

Redefining education: the convergence of liberal arts and career school education

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Today's businesses are investing heavily in IT transformational tools to keep pace with the 21st century's ceaseless advances in digital technology and artificial intelligence. However, business leaders are realizing those investments go nowhere without the creative minds to discover new ways to converge technology advances in software clustering algorithms, Big Data Analytics, data lake deployments, blockchains, chatbots, and social media apps with customer engagement for growth opportunities

Traditional business skills are no longer viable in a globalized digital ecosystem. Departmentalized linear and vertical thinking skill competencies have been usurped by the value chain of integrative, non-linear and lateral thinking. Complex problems arising from unfamiliar and multifaceted complications caused by globalization and technology advances need nontraditional, unconventional and atypical responses. The intellectual agility of the creative mind uncovers new associative links by converging disparate knowledge domains to provide innovative solutions.

Converging different ideas from different knowledge domains to form new patterns of thought has become one of the most valuable 21st century workforce skills. Yet, an overwhelming amount of higher education institutions separate, silo, and isolate one subject area of knowledge from another. A liberal art "breadth of knowledge" is no longer sufficient without establishing a methodology that provides a convergence of knowledge.

It is the finding of this paper that the case study of The North Coast College demonstrates a pedagogical model which converge disparate knowledge domains to redefine education for the 21st century.

The North Coast College's Principle of Convergence pedagogy is a response to the changing 21st century business environment and its need for "transdisciplinarity, interdisciplinarity, and multidisciplinary" minds to stimulate idea generation for innovation. The 4 Layers of The North Coast College's Principles of Convergence Plan are: The Convergence of Business and Design; The Convergence of Design Industry Standards with The NCC Academics; The Convergence of Linear Thinking with Lateral Thinking; and, The Convergence of General Education Requirements with Everything. Each layer is designed to interact with today's needs of a workforce skill which values convergence of knowledge to foster creative thinking and innovation. The NCC's pedagogical construct converges career skill-based competencies with the holistic breadth of a liberal arts education while providing an epistemological methodology to converge disparate knowledge domains for creative thinking and innovation aptitudes.

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I. Introduction

The 20th century's analog to digital revolution has generated a rapid pace of 21st century technology innovations. Smartphones, tablet devices, mobile apps, Cloud technology, Cluster Analysis, Recommendation Engines, global IT platforms, and the Internet of Things has changed consumer behavior and business model strategies.

A worldwide digital ecosystem of connectivity has formed an increasingly complex global market. Faster business cycles have come about due to the hyper-functionality of software algorithm speeds. Formerly stable value chains are in an upheaval because of digital technology disruptions of supply chain visibility constructs. Recalibrations of traditional business methods are ceaselessly reconstructed due to consumer behavior modifications and adaptations to the most current digital device innovations (Forrester Consulting, 2014).

Additionally, unprecedented increases in business competition have occurred because an innovation from a start-up entrepreneur on one side of the globe can have an Edward Lorenz's flap of a butterfly wing disruption for a Fortune 500 company on the other side due to a blogger's instantaneous information download. In a parallel manner of complexity is a digitally connected, highly variegated world demographic consumer of different political and cultural traditions which disrupts standardized procedures of marketing strategy.

Businesses are in a perpetual 'think differently' and 'think-outside-of-the box' mode of operation in order to create innovative systems for profit growth which converge technology advances with consumer behavior assimilations of digital technology (Mishra, Koehler, Henrikson, 2011). The intellectual agility of creativity to form new patterns of thought, which in turn facilitates innovative methods, strategies, and products, has become the new growth engine for the 21st century economy (Roco and Bainbridge, 2013). The World Economic Forum, The McKinsey Foundation, Forrester Consulting, Bloomberg Businessweek, Harvard Business Review, and scores of others have acknowledged we live in an age John Howkin labeled as the Creative Economy (Howkin, 2007).

The most valuable commodity of the 21st century's Creative Economy is no longer coal or iron ore as it was in the Industrial Economy; nor, is it the technology of the late 20th century's Information Age. It is creativity (The World Economic Forum, 2016).

The Creative Economy has expanded beyond the "creative industry" venues of advertising, architecture, and design. Traditional manufacturing, production, business, and service sectors have incorporated the "creative" component to generate new ideas and exploit their innovative potential for growth development (Florida, 2012; Hesmondhalgh, 2013). A business' competitive advantage to generate consumer interest is based on innovative strategies which cannot be easily copied by competitors. Innovation, and the creative mindset to produce it, has become a necessity in a competitive global market and a digitally connected world.

The very foundation and fundamental element of innovation and creativity is convergence. There is no creativity, nor innovation, without the convergence of different ideas from different knowledge domains to form a unique, original, and imaginative new idea which in turn sparks innovation (Amabile, 1996). The cognitive dexterity to converge disparate ideas brings about creativity and the ability to foster innovation, which in turn redefines all that came before (Puccio and Cabra, 2010).

The rapidity of digital technology and AI innovations has disrupted traditional formulas for business stability and predictability. Continuous advancements in technology are constantly changing business models and strategies. Technology and globalization disruptions have initiated the need for creativity in the business world. Rather than be controlled by disruptions of technology, businesses are looking for creative methods to transcend them.

Recently a new hierarchical emphasis has been established which pushes forward the prominence of convergence over creativity. The science and engineering communities, in particular, have recognized the current fragmentation of knowledge in higher education. They have called for a restructuring of the educational architecture in order to integrate traditionally separate knowledge domains for a holistic, systems thinking approach. Scientific advances in the past few decades have established a deeper understanding of the fundamental unity of biological organizations. Rather than splintering the sciences by way of reductionist methodologies, the admonishment is to unify, integrate and connect disparate knowledge bases which will form the next generation of “convergent industries” (Roco, 2003).

II. Disruption and Transformation

The all-encompassing, pervasive use of technology in the 21st century has dramatically changed requisite job skills needed for the business and industry world (World Economic Forum, 2015). Technology, specifically AI, has accelerated the speed of change in business, escalated competitiveness in the global market, intensified business model complexities, and erased lines between workplace knowledge domains. Automation is changing the business environment as quickly as globalization.

Concerns about social and economic disturbances created by the newest wave of 21st century advances in technology are old as Brunelleschi’s machines and the Luddite Movement. Today, the crude protest language of the 1811-16 Luddite riots has been replaced by the more eloquent, academic language found in the seminal 2004 treatise The New Division of Labor, by Richard Murnane of Harvard University and Frank Levy of MIT.

For the past 14 years, the premise, analysis, and predictions of The New Division of Labor have influenced writings about automation’s social, economic, and educational disruptions. Governmental and educational institutions have adopted Murnane’s and Levy’s cause and effect analysis of automation on society. There are the Bologna Process and European Higher Education summits from 2001 through 2009, The Center for Public Education’s *Defining A 21st Century Education* by CD Jerald in 2009, Oxford University’s 2013 *The Future of Employment: How Susceptible Are Jobs To Computerization?* and *Harvard Business Review*’s 2017 series of articles and webinars on the future of jobs and automation. The revolution of technology, and its economic and educational disruptions, has become institutional, conventional, and bureaucratic.

Progressive companies, like SapientRazorfish (an international digital transformation agency), pay little attention to these bureaucratic codifications of a revolution. They understand that the institutional systemization of the ongoing revolution ignores last month’s AI advances and tomorrow’s AI innovations. SapientRazorfish’s *AI Value Pyramid* purposefully avoids the departmentalization of the Bologna Process’ *Knowledge Triangle*. The entrepreneurial pivot-and-turn approach of the *AI Value Pyramid* provides agility and perpetual movement in an environment of technology disruption and transformation (Lord and Velez, 2013).

SapientRazorfish, and other progressive companies, understand today’s technology no longer just serves business. It defines business. Most importantly, they understand current technology advances have created a new workforce skill need. It is the holistic, big picture, creative synthesis (the top tier of Bloom’s Taxonomy), everything is connected, systems thinking skill set of the Solution Architect, Innovation Engineer, and Information Designer. Big picture, holistic thinking is needed to create, organize, and implement strategies which will pivot and turn around the seeming chaos of technology’s disruptions.

Computer program algorithms used to create AI are decreasing the need for standard linear and sequential thinking careers. Almost any routine and predictable thinking task can be automated by code. ATMs, TurboTax, Divorce.com, Soundrop.com, and E-discover have automated routine data collection tasks into pattern recognition algorithms. The most recent, and startling, AI advances are in the medical

field. AI is now capable of reading CAT scans and radiology reports with 50% greater accuracy than humans. A 2016 special edition report of *The Economist* on automation and future careers says AI is “blind to the color of your collar” (Morgenstein, 2016).

The current acceleration in social network platforms, mobile applications and devices, the Cloud, nanotechnology, biotechnology, Green/Sustainable technology, and data-mining are clear indicators of Kurzweil’s Law of Accelerating Returns and the exponential spike of AI/digital technology. The new constant in business is the ever-increasing acceleration of technology disruption (Weber and Henderson, 2014).

There is a common saying in the business world, ‘Every company is a technology company and, every industry is fundamentally changed by technology.’ Today, the global marketplace is driven by technology’s holy grail capacity to unlock revenue streams while improving efficiency. Business articles from *Harvard Business Review* to *Mashable.com* to *FastCompany.com* to *The Wall Street Journal* all provide similar heuristics and rules to handle the disruptive transformation of AI/digital technology on 21st century business. Growth and profit, they all write, is dependent on an agility to converge AI’s extraordinary data-mining capabilities with innovative software coding.

III Convergence

Digital technology and AI systems have exponentially-upon-the-exponential increased the amount of raw data available to business. However, all the raw data stored in the Cloud and, all the core mining techniques (decision trees, neural networks, collaborative filtering, association rules, pattern analysis, affinity analysis, and a host of others) to extract insight and create value from the data, go nowhere if coding algorithms don’t create functional software to increase consumer interaction and product development (Linoff and Berry, 2011).

Amazon converges data-mining and coding better than most. This is most evident in the newly launched Amazon Go convenience/grocery stores. Cameras and sensors powered by AI allow customers to walk into a store, pick up items, walk out, and be automatically charged through an app on their smart phone. AI Sensors and digital communication converge to create a new source of information to track consumer behavior. Pattern analysis of consumer behavior converges with automated feedback mechanisms to create new business models. And the Internet of Things converges with everything.

In the past decade, thousands of books and millions of pages have been written to express the necessity of convergence in an age of AI/digital technology disruption. Yet, humans are so adept at departmentalizing, siloing, and isolating information into bits and pieces. The human tendency to separate information into categories is older than encyclopedias. It is, in fact, old as humanity itself. The taking of disparate items and separating them into categories is fundamentally easier than converging them into something new. The focus on one thing is fundamentally easier than seeing many things converge into a big-picture.

The irony of this is human brains are wired to converge, not separate. Recent neuroscience studies (enabled by AI/digital technology) have proven it. The left brain, right brain, parietal lobes, temporal lobes, occipital lobes, frontal lobes, the amygdala and hippocampus of the limbic system, and the brain stem all converge information. Separate and distinct areas of the brain do not stay as separate and distinct areas. The corpus callosum and 86 billion neurons produce a mega convergence fulfillment center neural network called the Connectome. Even more amazing is that human neural growth and neural synaptic interfacing expands with use (Seung, 2012).

The capacity of the human brain to converge bits and pieces of information to create new ideas has an exponential curve which can compete with Kurzweil’s graph. Of course, the ability to acquire the capacity must be taught (Scott, Leritz, and Mumford, 2004).

IV the NCC Case Study

Fifty-two years ago, The NCC College was established as a two-year, associate degree career school. In 2015 a new president-initiated plans to converge the drill-down career school mind-set with the drill-up liberal arts perspective. The NCC's Convergence Plan began with procuring BFA and BS degrees for its Fashion Design, Fashion Merchandising, Graphic Design, and Interior Design programs. Additional BS degree granting programs in Art and Design Management and Fashion Marketing were added to the College's curricula.

The premise of The NCC's Convergence Plan was audaciously simple. It looked outside of the educational arena to find a new pedagogical pattern. The College focused on two areas as strategic models for the "pathway" development of its Convergence Plan. The first was the transformation of 21st century business due to the continual disruption of AI/digital technology advances. The business operation reality of continuous innovation (due to today's accelerated technology advances), and the cross-functional exchange of ideas and information between a business organization's separate departments, became a strategic model for the College. Advances in neuroscience became the College's second "pathway." Recent neuroscience research has proven the brain functions as a connective network rather than departmentalized, siloed regions. The 86 billion neurons and their estimated 700 trillion synaptic connections converges every region of the brain into an amazing web of interconnective entanglement (Feldman Barrett, 2018). These two models provided the College its Convergence Plan, which then redefined the content and context of its curricula.

The 4 layers of The NCC's Convergence Plan are: The Convergence of Business and Design, The Convergence of Design Industry Standards with The NCC Academics, The Convergence of Linear Thinking with Lateral Thinking, and The Convergence of General Education Requirements with Everything.

The first layer of The NCC's Convergence Plan (The Convergence of Business and Art) forms the foundation of its mission: "We strive to create a learning environment where both the creative and business sides of the design and art industry converge. We provide aspiring artists and designers a strong foundation in business and enterprise which enables them to successfully establish their own business opportunities and launch their own enterprises. Likewise, we provide future managers of creative industries with a strong foundation in art and design, so they can effectively inspire, motivate, and guide their creative teams and cultivate innovative thought."

The importance of TheNCC's second layer (The Convergence of Design Industry Standards with The NCC Academics) is curriculum development advice from the industry which provides curriculum relevance for student internships and employment. The design industry becomes a shareholder in the pedagogical process and thereby a willing employer.

The third layer (The Convergence of Linear Thinking with Lateral Thinking) pertains to each of the Academic Programs at The NCC: Graphic Design, Fashion, Art and Design Management, and Interior Design. This layer of convergence is "omnichannel" inspired and expands beyond a single experience perception. The "drill-down", skill competencies of career school learning in each The NCC Program is accompanied by the "drill-up", liberal arts core competencies and its synthesis of knowledge or "omnichannel" purposing to create a big-picture awareness: the exploration of products/knowledge in one area should be transferable to another domain for universal relevance; and, the exchange of data/knowledge is to enable acquisition of other data/knowledge to expand its value.

The final layer (The Convergence of General Education Requirements with Everything) is a Stephen Hawking approach. Math, science, social science, history, English, philosophy, and humanities actually do converge in the real world. Students need to see the convergence in the classroom. This has an epistemological purpose: seeing convergence brings about a knowledge of convergence and, an ability to

implement convergence. This is best exemplified by lectures in The NCC's History of Art II course. For example, the lecture on Gothic cathedrals is expanded beyond architectural structures of a time. Through the process of convergence, and "omnichannel" purposing, the complexity of Gothic cathedrals is related to Systems Thinking which expands into immunotherapy cancer drugs and further expands into the Second Law of Thermodynamics.

V Discussion

The purpose of this paper is to generate interest in the philosophical framework of Alfred Whitehead's essay, "The Aims of Education" and have it as a guide to recalibrate higher education for the 21st century. His 1929 essay is extraordinarily relevant today. His pragmatic purpose for education is to have it be of significant pertinence to one's life and career. Interestingly, Whitehead understood the concept of convergence's "transdisciplinarity, interdisciplinarity, and multidisciplinary" necessity 90 years before the now famous 2011 MIT paper on convergence was written (Sharp, Cooney, Kastner, 2011). Whitehead insisted on eradicating "the fatal disconnection of subjects which kills the vitality of our modern curriculum" (Whitehead, 1929).

The amount of literature on creativity, convergence, and 21st century education relevance is expansive and voluminous. The fundamental element for creativity is the convergence of disparate ideas to find unanticipated connections, or patterns which bring about a redefining, a reordering, a restructuring, and a reshaping of that which came before (Amabile, 1996; Csikszentmihalyi, 1997; Guilford, 1967; Pink, 2005; Robinson, 2011).

The necessity of convergence in education is paramount though most people are not finding it an alarming situation. Business leaders, IT specialists, consumers with their smartphones, and The National Research Council Committee on Biomolecular Materials and Processes have a clear and definite understanding of convergence as the formational principle of 21st century life.

The NCC has abided by the epistemological approach which breaks down the artificial walls between subject areas (Whitehead, 1929), understands the "transdisciplinarity, interdisciplinarity, and multidisciplinary" nature of convergence which is "a blueprint for innovation" (Sharp, Cooney, Kastner, 2011), and has created a foundational step to broadly rethink the formula for education (Kuhn, 1996).

VII Conclusion

The 21st century has shown there is no stand-alone of anything. In fact, today's business practices, neuroscience, omnichannel purposing, and AI show the connectivity of everything. The sciences are beginning to converge engineering, 3D printing, nanotechnology, biology, and bio-computation to achieve new configurations. Industries are entering a new phase of existence as they now converge different product bases to form "Convergence Industries". In order for higher education to remain relevant and viable it needs to implement, through practical application, the transformative and disruptive nature of convergence.

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