms work and may limit search results	Have students compare search result from different engines to analyze how the hierarchical system operates	None cited
Tagging literacy	Refers to the way information is indexed	Students need to understand the nature of indexing to be made aware of how tagging can make information more linked together, but also more vague and inconsistent. Students need to learn to read taxonomies and	None cited

		folksonomies	
Information literacy	Refers to the ability to identify and verify validity and reliability in information	Students should be made familiar with the concept of data triangulation or perhaps how to deconstruct information by following the data trail. Teachers need to include how to decipher origin, completeness, currency, and relevance.	None cited
Filtering literacy	In remedy to the information overload syndrome. Not unlike Castells concept of finding the right "flows" to connect to	Students need to know how to set up filters to ensure that the right information makes it way to us.	Shirky (2008)
Attention literacy	Refers to the phenomena of becoming distracted by details and perhaps missing the large patterns	Teaching students when to turn the network off and take time to reflect.	Rheingold, (2009)
Personal literacy	The ability to talk about yourself. Being able to shape our online presence. Reducing the chances of being misrepresented or misunderstood.	Students should be encouraged to experiment with representation through blogging or in digital stories in preparation for their professional careers.	Burniske (2008)
Network literacy	Is the ability to leverage digital networks to stay informed through mindful connections. Involves understanding the processes involved in shaping and being shaped by one's network.	Students for lower socio-economic background who may have less access to networking tools should be given opportunities to shape their online networks in view of future prospects.	None cited

		Also students must be sensitized of their digital imprint and how this can come to taint their reputation. Should include a component of digital safety with regards to privacy, surveillance, safety and responsibility	
Participatory literacy	Entails having an appreciation of how you contribute to the collective intelligence of a given field. Can include online social activism, political and civic involvement.	Teacher should aid students in honing their public voices and preparing them for the conflicts that participatory culture can create.	None cited
Cultural and intercultural literacy	Speaks to the ability to understand information within a cultural context. Also the ability to communicate with people from different cultural backgrounds whilst being mindful of their cultural background	This ability requires "epistemological humility" which means the acknowledgement that one's perspective is not the only perspective.	Ess, 2007
Remix literacy	Refers to the trend of taking pre-existing images, sounds, video, etc. and re-posting it with a personal spin. A phenomena Ito et al. refer to as "geeking out" or Dadaism gone global. Seen as the antithesis to the "templates" imposed the digital environment.	Remixing requires a host of digital literacies in order to decode the cultural products and repackage them in a relevant and compelling output. Encourage student to be active creators rather than passive consumers.	None cited

		Caution student about copyright and plagiarism Steer energies toward "educationally acceptable" production	

Table 2: Summary of Pegrum's (2011) literacies for digital learning

Pegrum's survey says so much about the undercurrents that can tug about when individuals intersect with Web tools. It is no wonder that some experience 'brain strain' or loss of concentration. Intersecting individual variability and individual self-efficacy with the Web creates plethora of skills and tensions. Indeed the body of knowledge surrounding literacies brings forth many questions on how educators and institutions should be modifying their role vis a vis this highly impactful societal and economical reality. Although it goes beyond the scope of this thesis to explore how formal institutions are responding to the new digital reality, embedded in Pegrum's discussion are really some of the fundamental learning considerations that may not be as 'natural' as we may like to think.

In a more global perspective, Gardner (2007) integrates cognitive science, neuroscience, history, anthropology, politics, economy and human values to offer five states of being that he speculates will be necessary in the new age of learning and work. Gardner admits the skills he sees relevant for the future are skills that have been relevant in past. However he hypothesizes the success of an individual in the digital age will greatly depend on their ability to embody these states.

In researching secondary school and college students, Gardner found the students were unable to make conceptual connections with notions that were abstractly related to

things previously learned. For Gardner, they had not learned to think with a ‘disciplined mind.’ Said differently, in learning there is a sense of discipline, or method, that can apply to all learning situations. For Gardner, without some form of disciplined thinking, learners may indeed get lost in the sea of information and eventually get washed up on the shore, disoriented.

Next on Garner's list is the "synthesizing mind". He turns to Nobel Prize-winning physicist Murray Gell-Mann who said that the most premium mind of the 21st century is the mind that can synthesize. With the explosion of information and its tip-of-the-finger availability, synthesizing massive amounts of data whilst keeping a vision of the big picture is a key learning skill. Some examples of synthesis include the ability to transfrom learnings into narratives, taxonomies, concepts, general rules, metaphors, theories and meta-theories. A little like Michelangelo's depiction of Christian history on the Sistine Chapel, impactful individuals have the ability to unify massive amounts of information in a way that is meaningful to their audience.

The third mind for the future is the "creating mind." He explains "in our global, wired society, creativity is sought after, cultivated and praised." Although it may seem like Gardner's claim is self-evident for any generation, he reminds us creativity was not historically valued (e.g. Galileo was imprisoned and Giordano Bruno burned at the state). The pace of innovation is blinding and those who can tap into pressing needs will have a viral effect, says Gardner. However, creativity is not a skill given to all, thus how can the "in-the-box" thinker stay a valuable contributor? Gardner qualifies the concept of creative thinking by recalling that many of our recognized creative icons (Mozart, Picasso, and I would venture Steve Jobs) were successful not necessarily because they had a creative

gift (though some did), but because they were able to risk failure and pick themselves up and try again when they failed. According to Gardner, the creative mind should be able to envision possibilities that are different from the current reality and should be able to inject just the right amount of critical analysis to not stifle visionary thinking. Gardner also contends that creativity can be cultivated in groups. Thus the ability to work collaboratively may palliate a lack of individual creativity.

The fourth state of being that requires conscious consideration is the 'respectful mind.' Albeit unquestionable, Gardner points out although we strive to respect each other, we have a distinct proclivity to band together against one another. There is a constant tension between altruism and antagonism that irks the human mind and according to Gardner it is the work of every generation to strive for respect. Increasingly relevant in digital environments where the absence of body language, facial expression and tone can leave more to interpret in non-verbal communication, the respectful mind in Gardner's view is not so much political correctness, but a flexibility and an openness toward differences.

Lastly the 'ethical mind' is among Gardner's 21st century skill that refers to the ability to recognize and strive for what he calls "good work." Essentially, through the ethical mind, Gardner is stressing the importance of citizenship and contributing to society through our talents. Albeit Gardner is not an ethicist per se, but as a psychologist, he explores how moral and ethical capacities develop, or fail to develop and his reflection on the development of ethical thinking have deep underpinnings. Despite the sound of it Gardner is not taking a preaching stance with his advocacy of the 'ethical mind' but really is investigating the ways in which people aspire to do work of high quality that

matters to humanity, improves the lives of others, and is done ethically. Said differently, the 'ethical mind' contains a dual objective in producing well-polished work that fits in the overall socio-economic and socio-political context and as we will see in the next section, having the awareness of the societal context in which we operate is indeed element of self-efficacy.

The list of what it takes to overcome some of the barriers to learning in digital networks is long indeed. The right mix of people and information, personality, literacy, and the right 'mind' are concepts that all seem so closely related they overlap and even repeat the same ideas. Still educationalist are increasingly thinking about and building various curriculums that address these issues. The notion of educators as facilitators of learning has re-emerged as a key philosophy in empowering learners. But this has been met with reminders that for certain fields proper knowledge transmission can only occur through the mouth of experienced professionals. Critical media literacy and critical online engagement (Norris 2001; Walters & Kop, 2008) are other themes that are gaining importance, but with the swaths of literacies underpinning a digital learning endeavor, characterizing a curriculum around these concepts is a work in progress. Let me now synthesize what this literature review reveals and pin point some of the aspects that could warrant exploration.

Synthesis

What would Vygotsy, Freire, or Foucault have to say about digital networks? Wesch (2009) tells us that Thomas Edison predicted the end of schools and institutions with the arrival of movies and Shirky (2010)claims that when Guttenberg invented the printing press, we produced pornographic stories long before using it for scientific

journals. The impact of digital networks on learning and knowledge has certainly created very dramatic viewpoints. For some, it opens new learning paradigms such as connectivism and post modernist knowledge construction and for others, it is eroding our ability think and recognize purposeful content. Are we slumbering in mediocrity or thriving in an abundance of collective intelligence? According to Jenkins the truth lies somewhere in between. He says that:

> "Knowledge communities work together to forge new knowledge often in realms where no traditional expertise exists; the pursuit of and an assessment of knowledge is at once communal and adversarial. Mapping how these knowledge communities work can help us better understand the social nature of contemporary media consumption. They also give us insight into how knowledge becomes power in the age of media convergence." (2006 p. 20)

Castells says:

> "Societies evolve and change by deconstructing their institutions under the pressure of new power relationships and constructing new sets of institutions that allow people to live side by side without self destroying, in spite of their contradictory interests and values." (2009, p.25).

As we crossed into the new millennium, a number of reports on K12 education – such as "enGauge®21st Century Skills: Literacy in the Digital Age" (North Central Regional Educational Laboratory, 2003) and "Results that matter: 21st Century skills and high school reform" (Partnership for 21st Century Skills, 2006) – began to question the adequacy of school education in preparing students for new challenges in the twenty first century. SDL is listed as a key component. SDL is also intricately linked to lifelong

learning, which has been listed as a demand for modern society by international organizations such as UNESCO and OECD. But as we suspect, SDL is more than just a learned skill, it requires motivation, discipline, a good personality, a nurturing environment and a critical eye, which in turn may be pushing the ability to harness networked knowledge further away. Said differently, the problem is this: if SDL is the skill required to survive in the new millennium, it may be creating large social gaps between those who *can* tap into the power of digital networks and those who use it for more trivial or narcissistic purposes. It appears that educators and policymakers have been considering how to integrate new media into education, but with the speed of innovation and the rapid adoption of the newer generation, the population may be better served if they were reflecting on how to prepare people to live with new media in purposeful way.

Out of the classrooms, away from books, exercises and linear learning we go into the rough waters of the Internet. There are without a doubt very polarized perspectives on the presence of digital networks on knowledge and learning. Reviewing the literature here, in quick succession, are some of the things that are known about SDL in the age of digital networks: (1) SDL is a prevalent form of post academic learning, (2) SDL readiness correlates with productivity and salary (3) digital networks work under a power law wherein popularity and similarity drive traffic (4) digital networks may have enhanced a mechanical aspect of learning in that they make it easier to connect tacit (peoples experience) and codified (documentation) information, (5) the personality traits of SDL individuals is fairly well known, (6) using digital networks in learning a host of literacies that may also require formal education to develop them, (7) digital networks

may be decentralizing institutional power over information, but may also creating opportunities to subtlety direct the underlying social rhetoric.

What is still unclear is how digital networks and the knowledge economy are affecting learner autonomy and self-efficacy. Bouchard (2009) advances that yes, mechanics and motivation are part and parcel of any exploration of learner autonomy, but digital networks also introduce new semantic implications, or said differently, presents a much larger array of messaging (e.g. video, blogging, games, hypertexts, social networking etc.) as well as important economical dimensions (or in Casllitian terms how knowledge can be transformed into value). Therefore the objective of this exploration is to obtain a holistic portrait of the dimensions entwined when intersecting learning and economics. As Selwyn puts it: "it would seem that the information society, knowledge economy and lifelong learning have been the subjects of much speculation but little examination" (p. 37, 2006). Selwyn furthers his thoughts on the matter in reminded educationalist that learning is a socially complex process. A learning endeavor can contain objectives that are supplementary to the acquisition of knowledge per se. As Selwyn notices, the literature has a lot to offer in terms of the 'possibilities' afforded by digital networks, but little in terms of 'actual' use—and even less attaching all to the larger context of the knowledge economy.

In an effort to frame the themes emerging from this new learning landscape, Bouchard (2009) has identified four dimensions that seem to influence to autonomous learning experiences. Bouchard suggests that autonomy lives on a continuum of various factors that determine just how autonomous the learning endeavor will be. The first dimension relates to the psychological aspects that underpin a learning experience. Traits

such as perseverance, confidence motivation fall into what Bouchard calls the 'conative' dimension. The 'algorithmic' dimension covers the more mechanical aspects of a learning experience—in other words the process of learning. Bouchard groups the notion of media, or in his words "the symbolic platforms the learners uses to interpret and convey meaning"—for example the use of hyper texting, video, social networks—into what he calls the semantic dimension. This aspect also covers the notion of literacies in terms of the type of interpretive skills that are required to create, interpret, evaluate and use knowledge. Lastly, but central, is the economic dimension, which refers to all the themes that concern the various paradigms of value of knowledge and/or learning between learning and value and even knowledge and power.

In essence, Bouchard (2009) proposes that the multi-facetted experience of autonomous learning can be encapsulated in four major dimensions: the conative, the algorithmic, the semantic and the economic. The table below details each of the dimensions as presented by Bouchard:

Dimension	Description	Explanation
Conative	Initiative	Essentially what drives the learner to learn. It refers to the psychological dimensions motivation, initiative and confidence. It also includes how context and transitions influence the need to learn, as well as the environmental support system around the individual (Kop & Fournier, 2010).
	Motivation	
	Non-learning goals	
Algorythmic	Pacing and sequencing	Essentially the mechanics of learning. It refers to pedagogical strategies like sequencing, pacing, goal setting, evaluation of progress, preparation for validation (Kop & Fournier, 2010).
	Formulation of goals	
	Selecting resources	
	Evaluation	
Semantic	Social interaction	Essentially how the learner makes sense of the information collected as well as the literacies required interpret and validate information.
	Use of text and hypertext	
	Collecting and using information	
Economic	Perceived value of knowledge	The economic validity of choosing SDL over other forms of learning. Said differently, the perceived and actual value of the learning, the choice to learn for personal gain such as for future employment, as well as the possible cost of other study options (Kop & Fournier, 2010).
	Cost-benefit ratio of learning	
	Opportunity cost of alternatives	

Table 3: Bouchard's (2009) dimensions of learner autonomy

These dimensions are still relatively theoretical in that they have only been used in two studies exploring learner autonomy in mediated learning environments (Bouchard, 2009) and in MOOCs (massive open on line courses) (Kop & Fournier, 2010) . How do

these categories extend to knowledge workers? Bouchard's thematic categories serve two important purposes in this study. Firstly they help train the researchers ear to listen for all the aspects that may affect the learning situation rather than focusing, perhaps even unconsciously, to only one. Secondly, the study will help validate if Bouchard's framework does indeed help the holistic narrative of learning in the knowledge economy emerge. In turn, I hope to reveal just how meaningful these analytical dimensions are in telling the story of a new learning frontier.

CHAPTER 3: METHODS

General Framework

As exposed by the literature digital networks are complex environments and despite their technological medium, much of what is happening is very human, with the age-old question of survival at the center of many who use it or have been transformed because of it. For those who are incumbent on exploiting knowledge and learning to create value, more specifically the knowledge worker, how do they describe their experience in this environment? The history of the SDL literature clearly points to a more qualitative method of to capture a more prosaic portrait of the phenomenon.

Within the spectrum of qualitative methodologies, this study will use a phenomenological approach. As per Creswell (2007), a phenomenological approach serves to capture the shared experience of individuals within a phenomenon. Said differently, what is sought is not to only to find commonalities among the participants, but reflect the cultural knowledge incurred through this experience. Within the phenomenological approaches the literature lists two types: hermeneutic phenomenology (van Manen 1990, cited in Creswell 2007) and empirical, transcendental, or psychological phenomenology (Moustakas, 1994, cited in Creswell, 2007). In the hermeneutic tradition research is oriented toward a lived experience and interpreting the "text" of life. According to Creswell, this form of research must capture a dynamic interplay. The researchers first turns himself/herself to an "abiding concern', in this case how to conduct successful autonomous learning in the digital age. In the process the research must reflect on the nature of this lived experience by letting themes emerge from discourse. Phenomenology is not only a description, but it is also an interpretive process

of what the lived experience means. The transcendental or psychological approach focuses more on the descriptions of the individuals where the investigator must abstract from drawing on any personal experience with the phenomena. Seeing as my own experience so closely related to that of the participants of this study it would be ill-advised to think that a transcendental approach is even possible. Instead, as an investigator, I used a hermeneutic tradition and used my experience to help identify the themes that surface.

Discourse is complex and highly symbolic and requires an attempt to interpret some of those symbols into patterns. To this end, the material collected will be transcribed and analyzed using a *discourse analysis* approach looking for various discursive repertoires (Seal, 2004) that frame the learning experience. It is understood in discourse analysis that as with the Foucauldian perspective, that what is sought is how language and discourse serves to organize fields of knowledge and practice. According to Creswell, this research approach lends itself to analyzing data using "multiple levels of abstraction." Moving in a funnel motion, from particular themes to more general levels of abstraction, the objective will be to let themes surface as plentiful as they need to and then re-group with more general themes. Finally the more general themes will then be connected to Bouchard's *a priori* scheme.

Bouchard's (2009) *a priori* scheme will be used much like Caunt et al.'s (2012) study on subjective well-being. In their study, participants were asked to write their 'recipe' for long term happiness. This simple question helped participants visualize and articulate rather specific variables that contribute to what the researchers call 'subjective well being'. In turn, the descriptions were broken down into thematic utterances and

classified into an *a priori* framework derived from dimensions already identified by the literature. From this, Caunt et al. were able to discuss some of the more specific 'ingredients' connected to each dimensions as well as point out some aspects that did not find a dimension.

Much like Caunt et al. this current study will also ask participants to describe how it is they came to learn their occupation and what their 'recipe' for learning is in light of their experience (for more detailed description of the collection tools see Data Collection section).

Hypothesis and objectives

The literature has demonstrated that SDL is a complex phenomenon that involves many psychological, social, cognitive, and now technical predispositions and skills. The literature has also demonstrated its increasingly intimate connection with socio-economics. Thus SDL and the proclivity to learning autonomy can be considered an essential skill. The literature has also established that digital networks a battleground for political, economical and social agendas and are thusly complex environments to derive value from. Moreover, users seemingly hold a power that they are perhaps unaware of and being exploited for—namely their ability to spread knowledge. Thus the broader philosophical assumption for this study is that there may be a wisdom that can be derived from users who are potentially making good use of this environment. In turn, this wisdom may provide useful insight to create guidelines for critical participation and tools to help derive value from knowledge.

Once again, the specific questions that underpin this inquiry are:

e. What triggers the need to self-teach?

f. What is their process or processes?

g. How are they using the tools and skills effectively?

h. How is it affecting their socio-economic prospects?

Methodology

Unit of Analysis

Drawing from Gibbons' (1980) criteria, this current study questioned individuals who have an occupation for which they did not study in. Added to which, the occupation has some form of recognized of degree, diploma or official training that was sideswiped. Participants were chosen to represent a range of ages between 25 and 70 and with varying educational backgrounds (some university graduates and some non university graduates). All participants had at least completed a technical degree at the college level and only one the participants had graduate studies, although some had multiple undergraduate degrees. Moreover, the participants' fields of expertise were spread across many different sectors, excluding of course any occupation that requires official recognition (e.g. pilots, doctors, dentists, etc.) It warrants mention that all of the participants know me personally and were recruited via professional and personal network sites Linkedin and Facebook and also contacted directly through email. With varying degrees of intimacy, I have worked with most of them and a couple are considered close friends (see Annex 4 for the general recruitment message).

In order to establish membership to knowledge working community and provide the timeframe in which ICT skills were adopted and acquired, the table below provides a description each participant's occupation, educational background and age.

Participant	Occupation	Studies	Gender	Age
P1	Software Specialist	M.S. Electrical Engineering	Male	46

P2	Marketing Coordinator and TV Researcher/Production Coordinator	B.A. Major in western civilization history and thought, imperial history, minor in Jewish studies	Female	38
P3	Online Marketing Manager	Bachelor's of Interior Design AEC in multimedia production	Female	36
P4	Business Owner/Entrepreneur In eLearning and mobile apps	B.A. Certificate of Technical communication	Female	44
P5	eLearning Integrator and Software Trainer	D.E.C Health Sciences	Female	44
P6	Researcher/Journalist	B.Ed. Bachelor's in German studies	Male	67
P7	Director of Human Resources	D.E.C Sciences humaines I.C.A.R.I. (multimedia production)	Male	38
P8	Industrial Commissioner	Bachelor of Architecture Bachelor of Science	Male	48

Table 4: Description of participants by occupation, education, sex and age

Data collection

The study used a combination of a pre-questionnaire (see Annex 5) and open-ended interview (see Annex 6). The pre-questionnaire served to "set the table" for the study in explaining its purpose as well as expose some of the current theories (i.e. that digital networks make success more accessible or that digital networks are dulling our cognitive abilities). The pre-questionnaire includes some demographic elements, such as age, occupation, educational background, quality of life, perception of SDL and Internet use and provide the questions for the interview so as to allow participants to think ahead on the points that will be discussed. The pre-questionnaire served to confirm that the participants were indeed working in an occupation for which they were self-taught or partially self-taught should there be transferable or relatable skills. It also provided a springboard to launch the discussion in that I used the occupation title and studies to first ask them how and why they learned to do their job. Also in order to limit any confusion between my own perception of the current occupation and the educational background, I asked participants to say whether they perceived themselves as self-taught. In turn, a negative answer would allow me to determine if the participant's contribution is relevant.

Next, I asked participants to rate their overall quality of life. This question is really a relic of a previous focus for this thesis that sought to create a link between SDL and quality of life. The question in and of itself proved a little shallow and even a little politically charged given Selwyn's (2010) claim that governments are in fact leading us to think this way because of the cost benefits. Still, I the findings will be reported as it may be an interesting variable to factor it the analysis. Lastly, I asked the participants to provide a rough estimate of the time they spend online.

The interviews were conducted via Skype and recorded with Garage Band on a MacBook Pro. Only the voice feature was used (no video) to allow for optimum sound quality and omit any elements that could be distracting to the comfort of the participants. Data was then saved on a password protected external hard drive—accessible only by me. Voice recordings of the interviews, are kept on the external disk and will be reformatted to destroy all files, one year after the submission of the thesis. Any paper copies will be shredded using the equipment in the Department of Education.

The interviews were introduced with why the participants have been chosen (e.g. the fact that they perform an occupation that they did not study for, but for which there is a degree or certified training program) and I explained how in my view this constitutes a context for rather intense self-teaching. I explained that their skills as a self directed learners are particularly interesting to survey, because we are in the area of digital networks and there is varying opinions about whether digital networks are a good place to learn or not. Still, I reinforced the fact that I do not want to know how they used digital networks to achieve their learning endeavor per se, but simply to describe their path knowing that we are in a new learning context.

Consent was obtained through a written consent form provided by the Ethics Commission of Concordia University. A note to discontinue was included in the consent form and participants will have until summer 2013 to either notify me or my supervisor via email or telephone.

The interviews were transcribed verbatim, omitting some chit chat between the participant and interviewer that was not relevant to the discussion at hand. Also all names of companies, people or any reference to recognizable entities were removed.

Data coding and analysis

The interview transcripts were read through at least three times to identify all ideas, concepts, tricks, tools, wisdom, insights related to the learning experience of the participants. These insights were attributed a thematic label and placed in a database using the software "Bento" (see Figure 3). The thematic data entry included the thematic category, a section to paraphrase or provide other forms of articulating the theme (for clarification purposes), a section to check off the dimension of learner autonomy, a section to identify which participants brought up the theme and a place to include the utterances associated to the theme.

Figure 2: Thematic database

Although inspired by the utterances of the participants, I named the thematic entry according to a more general title that covers the meta-issue surrounding the ideas (figure 4).

Figure 3: Thematic Category section

I also included a section called 'Paraphrasing' to include other forms of articulation that

came to me in interpreting the transcripts (Figure 5).

Figure 4: Paraphrasing section

Then I marked which category of learner autonomy the theme should be associated with (Figure 6).

Figure 5: Dimension of learner autonomy section

Also, within the database, I identified which participant expressed ideas and included the corresponding utterances (Figure 7 and 8)—thus all the pieces that led to the dimension/theme association is included in its respective datasheet.

Figure 6: Participant identification section

Figure 7: Utterance section

Ethical Considerations

As this study explores human subjects as its main unit of analysis, the study will closely follow the Universities' ethical research certification criteria as defined by the Tri-Council Policy Statement. The study intends to hold the core principles of (a) respect for persons, (b) concern for welfare and (c) justice, as described in TPSC2 (2010), in every aspect of the study—be it how questions are articulated, how data is codified and how information is disseminated. The participants will be recruited on a voluntary basis and will have knowledge of the objective and hypothesis of the study through a consent form and the researchers explanations. At any point in the study, participants will have the option to withdraw their consent and do not need to offer any explanation to do so. They can do this with me directly or can contact my supervisor. Participants' identity will remain confidential and pseudonyms will be used for all data collected. Interviews will be conducted on an individual basis in a private setting. In any case, no one but the

interviewer will be privy to the dialogue in the interview and will then transcribe the interview verbatim in order for it to be reviewed by other researchers.

Participants shall not be excluded from the opportunity to participate in research on the basis of attributes such as culture, language, religion, race, disability, sexual orientation, ethnicity, linguistic proficiency, gender or age, unless there is a valid reason for the exclusion.

The study was submitted to the Research Ethics and Compliance Advisor Office of Concordia University and received approval on February 19th of 2013.

CHAPTER 4: RESULTS

Results

It was a somewhat tense experience to enter into an interview with a relatively pre-conceived idea of what to look for. I concentrated on letting the participants simply share their thoughts openly and freely and crossed my fingers that I would get *something*. "You have to take the deep plunge," said many of the participants of their own career endeavors, thus drawing from the bold courage of the participants, this next section will expose the key findings collected in the pre-questionnaire and interviews. In order to give the participants the spotlight they deserve, each transcript was analyzed with the perspective that *they* are the experts in learning. Thus any issue, idea and concept was treated, as independently from my own experience from self-teaching and learning as possible.

First we will look at the results of the pre-questionnaire. They include some quantitative elements that I deemed relevant to analyzing the interviews. Aside from the demographic elements reported in the Methods section (occupation, educational background, age) the pre-questionnaire reports provide quantitative data on whether or not participant's perceived themselves as self-taught, what rating they give their quality of life, and the average time they spent on the Internet.

Then I will provide the results of the interviews. First I will expose of visual representation of the distribution of themes across Bouchard's framework to illustrate the importance of each dimension in the overall discourse of the participants. Then I will explore each dimension and discuss their associated themes. In each dimension, I will not only expose the respective themes as they are reported in Table 5, but also overlap a

secondary layer of thematic analysis to further characterize thematic sub-groups. Each dimension will recall the research question it serves to answer, namely:

a. What triggers the need to self-teach? Conative
b. What are the learning processes? Algorithmic
c. How are the resources being used? Semantic
d. How is SDL affecting their socio-economic reality? Economic

These sub-questions serve to paint an analytical and critical narrative that aims to answer the question: How do knowledge workers describe their learning experiences within the context of digital connectivity? In turn, the discussion will revisit the working hypothesis that those who are able who navigate in digital networks effectively have a tacit recipe for orchestrating knowledge and economics. I will look at some of the 'ingredients' to the participants learning journeys' and compare these to the claims made in the literature. Also I will discuss the usefulness of Bouchard's framework in characterizing the relevant aspects of the learning journeys of knowledge workers. Is the whole indeed more telling then the sum of its parts? What elements of these stories can be retained to help shape educational policy for future knowledge workers? What questions remain? I will also expose some of the felt limitations of this study and make recommendations on how it could be done differently?

Results of the pre-questionnaire

Despite the appearances of a bifurcated path between occupation and education, I felt it important not to assume the individuals perceived themselves as self-taught. Therefore, the pre-questionnaire asked to say whether they perceived themselves as self-taught. Figure 9 illustrates the answers:

Perception of SDL

Figure 8: Perception of SDL

Only three of the eight participants answered a simple "yes" to this question. One participant said that they considered themselves only partially self-taught because they had taken a number of training courses to aid in developing the skills necessary for the occupation. Upon discussion with this participant, I determined that the said training courses were in actuality part of the tools involved in the training journey. In other words, these training courses were not imposed as a part of an overall program to train for the occupation, but skills training courses that the participant deemed important to take--in Spears and Mocker (1984) words, part of the organizing circumstances that were available.

Three participants felt that they were partially self-taught because their education had provided them with the basic skills required for their occupation. In the participants' words: formal education gave them a base for the "self-discipline and research methods, along with the technology toolset that allows me to learn independently." Another participant said that "I learned so much on the job… … But I am taking a lot of decisions based on my school years." The third participant said: "Architecture prepared me for that kind of thinking because it is a profession that assimilates knowledge from other fields, from engineering, science, arts, accounting etc." The theme of formal education as a basis for all occupations, or as one of the participants put it "a universal passport", also emerged in the interviews and will be explored further.

One participant even expressed that the notion of working in a field that you trained for was an "outmoded idea." In the participant's words: "the norm is skills transfer." This

is an interesting point in that as the interviews revealed that the historical context created by the explosion of ICT created countless jobs for which there was no training available. As the interviews will reveal, many participants expressed that their occupational journey was more a matter of adapting to a rapidly changing job market. In fact, for all the participants, SDL was not necessarily a matter of personal choice over formal education, but a knee-jerk response to the needs of the industry.

The next variable collected in the pre-questionnaires was a rating for the overall quality of life. As mentioned earlier, this element was a relic from an earlier focus of the thesis, attempting to connect SDL to quality of life. Previously, my working hypothesis was that those who are able to navigate the digital world effectively may also hold a tacit recipe for orchestrating knowledge and opportunity. Participants were asked to rate their quality of life on a scale from 1 to 10:

Figure 9: Quality of life rating

As the graph illustrates, the overall rating is very high. Moreover, in the interviews, participants reported that indeed they had a very satisfying life. They attributed this mainly to job satisfaction. However, when discussed further, at least three participants reported having compromised important aspects of their life's aspirations, such as having a family, for work. One participant even confessed a battle with burn out because of the constant need for learning. Thus this would provide evidence that is contrary to the original hypothesis connecting SDL to quality of life. It also gives a more "shop floor" flavor to the Governor General's claim that 'how well we live, depends greatly on how well we learn.' Or at least it qualifies that job satisfaction may enhance quality of life, but in some cases it comes at a cost. Still one participant reported that their confidence in

their ability to learn allowed them to sculpt their occupation according to the needs of their life—thus providing more time to spend with family.

The last quantitative element relevant to analyzing the interviews is the time spent connected to the Internet. The results are shown in the following table.

Figure 10: Average time connected to the Internet

As the graph illustrates, the average time connected to the Internet is approximately 8 hours. This mixes all forms of Internet use, personal and professional. What is interesting about this figure is that during the interviews, the Internet was barely mentioned. In fact, I needed probe in order to get more specific ways digital networks were used—as if it were understood that self-teaching utilizes the Internet. Only one participant reported lower uses of the Internet (2-3 hours per day). This participant also reported a preference for face-to-face training courses over online learning for what they termed "far transfer learning."

> "when I encounter an area that I need to grow in that involves far-transfer learning, there is near-transfer and far-transfer. If it's far-transfer in other words I have to apply the skills in different ways not just to a specific task, I like to have formal training."
>
> (Female, eLearning and Mobile Solutions Business Owner, 48)

This notion refers to skills that the participant deemed 'difficult' and required an expert to help guide the learning process. Face-to-face learning also provided useful networking opportunities allowing the participant to make acquaintances with shared interests and goals. For the "near transfer learning," says the participant, the Internet was indeed a great tools to gain quick tips and ideas.

These findings should be kept in mind as the next sections dissect the utterances collected in the interviews. As you will see, despite the high scores attributed to quality of life and Internet connection, the stories tell a bumpier road to success complete with failures, career surprises, courageous leaps and struggles to survive. What's more, digital networks are barely mentioned—not that they are not present, but rather they have become an almost ubiquitous tool that need not be mentioned.

Results of the interviews

Overall findings

The interviews ran an average of 25 min each in which I asked two questions: "how did you train yourself to do what you do" and "what is your recipe for learning on your own." The resulting thematic breakdown yielded 87 entries. At a glace, Figure 6 provides a network representation of the thematic distribution to illustrate the importance of the dimension in the overall discourse of the participants as well as their interconnectedness.

Figure 11: Distribution of themes

In some cases the entry touched two dimensions. The following table provides a breakdown of the themes and their associated dimension of learner autonomy. And in one instance the theme contained references to all four dimensions.

	Thematic Category	Conative	Algorithmic	Semantic	Economic	Other
1	Unforeseen constraint to perform planned occupation	x			x	
2	Adapt and adjust	x			x	
3	Having impact	x			x	
4	Quality of life	x			x	
5	Freelancing	x			x	

	Thematic Category	Conative	Algorithmic	Semantic	Economic	Other
6	Make yourself relevant for the company	x			x	
7	Freedom and control over my destiny	x			x	
8	Failure is the mother of all inventions	x	x	x	x	
9	Occupation changes	x			x	
10	Career advancement	x			x	
11	Dream job	x			x	
12	Self-proclaimed proclivity toward pedagogy	x		x		
13	Recoup, regroup and re-strategize	x	x			
14	Getting out of your comfort zone	x	x			
15	Political and social intelligence	x				
16	Confidence, audacity, courage	x				
17	Be fearless	x				
18	Need new challenge	x				
19	SDL is my go to…it's second nature	x				
20	Blindness required	x				
21	Sibling self-taught	x				
22	General curiosity, the eternal quest for whatever	x				
23	Persistence	x				
24	Expectations not defined	x				
25	Personality rooted in action	x				
26	Humility	x				
27	Occupation requires no formal credentials	x				
28	Curiosity of a new field	x				
29	Change keeps you awake, alert, alive	x				
30	Open source movement			x		
31	Formal education as a universal passport			x	x	
32	Networking to help predict the future			x	x	
33	Network as a safety net			x	x	
34	Shine bright like a diamond				x	
35	The right mix: cost, flexibility, time, effectiveness				x	
36	Eye on the future				x	
37	Formal education too lengthy				x	
38	Speed is of the essence				x	
39	Unforeseen talent				x	
40	Formal education not available				x	

	Thematic Category	Conative	Algorithmic	Semantic	Economic	Other
41	Branding yourself				x	
42	Job in demand				x	
43	A matter of survival				x	
44	Demonstrated success attracts new responsibilities				x	
45	You need to be smart before you Google, not Google to be smart		x			
46	Online training		x	x		
47	IT fields are best learnt online		x	x		
48	Articles online		x	x		
49	Learning on the job		x	x		
50	Blogs			x		
51	Formal education eclectic			x		
52	Network for peer exchange			x		
53	Network as a learning lab			x		
54	Network to compare and contrast			x		
55	Learn the language			x		
56	Seek first to understand		x	x		
57	Gestalt of skills			x		
58	Quickie videos			x		
59	The Web organizes			x		
60	Network as a sounding board			x		
61	RSS feeds			x		
62	Not available in books		x			
63	Set realistic goals		x			
64	Problem solving		x			
65	Value of excellence		x			
66	Create the right network		x			
67	Immersion and submersion		x			
68	Don't seek perfection		x			
69	Collective problem solving		x			
70	Pace yourself		x			
71	Copy and improve		x			
72	Debrief and acknowledge what you achieved		x			
73	Circuitous learning		x			
74	Transferable skills		x			
75	Research, research, research... with a question in mind		x			
76	Formal education too theoretical		x			
77	Analyze similar projects		x			
78	Guided by experts		x			
79	Mentoring		x			
80	Identifying gaps beyond known		x			

	Thematic Category	Conative	Algorithmic	Semantic	Economic	Other
	requirements					
81	Formal training for complex skills		x			
82	Play around		x			
83	Know your information hubs		x			
84	Dive in		x			
85	Prototyping		x			
86	An eye for quality information		x			
87	Self teaching for easier skills		x			

Table 5: Thematic breakdown and its associated dimension of learner autonomy

The conative dimension counted 29 associated themes with 2 themes that touched both conative and algorithmic dimension and 11 themes that touched both the conative and economic dimension. “Recoup, regroup and re-strategize” and “Getting out of your comfort zone” were themes that I deemed relevant to both conative and algorithmic dimension because the participant utterances expressed both a psychological predisposition required to entering into a learning endeavor as well as how the psychological pulse should serve to make appropriate decisions about setting goals and selecting the appropriate resources for learning.

The other dimensions that presented considerable overlap is the conative and economic dimension with 11 themes belonging to both. In the literature concerning Bouchard’s framework, the economic dimension is essentially described as the economic validity of choosing SDL over other forms of learning. Said differently, the perceived and actual value of the learning, the choice to learn for personal gain such as for future employment, as well as the possible cost of other study options (Kop & Fournier, 2010). In the case where the impetus to learn was feed by economic objectives, I felt it important to reflect this in the conative category as well as the economic dimension because it contributed to both the triggers and perceived value of learning. But more importantly, I felt it important to represent the economic dimension beyond the cost/value equation of

learning. Although I may have stretched the boundaries of the economic and conative dimensions' original intention, I nevertheless, felt it more meaningful to illustrate what portion of motivation belongs to economic roots. In other words, the main reason these participants entered into a large scale learning endeavor was mainly for socio-economic reasons—be it to improve job prospects, or occupy a job that is more suitable to their interests, or make more money. The results are no doubt tainted by the fact that the sample was taken from individuals who have made major career changes.

The algorithmic dimension occupied the most important presence in the discussion. With 35 themes attached to the more mechanical aspects of learning, the participant's certainly provided a lot of insight as to how one learns with and without the affordances of digital networks (specifics to come in the Algorithmic section). This is hypothetically due to the question 'what is your recipe' for learning, which probes the discussion in this direction. I did not, however, probe specifically for how learning occurs over digital networks. There were 4 themes that overlap the algorithmic dimension with the semantic dimension. This is due simply because in many cases, participants would describe choosing and using a resource within the same thought. For example in 'IT fields are best learnt online' the participants revealed that in order to stay current in this field it is necessary to know the online resources and know how to extract information in them. For instance, the participants described how to use discussion forums, or how to consult blogs for ideas, or how to use open source code material. Both selecting and interpreting information is involved here, therefore both dimensions are represented.

The semantic dimension counted a total of 23 themes. Three themes overlapped with the economic dimension. Again, I may be stretching the boundaries of the economic

dimension, but it seems relevant to reflect just how much of the learning process is tied to economic underpinnings. In the case of the semantic/economic overlap, themes that involved using people networks demonstrated a dual objective. First the network is used for its learning value, and then it is leveraged to help you fulfill client requests. Thus it serves both a learning benefit and an economic benefit.

Lastly, the economic dimension was represented with an equally important number of themes counting 26 entries. As mentioned 14 of these entries overlap with other dimensions and in some cases represent the presence of an economic undercurrent more than an overt reference the economics related to learning.

The theme that proved the richest in terms of connections with all dimensions and insight is 'Failure is the mother of all inventions'. The utterances resonate aspects of a learning journey that apply to motive, mechanics, interpretive strategies and economics all at once. Several participants confessed that a failure in a work or learning related experience became, in turn, the impetus for launching a learning endeavor and eventually added value to their career:

> "I launched a few campaigns for this company and they didn't actually go that well, so I learnt a few things about what do to and what not to do. And later when I was looking for work I started a couple Websites doing online marketing research. It wasn't to make money but, I became more interested in online marketing and key-wording, so I built a couple of Websites and did some more experiments with the key-wording and market research. That was purely a personal projects at that point. I did a lot of research and some online training courses but just free online training courses, so videos and reading lots of blogs,

> reading lots of articles. And eventually when I interviewed for the job that I have now which is online marketing manager, when I went to the interview that was what I brought up as my experience. I showed them the Websites I built and the research I had done on them. I showed them examples of campaigns when I was working as a Web designer. So that was sort of my step into this job, because I had a little bit of self-directed experience in the field. So everything I've learnt in addition to that has been on the job."
>
> (Female, Online Marketing Manager, 36)

> "I understand that the first effort may not be worthy of an Oscar, but that's fine, I feel that everyone has at least 20 bad movies in them, so may as well do them and get them out of your system."
>
> (Female, TV Production and Marketing Manager, 38)

> "…these things, through trial and error, resulted in success, which kept me going."
>
> (Female, eLearning and Mobile Solutions Business Owner, 48)

Indeed, failure on a large scale, or even trial and error on the smaller scale is probably one of the most prevalent learning strategies. However, on the larger scale it seems to plant a larger inquisitiveness seed that sets all dimensions of learner autonomy in motion.

With this global perspective in mind, let us move to a more detailed analysis of the interviews. Through the lens of the respective dimensions of learner autonomy, a secondary layer of analysis was used in order to make thematic sub-groups. The purpose, as you will see, is to help frame the results within the aspects of SDL exposed in the literature.

Conative

In order to have some of the key concepts top of mind, let me restate that the conative dimension of learner autonomy implies all aspects of a learning project that relates to triggers, drive, motivation, essentially the peripheral goals attached to a learning project as well as the individual's psychological predispositions. In lending my ear to the conative dimension, I hoped to answer the research question: what triggers the need to self-teach? This yielded an array of themes belonging to the more general themes of 'motivation/triggers', 'personalities/psychological predispositions' and 'philosophies about learning'

Table 6 provides the themes associated to the conative dimension:

Conative themes		
Motivation/Triggers	**Personalities/psychological predispositions**	**Philosophies about learning**
Unforeseen constraint to perform planned occupation	Recoup, regroup and re-strategize	SDL is my go to…it's second nature
Failure is the mother of all inventions	Confidence, audacity, courage	Self-proclaimed proclivity toward pedagogy
Occupation changes	Be fearless	Getting out of your comfort zone
Adapt and adjust	Blindness required	Sibling self-taught
Having impact	General curiosity, the eternal quest for whatever	Change keeps you awake, alert, alive
Quality of life	Persistence	
Career advancement	Personality rooted in action	
Need new challenge	Political and social intelligence	
Freedom and control over my destiny	Humility	
Dream job		
Expectations not defined		
Freelancing		
Occupation requires no formal credentials		
Curiosity of a new field		
Make yourself relevant for the company		

Table 6: Themes related to the conative dimension of learner autonomy

From these themes three main ideas that seemed prevalent with regards to findings. Firstly, within the category of motivation and triggers, the issue of accidental vs. deliberate choices lent some interesting insights. Second, an oldie but a goody, the participants provided their own insights on the personality/psychological predispositions deemed necessary to accomplish such a career shift. And third, some of the perceptions of the participants really belonged to a more general vision of what constitute effective learning—in other words their learning philosophies.

In the literature there is a sense that SDL is a choice or a preference over other forms of learning—an act endeavored by do-it-yourself type individuals who prefer their own judgments to those of institutions. Therefore the assumption is that SDL is highly deliberate. However, the impressions left by the interviews was entirely different. Not that the individuals were unaware of the fact that they were indeed teaching themselves to do their jobs, but that self-teaching was not necessarily viewed as the best alternative, but the *only* alternative.

Here are some of the participant insights concerning this issue:

> "There was in my time mostly electronics, electronic based programs. And because before even that time there was no software in a sense. There was very little. Electrical engineers were programming it out just by necessity. And now it has evolved into a much bigger discipline perhaps than even electronics. And today you do have a lot of good programs out there. But perhaps what may happen now is that someone starts studying software and then he ends up being interested in electronics."
>
> (Male, Software Specialist, 46)

> "Because it's an industry that changes everyday. Even there was a technical degree you could do in a maybe 6 months or a year in a college, by the time you would finish your diploma it would be out of date. So I don't think it would be useful."
>
> (Female, Online Marketing Manager, 36)

> " … Ça faisait même pas un an que j'ai occupé le poste de data coordinateur pour changer. De partir de zéro knowledge en computer à devenir un "implementation specialist" pour un gros logiciel de capture de données. C'est un logiciel que je ne connaissait pas du tout."
>
> (Female, eLearning Technician and Software Trainer, 44)

> "That was one of those things where that the learning was not due to a particular personal interest or skill, it was out of necessity. So I went at it, I did not compare myself to whoever else, the whole point was I needed to be fluent."
>
> (Female, TV Production and Marketing Manager, 38)

> "Because I kinda had to do it. I didn't necessary want to go around and learn all these things that are very different. It was really about facing challenges and delivering the goods. And then being on the spot for delivering the goods. All of a sudden you kind of have to peddle, you have to move forward."
>
> (Male, Industrial Commissioner, 48)

Although the participant seemed happy with the outcome of their learning endeavors, there was certainly a sense that self-teaching was more of an imposition than a choice.

Also in the vein of accidental versus deliberate choice to self-teach, all except two of the participants declared that freelancing played a major role for many learning

endeavors. Because of the inherent need to respond to client requests and the lack of an organized support system (as in an organization), learning quests were often the result of quickly acquiring skills to complete client sponsored tasks. As this is necessarily tied to maintaining good client relationships and continued contracts, SDL did not necessary seem to be the preferred route, but the only rout given time constraints and sometime eclectic tasks. As one participant put it "you've got to run. Your always in movement. Learning on the fly becomes second nature."

> "[about freelancing] Tu peux pas être bouché à ce qui se passe allentours, tu vas faire faillite… …Je voyais bien que c'était un outil (ordinateur), je dis bien un outil, qui allait devenir incontournable. Je n'y comprenais rien mais je voyais bien que l'outil était incontournable… …Mais j'ai aucun intérêt pour la technologie, mais tu peux pas payé le luxe comme pigiste 'je connais rien à la technologie je continue avec la plume'. Tu vas faire faillite."
>
> (Male, Researcher/Journalist, 67)

> "Probably because where I come from I was always freelancing and helped companies around me. Because I was being asked. Because I started freelancing young, I was always being asked 'could you write this, could you do that, could you help me do this' the usual 'could you do a website'."
>
> (Male, Industrial Commissioner, 48)

Of course not all participants changed careers because of accidental or unanticipated circumstances. Some simply felt uninspired with current occupation and pursued new challenges.

> "I did not want to end up being a technician, only a technician that pushes buttons as we used to say. I needed something, some food for thought, to intellectually counter balance the technical knowledge I used to learn and to operate… … [about SDL] I don't know any other way. I don't know any better."
>
> (Female, TV Production and Marketing Manager, 38)

Still with this utterance, SDL did not seem a deliberation based on preference but on circumstance.

In fact only one participant expressed a preference for having control over their learning journeys:

> "It gives me the freedom to control the direction of my job. If there is one area I want to pursue more I have that ability to do that. If I want another job or work for another company I have the flexibility to do that… …I think the main thing is being adaptable and flexible and that gives me more control in my life."
>
> (Female, Online Marketing Manager, 36)

Exception aside, the assumption that SDL is a deliberate choice over other choices is not echoed through the interviews of this study. Participants seemed to describe their career choices, and resulting learning responses, to more accidental or unexpected circumstances.

This leads me to another important item that emerged from the interviews. In most cases the participants' career changes hinged on a context where the occupation was in the very process of being invented, or re-invented. Said differently, part of the appeal of accepting the challenge of a new occupation was that the opportunities had very little in terms of performance expectations and were not very well defined. This presented a

highly stimulating context in which the participants expressed a freedom to invent as they learnt. Here are some excerpts from the interviews:

> "Après ça, pourquoi je crois exceller dans les deux ou trois premières années que je suis entré chez *company* c'est que je suis rentrer dans un contexte où il avait beaucoup de chose à bâtir. Et ça ça été une autre source de motivation… … Donc j'avais carte blanche sur plusieurs thématiques ce qui faisait que c'était hyper motivant. Je pouvais arrivé avec des idées assez particulières… …La motivation était tel que, on avait le financement et la volonté du studio de voir émerger des nouvelles idées."
>
> (Male, Human Resources Director, 38)

> " … hired me without knowing what they would call me, they just needed help with the American market. After four years I was their strategic planner… … And the company because it was a melting pot of different fields it was a comfortable place for me. In terms of the subject and the concepts anyway. To go further towards that and keep exploring… … Then all of a sudden I might find a role in a company where I became important strategically."
>
> (Male, Industrial Commissioner, 48)

In most cases the participants reported being in a context where little was expected of them. Whether it is because the performance expectations of their occupation was not yet defined, or because they took a leap into a job that no one else wanted, the interviews transpired a feeling of freedom to play around and invent.

Of the 22 themes attributed to the conative dimension, nine seem to refer to the more psychological predispositions required for self-teaching. Representing a little under

half of the conative floor space, it seems a given that taking on a career shift on one's own requires a good set of psychological chops. Of the more obvious ones, the notion of courage, fearlessness, "jumping in" was unanimously mentioned as part of the necessary ingredients. Here are some of the participant insights in looking back at what they have achieved:

> "If anything I learned it was to be fearless of learning something."
>
> (Male, Industrial Commissioner, 48)

> "Lance toi dedans, crée toi pas des peurs."
>
> (Female, eLearning Technician and Software Trainer, 44)

> "…to this day I have tremendous confidence in my skills and capacities. And I've been able to translate that into a realm that I was less than good at."
>
> (Female, TV Production and Marketing Manager, 38)

This was coupled with the notion that courage and 'ego' must be counterbalanced with humility, openness and being a good listener--because if you want to learn something, you must be mindful of your own gaps and be open to receiving 'foreign' information (rather that simply confirming what you may already know).

Also in the spectrum of psychological predispositions, the theme of political and social intelligence occupied a considerable portion of two interviews. This theme was characterized by the ability to recognize your social surroundings and contribute in a way that doesn't threaten or bruise collaborators.

> "You've got to learn how to swim with the different breads of fishes and sometimes sharks as you plunge… …I learnt how to apply diplomacy in action and lets just say that was something I did not have a particular talent for. I realized that good relationship were the grease that lubricated a production. That you needed to be outgoing that you needed to appear confident that you needed to pay attention to people, to not talk often and listen a lot and then offer insight when it was called when it was necessary."
>
> (Female, TV Production and Marketing Manager, 38)

> "C'était de comprendre les enjeux sociaux. Je rentrais quand même dans une boîte qui avait deux mille personnes. Pour trouver ta place et comprendre que ce que tu dois faire a une portée… … Un coup t'as fait ça tu peux comprendre le jeux de pouvoir, et là tu sais à qui tu dois parler. Et là tu peux tirer l'info. Avec l'info tu peux te retourner vers ton équipe et faire un plan de match."
>
> (Male, Human Resources Director, 38)

This theme is rich in that it contains both a psychological approach to learning as well as how social prowess can impact learning. Knowing how to decode the political context surrounding a task seems and applying diplomacy not only puts people at ease for volunteering information it also helps build relationships that may contribute to career advancement. I don't mean to make this sound as though these participants are in anyway manipulative or ruthless, but more that to these participants, the learning endeavor requires a degree of sensitivity to their social surroundings which entails the ability to decode the underlying agendas that could either enhance or conflict with it.

Lastly, classified in the conative dimension of learner autonomy, are all the themes that refer to the more general learning philosophies of the participants. Firstly, despite the feeling that SDL may not have been the first choice as a learning path, it was expressed that SDL is 'healthy' for the mind. In other words being able to self-teach keeps you awake and alert—an important predisposition if you are to survive in these changing times.

> "You need to keep an active mind at all times or almost all times. There are times to rest, there are times when you are more introspective and reflective, but when its time for action you need to be able to learn as you go because if not you become stagnant and outdated."
>
> (Female, TV Production and Marketing Manager, 38)

"C'est un changement continuel. Ça te tient constamment réveiller."

(Male, Researcher/Journalist, 67)

Said differently, SDL is good exercise for the brain. It chases away the complacency that could be detrimental to a career by exercising your alertness and critical predispositions.

Therefore in response to the question 'what triggers the need to self-teach' it would appear that economic circumstance plays the largest role in motivating a self-directed career shift. Some of the factors that seem to play a role in this path are time constraints, limited availability of official training, and the thrill of problem solving. Although the participants professed that they are self-taught more because of necessity than choice, I got a sense that this was in part an instinctive reaction to effective problem solving as well as promptly responding to industry shifts which offers a head start in occupying new and still undefined roles. In other words, should official training be the most effective

route, I have no doubt that this is the path they would have followed. This brings us to the next dimension, that of selecting resources, setting goals and planning the learning path—that is the algorithmic dimension.

Algorithmic

The algorithmic dimension serves to capture all the aspects of a learning journey that refers to pacing, sequencing, goal setting, selecting resources, and evaluation. In classifying the themes in the algorithmic dimension, the hope is to answer the research question: what is the process or processes of learning? This yielded an array of themes that were sub-categorized as 'Calibration', 'Selection', 'Tools and Resources' and 'Learning Patterns'. Table 7 provides the themes associated to the algorithmic dimension:

Algorithmic themes			
Calibration	**Selection**	**Tools and Resources**	**Learning Patterns**
Recoup, regroup and re-strategize	IT fields are best learnt online	Learning on the job	Circuitous learning
Getting out of your comfort zone	Not available in books	Online training	Play around
Value of excellence	You need to be smart before you Google, not Google to be smart	Articles online	Collective problem solving
Identifying gaps beyond known requirements	Know your information hubs	Guided by experts	Analyze similar projects
Don't seek perfection	An eye for quality information	Mentoring	Copy and improve
Set realistic goals	Formal education too theoretical		Transferable skills
Debrief and acknowledge what you achieved	Create the right network		Research, research, research... with a question in mind
Pace yourself	Formal training for complex skills		Prototyping
	Self teaching for easier skills		Dive in
			Immersion and submersion
			Seek first to understand

Table 7: Themes related to the algorithmic dimension of learner autonomy

It is important to keep in mind that the interviews included a rather direct question asking for a recipe for self-teaching, thus the themes from this dimension are no doubt tainted by this probe. In reviewing the transcripts and cross-referencing these with the themes of the algorithmic section, I will begin by exposing the underlying learning patterns that surfaced from the interviews as they frame the other sub-categories. I will follow this with how participants chose their tools and resources and speculate on the calibration process, which is essentially the method by which goals and performance indicators are set. Finally, I will share some useful tricks and quick hits participants volunteered.

Upon reflecting on the testimonies I cannot say that any one learning pattern emerged. However, a few prevalent strategies surfaced. The first, and most widespread, surprisingly doesn't involve learning at all, but skills transfer. All participants voiced that their occupational change involved a number of transferable skills—thus there was no learning per se but simply 'recycling' some of the more overarching knowledge.

> "From recycling from architecture. I felt confident to approach other people's problems and say 'if you think about it, maybe you can structure a solution for that'. My learning in architecture is really about problem solving. Sure it's art, it's engineering, it's a melting pot of a few things in architecture… …Architecture is about analyzing a problem or circumstance, or a set of variables and finding a solution, then expressing it and standing in front of it and defending it. That sort of loop was a good skill set to transfer."
>
> (Male, Industrial Commissioner, 48)

> "But this is over and all, that's something that I have worked in for 15 years, this is not what I am doing right now, but it is still helping me tremendously in adapting in new situations."
>
> (Female, TV Production and Marketing Manager, 38)

> "Which obviously most of that is online task and doing online research. And does overlap into marketing a little bit."
>
> (Female, Online Marketing Manager, 36)

> "Cela dis, j'ai été capable quand même de trouver des similitude entre le travail que je faisais et le nouveau poste que je devais occupé."
>
> (Male, Human Resources Director, 38)

Therefore one of the 'ingredients' to learning is knowing what you already have and how it can be useful to the current situation.

Next on the list of learning strategies is the appearance of problem-based learning. The literature pays quite a lot of attention to the relevance and potency of problem-based learning. And there is no doubt that when you have a client or boss breathing down your neck for a solution, the next thing that occurs is a quick and efficient learning endeavor (at least we hope). For some participants, this is what shapes their learning endeavors.

> "The strategy came from I'd say really being in the fire of having to solve something… …It's really if you see a challenge ahead that you want to overcome. I think that's what forced me to learn different things… …When somebody says 'oh I've got a problem' all of a sudden 'oh allright what's the problem' and find a strategy or a structure so that you can get around that… …All these things were

accumulated by trial and error and in real circumstances. Really within legitimate contracts."

(Male, Industrial Commissioner, 48)

"If you had a problem you could go there and ask a question and then somebody from somewhere else in the world could answer and help you get over the obstacles that maybe somebody else had overcome."

(Male, Software Specialist, 46)

From the problem-based impetus, I got a distinct sense that the learning pattern was really a collection of 'solved problems' that amounted to a learning journey. In this case the orchestration of learning value into industry value seems to come through an ability learn in the fire of a problem. As the literature would dictate, the 'authenticity' of the moment created the criteria by which goal setting, knowledge gathering, and practice is defined.

But this was not true for all participants. Indeed, some participants professed that in order to fulfill the requirements of their occupation, they needed to identify the peripheral skills unrelated to any one problem or task and planed their learning accordingly. Where the skills presented considerable gaps or risks, it appeared that participants preferred to have some sort of expert intervention to help guide the process.

"I was getting involved in selling products that were out of my comfort zone and just felt I needed to get educated."

(Female, eLearning and Mobile Solutions Business Owner, 48)

"I had mentor however, I don't operate very well in a vacuum. Having mentor took out of the equation the performance anxiety… … who is himself a journalist is very much himself self-taught, a man with immense curiosity, who basically believes in teaching apprentices the old school way… … my mentor put my feet in the stir ups but I did the riding."

(Female, TV Production and Marketing Manager, 38)

" quand t'a pas de coach, tu vas faire toutes les erreurs standards… …Si t'as un coach, il va te le dire. Tu vas pas nécessairement le suivre, mais il va t'éviter ce genre d'erreur… …là tu vas chercher tu monde qui vont te dire comment faire."

(Male, Researcher/Journalist, 67)

Others used a similar but less direct route to outside 'coaching' by simply observing others.

"you learn how they learn. And that's then becomes your own, you develop your own methods and it's very human lets say. We copy each other and we improve on what we see."

(Male, Software Specialist, 46)

"Tout ce que je savais c'est que il fallait qu'on développe, qu'on diffuse et qu'on analyse les données. Pour moi c'était la base, et cette base là je l'ai appris dans mon ancienne emploi ou je côtoyais des gens de formation qui avait développer des programmes et qui faisait ce genre de travail là… …Le fait d'avoir travailler avec des concepteurs pédagogiques multimedia chez *company name* . Je pense qu'il y a un gros bagage qui vient de là."

(Male, Human Resources Director, 38)

> "I've had a lot of exposure to search engine experts… …In my networks and with my clients."
>
> (Female, eLearning and Mobile Solutions Business Owner, 48)

Herein what can also be heard is that for all learning endeavors, there seems to be a 'gathering' phase where knowledge is somehow collected before it is analyzed, transformed and applied.

Then, some participants professed designing mini-projects involving some form of prototyping or 'playing around' to prepare for anticipated projects.

> "start with some hobby projects. For example, what I did was I programmed some musical software at home for my own amusement… …and most likely you could find some real life application for that."
>
> (Male, Software Specialist, 46)
>
> "And later when I was looking for work I started a couple Websites doing online marketing research. It wasn't to make money but, I became more interested in online marketing and key-wording, so I built a couple of Websites and did some more experiments with the key-wording and market research. That was purely a personal projects at that point."
>
> (Female, Online Marketing Manager, 36)

Then once a certain confidence accumulates, almost all participants professed 'taking the plunge' and leaping into a real life application involving expectation and risk.

> "But again I had to hit the ground running, set aside my doubts and get working."
>
> (Female, TV Production and Marketing Manager, 38)

"So you basically need to dive in and start doing it. Start with the basics of the course and build onto your knowledge."

(Female, Online Marketing Manager, 36)

"Je me lançais dedans. Juste comme ça. J'apprends vite. On me le montre une fois et je peux le refaire… … La recette magique c'est lance toi dedans et nage"

(Female, eLearning Technician and Software Trainer, 44)

"Moi je suis arrivé pis j'ai sauté là dedans, bon ben let's go on y a vas all in."

(Male, Human Resources Director, 38)

Although the above may make the journey sound rather linear, in actually the process of gathering, practicing and jumping seems to be more of a spiral process or even tree-like process. Much like the Kolb model, in these stories I could infer that participants would travel down the same gathering, practicing and some cases jumping paths, then calibrate the next set of learning experiences according to the previous experience—each time going deeper and getting more complex. Said differently, it seems that before a goal is even set, there is a learning phase that involves a combination of gathering, observing, mentoring and trial and error that in turn hones more pointed learning objective and path.

"You can't intellectualize the whole process. It's a process that is a living thing. So you are constantly, when you are working in that field, you are constantly learning."

(Female, TV Production and Marketing Manager, 38)

What resonates here is that the calibration process is in constant evolution as knowledge and experience accumulates and thusly the learning path is re-visited in a spiral-like fashion adding complexity and nuance each time.

In terms filtering and selecting tools and resources, overall, the choices seem heavily influenced by the industry they belong to. Those who operated in a more ICT centered industry acknowledged that quality information really does happen online. The Online Marketing Manager acknowledged a need for constant, daily, learning. For this she uses a RSS aggregator to sift through the masses of information and follows various blogs that are recognized as references in her industry. Moreover in preparation to her position, she felt that online resources like eLearning courses and online articles were really the most current and appropriate for her needs.

> "Technical based and online based all the resources are there to learn how to do it. There is lots and lots of free resources like video training, articles, blogs, forums, people exchanging information… … As far as taking a technical course in this kind of work, I don't think it really exist exactly. I would say that many of the resources where you can learn to do this they are online courses and wouldn't be somewhere where you sit in a classroom."
>
> (Female, Online Marketing Manager, 36)

This testimony echoes Castells (2009) and Siemens (2005) idea that connecting to the right information flows is key for continued learning and staying abreast of any changes in industry. But in this testimony there is also the notion of knowing where to find quality information for your specific industry—and for ICT jobs it is online. This is also expressed by the Software Specialist:

> "more and more the information and knowledge was coming from the Web and especially in the software field, people were on the on the Internet from day one pretty much. They were exchanging information and there were blogs… …soon there was Wikipedia and even programmers who organized themselves into open, what they call, open source movement, which is a software foundation that is on the Internet its located on the Internet, and its meant to exchange software knowledge and software code even for free."
>
> (Male, Software Specialist, 46)

This is different for the more people oriented fields like with the Industrial Commissioner, the Human Resources Director and the Business Owner. For these industries the learning resource seem to come more from the people network.

> "j'ai assisté à beaucoup de conférences pendant cette période là. Puis les conférences m'ont permis deux choses. Un d'améliorer mon discours parce que tu échanges beaucoup avec les gens. En échangeant avec les gens tu te challenges beaucoup et tu te dis ça fait du sens ce que je dis… …D'une part tu peaufines ton discours, t'entend ce qui se passe ailleurs alors tu peux te comparer. Et là je te caches pas que tu te compares avec des organismes semblables à la tienne. Tu compares pas à une banque quand tu es une compagnie de divertissement.
>
> (Male, Human Resources Director, 38)

> "I joined local networking groups. Through those, I realized I needed to learn how to sell. Just through trial and error. I realized I have a big learning gap. I have a gap here, performance or knowledge or both in selling face to face…
>
> …Toastmaster which is sort of a learning lab where we all go together and we

> give feedback on each others on our speaking performances and we put ourselves out there to learn."
>
> (Female, eLearning and Mobile Solutions Business Owner, 48)

Notice that in both these instances, the learning is occurring face-to-face rather than online. Once again, I got the sense that these choices were based more on an ability to discern the best possible resource for the industry requirements. Said differently, for the more people oriented work, it was preferable to make actual people connections for learning—and these preferably in person than online.

Lastly, was the participants inadvertently provided a very handy list of 'go to's' and quick hits that have made a difference even in my own practice of eLearning development. Through participants I discovered the speed and wealth of YouTube and Lynda.com to get quick tutorials on software operations.

> "Strictly software training I use Youtube [and Lynda.com] video, I can't tell you how much I've learned from YouTube videos like how to group objects in Illustrator… … Whenever I have a question, I had to put a widget on my site, I just go through the plethora of video courses that they [Lynda.com] have on that site, find exactly what I need according to the little challenge that I'm facing. I what the video on one of my screen and apply it on the other and voila that's what I do.
>
> (Female, eLearning and Mobile Solutions Business Owner, 48)
>
> "[on how to teach yourself to be online marketing savvy] do a basic video training course and maybe follow the steps with build up a small Website"
>
> (Female, Online Marketing Manager, 36)

And of course the use of forums and blogs for any kind of programming and software troubleshooting seems to be essential resource.

> "…more the information and knowledge was coming from the Web and especially in the software field, people were on the on the Internet from day one pretty much. They were exchanging information and there were blogs…"
>
> (Male, Software Specialist, 46)

In light of these contributions, what is the process or processes of learning? First and foremost the process begins with identifying the already acquired skills that can be transferred. Then, some participants showed a distinct proclivity towards problem-based learning—drawing on the authenticity of the moment to shape goals, select resources and set performance indicators. Others followed a more classic path of gathering, practicing and diving in. In both cases calibration seem to travel in a spiral-like fashion enabling the learning path to be re-visited with the nuances and complexities gained through experience. In terms of choosing tools and resources, it seems prevalent that the selection is influenced mostly by the type industry the occupation belongs to. To get a better understanding of the deeper aspects of these patterns, let us now dive into the question of how knowledge was absorbed and interpreted. Let's lend an ear to the semantic dimension.

Semantic

The semantic dimension of learner autonomy proved to be the most difficult to identify and interpret. Given it encompasses all evidence of how individuals are making sense of the information collected, it felt as though I needed to jump inside the

participants heads to get a sense of how knowledge was being processed and transformed. This dimension serves to answer the research question: How are they using the resources? Once I apprehensively associated the themes to this dimension, I felt more confident about my choices when I was able to see that the themes did in fact echo Gardner's (2007) 'disciplined mind' and 'synthesizing mind'. This helped confirm that the themes were indeed linked to the less tangible aspects of learning—namely the interpretive strategies. The other sub-classification that emerged in the interviews is best characterized through Pegrum's (2011) 'Network Literacy.' Table 8 list the themes according to their respective sub-classification.

Semantic dimension		
Disciplined Mind	**Synthesizing Mind**	**Network Literacy**
Formal education as a universal passport	Failure is the mother of all inventions	Network as a safety net
Formal education eclectic	Learning on the job	Networking to help predict the future
Gestalt of skills	Seek first to understand	Network for peer exchange
Learn the language	Online training	Network as a learning lab
Self-proclaimed proclivity toward pedagogy	Articles online	Network as a sounding board
	IT fields are best learnt online	Network to compare and contrast
	Open source movement	
	Blogs	
	Quickie videos	
	RSS feeds	
	The Web organizes	

Table 8: Themes related to the semantic dimension of learner autonomy

The following will expose that for these participants the semantic dimension of learner autonomy mainly revolved around the ability to apply a certain method to their thought process, the ability to make connections between knowledge sets, the ability to

analyze and synthesize varying amounts of information, and finally how to use people networking for learning.

As mentioned in the conative section, one of the more prevalent strategies in operating major career changes in a self-directed manner is first and foremost to identify transferable skills. In deeper sense, it echoes Gardner's description of the 'disciplined mind', which according to Gardner, is the ability to make connections between knowledge sets and repurpose knowledge and skills for different situations. I found that this trait was primarily expressed through the participants' view of formal education. Perhaps my expectation was to hear ideas that eluded to the inadequacy of formal education. Or even that they as individuals felt that they could do better in planning their own learning endeavors than a formal institution. Although there were indeed comments oriented in that direction, in the general sense, formal education is viewed rather positively as a 'universal passport' or the guideline for many of the essential skills carried into work and self-directed learning.

> "C'est la méthode…rigueur intellectuel disons… … Tu t'aperçois assez vite si quelqu'un à fait l'université quelque soit le domaine… … Ce que l'université t'a appris c'est de distinguer l'important de ce qu'il l'est pas, une certain méthode, et ne pas confondre Sisley ou l'équivalent, avec un peintre amateur du carré Saint Louis."
>
> (Male, Researcher/Journalist, 67)

> "I learned two things at McGill, I learned to work and I learned really to solve problems."
>
> (Male, Industrial Commissioner, 48)

In these utterances I hear what Gardner (2007) terms the 'disciplined mind'. Gardner advances that people should master information within the major disciplines, like History and Math, to exercise ways of thinking that require practice because the brain is not pre-wired to utilize them intuitively. Gardner advances that a disciplined mode of thinking will ultimately create the methodical abilities to build relevant knowledge and make connections between knowledge sets.

In similar vein, the next interesting point among the participants that eludes to an ability to orchestrate overarching knowledge sets is the view that their occupations entailed a 'gestalt of skills' or in other words, that their occupation required skills from a collection of professional disciplines.

> "…requires a great array of technical skills and people skills as well as well as research skills and management skills. And this is a gestalt mostly rather than a collection of skills."
>
> (Female, TV Production and Marketing Manager, 38)

> "[about being Industrial Commissioner] It's really a hybrid thing… …It's an accumulation of a variety of things that made me interesting for the *name* to hire me, because they thought I could have an impact on a variety of things.
>
> (Male, Industrial Commissioner, 48)

> "software specialist…it's a mix of multiple disciplines"
>
> (Male, Software Specialist, 46)

Once again, the ability to perform an occupation they did not study for is viewed more as process of have a 'method' in approaching new situations and being able to connect

knowledge and skills that are perceived as unrelated—as if it were something they would not have been able to learn in school if they wanted to.

The other important collection of comments that displays an inclination toward applying discipline in learning is the participants' 'self-proclaimed inclination toward pedagogy'. Almost all the participants professed having pedagogical penchant that allowed them to plan and carry out their own learning endeavors.

> "Ce que je pourrais te dire c'est que la pédagogie m'a toujours suivi partout…
> …Être formatrice j'ai fait ça dans tous mes emplois. J'ai toujours fini par étant trainer à la fin."
>
> (Female, eLearning Technician and Software Trainer, 44)

> "I think that is the way I am geared. I witnessed my father learning so many different skill sets as was needed. How do you replace a gutter? Well you look at how it's put together, you assemble your tools, you put it out, you replace."
>
> (Female, TV Production and Marketing Manager, 38)

The next interesting interpretive skill that emerged from the interviews is hidden in the concept of 'learning on the job.' This theme encapsulates a rather common learning pattern, which combines observation, research, trial and error and peer collaboration to learn tasks that are already performed in the work environment. Taken at face value it seems relatively simplistic in nature. However when I reflected on the utterances associated to this theme, it almost never sounds like simple imitation. I see that within this process there are rather important analytical skills that are prompting the participants to yes gather knowledge, but then analyze and personalize data to perform related tasks. Said differently, it reminds me of what Gardner (2007) would term the 'synthesizing

mind'. According to Gardner, synthesis includes the ability to transform learning into narratives, taxonomies, concepts, general rules, metaphors, theories and meta-theories. This is what I heard in the next series of utterances about learning on the job:

> "Je savais pertinemment qu'en rentrant chez *company name* la première tâche ardue allait être de comprendre l'environnement et l'univers… …En premier lieu, il y a une phase d'écoute. Dans les premiers mois, j'ai sondé les gens. Au début j'ai pris trois mois pour sonder les gestionnaires du studio pour comprendre leurs attentes et besoins et voir comment notre département pouvait leur apporter. L'objectif d'une manière général c'était de définir les objectifs en tant qu'équipe, mais pour moi c'était de comprendre l'environnent… … c'était une phase d'analyse"
>
> (Male, Human Resources Director, 38)

> "In this particular field you need to learn along the lines and along the margins a lot more than that's actually listed in your job description."
>
> (Female, TV Production and Marketing Manager, 38)

> "So I had the task that was given to me and I had to do a lot of research on how to set it up because I had never done it before, so I was basically just learning on the job and doing research on the job how to do this."
>
> (Female, Online Marketing Manager, 36)

My purpose in making a stop at a the very common learning strategy is to point out how this strategy seems to echo a more complex skill of gathering data, analyzing it, framing it and applying to appropriately. The utterances make it sound as though 'learning on the job' has a rather nebulous or hazy component to it where participants are concentrating

efforts on decoding the tacit skills hidden in producing quality work. For this the participants needed to experience the work to infer the tacit skills required.

Also in the family of the synthesizing knowledge were all the themes that alluded to research (mostly occurring online). Almost unanimously, participants confessed to spending considerable amounts of time researching online resources related to new work situations, problems or tasks.

> "...you need to find reliable sources that you can follow regularly and being able to filter what is good information out of that and what applies to your daily life… …being very good at doing online research, knowing what you are looking for… … reading lots of blogs… … I did a lot of research and some online training courses but just free online training courses… … reading lots of articles… …"
>
> (Female, Online Marketing Manager, 36)

> "Research, research as much as you can and then stop researching and jump in."
>
> (Female, TV Production and Marketing Manager, 38)

> "I have had to do some research online from various sources to get the answer"
>
> (Female, eLearning and Mobile Solutions Business Owner, 48)

> "Pis encore là, en fouillant sur Google… …Demande toi toujours quand t'es devant ton écran, c'est quoi je veux faire. Pis la réponse est toujours sur ton écran."
>
> (Female, eLearning Technician and Software Trainer, 44)

> "J'ai passé un an de temps à faire que de la recherche sur Internent, matin et soir, c'était ridicule mon affaire… … Là dessus je me suis vraiment abreuvé de tout ce que j'ai lue sur Internet. Ça m'a aidé grandement"

(Male, Human Resources Director, 38)

In fact, two things can be heard through these utterances, on the one hand it does sound like a there is considerable amount of time is invested in using the Internet to research various aspects related to their occupation. Although not overtly stated, I believe it is implied that synthesizing knowledge is part and parcel of processing this information. But also, there is also evidence of filtering strategies that seems to help sift through and select quality over quantity.

Now onto a more personable aspect of the learning process. Probably the most exciting finding of the interviews is how the participants characterized the use of their people network for learning. As social learning theories would have it, learning is a social process, this much we know, but according to the participants of this study, there are various ways to use people as learning resources. This resonates with Pegrum's (2011) concept of 'network literacy', which is the ability to leverage digital networks to stay informed through mindful connections. According to Pegrum, it involves understanding the processes involved in shaping and being shaped by one's network. Form the interviews I noticed different patterns of how the people network was used.

First you need to gather the right network:

> "I like working with fun interesting creative people, so I'm not going to seek dodgy people."
>
> (Female, TV Production and Marketing Manager, 38)

> "I sit with other business people, either owners or people in the sales profession and we learn about sales—how to sell."
>
> (Female, eLearning and Mobile Solutions Business Owner, 48)

"Ça ça été une source d'information vraiment pertinente, sortir de ton milieu de travail et échanger beaucoup avec des gens du milieu."

(Male, Human Resources Director, 38)

"So it's a lot of keeping up with news, communicating with other people in the field and what techniques they've learn that have worked for them and haven't worked for them"

(Female, Online Marketing Manager, 36)

Then you can use your network as a sort of 'learning lab' or test ground.

"Puis les conférences m'ont permis deux choses. Un d'améliorer mon discours parce que tu échanges beaucoup avec les gens. En échangeant avec les gens tu te challenges beaucoup et tu te dis ça fait du sens ce que je dis."

(Male, Human Resources Director, 38)

"I joined local networking groups. Through those, I realized I needed to learn how to sell. Just through trial and error. I realized I have a big learning gap. I have a gap here, performance or knowledge or both in selling face to face."

(Female, eLearning and Mobile Solutions Business Owner, 48)

"from that foundation we were all learning and we were borrowing pieces of code solutions and exchanging different ways to write software."

(Male, Software Specialist, 46)

You can also use your 'network as safety net':

"I always had a tremendous safety net even though I was not always aware of it, through a fantastic network of journalists and researchers that gravitate around my mentor… …That network has given me tremendous confidence.

(Female, TV Production and Marketing Manager, 38)

> "I do have a really great network of support. If I have too much writing for example or even instructional design work, I have really great people that also work as freelancers that can help out and they have.

(Female, eLearning and Mobile Solutions Business Owner, 48)

And finally, you can use your network to help predict the future:

> "Tu peux pas être bouché à ce qui se passe allentours, tu vas faire faillite… … Tu croises du monde à Montréal et tu apprends que *chaine telévision* penses à une série sur les peintres. C'est pas secret, mais tu le sauras jamais si tu restes à Rivière du Loup. Si tu es dans un coin reculé, t'as pas l'information qui te permet de savoir quand et où proposer quelque chose. Tout des trucs qui vont te permettre de te positionner… … Savoir ça un année à l'avance c'est crucial."

(Male, Researcher/Journalist, 67)

> "Encore un fois, t'écoutes tu regardes comment ça se passe et j'ai compris rapidement que l'avènement des médias sociaux avait une portée immense sur les relations humaines en milieu de travail."

(Male, Human Resources Director, 38)

The people network is indeed a very important learning tool. But therein lies a process of critical selection and mindful interaction. There is intelligent orchestration in gathering the right network that will be able to provide meaningful feedback, test driving ideas and even perhaps some of the heavy lifting in work related situations. But underneath the skill to 'network' lies a social dexterity that allows individuals to build

trusting relationships in order to reach a level of honest feedback and supportive collaboration—a subject explored numerous business self-help books.

The semantic dimension really represents the inner thinking that remixes information gathering. In response to the question 'how are the resources being used' two major interpretive strategies seem instrumental in transforming knowledge into value. First, it seems useful to apply a form of discipline: discipline in the sense of having a method in the thinking process; discipline in the sense that there is form of training, muscle building if you will, in the stamina required; and discipline in the ability to make connections between knowledge sets. Whether it is by drawing on the processing skills learnt in formal education, or having some degree of meta-cognition, or being able to identify overarching knowledge patterns, participants did express some sort of higher level thinking skills. This was combined with a sort of fortitude or as one participant put it 'being rooted in action' in order to invest and maintain the energy required. I think both are implied in Gardner's 'disciplined mind'. Then there is the ability of filtering and synthesizing mass amounts of information and analyzing it. Whether it is creating general rules, or meta-theories or taxonomies, it is not entirely clear just how the synthesis results, but I think it can be inferred that there is a result to data gathering that goes beyond direct correlates or imitation. Lastly, there is the talent of 'networking.' This encompasses both personal and communicative strategies that leverage collaboration and exchange for learning and career grooming. More commonly known for it's socio-economic power, the interviews revealed that networking was used for a variety of reasons: namely as a learning lab, as a safety net and also as a means of predicting the future which is a theme that overlaps with the economical dimension. That said, let us

now place economics at the forefront of the themes and explore what elements in the economic dimension may have influenced the learning autonomy of the participants.

Economic

Albeit the last of the four dimensions, the economic dimension of learner autonomy presented itself as the linchpin of all the other dimensions—at least with these participants. The economic dimension covers all aspects of learning that are attached to the perceived value of knowledge and the cost/benefit ratio of learning. In gathering thoughts in the economic dimension I hope to answer the question: How is SDL affecting the socio-economic reality of knowledge workers? Predictably, a number to themes revolved around the motivation for changing careers. Ranging from survival, to pleasant self-discoveries and amazing opportunities, the motivation to self-teach contains quite a bit of variety. But more surprisingly, many participants professed that digital networks present an important need to 'brand' oneself appropriately in order to be understood as a professional and easily found in the network. As mentioned in the previous section using networks to make guestimates about the future seemed top of mind in most participants and most certainly affected learning and career journeys. And lastly, the topic of the relevance of formal education was addressed. Table 9 lists all the themes related to the economic dimension.

Economic dimension			
Motivation for change	**Branding**	**Predicting the future**	**Finding the right mix**
Failure is the mother of all inventions	Make yourself relevant for the company	Networking to help predict the future	Formal education as a universal passport
Adapt and adjust	Having impact	Eye on the future	The right mix: cost, flexibility, time, effectiveness
Occupation changes	Shine bright like a diamond	Network as a safety net	Formal education not available

Economic dimension			
Motivation for change	**Branding**	**Predicting the future**	**Finding the right mix**
Unforeseen constraint to perform planned occupation	Branding yourself		Formal education too lengthy
Career advancement			Speed is of the essence
Dream job			
Freedom and control over my destiny			
Quality of life			
Freelancing			
A matter of survival			
Demonstrated success attracts new responsibilities			
Job in demand			
Unforeseen talent			

Table 9: Themes related to the economic dimension of learner autonomy

Imbedded in the question of how they changed careers, is the question of why they changed careers. In order to piece together learning journeys, participants told me about the context surrounding their change. As discussed in the conative dimension, many of the changes were attached to the socio-economic context triggered by the prevalence of ICT. Industry demands changed almost overnight and workers saw their career aspirations and learning efforts simply melt into a new reality—the digital reality. As one participants said "you have to hit the ground running and run fast."

> "My first job search I found that there was lots of opportunity out there and mostly in software. That was the big surprise. The schooling system did actually know about the reality it seemed at that time."
>
> (Male, Software Specialist, 46)

> "I had to learn to code in HTML when the Internet exploded because that was the only way to get Web pages online and update them. So I did it. Is that something I

wanted to do, no. Was it something I needed to do, I guess I saw it as such and that's what I did. But when the need arises, I rise up to the occasion."

(Female, TV Production and Marketing Manager, 38)

"You also have to be very adaptable because it's not a field that you can just learn once take a training course and then you know everything and just continue doing your job. It's something you need to research every day."

(Female, Marketing Manager, 36)

"[about computers]Je voyais bien que c'était un outil, je dis bien un outil, qui allait devenir incontournable. Je n'y comprenais rien mais je voyais bien que l'outil était incontournable… …Mais j'ai aucun intérêt pour la technologie, mais tu peux pas payé le luxe comme pigiste 'je connais rien à la technologie je continue avec la plume'. Tu vas faire faillite."

(Male, Researcher/Journalist, 67)

"Ça faisait même pas un an que j'ai occupé le poste de data coordinateur pour changer. De partir de zéro knowledge en computer à devenir un "implementation specialist" pour un gros logiciel de capture de données. C'est un logiciel que je ne connaissait pas du tout."

(Female, eLearning Technician and Software Trainer, 44)

ICT generated many changes. Generally speaking, change does create resistance, but despite this feeling of resistance, most participants expressed that their career switch was a source of enjoyment once the initial learning curve surmounted.

The next interesting group of socio-economic themes belong to the notion of 'branding.' Castells tells us that "branding is the cultural dimension of the global market,

and the process by which individuals assign meaning to their consumerism" (2009, p.120). There are two key thoughts in Castells definition of branding that echo the thoughts of the participants. First, the notion of branding as a means to assign meaning: This seems to be a matter of concern in the new economic reality in that workers need to clearly define themselves, their knowledge, their skills, in order to be properly identified and associated to appropriate projects. Further, some participants overtly expressed the importance to being properly 'tagged' on the Internet so as to be easily found.

> "And plus you've got to realize that people are people are people and the product that you sell is basically yourself, it's the production version of yourself, but it's still yourself."
>
> (Female, TV Production and Marketing Manager, 38)

> "I did podcasts, I did presentations, I think it was in 2008 when I gave one talk. And I started to build my name online because that's what I learned you had to do. You had to become a thought leader in your space to get clients. And that actually worked. I started to get clients and I became very busy. I was found through Linkedin, I still have a client that found me that way. I was found, I had another client who I had for 4 and a half years, who found me because of the talk I gave in Montreal. You Googled my name and my talk came up. So these things, through trial and error, resulted in success, which kept me going… … All these things will get attached to your name… …You become like a brand of knowledge or a knowledge leader or a thought leader in the field…. …"
>
> (Female, eLearning and Mobile Solutions Business Owner, 48)

Herein I see a connection to Castells' idea that branding is connected to 'consumerism'. In a way, what the participants are saying is that we need to become well-defined 'products' in order to be uncovered. Considering people as products is a rather negatively charged notion, I don't mean to make it sound like this, simply put, digital networks has made the pool of people so vast, that in order to stand out, it seems necessary to have the right 'wrapper'.

> Another concern expressed by the participants was the need to predict the future.
>
> "..il y a un côté jeu d'échec dans la pige. C'est à dire, quelqu'un qui n'est pas pigiste, sa revue tombe, il fini en thérapie. Alors qu'un pigiste va dire 'bon ben c'était l'fun pendant que ça durée la revue a tombé, je ne suis pas vraiment surpris parce qu'il ce passait ça pis ça pis ça, le Web est arrivé'."
>
> (Male, Researcher/Journalist, 67)
>
> "Encore un fois, t'écoutes tu regardes comment ça se passe et j'ai compris rapidement que l'avènement des médias sociaux avait une portée immense sur les relations humaines en milieu de travail. J'ai allumé sur le fait que les médias sociaux venait chercher dans le milieu de travail les individus ce à quoi ont avait pas accès avant… …Aujourd'hui avec Facebook, avec Twitter, peu importe tous les logiciels qui à avec les téléphones intelligents, les gens sont accessibles immédiatement. Donc, en terme de recrutement, j'ai fait énormément de veille."
>
> (Male, Human Resources Director, 38)

Indeed, being prepared for change seems instrumental in coping with the speed introduced by ICTs. Moreover, having an idea on the direction this change inspire the

innovative idea that sets you apart and ensure your pertinence on the job scene. Where did I put that crystal ball?

Last but not least in the economic dimension are all the thoughts that pertained to formal education and why taking the formal route was inadequate. Unsurprisingly the main element in the reality of knowledge workers that does not jive with formal education is speed. Participants declared that going the formal path to learn their occupation would have been much too long and in some cases too theoretical for the needs of the job. Between transferable skills and some research or a few courses (online and in person), it seems that participants were able to find quicker more efficient routes to filling their knowledge gaps. Given the participants did not perform occupations that require official recognition (e.g. doctor, dentist, pilot, etc.) it seemed illogical to invest the time into formal education. Moreover, some participants expressed a lack of confidence in sustainability of formal education in the sense that after investing all that time, the knowledge gained would probably be obsolete.

> "Because it's an industry that changes everyday. Even there was a technical degree you could do in a maybe 6 months or a year in a college, by the time you would finish your diploma it would be out of date. So I don't think it would be useful."
>
> (Female, Marketing Manager, 36)

From this one can infer that formal education is perceived more as a block of static knowledge that can only extend to global situations. It is good as a universal passport or to train for basic skill like problem solving or analysis, but not to address practical applications.

So how is SDL affecting the socio-economic reality of knowledge workers? Digital networks are certainly keeping us on our toes. Whether by choice or necessity, participant did not seem to hesitate in taking on the learning task associated with the shift introduced by ICTs. It seems the economic dimension of learner autonomy really tells the story of the current job reality. Digital networks have indeed introduced volatility in the job market and what was a known occupation ten years ago may have become obsolete. Echoing Castell's thought that a large part of gaining power in the new economical context is not so much about knowing what is coming down the pipe, but knowing which pipes to be watching. Also in the family of keeping a watchful eye, is the notion of being seen. As knowledge and skill can be relatively internal, the need to shine or brand our talents also seems part of the outcomes of digital networks. This picture certainly paints a very different scene than those who herald that digital networks are causing us to be swamped in chaos. Is this only for the minority of disciplined thinkers who are rooted in action or perhaps, given its inherent ties with survival, it is waking some of us up and making us sharper. The next section will compare the results of the interviews with the literature and make a few conclusive remarks about this study, its implications on future research and educational policy as well as some of it limitations.

Discussion

How *do* knowledge workers describe their learning experiences within the context of digital connectivity? Do they hold tacit recipe for orchestrating knowledge and economics? The purpose of this study was to listen, as my predecessors, Houle, Candy, Tough and Knowles did, to the whole story. This is not just pedagogical story, but social, psychological and economical story. How do knowledge workers transform the

"approximation of the unknowable," as Aristotle puts it, into value. For this, I used Bouchard's (2009) framework characterizing the dimensions of learner autonomy into conative, algorithmic, semantic and economical dimensions. The purpose of using this tool was to train my ear and help uncover all the elements that may influence the autonomy and effectiveness of a self-directed learning journey. In this section, I will describe the context in which the participants changed careers as I believe it underpins their self-teaching journeys. Then, I will discuss the usefulness of using Bouchard's framework in categorizing the themes emerging from the eight interviews. I will compare some of the findings with the claims made in the literature—especially with regards to the 'ingredients' involved in SDL, claims made about learning theory, Web-related tensions, literacies, and ultimately the notion of the power of knowledge in the knowledge economy. In turn, I hope to characterize some of the pillars of the autonomous learning in the current economic context and provide some insight into how educationalists could prepare future generations. I will also do a critical review of this current study to expose its contribution to the thinking around policymaking and as well as render some of the felt limitations and recommendations for future studies.

It would appear that one of the main triggers of self-teaching is a historical one—namely the explosion of ICT. In the last 30 years, the presence of ICT has affected almost every professional sector of the working world. Within it's own respect, swaths of new ICT related jobs were created, for which there was no training available. But even in non ICT fields, such as journalism, business, education etc., computers and digital networks introduced new tools and affordances that created a need for learning. It also pruned other occupations that became either redundant or obsolete, thus creating a need to

'recycle' skills from one occupation into another. Albeit rough waters to jump into, it stands to reason that many felt they had no choice. SDL and survival do indeed seem intimately tied, whether or not individuals possess all the internal and external resources to cope. But before looking at the possible barriers to learning it seemed logical to look at the triumphs—to turn to some expert surfers.

The participants of this study were chosen on the basis of performing an occupation for which they did not study in, but for which there exists an official training program. For some this was a result of changing industry due to ICT, and for others, it was more because of career happenstance. Said differently, some participants developed new interests, or discovered skills they were unaware of, or were entrusted with new responsibilities, some ICT related and some not. Still, the presence of ICT did seem influence these career shifts and learning journeys in varying degrees. Has this brought anything new to what we already know about SDL? First and foremost, according to Bouchard (2009) it should change how we tell the story. Given the new economical context, educationalist need to understand the industrial foundations on which SDL is occurring. Moreover, given learning is leaping out of books and classrooms into and into digital networks, educationalists need to dig into how this new media is used and interpreted. Earlier forms of SDL research concentrated more on learning mechanics and learning contexts, but through Bouchard's framework characterizing four major dimensions of learner autonomy, the hope is that the SDL journey is told through all of its interrelated elements.

At a glace, Bouchard's framework was indeed useful in helping to extract, qualify and characterize the meta-content of the interviews. Although I included a column called

'Other' I did not come across any themes that could not be associated to a dimension. However, I felt as though some dimensions needed to be more inclusive and others were too inclusive to be meaningful. For example, when I came across themes concerned with economical motivation, I did not know whether these should be placed in the conative dimension or the economical dimension. The economic dimension is meant to cover themes associated to the value of knowledge and cost-benefit ratio of learning. Motivation is neither of these and should really be placed in the conative dimension, which concerns drive. But as mentioned in the Results section I put them in both because omitting to represent these themes in the economic dimension seemed to create a misrepresentation of the importance of the economical undercurrent driving certain learning endeavors. However, I did feel as though I stretched the parameters of the economic dimension.

That said I felt as though the conative dimension may be too inclusive to be meaningful. The Oxford dictionary defines conation as "the mental faculty of purpose, desire, or will to perform an action; volition." In Bouchard's view this also includes psychological predispositions, personality, context and environmental support. However putting both motivational and psychological aspects into the same category seemed odd as motivation contains many extrinsic components and psychological predispositions are mostly intrinsic. Given personality and the psychology involved in learning take a rather large slice of the SDL literature, placing these themes alongside themes concerned with motivation and environment felt as though they were being buried. I believe the conative dimension would be better represented if the psychological aspects lived in a dimension of their own. This would allow a clearer picture of what is extrinsic to learning

(motivation and environment) and intrinsic to learning (personality and psychological predisposition).

In term of the 'ingredients' involved in SDL, as with Gagliardi et al. (2009) study, overarching results of the algorithmic dimension do reveal a mix of tacit resources (people-based) and codified (document-based) learning. This process does echo the Vygotskian concept of 'scaffolding' in that almost all participants professed having some sort of support system to help their learning process. However, in its more nuanced version, calibration, selection process, tools and resources and learning patterns seem to be varied depending on the where to access the best possible learning tools for the goal (usually occupation-driven). For the more technically oriented occupations and tasks there is a more dominant use of online learning tools. For the 'softer' more people oriented occupations, there was a prevalence of mentoring, peer collaboration, discussion and comparison. What's more, although Internet connection times were reported to be relatively high across the board (except for one), most people-oriented workers seem to prefer in-person contact with peers.

This does somehow echo the concept of 'organizing circumstances' of Spears and Mocker (1984), in that participants had to use the resources that the field offered. But I did get a sense that participants chose resources according to what works best for their industry not because other, perhaps easier, resources were not available, but not as good. Based on the testimonies of these participants, I would disagree with Spears and Mocker's claim that resources are chosen more on the basis of the limitations of the circumstance. Participants seem to be exercising a high degree of discernment in terms

of choosing highest quality resource for the needs of their industry, above their preference and comfort zone.

In terms of learning patterns, there also seemed to be an interesting variety. Some seemed more problem-based, others seemed to apply more foresight and preparation in upcoming learning tasks. It reminded me of Brookfield's (1986) description of learning:

1. Instrumental learning: which refers to task-oriented and problem solving based learning.
2. Dialogic learning: which requires some form of critical understanding of what others mean when communicating
3. Self-reflective learning: which entails developing an understanding of ourselves and any dependencies or inhibitions.

The Industrial Commissioner, eLearning Technician and Software Specialist seemed to express a distinct preference for instrumental learning. As per the Commissioner's description, learning is in actuality a series of solved problems that amount to a distinct and interesting experience pool that enables insight into other problems. With the Online Marketing Manager, the Human Resources Director and the Researcher/Journalist there were elements in their dialogue that recalled Brookfield's dialogic learning. The Human Resource Director expressed it most articulately in overtly saying that his learning process involved a listening phase to understand the underlying issues in his company followed by a discussion phase to 'polish his discourse' with peers operating in related field. Thus 'meaning' seems at the forefront of this learning process more than problem solving or performing specific tasks. Finally, the eLearning and Mobile Solutions Business Owner and TV Production and Marketing Manager showed rather interesting

reflective strategies in their learning. Things like 'identifying gaps', learning things out of their comfort zones, the need to 'recoup, regroup and re-strategize' were utterances that eluded to an understanding of their inhibitions and a rather high degree of self-knowledge. Thus claims made 'authenticity' or 'situated learning' (Lave & Wenger 1991) is the epitome of what makes learning effective was present in only a few participants. Many participants demonstrated an ability, even a need, to go beyond practical application and problem solving and learn items that could be considered more abstract. Moreover, all participants expressed an appreciation for skills learnt in formal education that provided a form a disciplined thinking that aided in all learning and work situation. Thus having to learn in the fire of an authentic situation may be motivating and provide a tool to help shape objectives and process, but it does not determine efficacy as the literature would suggest. Whether these learning patterns were shaped by personal preference, or by industry, or by the size of the gap between the person and the occupation is still unclear to me. However, I do see that these learning approaches are not binary (one over the other), but more stacked vertically on one another. Said differently, those who follow a more self-reflective pattern, also have dialogic and instrumental components, but those who follow instrumental patterns uttered little to show signs of reflective patterns.

The other interesting claims made by the literature and reflected in the interviews is the notion that self-efficacy in SDL is determined by the presence of meta-cognitive knowledge. Said differently, those who know about learning and teaching seem more successful with their own learning tasks (Clark and Mayer's 2008). Indeed, I would say that six out of the eight participants expressed overt talent and knowledge for pedagogy.

Either because of being teachers/trainers themselves or simply utilizing language that distinctly belongs to the pedagogical world, there was a clear proclivity to pedagogy. However, the two participants that did not express pedagogical inclination were equally successful in their learning endeavor. Is this due to an instinctual understanding of learning or are there other factors, unrelated to meta-cognition, that influence self-efficacy? Sufficient to say that these two participants have planted a seed of doubt with regards to Clark and Mayer's views and could also warrant further exploration.

The next interesting set of revelations emerging from the comparison of the interviews and the literature concerns claims by the connectivists Siemens and Downes (2009) that 'know-how' and 'know-what' are being replaced by 'know-where.' Siemens advances that because of the abundance knowledge available through digital networks, we can no longer think of ourselves as agents of meaning-making, but rather that meaning exists and requires us to access it. Based on the interviews, I would disagree with Siemens on this point. I will acknowledge that know-where was mentioned as important in many interviews, especially with those who had ICT related occupations and experience a high degree of fluctuation in their work, but 'know-how' and 'know-what' still seemed rather important. Many participants uttered ideas that demonstrated a need to internalize knowledge and skills and also exhibited evidence that they were indeed transforming this knowledge into personalized meaning. The connectivist also advance that 'chaos' is a major element of orchestration in using digital networks for learning, but this did not seem to occupy any concern among the participants--at least not overtly. However to be fair to the constructivist theory, characterization of the nine principles (see p.39) do indeed describe many of the process and technics utilized by the participants.

Whether this is because these principles characterize many learning theories or because the premise of constructivism (being grounded in chaos) sounds more dramatic than its application I cannot say. At the risk of steeling the luster away from this modern theory, it appears that its antecedent constructivism (meaning-making through gathering and interpreting data) is still the process du jour among these participants.

The last interesting claim about the effects of digital networks on learning theory is Candy's (2004) notion that learning has become more cyclical rather than linear. This was definitely verified through the interviews. In fact, for many participants, calibration and knowledge gathering seemed to be revisited and adjusted several times in order to hone exactly what needed to be learnt and at what depth. Is this a by-product of Web-related affordances or simply a bi-product of not having a teacher guide the learning process? Perhaps both, but is it certainly a unique feature of SDL type learning in that in some instances, participants eluded to the fact that although they knew what they needed to learn in the general sense, planning and goal setting happened intuitively based on collecting knowledge and adjusting learning as they went. They simply dove in, experienced the knowledge and then were able to narrow their learning path.

In terms of the claimed Web-related tensions or barriers to learning, claims made by Carr (2011) that the Internet is reducing our ability to concentrate and scattering our attention was difficult to verify through this mode of inquiry. Carr based this claim on a study illustrating that more linear mode of information transfer (e.g. books, articles, etc.) seem to take less time to absorb and have better retention results. The participants did not utter anything to confirm or disprove this. They did, however, almost unanimously mention that persistence was a key personality trait required to learn so much on their

own. Albeit it may look as though I am mixing apples and oranges in connecting a personality trait to the performance of certain learning tools over others, but I believe that through the overwhelming importance of persistence as an ingredient to learning, the participants may have been demonstrating a coping mechanism to any element that can draw away from the learning task.

Also in the family of philosophies that say the Internet is making us duller, Candy (2004) suggests that the Internet may be increasing the chances for more shallow reproductive learning. This was certainly not the case with these participants. Not only was there no evidence of simple reproduction, the participants expressed considerable amounts of energy invested into analyzing and consolidating knowledge. Although I recognize that Candy may be saying this because we do seem rather quick at whipping our smart phones out of their holsters and shooting out the first Google hit that appears, however, from this study I can infer that the depth of the learning is probably determined more by the needs of the tasks than the speed at which we can access preliminary information.

Lastly on the list of Web-related tensions are claims that networks are feeding our natural tendency to flock to like-minded people—thus reducing a much needed intellectual exercise of acknowledging and exploring opposing positions. As Castells (2009) puts it, digital networks are increasing the likelihood of cognitive hoarding or gathering around others who share our "self-proclaimed truths" and lead us into "close knit tribalism" (Bouchard, 2013). This study did not provide any material with which to confirm or disprove this. However, some participants did express the need to get out of their comfort zone in order for true learning to occur. Also, another participant expressed

a preference for online networking and learning, but recognized that for her purposes she needed to get out and be face to face with people in the field she was training for. Is this evidence of an instinctual recognition of the need to face more uncomfortable elements in learning? This element alone would make a fascinating study, but this current study has little to offer in this regard.

Aside from weak a display of the critical disposition required in decoding the value-laden currents created by digital networks, with the exception of the Researcher/Journalist, I did not sense or identify evidence of media literacy. In the case of the Researcher/Journalist, he mentioned that he was constantly playing a "game of chess", constantly guessing where the current will take the industry and travelling with the current. Could this be loosely related to Pegrum's (2011) view, media literacy is the ability to recognize how advertising and corporate or political interest can influence information flows, I'm not sure. Moreover, I must admit that until I read Castells (2009) *Communication Power* I was also unaware of the subtleties involved in how information gains strength and visibility. Additionally, to be fair to the nature of the interviews, the questions in the interview really didn't take this direction. Had there been any focus on hegemony and social rhetoric, perhaps I would have different results.

On the more practical side, some participants did demonstrate considerable knowledge of personal and tagging literacy. These surfaced as a result of the discussion of the importance of 'branding oneself'. Digital networks do indeed offer a vastness of options, thus in order to be found and associated to the right projects or positions, many participants did talk about the importance of knowing who they are from a professional stand point as well as being able to articulately describe themselves. ICT seem to be

intersecting many different professional sectors, therefore having an eclectic skill set that can be transferred from one project to another seems a boon. The impact on identity is that it is less the job title that defines the person, but the person who defines the occupation.

Conclusion

In the words of Selwyn (2006), social research should be more than to investigate where society is going, who gains, who loses and by what mechanisms of power. We must also ask is this change desirable, and what should be done in response. Selwyn adds that social research has a "moral obligation to contribute to the general flow of public debate on our collective future" (p. 192). It is with this underlying philosophy that the current study wishes to report the reality of knowledge workers. This study needed to explore many questions that hang in the balance about digital networks and its impact on learning—for example how are digital networks affecting the value of knowledge and thusly the patterns of self-teaching? What characterizes self-efficacy? How should we be reacting as educationalist?

This current study surveyed a very distinct group of individuals. The goal was to turn to learning experts, so to speak, and document how they managed to teach themselves a rather complex set of skills. In other words, to look at success stories and chart what elements that contributed to this success. What I found, was a rather overwhelming resonance of the link between self-teaching and survival.

Much of what the participants said lies quite deep within the individual rather than in digital networks per se. In fact, the Internet was hardly cited at all (despite rather high connection times). Definitely the notion of discipline seems to stick. Discipline in

the sense of having a framework for processing knowledge, discipline for maintaining the stamina and persistence required, discipline in terms of knowing where to find the best resources possible for the industry, and finally, discipline in making conceptual connections of overarching skills and knowledge. In counter balance to this rather stoic recipe, there also seems to be a level of play, experimentation, freedom to explore without too much judgment and of course collaboration—all of which seem to contribute to a certain bravery in investigation and innovation.

The purpose of this current study was gather elements, a list of ingredients so to speak, that could feed the thinking around self-teaching—not from educationalists, but from the shop floor knowledge worker. It does not, however, shed any light into the actual gaps in learning skills of the newly graduated, or new generations of knowledge workers. As this is a key element to translate the evidence of this current study into any solid policy recommendation or curriculum development, I will not be making policy recommendations. However, the results of this study does hope to offer a contribution to the conversation on learning and economics and further drive the importance of discerning the industrial context that educationalists are sending students into.

Although it was beyond the scope of this study to discuss the changing identity of educators, it is certainly inferred that if workers need to know how to learn, teachers should be aware of these skills and thusly include them in their curriculum. As the saying goes, sometimes “the cobbler's children go barefoot.” This alone would make fascinating topic of inquiry: surveying the teaching community on their self-directed proclivities and their knowledge of self-direction. This aside, it would appear that educationalist must first and foremost ensure that the new teaching corps is properly tooled teaching students

how to learn. Teachers themselves may have to embrace a rather nebulous learning space that is digital networks. We may need to be more aware of the tectonic shifts between knowledge and power to then find our role in preparing students. And even more foreign to most educators, we may need to increase our media literacy and be aware of how media and 'hype' and social trends may be affecting information flows.

Above all this study is calling for less drama and more realism around the rhetoric of digital networks. As with any major change in communication media, the pendulum swings from naïve optimism to sinister doom, but in truth it seems we are intrinsically wired to self-regulate. Thus the real question is, as always, in the nuances of what is characterizing the possibility of a "learning society."

Epilogue

As I reflect on my own journey in becoming an eLearning designer, and now a master's student, I am suddenly haunted by a movie I recently watched entitled *Chasing Mavericks*. The movie recounts the life and training of legendary surfer Jay Moriarty. In it Jay becomes entranced with surfing big waves of Half Moon Bay in California—the mavericks. The waves themselves can reach up to 30 feet high and can be deadly if not approached with the proper physical training and technique. Jay, the character, meets veteran maverick surfer Frosty and convinces Frosty to train him. According to Frosty the skill rest on four pillars: mental, emotional, physical and spiritual. Frosty has Jay doing series of exercises around these pillars, some of which involve writing essays. What's the parallel? It seems to me that the participants of this study are a bit like Jay—athletes of learning. They display discipline, openness, courage, perseverance and fun. Whether they jumped into the surf because they were sitting on the beach and were called in by the

thrill of the waves or because they were already in the water and had to paddle, they trained themselves to take on some pretty big waves. Yes there was trial and error, but there was also the excitement of the challenge, reflection and a lot of hard work. Could I copy Frosty's wisdom and draw my own pillars, the pillars to self-directed learning in the age of digital networks? I am tempted to say that yes, but reducing this study to pillars really isn't my goal. Jay's story reminded me how committed athletes can be to their task. It made me think that being self-directed does require, as one participant put it, a "personality rooted in action." Jay's story made me feel as though I have been surfing big waves for quite some time and didn't know it--nor did the participants of this study. That is why I felt it was important to ask them how they did it. To chart the tacit elements that went into their training. All this because yes I think that many are out there floating on their boards, letting the tides and currents sway them this way and that way, but when the swells grow, they will need to have a few basic skills to get up and ride. This is our job as educators. This is my job.

References

Aldridge, F., & Tuckett, A. (2001). *Winners and losers in an expanding system: The NIACE survey on adult participation in learning*. Leicester: NIACE.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (2002). Social cognitive theory in cultural context. *Applied Psychology: An International Review*, *51*(2), 269–290.

Barabasi, A.L. (2002). *Linked*. New York: Plume.

Bell, F. (2011). Connectivism: Its place in theory-informed research and innovation in technology-enabled learning. *International Review of Research in Open and Distance Learning*, *12.3*(March), 99–118.

Benkler. Y. (2006). *The Wealth of Networks: How Social Production Transforms Market and Freedom*. London: Yale University Press.

Bennett, S., Maton, K., & Kervin, L. (2008). The "digital native" debate: A critical review of the evidence. *British Journal of Educational Technology*, *39*(5), 775–786.

Boekaerts, M., & Minnaert, A. (1999). Self-regulation with respect to informal learning. *International Journal of Educational Research*, *31*, 533–544.

Bonham, L. A. (1989). Self-directed orientation toward learning: a learning style. In *In H.B. Long & Associates, Self-directed learning: Emerging theory & practice* (pp. 13–42). Norman, OK: Oklahoma Research Center for Continuing Professional and Higher Education.

Bouchard, P. (in press). Informal learning and autonomous learning in networked learning environments. *The International Journal of Business, Humanities and Technology*.

Bouchard, P., & Kop, R. (2011). Role of adult educators in social media age. In *Digital Education: Opportunities for social collaboration* (pp. 61–80). New York, N.Y.: Palgrave MacMillan.

Bouchard, P. (2009). Some factors to consider when designing semi autonomous learning environments. *Electronic Journal of e-Learning*, *7*(2), 93–100.

(1998). Training and work: Some myths about Human Capital Theory. In *A Canadian Reader in Adult Education* (Spencer B & Scott S., pp. 33– 68). Toronto: Thompson Publishing Co.

(2006). Human capital & the Knowledge Economy. In *Learning for Life*. Toronto: Thompson Publishing.

(2009). Pedagogy without a teacher: What are the limits? *International Journal of Self-Directed Learning*, *6*(2), 13–22.

(2011). Network promises and their implications. *The Impacts of Social Networks on Teaching and Learning*, *8*(1), 288–302.

(2013). Learning without a distance: Networked learning, in Nesbit, T. *et al* (eds). *Building on critical traditions in adult education*. Toronto: Thompson Educational Publishing Inc.

Boucouvalas, M. (2009). Revisiting the concept of Self in self-directed learning: Towards a more robust construct for research and practice in a global context. *International*

Journal of Self-Directed Learning, *6*(1), 1–9.
Britt, M. A., & Gabrys, G. L. (2001). Teaching advanced literacy skills for the World Wide Web. In *Learning and teaching on the World Wide Web* (pp. 73–90). San Diego: Academic Press.
Brockett, R. G. (1985). The relationship between self-directed learning readiness and life satisfaction among older adults. *Adult Education Quarterly,*, *36*(1), 15–24.
Brockett, R. (n.d.). Self-directed learning and the hard-to-reach adult. *Lifelong Learning: The Adult Years*, *6*(8), 16–18.
Brockett, R. G., & Hiemstra, R. (1991). *Self-direction in adult learning: Perspectives on theory, research, and practice*. New York: Routledge.
Brookfield, S. D. (1986). *Understanding and facilitating adult learning*. San Francisco, CA: Jossey-Bass.
Buckingham, D. (2008). Introducing identities. In *Youth, identity, and digital media* (pp. 25–47). Cambridge: The MIT Press.
Caffarella, R. S., & O'Donnell, J. M. (1987). Self-directed learning: A critical paradigm revisited. *Adult Education Quarterly*, (37), 199–211.
Caffarella, R. S. (1993). Self-directed learning. In *New Directions for Adult and Continuing Education*. (Vol. Vol. 57, pp. 25–35). San Francisco: Jossey-Bass.
Cameron, D. (2005). The Net Generation goes to university? Presented at the Journalism Education Association conference.
Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, and Social Sciences and Humanities Research Council of Canada, Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, December 2010. (2010).
Candy, P. (1992). The inquiring mind: a study of the adult who continues to learn. In *Guideposts to self-directed learning* (pp. 23–35). Prussia, PA: Organization Design and Development Inc.
(1991). *Self-direction for lifelong learning*. San Francisco: Jossey-Bass.
(2004). *Linking Thinking: Self-directed learning in the digital age*. Australian Government, Department of Education, Science and Training.
Carr, N. (2011). *The shallows: What the internet is doing to our brains*. New York: W.W. Norton & Company.
Caruso, J. B., & Kvavik, R. (2005). ECAR study of students and information technology 2005: Convenience, communications, control and learning. EDUCAUSE. Retrieved from http://connect.educasue.edu/Library/ECAR/ECARStudyofStudentsandIn/41159
Castells, M, & Tubella, I. (2007). Research Report of the Project Internet Catalonia. *Internet Interdisciplinary Institute, Barcelona*, *10 vols*. Retrieved from http://www.uoc.edu/in3/pic/esp/
Castells, M. (2000). *The Rise of the Network Society*. Oxford, U.K.: Blackwell Publishers.
(2009). *Communication Power*. Oxford, U.K.: Oxford University Press.
Cattell, R.B. (1963). Theory of fluid and crystallized intelligence: A critical experiment. *Journal of Educational Psychology*, *54*, 1–22.
Caunt, B. S., Franklin, J., Brodaty, N. E., & Brodaty, H. (2012). Exploring the causes of subjective well-being:a content analysis of people's recipes for long-term

happiness. *Springer Science+Business Media B.V.*

Chee, T. S, Divaharan, S., Lynd, T., & Mun, C. H. (2011). *Self-Directed learning with ICT: Theory, Practice, Assessment*. Ministry of Education, Singapore.

Clancey, W. J. (1997). *Situated cognition: on human knowledge and computer representation*. Cambridge, MA: Cambridge University Press.

Clark, R. C., & Mayer, R. E. (2008). *e-Learning and the science of instruction*. San Francisco: Pfeiffer.

conation: definition of conation in Oxford dictionary (British & World English). (n.d.). Retrieved October 1, 2013, from http://oxforddictionaries.com/definition/english/conation?q=conation

Confessore, G. J. (1992). An introduction to the study of self-directed learning. In *Guideposts to self-directed learning* (pp. 1–6). Prussia, PA: Organization Design and Development Inc.

Creswell, J. W. (2007). *Qualitative inquiry & research design*. California: Sage.

Dakenwald, G.G., & Merrian, S. B. (1982). *Adult education: Foundation of practice*. New York: Harper & Row.

Damasio, A. (1994). *Descartes' error: emotion, reason, and the human brain*. New York: Penguin.

Danis, C. (1992). A unifying framework for data-based research into adult self-directed learning. In H. B. Long & Associates (Eds.), Self-directed learning: Application and research (pp. 47-72). Norman: Oklahoma Research Center for Continuing Professional and Higher Education, University of Oklahoma.

Davis, C. A., Bailey, C., Nypaver, M., Rees, T., & Brockett, R. G. (2010). Learning projects of graduate students: An update of Tough's study. International. *International Journal of Self-Directed Learning*, *7*(1), 14–28.

de Kerckhove, D. (2009). Connected Intelligence. *Institute on Governance*, (26-Feb-2009). Retrieved from http://hdl.handle.net/123456789/11309

Dede, C. (2008). A Seismic Shift in Epistemology, 80–81.

Dettori, G., & Persico, D. (2008). Indicators of self-regulation in computer supported collaborative learning. *IEEE Transactions on Learning Technologies*, *VOL. 1*(JANUARY-MARCH 2008), 11–19.

Doheny-Farina, S. (1994). Cybernauts in the electronic frontier: Pets on a leash. *Computer-Mediated Communication Magazine*, *1*(7), 10.

Dohn, N. B. (2009). Web 2.0: Inherent tensions and evident challenges for education. *Journal of Computer-Supported Collaborative Learning*. Retrieved from http://www.sdu.dk/Om_SDU/Institutter_centre/Ifki_fagsprog_kommunikation_og_informationsvidenskab.aspx?sc_lang=en)

Donaghy, R. (2005). Professor Allen Tough Reflects on Self-Directed Learning. Retrieved October 12, 2011, from http://ieti.org/tough/learning/donaghy.htm

Drucker, P. F. (2002). The Next Society: a survey of the near future. *The Economist*, *Vol. 361*(No. 8246, November 2001), 3–9.

Dutta, S., Mia, I., Geiger, T., & Herrera, E. T. (n.d.). *How networked is the world? Insights from the Networked Rediness Index 2009-2010* (p. 2010). World Economic Forum.

EDUCAUSE. (2005). *ECAR study of students and information technology 2005:*

Convenience, communication, control and learning. Retrieved from http://connect.educasue.edu/Library/ECAR/ECARStudyofStudentsandIn/41159

Gagliardi, A. R., Wright, F. C., Victor, J. C., Brouwers, M. C., & Silver, I. L. (2009). Self-directed learning needs, patterns and outcomes among general surgeons. *Journal of Continuing Education in the Health Professions*, *29*(4), 269–275.

Gardner, H. (2007). *Five Minds for the Future*. Cambridge, MA: Harvard Business School Press.

(1993). *Multiple intelligences: the theory in practice*. New York: Basic Books.

Garrison, D. R. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly*, *48(1)*, 18–33.

Gibbons, M., Bailey, A, Comeau, P., Schmuck, J., Seymour, S., & Wallace, D. (1980). Toward a Theory of Self-Directed Learning: a Study of Experts Without Formal Training. *Journal of Humanistic Psychology*, *20*(41), 40–56.

Gladwell, M. (2002). *The tipping point: how little things can make a big difference*. New York: Brown and Company.

(2008). *Outliers: the story of success*. London: Penguin Books.

Granic, I., & Lamey, A.V. (2000). The self-organization of the internet and changing modes of thought. *New Ideas in Psychology*, *18*(1), 93–107.

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, *78*, 1360–1380.

Grow, G. (1991). Teaching learners to be self-directed: A stage approach. *Adult Education Quarterly*, *41(3)*, 125–149.

Guglielmino, L. M., Asper, D., Findley, B., Lunceford, C., McVey, R. S., Payne, S., … Phares, L. (2005). Common barriers, interrupters and restarters in the learning projects of self-directed adult learners. *International Journal of Self-Directed Learning*, *2*, 71–93.

Guglielmino, L. M. (1977). *Development of the self-directed learning readiness scale*. University of Goergia, Goergia. Retrieved from Dissertation Abstracts International, 38, 6467A.

Guglielmino, P. J., & Guglielmino, L. M. (2011). An exploration of cultural dimensions and economic indicators as predictors of self-directed learning readiness. *International Journal of Self-Directed Learning*, *8*(1), 29–45.

Hallowell, E. M. (2007). *Crazybusy: Overstrectched, overbooked, and about to snap! Strategies for handling your fast-paced life*. New York: Ballantine Books.

Herrington, J., Oliver, R., & Reeves, T. (2003). Patterns of engagement in authentic online learning environments. *Australian Journal of Educational Technology*, *19*(1), 59–71.

Hiemstra, R. (1994). Self-directed learning. In *The International Encyclopedia of Education*. Oxford: Pergamon Press.

Houle, C. O. (1961). *The inquiring mind: A study of the adult who continues to learn*. Madison: University of Wisconsin Press.

Hwang, G.-J., Chu, H.-C., Lin, Y.-S., & Tsai, C.-C. (2011). A knowledge acquisition approach to developing mindtools for organizing and sharing differentiating knowledge in a ubiquitous learning environment. *Computers & Education*, *10*, 22–35.

Illich, I. (1971). *Deschooling society*. London: Marion Boyars.

Jenkins, H. (2009). *Confronting the Challenges of Participatory Culture: Media Education for the 21st Century*. Cambridge, MA: The MIT Press.

Jenkins, H. (2006). *Convergence Culture Where Old and New Media Collide*. New York: New York University Press.

Jensen, E. (1998). *Teaching with the brain in mind*. Alexandria, VA: Association for Supervision and Curriculum Development.

Johnson, J. A., Sample, J. A., & Jones, W. J. (1988). Self-directed learning and personality type in adult degree students. *Psychology: A Journal of Human Behavior*, *25*(1), 32–36.

Jones, C. (2004). Networks and learning: Communities, practices and the metaphor of networks. *ALT-J: Research in Learning Technology*, *12*(1), 81–93.

Jones, C., Ramanau, R., Cross, S., & Healing, G. (2010). Net generation or digital natives: Is there a distinct new generation entering university? *Computers & Education*, *54*, 722–732.

Kauffman, D. F. (2004). Self-regulated learning in web-based environments: instructional tools designed to facilitate cognitive strategy use, metacognitive processing, and motivational beliefs. *Journal of Educational Computing Research*, *30*(1-2), 139–161.

Kirwan, J. R., Lounsbury, J. W., & Gibson, L. W. (2010). Self-direction in learning and personality: the big five and narrow personality traits in relation to learner self-direction. *International Journal of Self-Directed Learning*, *7*(2), 22–34.

Kleiner, A. (2002). Karen Stephenson's theory of trust. *Strategy+Buisiness*, (29).

Knight, C. (1864). *Passages of a working life during half a century, with a prelude of early reminiscences (3 vols)*. London, England: Bradbury and Evans.

Knowles, M. S. (1975). *Self-directed learning*. Follett: Chicago.

Kop, R., & Fournier, H. (2010). New dimension to self-directed learning in an open networked learning environement. *International Journal of Self-Directed Learning*, *7*(2), 2–20.

Kop, R., & Hill, A. (2008). Connectivism: Learning theory of the future or vestige of the past? *The International Review of Research in Open and Distance Learning*, *9*(3). Retrieved from http://www.irrodl.org/index.php/irrodl/article/viewArticle/523/1103

Kvavik, R. (n.d.). Convenience communications and control: How students use technology. In *Educating the net generation*. EDUCAUSE. Retrieved from . http://educause.edu/ir/library/pdf/pub7101.pdf

Lave, J., & Wenger, E. (1991). *Situated learning: legitimeate peripheral participation*. Cambridge: Cambridge University Press.à

Leitsch, P. K., & Van Hove, S. D. (1998). Extraverted intuitives: A profile of adult learners. *Psychology: A Journal of Human Behavior*, *35*(3-4), 44–49.

Lindeman, E. C. (1961). *The meaning of adult education*. Montreal: Harvest House.

Long, H. B. (1991). *Self-Directed Learning: Consensus & Conflict*. Oklahoma: Oklahoma Research Center for Continuing Professional and Higher Education.

Long, H. B. (1992). *Self-directed learning: Application and research*. Oklahoma: Oklahoma Research Center for Continuing Professional and Higher Education.

Long, H. B., & et al. (1989). *Self-directed learning: Emerging theory & practice*. Norman, OK: Oklahoma Research Center for Continuing Professional and Higher Education.

Long, H. B., & et al. (1993). *Emerging perspectives of self-directed learning*. Norman, OK: Oklahoma Research Center for Continuing Professional and Higher Education.

Long, H. B., & et al. (1994). *New ideas about self-directed learning*. Norman, OK: Oklahoma Research Center for Continuing Professional and Higher Education.

Long, H. B., & et al. (1995). *New dimensions in self-directed literature*. Norman, OK: Oklahoma Research Center for Continuing Professional and Higher Education.

Long, H. B. (1989). Self-directed learning: Emerging theory and practice. In *Self-directed Learning: Emerging Theory & Practice*. University of Oklahoma, Norman, Oklahoma: Oklahoma Research Center for Continuing Professional and Higher Education.

Lounsbury, J. W., Levy, J.J., Park, S.H., Gibson, L. W., & Smith, R. (2009). An investigation of the construct validity of the personality trait of self-directed learning. *Learning and Individual Differences*, *19*, 411–418.

Lucas, M., & Moreira, A. (2009). Bridging Formal and Informal Learning– A Case Study on Students' Perceptions of the Use of Social Networking Tools. In *EC-TEL 2009* (pp. 325–337). Springer-Verlag Berlin Heidelberg.

Marcus, G. (2001). *The Algebraic Mind: Integrating Connectionism and Cognitive Science (Learning, Development, and Conceptual Change)*. Cambridge: MIT.

Margaryan, A., Littlejohn, A., & Vojt, G. (2011). Are digital natives a myth or reality? University students' use of digital technologies. *Computers & Education*, *56*(2), 429–440.

Marshall, J., & Rossette, A. (2011). Mapping the e-learning terrain. *The International Jounal on E-Learning*, *10*(2), 169–198.

McLuhan, M. (1967). *The medium is the message: An inventory of effects*. Corte Madera, CA: Gingko Press.

Mejias, U. A. (2009). *Social media: Teaching and learning*. Goergetown University.

Merriam, S. B., & Caffaralla, R. S. (1999). *Learning in adulthood: A comprehensive guide (2nd ed.)*. San Francisco: Jossey-Bass.

Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the internet worldwide*. Cambridge, MA: Cambridge University Press.

Oblinger, D. G., & Oblinger, J. L. (2005). *Educating the net generation*. Educause. Retrieved from www.educause.edu/educatingthenetgen/

Oddi, L. F. (1986). Development and validation of an instrument to identify self-directed continuing learners. *Adult Education Quarterly*, *36*(97).

Okabayashi, H., & Torrance, E. P. (1984). Role of style of learning and thinking and self directed learning readiness in the achievement of gifted students. *Journal of Learning Disabilities*, *17*(2), 104–106.

Pachnowski, L. M., & Jurczyk, J. P. (2000). Correlating self-directed learning with distance learning success. (pp. 16–19). Presented at the Annual Meeting of the Eastern Educational Research Association 23rd, Clearwater, FL.

Pegrum, M. (2011). Modified, multiplied, and (re-)mixed: Social media and digital literacies. In *Digital Education: Opportunities for social collaboration* (pp. 9–35).

New York, N.Y.: Palgrave MacMillan.
PERRY, W. G. (1970). *Forms of intellectual and ethical development in the college years*. New York: Holt, Reinhart & Winston.

Ponton, M. K., Derrick, M. G., Carr, P. B., & Hall, J. M. (2004). The relationship between self-efficacy and autonomous learning. Presented at the International Self-Directed Learning Symposium, Cocoa Beach, FL.
Rager, K. B. (2009). I feel, therfore, I learn: The role of emotion in self-directed learning. In *New Horizons in Adult Education and Human Resource Development*. Oklanoma: University of Oklahoma.
Rheingold, H. (2009). Attention literacy. *SFGate*. Retrieved from http://www.sfgate.com/cgi-bin/blogs/rheigold/detail?entry_id=38828
Rogers, E.M. (1962). *The diffusion of innovations*. New York: The Free Press.
Rubenson, K., & Walker, J. (2006). The political economy of adult learning in Canada. In *Contexts of Adult Education* (pp. 173–186). Toronto: Thompson Educational Publishing.
Sadler, C, & Kalvet, T. (2008). Information Society Studies in Practice – a Networked Learning Case Study: student needs and feedback in the NETIS project. Presented at the 6th International Conference on Networked Learning, Greece.
Salaway, G., Caruso, J. B., & Nelson, M. R. (2008). *The ECAR study of undergraduate students and information technology*. Boulder, CO: EDUCAUSE Center for Applied Research.
Savin-Baden, M., & Major, C. H. (2004). *Foundations of problem-based learning*. Berkshire: SRHE&Open University Press.
Schraw, G. (2010). Measuring Self-Regulation in Computer-Based Learning Environments. *EDUCATIONAL PSYCHOLOGIST*, *45*(4), 258–266.
Schraw, G., Kauffman, D., & Lehman, S. (2002). SRL theory. In *Encyclopedia of cognitive science*. London, England: Macmillan.
Schugurensky, D. (2000). The forms of informal learning: towards a conceptualization of the field. *WALL Working Paper*, (19). Retrieved from http://hdl.handle.net/1807/2733
Selwyn, N. (2010). The "new" connectivities of digital education. In *The Routledge International Handbook of the Sociology of Education* (pp. 90–98). New York, N.Y.: Routledge.
Selwyn, N., Gorard, S., & Furlong, J. (2006). *Adult learning in the digital age*. London, England: Routledge.
Selwyn, N. (2007). Web 2.0 applications as alternatives environments for informal learning-a critical review. Presented at the OECD-KERIS expert meeting.
(2008). An investigation of differences in undergraduates' academic use of the internet. *Active Learning in Higher Education*, *9*(11), 11–22.
Shirky, C. (2008). It's not information overload. It's filter failure. Presented at the Web 2.0 Expo, New York.
(2010). *Cognitive Surplus Creativiety and Generosity in a Connected Age*. London: Penguin Books.
Siemens, G, & Downes, S. (2008, September). Connectivism and connected knowledge.

Retrieved from http://bit.ly/358Wms

Siemens, Goerges. (2005). Connectivism: A Learning Theory for the Digital Age. *International Journal of Instructional Technology and Distance Learning*, *2*(1).

Small, G., & Vorgan, G. (2008). *iBrain surviving the technologicla alteration of the modern mind*. New York: Collins Livings.

Spear, G. E. (1988). Beyond the organizing circumstances: A search for methodology for the study of self-directed learning. In *Self-directed learning: Application and theory* (pp. 199–221). Athens, GA: Adult Education Department, University of Georgia.

Spear, G. E., & Mocker, D. W. (1984). The organizing circumstances: Environmental determinants in self-directed leanring. *Adult Education Quarterly*, *35*, 1–10.

Spear, G. E., & Mocker, D. W. (1984). The organizing circumstance: Environmental determinants in selfdirected learning. *Adult Education Quarterly*, *35*, 1–10.

Spiro, R. J., & Jehng, J. C. (1990). Cognitive flexibility and hypertext: Theory and technology for the nononlinear and multidimensional traversal of complex subject matter. In *Cognition, education and multimedia: Explorations in high technology* (pp. 105–163).

Stone, L. (2008, January 9). Fine dining with mobile devices. *The Huffington Post*.

Tapscott, Don. (1996). *The Digital Economy Promise and Peril in the Age of Networked Intelligence*. New York, N.Y.: McGraw-Hill.

Torrance, E. P., & Mourad, S. (1978). Some creativity and style of learning and thinking correlates of Guglielmino's Self-Directed Learning Readiness Scale. *Psychological Reports*, (43), 1167–1171.

Tough, A. (1967). *Learning without a teacher: A study of tasks and assistance during adult self-teaching projects*. Toronto, Ontario: Ontario Institute for Studies in Education.

(1978). Major learning efforts: Recent research and future directions. *Adult Education*, 250–263.

(1979). *The Adult's Learning Projects: A Fresh Approach to Theory and Practice in Adult Learning*. Toronto, Ontario: University Associates (Learning Concepts), San Diego, and Ontario Institute for Studies in Education.

Tough, A., & Donaghy, R. C. (2006). Studying self-directed learning: The personal story of Allen Tough. Presented at the 20th International Self-Directed Learning Symposium, Boynton Beach, FL.

Tough, A. M. (1966). The assistance obtained by adult self-teachers. *Adult Education*, *17*, 30–37.

Tremblay, N. (2000). Autodidactism:an exemplary model of self-directed learning. In *Conceptions of self-directed learning: theoretical and conceptual considerations* (pp. 207–220). Munster: Waxman.

Van den Beemt, A. et al. (2010). The use of interactive media among today's youth: Results of a survey. *Computers in Human Behavior*, *10*(1016).

Walters, P., & Kop, R. (2009). Heidegger, digital technology and post-modern education: From being-in-space to meeting on MySpace. *Bulletin of Science, Technology & Society*, *29*(4), 278–286.

Wasik, B. (2009). *And then there's this: How stories live and die in viral culture*. New York: Viking.

Watkins, S. C. (2009). *The young and the digital: What the migration to social network sites, games, and anytime, anywhere media means for our future*. Boston: Beacon Press.

Watts, D.J., & Dodds, P. S. (2007). Influencials, networks and public opinion formation. *Journal of Consumer Research*, *Vol. 34*(December), 441–458.

Webber, S., & Johnson, B. (n.d.). Conceptions of information literacy: New perspectives and implications. *Journal of Information Science*, *26*(6), 381–397.

Weiser, M. (1991). The computer for the 21st century. *Scientific American*, (September), 94–104.

Wesh, M. (2009a). *The machine is changing us: YouTube and the politics of authenticity*. Presented at the Personal Democracy 2009.

Wesh, M. (2009b). *TLISI Keynote Address: Goergetown University*. Goergetown University.

Zainuddin, A.S., Abdullah, A., & Downe, A. G. (2011). Social networking sites for learning: A review from Vygotskian perspective (Vol. 5, pp. 41–46). Presented at the 2011 International Conference on Telecommunication Technology and Applications, Singapore.

Zickuhr,K. (2010). Generations 2010. *Pew Research Center*, 29.

Ziebland, S., Chapple, A., Dumelow, C., Evans, J., Prinjha, S., & Rozmovits, L. (2004). How the Internet affects patients' experience of cancer: A qualitative study. *British Medical Journal*, *327*(7439), 564–576.

Zimmerman, B.J. (2000). Attaining self-regulation: a social cognitive. In *Handbook of Self-Regulation, M. Boekaerts, P. Pintrich, and M. Zeidner, eds*. (pp. 13–39). Academic Press.

Annexes

Annex 1: Tough's 12 teaching tasks (as per O'Donnell 1991)

1. Decide about a suitable place for learning
2. Consider or obtain money for the project
3. Decide when to learn and for how long a period
4. Choose the learning goal
5. Decide how to achieve the learning goal
6. Obtain or reach people, books, or other resources
7. Deal with any lack of desire to finish the project
8. Deal with any dislike of necessary activities
9. Deal with doubts about success
10. Estimate level of knowledge and skill
11. Deal with difficulty in understanding some parts of the project
12. Decide whether to continue after reaching a goal

Annex 2: Gibbons common traits of self-directed learners from a study of the autobiographies of self-made people (1980)

- Control belongs to the individual
- Focus is usually on a specific subject rather than a general field
- Usually for immediate use
- Self-educators are self-motivated, usually by a commitment to their field
- Self-educators have a vision of accomplishment and have a plan to make that vision reality
- Self-educators tend to choose a field that combines interests, past experience, talents and opportunities.
- Self-educators tend to define a unique study pattern combining formal, informal and casual methods by which they learn best. For example: study, observation, experience, courses, training, conversation, practice, trial and error, apprenticeship, productive activity, group interaction, events and projects.
- Self-educators have personal characteristics traditionally associated with people with character. e.g.: integrity, self-discipline, industriousness, perseverance, altruism, sensitivity to others, and strong guiding principles.
- Self-educators have other personal characteristics associated with people with self-directed even radical personalities: drive, independence of thought, non-conformity, originality and talent.
- Self-educators use process skills to gain knowledge

- Self-education emerges as a life theme that has worked for them
- Self-education is best cultivated in a warm environment, where people are generally active, and there is at least one close relationship
- Self-educators are people who are liked and like other people
- Self-educators have a mature personality

Annex 3: Personality traits associated to learning self-efficacy

Trait	Researcher
Industriousness	(Gibbons et al., 1980)
Perseverance	
Self-discipline	
Curiosity	
Single-minded pursuit	
Creativity	
Ingenuity	
Self-confidence	
Natural ability	
Assertiveness	
Intelligence	
Independent exploration	
Observation	
Integrity	
Non-conformity	
Ambition	
Physical good health	
Altruistic	
Sensitivity to others	
Personal charisma	
Psychological good health	
Strong personal guiding principles	
Optimism	
Pleasing appearance	
Good sense of humor	
Agreeableness	(Lounsbury et al., 2009)
Conscientiousness	
Emotional stability	
Openness	
Optimism	
Tough-mindedness	
Work drive	
Sense of identity	
Extraversion	(Leitsch & Van Hove, 1998)
Intuition	

Annex 4 : Call to participate

Hello,

As you may know, I am currently doing a Masters degree in Educational Studies. The focus of my thesis is to explore some of the changes in our learning patterns introduced by digital networks. It's quite a fascinating question really. Some hypothesizes that digital networks are opening up new realms of knowledge and giving us better job/life prospects. Others say digital networks are full of noise and reducing our ability to concentrate and think critically. What's the answer?

For this, I turn to you, the learning expert. If you are currently working in a field that you did not study in, but for which there exist a degree, I would like to pick your brain and see just *how* and *why* you chose to learn on your own--or in more technical terms, self-directed learning.

I would like to spend 30 min (no more I promise) with you via Skype to talk about some of you learning endeavors. Your insight may provide invaluable tools for future learners who must become skilled at navigating in the murky water of learning in the age digital networks.

I would be most grateful for your participation. In return, I would be happy to share the results of the study. Of course your name will not appear anywhere in the study. Should you be interested, please let me know and I will contact you to make an appointment.

Thank you in advance…

Mélanie

Bonjour,

Comme vous le savez peut-être, je fais une maitrise en sciences de l'éducation. L'objectif de ma thèse est d'explorer les changements dans nos modes d'apprentissage depuis les réseaux numériques. C'est une question assez fascinante. Certaines hypothèses nous disent que les réseaux numériques ouvrent la porte à d'innombrables connaissances et peuvent nous offrir de meilleurs emplois ainsi qu'une meilleure qualité de vie. D'autres disent que les réseaux numériques réduisent notre capacité à concentrer et à penser de façon critique. Quelle est la réponse?

Pour ce faire, je me tourne vers vous, l'expert en apprentissage. Si vous travaillez dans un domaine dans lequel vous n'avez pas étudié, mais pour lequel il existe un diplôme, je voudrais voir avec vous comment et pourquoi vous avez choisi d'apprendre votre métier ainsi—en auto-apprentissage.

Je voudrais passer 30 minutes (pas plus je vous promets) avec vous via Skype pour parler de vos projets d'apprentissage. Votre contribution pourrait offrir des pistes intéressantes pour les futurs apprenants qui doivent devenir habiles à naviguer dans les eaux troubles de l'apprentissage dans l'ère des réseaux numériques.

Je vous serais très reconnaissant de votre participation. En retour, je serais heureuse de partager les résultats de l'étude. Bien sûr, votre nom n'apparaitra pas dans l'étude. Si vous êtes intéressé, s'il vous plaît faites le moi savoir et je vous contacterai pour prendre rendez-vous.

Je vous remercie à l'avance ...

Mélanie

Annex 5: Pre-questionnaire

Self Directed Learning in the Age of Digital Networks

Pre-Questionnaire

We thank you in advance for taking part in our study on learning in the area of digital networks. You have been chosen to participate in this study mainly because you are working in a field that you did not study in. Achieving this shows a strong ability to self-teach, which means your insights could be very valuable in understanding the natural learning skills that occur when you take learning into your own hands. This insight is even more important in the area of digital networks where young learners are increasingly relying on digitize information for learning, but may lack the skills required to find and use information appropriately.

So how did you do it? Perhaps you didn't use networked information at all. Perhaps you were mentored by someone or many people—thus even though you didn't have official teachers, there were many unofficial teachers. Or perhaps you are a master Googler, who knows how to find information and transform it into something you can use in the real world. Whatever your techniques, we want to know.

The study will occur in two parts. First we ask you to complete this pre-questionnaire to collect some basic demographic information and help you think about how you learnt to do your job. Second, in the interview, we will ask you a few questions to get a more descriptive picture. Of course, there are no right or wrong answers, we ask only to be as true to your personal experience as possible. No knowledge of learning theory or cognitive science is necessary.

In this questionnaire, when refer to "digital networks" we mean the internet and all its features accessed through personal computers, mobile devices and tablets. (e.g. social networks, information cites, blogs, videos, television, personal learning environments, RSS, newsletters and email etc…)

Personal information (please fill in the information)

Age:

Profession:

Educational background (where did you go to school, what degrees have you completed, etc.)?

Do you consider you are self-taught?

On a scale of 1 to 10 how would you rate your quality of life (1=poor and 10=ideal)

Information about digital network usage

How much time, on average in a day, do you spend using digital networks (for work and personal related purposes)?

Mental preparation for the interview (do not fill in your answers in the questionnaire, simply think about what you might say)

In order to prepare for the interview, we would like you to reflect on how you learnt to do your job. If it helps, think of it in terms of a recipe. What ingredients are required to learn to do what you do?

Think of why you chose to learn on your own as opposed to going to school.

Think of the impact this has had on your quality of life? Do you think that your ability to learn has provided you with access to better opportunities

Appointments

The interview will last around 30 min. They will occur during the months of February and March during three time periods:

Thursdays from 2:00 to 4:00

Fridays from 10:30 to 12:30

Sundays from 10:30 to 12:30

Annex 6: Interview schedule

For clarification, could you please describe the occupation you perform and then describe what you studied in.

Note to the interviewer: the participant should describe a situation where their studies are not related to their occupation

In order to prepare for the interview, we would like you to reflect on how you learnt to do your job.

If you think of it in terms of a recipe, what ingredients do you think are required to learn own your own?

Why did you chose to learn on your own as opposed to going to school?

What is the impact on your quality of life? Do you think that your ability to learn has provided you with access to better opportunities?