ANALYZING A DYNAMIC CURRICULUM CHANGE PROCESS TO BRIDGE THE SKILLS GAP

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The nineteenth-century poet and novelist, Victor Hugo, once said “Life’s greatest happiness is to be convinced you’re loved.” I am utterly convinced that I am wonderfully loved by the God who created the universe. To my North Star, Jesus Christ--who has guided me as I aspired for higher learning--this thesis is dedicated to you. Thank you for putting me where I am now. May I never reach a point where I acquire much knowledge but fail to understand the knowledge of the truth. May I always be reminded that there is no profit for a man who gains the whole world and loses his soul in the process.

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Abstract

This research study provides a detailed account of how one college went about making continuous changes to their video game curriculum to generate a program that will prepare students with relevant skills sought by the dynamic tech industry. The changes were made despite some of the millennia-old constraints that colleges and universities abide by when updating curriculum. This thesis used a case study methodology conducted in a private, non-profit, non-tenure, open-enrollment college in the Northeast region of the United States. The research was conducted inside the Bachelor’s and Associate’s Degree programs in video game development. Data were collected from professors and administrators, document reviews, and investigator’s field notes. The resulting data were interpreted in an inductive manner. The key findings included the following themes: 1) Innovative ideas were introduced by an individual faculty member who then collaborated with peers and administrators to adopt the idea and integrate it into the curriculum; 2) Changes that were needed to fill the skills gap were identified by individual educators (faculty members or administrators) who then integrated both external industry views and internal college procedures to initiate curriculum modifications; 3) Industry involvement with the College, through faculty members reaching out to industry experts, was central to narrowing the skills gap; 4) Unceasing change in industry directions and needs required ongoing adjustments in internal college policy to bring about dynamic curricular change; 5) Dynamic curriculum change needs to be prompt, but well-paced, ranging from implementation in as short a time as one quarter to implementation in less than one year; 6) The culture and climate must be one of teamwork: honest thinkers, who trust, collaborate and unite to support shared goals. The overarching theme was that to bridge the skills gap, educators must
innovate and become “social” by reaching out to industry experts, collaborating with other educators, and by conversing with students.

Keywords: organizational learning, knowledge creation, dynamic curriculum, bridging, skills gap, work-ready graduates, case study
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Chapter I: Introduction

The top 10 in-demand jobs projected for 2010 did not exist in 2004. Thus, the new mission of schools is to prepare students to work at jobs that do not yet exist, creating ideas and solutions for products and problems that have not yet been identified, using technologies that have not yet been invented.

–Linda Darling-Hammond

This research study was designed to identify how the game development department at Oceanfront College went about making continuous changes to their GDSP curriculum despite some of the millennia-old constraints that colleges and universities abide by when developing curriculum. The process used by OC’s faculty and administrators to dynamically update their curriculum could serve to inform others who are concerned about alleviating a widening skills gap.

A skills gap is a point in an organization’s life cycle where it can no longer grow and remain competitive because its employees lack the skills they need to achieve its goals (American Society for Training and Development, 2012; Beach, 2013; Cappelli, 2012). There are several causes for the skills gap. Included are changes in workforce demographics (Beard, Schwieger, & Surendran, 2008), changes in technology and evolving business models (Cruea, 2011; Greene, 2011), shift to a service economy requiring knowledge workers (American Society for Training and Development, 2012; Beach, 2013; Drucker, 1994; Elkeles & Phillips, 2007; Nakamori, 2011), shifting conditions in the environment and in the changing expectations of constituents (Alvior, 2014; Benamati, Ozdemir, & Smith, 2010; Mann, 2004; Shao & David, 2007), as well as under-prepared students (Arum & Ruska, 2011; Bateman, 2015; Beach, 2013).
A college or university can help bridge the skills gap (Beach, 2013; Galagan, 2010a; Galagan, 2010b). In order to gain insight into the curriculum change process at Oceanfront College, answers to critical questions were sought. For example, what prompted the changes to the curriculum? How was the need for change first detected? What activities were followed after determining that a change was necessary? Who were the stakeholders whose inputs were heard by the decision makers? How were the decisions to add and discard courses made? Who approved the changes? Who else should have been consulted? What trade-offs were weighed? What benefits, risks and safeguards were considered? How long did it take for the change process to transpire from identification to implementation? What changes were made to infrastructure, curricular framework, instructional strategies, processes, as well as policies? How were the change results assessed? Due to the pragmatic nature of these questions, a case study was conducted at OC to examine what occurred.

Statement of the Problem

**Problem of practice:** Curriculum leaders, including professors and administrators who were responsible for the creation and dynamic maintenance of the curriculum at Oceanfront College, did not know how effective the changes were and whether the subsequent curriculum they put forward equipped students with relevant and meaningful skills so that they would be work-ready (Oliver, Tucker, Jones, & Ferns, 2007b) at the time of their graduation.

**Significance of the problem:** In the tech industry, especially the video game discipline, the skills need is shifting and moving at a rapid pace (Bateman, 2015; Benamati, Ozdemir, & Smith, 2010; Beach, 2013; Cappelli, 2012; Greene, 2011; Shao & David, 2007); also, many colleges and universities take a great deal of time to change curricula (McGee, 2001; Mutch, 2006) in order to remain current with industry. Thus, if higher education professionals do not
figure out a way to continually update their curriculum, the students they graduate will not have the skills needed in order to be gainfully employed in the video game industry. This research study examined how one institution lessened that overarching problem.

**Who would benefit:** The U.S. economy can benefit from knowledge that helps it to remain competitive in the global market (Beach, 2013). Higher education faculty and administrators will also benefit as they continue to consider innovative techniques to maintain their curriculum. Finally, students will benefit, as they will be the ultimate recipients of the relevant and timely skills that industry seeks.

**Research Question**

In video game education, how can an institution take in, make sense of, and distribute knowledge in order to continuously align its curriculum with the rapidly-changing video game industry and prepare students with the right skills to be knowledge workers and work-ready at the time of their Bachelor’s Degree completion?

The research question helped focus the purpose of the study as it showed the parameters and actors involved in the research, including students, faculty members, and administrators. Moreover, the research question also exposed the ways in which a college curriculum influences its environment as students graduate from higher education institutions and move on to industry.

Because the aforementioned core questions span across different layers in the organization, in order to look for innovative ways to make a change process dynamic, the Organizational Capacity for Continuous Innovation (Seelos & Mair, 2012) was selected to help understand the interplay among the stakeholders involved in updating the GDSP curriculum at OC. The knowledge created (Nakamori, 2011) through the findings of this research can be used to inform other colleges’ and universities’ processes as they continuously update their curricula.
The dynamic nature of continuously innovating (Christensen, 2006) a curriculum, if used by educational leaders, may help narrow the skills gap between industry and academia. The core questions above were used as a guide during the data collection phase of this research study and were used to locate documents that were germane to this research.

**Organization**

In Chapter 2 the role of the theoretical framework is explicated. Seelos and Mair’s (2012) Organizational Capacity for Continuous Innovation (OCCI) Theory was selected as the theoretical framework for this research study in order to narrow the research focus (Merriam, 2006), inform the research questions (Fowler, 2006; Merriam, 2006), suggest the elements for collection of data (Fowler, 2006; Henstrand, 2006; Merriam, 2006), and help guide interpretation of data (Henstrand, 2006).

Also, OCCI addresses the complexity of innovation and embraces the need for a multi-level perspective. The framework encompasses the creation of ideas through the use of receptors that listen to external innovation and to the generation of knowledge developed internally through exploration and exploitation using organizational learning (Crossan et al., 1999; Daft & Weick, 1984; Fiol & Lyles, 1985). This single theory was selected because it is at the heart of the exploratory nature of this research study.

In Chapter 3, the literature is reviewed in three logical domain groupings. These domains include the problem, the background, and the context for the research study. The different vantage points include: (1) identifying ways to change a curriculum, (2) identifying techniques used by institutions to mitigate the skills gap problem, and (3) delineating some of the reasons why the skills gap existed.
Chapter 4 contains the research design that was developed for this study. It includes how the methodological decisions cohered with the theory selected: for example, the tight couplings of a case study approach (Yin, 2009) to Seelos and Mair’s (2012) OCCI theoretical framework. The chapter also includes the purposeful selection of eight participants, interview questions that enabled the collection of data, and data analysis procedures (Saldana, 2009).

Chapter 5 summarizes the participants’ experiences and perceptions regarding their involvement in the creation and maintenance of the video gaming curriculum. As part of the triangulation approach to collecting data for a case study, the documents they shared with the investigator were reviewed and the researcher’s field notes were codified.

Chapter 6 includes the research findings and how they related to the existing literature and framework. The chapter also contains the implications for theory and practice, as well as recommendations for future research.
Chapter 2: Theoretical Framework

Theoretical Framework Definition

Vincent Anfara and Norma Mertz (2006) defined theoretical framework as “any empirical or quasi-empirical theory of social and/or psychological processes, at a variety of levels (e.g., grand, mid-range, and explanatory), that can be applied to the understanding of phenomena” (p. xxvii). Several powerful metaphors have been used to describe the possible roles of theory in qualitative research: it can be a lens (Harris, 2006), a sieve (Fowler, 2006), a roadmap (Kearney & Hyle, 2006), a reconstruction of a broken mirror (Lugg, 2006), or a window with walls to reveal and conceal meanings (Merriam, 2006).

The Role of Theoretical Framework

The word picture that resonated with the investigator was Merriam’s (2006) comparison of a theoretical framework to a construction of a new building. According to Merriam (2006), the foundation is made up of the disciplinary base and the literature, out of which emerges the theoretical framework. Its structure informs the problem to be investigated, the research questions to be asked, the data to be collected, the research methodology to be used, and the interpretive techniques to be employed.

The theoretical framework used influenced nearly every aspect of the study (Henstrand, 2006) and unified the research (Henstrand, 2006) by identifying and narrowing the focus of the research work (Fowler, 2006; Merriam, 2006) in order to make the worldview explicit and to provide the tools in terms of concepts and models for structuring the investigation (Merriam, 2006). Furthermore, it clarified ideas (Henstrand, 2006), helped derive the research questions (Fowler, 2006; Merriam, 2006), filtered the input (Henstrand, 2006), made sense of the data (Bettis & Mills, 2006), and planned, guided, and clarified the data collection and analysis.
(Fowler, 2006; Henstrand, 2006; Merriam, 2006). Finally, the theoretical framework helped to develop a defensible interpretation and managed the subjectivity involved (Henstrand, 2006).

**Role of Theory Expounded**

A theoretical lens in a qualitative research study is optional (Creswell, 2007). However, when theory is used in research, it can serve to narrow the perspective or position the researcher uses in analyzing the data. It can show which cause the researcher is committed to, portray the particular worldview of the researcher articulate the underlying frame of reference adopted, make the investigator aware of the boundaries within which he/she will approach a subject matter, and define parameters critical to the study within which the research can take place. Theory is used as an action frame of reference to give a special brand of insight and to add context and focus to the study (Burrell & Morgan, 1979).

“A theory is like a pair of spectacles; you examine things by it, and your knowledge of it lies in this very use of it” (Polanyi, 1977, p. 37). Because the investigator is interested in how colleges and universities function, he selected a theory that focused on how knowledge is acquired and disseminated in an organization. While Open Systems Theory (Bertalanffy, 1968; Burke, 2008; Littlejohn, 2001) applies to the organizational level, it lacks specificity. Hence, to help the investigator understand the complex entities (and their relationships) involved in the widening skills gap (American Society for Training and Development, 2012; Bateman, 2015; Beach, 2013; Cappelli, 2012) and to help address the research questions, Organizational Capacity for Continuous Innovation (OCCI) theory (Seelos & Mair, 2012) was adopted because it focuses specifically on the creation and propagation of innovative ideas within and outside of the organizational boundaries.
Organizational Capacity for Continuous Innovation (OCCI) Theory

To guide the collection and interpretation of data, the nascent Organizational Capacity for Continuous Innovation (OCCI) theory (Seelos & Mair, 2012) was employed. The rationale for the use of OCCI is its profusion of intrinsic properties highlighting knowledge creation (Arumugam et al., 2013; Nakamori, 2011; von Krogh et al., 2012) based on both innovative events created externally from the organization and innovative ideas generated internally within the organization (Purcarea et al., 2013). Nonaka and Takeuchi (1995) argued that the ability to generate new knowledge is critical to innovation.

Moreover, the OCCI theory was chosen because of its articulation of knowledge diffusion as it occurs from the original source and disseminates into the larger ecosystem of organizations. It also explicates the capacity of organizations to absorb and adopt new ideas or innovations by disputing that diffusion traverses through weak individual ties rather than strong ones. These claims helped in understanding the strength of relationships among professors, administrators, industry contacts, and students.

The use of this theoretical framework made explicit the level of analysis (Klein, Dansereau, & Hall, 1994) for this study. Rousseau succinctly defined it as the “level to which generalizations are made” (Rousseau, 1985, as cited in Klein, Dansereau, & Hall, 1994, p. 198). According to the aforementioned framework, learning within an organization takes place at the individual level, but until it is encapsulated at the organizational level (which is more than simply the sum of the individuals’ learning), information remains private and unknowable.

Seelos and Mair (2012) purported that innovation is vague and complex, and understanding it requires multi-level perspectives across a dynamic process. It is a broad term with multiple meanings. They claimed that research to find a recipe regarding how a company
should innovate is inconsistent and inconclusive. Seelos and Mair (2012) defined innovation as “the process by which an idea that is new to an organization gives rise to a new set of activities” (p. 4). This definition encompasses different types of innovation including administrative innovation, operational innovation, technical innovation, new products and services or new business models. Because of the lack of a coherent theory of innovation, Seelos and Mair created OCCI as a comprehensive theoretical framework that integrates a constellation of seminal works for making progress in innovation research including Crossan, Lane, & White’s (1999) organizational learning framework.

**Externally triggered innovation:** Seelos and Mair’s (2012) OCCI theory posits that organizational innovation is the process by which a new idea gives rise to new technologies, new products, new services, or new managerial processes. This innovation can be triggered by external ideas or by internally-created knowledge within an organization (Purcarea et al., 2013; Seelos & Mair, 2012; von Krogh et al., 2012; Wilson, 2002). Competitor’s and/or collaborator’s innovations can be adopted, improved, and explored within an organization. Also, new ideas can be generated within the company through the use of the organization learning framework (Crossan et al., 1999).

**Internally generated innovation.** In organizational learning (Collinson & Cook, 2007; Marquardt, 2011; Nonaka & Takeuchi, 1995), in order for an organization to learn and construct new knowledge (Arumugam et al., 2013; Nakamori, 2011; von Krogh et al., 2012), the following four related processes have to occur: individual intuiting, group interpretation, group integration, and organizational institutionalization (Crossan et al., 1999). In this same vein, Nonaka and Takeuchi (1995) posited that knowledge propagates from individuals, groups, and organizations along the ontological continuum, as well as oscillates epistemologically between the tacit and
explicit dimension. These properties are critical to the understanding of how knowledge is distributed in an organization, as well as to the insight of faculty members and the information technology department dynamics within an institution as they generate knowledge. The frameworks’ attributes will also be essential in helping to discover improvements in performance, learning, and in positioning the organization to adapt better in turbulent, changing times.

**Innovation versus exploitation.** Creating innovative ideas within an organization is a balance between exploitation and exploration. They are at the heart of an organization’s strategic renewal as it searches for new ways to innovate (Vera & Crossan, 2006; Seelos & Mair, 2012). Exploration is to search out and to investigate systematically for the purpose of diagnosing and discovering new ways of learning (Crossan et al., 1999). Most organization tends to focus on the exploration side where they assimilate new learning (feed forward) (Vera & Crossan, 2006). Exploitation is to employ to the greatest possible advantage the best use of existing resources including data and experience (Seelos & Mair, 2012). It is about the refinement and extension of existing competences, technologies, and paradigms (Seelos & Mair, 2012). Exploitation is a process where change agents enhance what their organization has already learned, understood, and institutionalized in the past (feedback) (Crossan et al., 1999; Seelos & Mair, 2012; Vera & Crossan, 2006). Therefore, organizational learning involves a tension between change and continuity, as well as between assimilating new learning (exploration) and using what has been learned (exploitation). Balancing both techniques where catalysts look forward to what is out there in the marketplace as well as look back and continue to use what they already know has worked is central to success (Crossan et al., 1999; Seelos & Mair, 2012; Vera & Crossan, 2006).
Seelos and Mair (2012) argued that to innovate, organizations favor exploitation because the results are predictable and known. In contrast, the results of exploration are uncertain, and most new ideas are poor, therefore, OCCI relies on incremental exploitation. However, they go far in supporting unusual management ideas that work and consequently are able to spark innovation. As knowledge within the organization accumulates, the institution gets better at innovating. The dilemma for organizations that have become really good at doing something is that they might also institutionalize all the reasons not to change anymore, and thus over time, turn core capabilities into core rigidities. Therefore, the OCCI authors cautioned that core capabilities simultaneously may enhance and inhibit development.

Part of the complexity of the generation of innovative ideas is the many actors involved and their interwoven relationships. For example, many students from PK-12 enter college underprepared (Arum & Roksa, 2011). Professors need to think creatively (Bidwell, 2013) about diverse ways to get to know each student (Sergiovanni, 1999), determine what skills are missing (Oliver et al., 2007a); and intuit innovative ways to change instructional strategies and curriculum in order for the students to acquire the lacking skills (Crossan, Lane, & White, 1999). According to Crossan et al. (1999), intuiting is to know by intuition or feeling before one can prove the idea. A mathematician intuits an idea for years before he or she can prove it through empirical experiments or through the generalization of patterns through a math formula. This means that the individual faculty member’s knowledge, experience, assumptions, and mental models are critical to the knowledge creation (Arumugam et al., 2013; Nakamori, 2011; von Krogh et al., 2012) and will help transform a college or university that is already operating at a meaningful scale when it is delivering administrative and operational innovative processes.
Knowledge Propagation and Diffusion

A faculty member who possesses tacit knowledge (Polanyi, 1977) will then socialize (Nonaka, 1994) with his/her peers to dialog (Tsoukas, 2009) and interpret (Crossan et al., 1999) the new idea(s). Crossan et al. (1999) posited that interpreting is explaining through words and/or actions, an insight or idea to others. Real change in the curriculum will occur only if faculty members’ perceptions and experiences are taken into account (Cortazzi, 1993). Faculty members are the ultimate agents of change and college improvement (Louden (1991), quoted by Cortazzi (1993)). Individual faculty member’s knowledge, experience, assumptions, and mental models are critical to the knowledge creation and will help transform a college or university into a knowledge-creating organization.

How an Organization Learns

In order for new knowledge (e.g., bridging the skills gap) to be created, an individual (faculty member, staff, or administrator) intuits his/her tacit knowledge (Nonaka & Takeuchi, 1995; Polanyi, 1977). Through socialization, teaming and collaboration with peers, this tacit knowledge is externalized as well as interpreted and integrated with colleagues' ideas and experiences. Peers’ mental models are also elicited through group interpretation and combined with existing organizational knowledge (Wilson, 2002). Mental models are tacit knowledge that are highly personal and hard to formalize, making it difficult to communicate or to share with others. These include subjective insights, intuitions, and hunches. In this same vein, Drago-Severson (2009) posited that faculty members learn from each other.

In order for academics to be prolific in the generation of new knowledge, they should be well-read, stay current with research and benchmarking results, establish peer networks that allow them to learn and gain insights from others in the profession, give back to the profession
and help develop and prepare others to meet what they see as the challenges for the future of the profession (Elkeles & Phillips, 2007).

Once the individual and a peer gain common language and understanding, new knowledge is created and can become part of shared governance that is brought to the group to further interpret and integrate (Crossan et al., 1999; Wilson, 2002) with other professionals’ ideas or with previous departmental experiences. As part of shared governance, an idea should be approved with consensus before its implementation. Crossan et al. (1999) explained that integrating is the process of developing shared understanding among individuals and of taking coordinated action through mutual adjustment. Through dialogue (Tsoukas, 2009) and joint action, individuals come to a consensus to adopt and implement an idea in the organization. Exploration and exploitation may ensue, and by means of this process, the organization will learn a new technique and will generate new knowledge (Arumugam et al., 2013; Nakamori, 2011; von Krogh et al., 2012).

The next step in the internal knowledge creation process is to present the new and innovative idea at the college level. Structures and policies may be changed to institutionalize the new knowledge across the organization (Crossan et al., 1999; von Krogh et al., 2012). Institutionalizing is the process of embedding individual and group learning into the organization through documentation and other means, and it includes changes to systems, structures, procedures, and strategy. Also, through these procedures curriculum may be updated, giving other faculty members a chance to internalize this new idea.

**Learning Organization Needed**

The speed in generating and implementing innovative ideas, whether the source is external or internal, is critical to an organization’s ability to sustain success (Kira & van
Eijnatten, 2008; Meadows, 2008; Senge, 2006)—not too fast and not too slow. Continuous innovation learning is needed (Christensen, 2006).

**Summary**

Chapter 2 explained the theoretical framework and its importance to the study. The use of Organizational Capacity for Continuous Innovation (OCCI) theoretical framework helped draw attention to the focus of the study which is the inner workings of a college organization. The framework helped conceptualize the scope of the research study as one college sought to minimize the skills gap.

The next chapter will examine the skills gap problem in the United States, dynamic curriculum, work-ready graduates, under-prepared students, and the knowledge creation and propagation process.
Chapter 3: Literature Review

The literature reviewed for this doctoral thesis is organized into the following strands of information related to the curriculum change process:

1. What were some ways to change a curriculum?
2. Which techniques were institutions using to mitigate the skills gap?
3. What were the reasons why the skills gap existed?

Higher Education Initiatives

In some higher education institutions, faculty members’ innovative ideas are hindered by institutional protocols (Anfara & Mertz, 2006). For example, some faculty members do not have the freedom to select their own curricula and textbooks because these decisions are made by upper levels of administration (Harris, 2006). Harris’ Grid and Group theory reveals the continuum between academic bureaucracy and faculty autonomy regarding classroom teaching and learning processes. To manage learning in an organization, a chief learning officer (CLO) is needed (Elkeles & Phillips, 2007). Part of CLO’s job is to connect with industry leaders, understand the future direction of his/her institution, and decide what future capabilities the workforce should have to support a dynamic business environment (Elkeles & Phillips, 2007). For example, onboard training may be needed to help ensure that neophytes become productive and successful as quickly as possible (American Society for Training and Development, 2012), while providing the current workforce professional development to acquire the emergent competencies (Elkeles & Phillips, 2007; Teece, 2007; Uhl-Bien & Marion, 2011).

Institutions of higher education use differing organizational learning mechanisms (Ron et al., 2006) to align their curriculum with industry needs, including skills mapping (Oliver, Jones, Ferns, Tucker, 2007a) so their curriculum, course syllabi, assessment methods, learning
outcomes, and learning experiences are aligned to industry needs as well, as ensuring that its graduates are work-ready (Cho, 2011; Oliver, Tucker, Jones, & Ferns, 2007b; Robst, 2006; Dalitz, Toner, & Turpin, 2011). Some of these organizational learning mechanisms (OLM) may be classified as temporary fixes (Meadows, 2008; Ron et al., 2006), others are systemic changes (Ron et al., 2006; Senge, 2006). Similar points were raised by several scholars including Elkeles & Phillips (2007), Ron et al. (2006) and Senge (2006) who believe that the OLM need to be tied to the institution’s mission and vision.

Several ideas surfaced from the literature review. Advocates of organizational learning including Argyris (1999), Crossan et al. (1999), Elkeles and Phillips (2007), and Nakamori (2011) advanced the idea that institutions should conduct regular knowledge-creating events at the group level, such as team building and regular departmental brainstorming sessions. Elkeles and Phillips (2007) concurred with Galagan (2010a, 2010b), Bateman (2015), and Bidwell (2013) that industry and higher institutions should collaborate to establish talent pipeline, apprenticeships, coop programs, and on-the-job training. While many educational institutions failed to upgrade their programs (Bailey & Stefaniak, 2001), some tech companies worked with higher education to think creatively in order to combat the challenges in computer science education (Bidwell, 2013).

Taken together, organizations have different cultures (e.g. Ron et al., 2006, organizational learning mechanisms) that may help or hinder innovation. In some colleges, they pay more attention to retention instead of learning (Arum & Roksa, 2011). In the context of bridging the skills gap, educational leaders must continue to ask if learning has occurred or is occurring in their institution (Elkeles & Phillips, 2007; Ron et al., 2006). When initiatives are linked to a college’s mission and vision, these initiatives narrow the options and become a
limiting factor to innovators as they internally follow the scaffolding of OCCI theory (Seelos & Mair, 2012) to generate innovative ideas. Similar points about the instructor’s need for professional training and connectedness to industry leaders were raised by Elkeles and Phillips (2007).

**The Shifting, Evolving, and Unpredictable Skills Needs of the Video Game Industry**

The trend towards globalization in the last decade and the once depressed U.S. economy are increasingly requiring newer skills (American Society for Training and Development, 2012; Beach, 2013; Galagan, 2010a, 2010b). Beach (2013), Elkeles and Phillips (2007), and Galagan (2010a, 2010b) stressed that collaboration between industry and academia is key to aligning skills taught in college and the skills sought by industry. These scholars consistently advocated several techniques including fostering open dialogs (Tsoukas, 2009), conducting interdisciplinary joint projects, creating coop programs, internships, and seminars, inviting academia to observe industry operations, and/or auditing classes by industry experts.

**Reasons for the Gap**

The reviewed literature revealed several reasons for the skills gap, including the fact that industry has a hard time looking for resources that possess specialized skills (Galagan, 2010a, 2010b; Hemphill, 2012; Oliver et al., 2007a, 2007b; Thibodeau, 2012). There exists some misalignment between the skills taught in colleges and universities and the skills needed by industry (Darling-Hammond, 2010; Watson, 2011). For example, businesses value soft skills as equally as technical skills, but academia emphasizes mostly technical skills (Murphy-Hill, Zimmermann, & Nagappan, 2014; Oliver et al., 2007a, 2007b). This mismatch is causing some recent Bachelor’s degree graduates to have difficulty realizing a job in their discipline (American Society for Training and Development, 2012; Oliver et al., 2007).
Difference Between Industry and Academia

While new knowledge created in academia is expected to be published, new knowledge created in industry is kept away from competitors. Industry conceals new ideas as intellectual property and makes this emerging skill secret and protected under patent laws; due to trade secrets and other legal business issues, new products and technologies are only available privately (Watson, 2011). In an academic setting, there are fewer constraints and legal restrictions and more freedoms; a project’s progress does not have to be reported daily; there is plenty of consultation and support available; and academics can spend time finding the most elegant solutions (Cho, 2011; Sekhon, 1989; Watson, 2011). On the contrary, in industry, solutions to a problem have to be found in a shorter amount of time, and within the project’s budget, so that products can be legally manufactured, using pragmatic solutions that will positively impact revenue (Sekhon, 1989; Watson, 2011). The length of time it takes in academe to research something is totally eclipsed in industry setting up a friction between the academic and industry approaches (Christensen, 2006; Foster, 1986; Watson, 2011).

Feedback

Timely responses are critical in feedback between industry and academics (Meadows, 2008; Senge, 1994, 2006). “A system just cannot respond to short-term changes when it has long-term delays” (Meadows, 2008, p. 151). Responses also cannot be too long or too short (Meadows, 2008; Senge 1994, 2006). Delays that are too short cause overreaction; long delays stifle growth and extinguish previous gains made; overlong delays cause an overshoot and collapse (Meadows, 2008). Also, organizations that focus only on external events are doomed to reactivity (Senge, 2006).
Branches of the Computing Community

In the computing industry, skill sets are categorized in a hierarchy with information systems (IS) at the top. Underneath and part of IS are related disciplines including computer science (CS), information technology (IT), computer engineering (CE), system development, and game development and simulations programming (GDSP) (Mansour & Reynolds, 2009). The creation of video games requires computer programming skills (Kasurinen et al., 2013); therefore, this section is a short, but necessary, review of computing skills.

Other Causes of the Skills Gap

Due to the U.S. recession of 2008, the workforce partly stalled and a skills crisis ensued (Beach, 2013; Elkeles & Phillips, 2007; Galagan, 2010a, 2010b; Hemphill, 2012; Thibodeau, 2012). When the U.S. economy recovered, new metaphors (Taft, 2014) for constructing products and services, and for different skill sets were sought by the knowledge-creating industries (Beach, 2013; Benamati et al., 2010; Elkeles & Phillips, 2007; Mansour & Reynolds, 2009). Increasingly in this century, workforce demands a shift towards knowledge workers (Benamati et al., 2010; Dick, Granger, Jacobson, & van Slyke, 2007; Mann, 2004; Shao & David, 2007), and thought leaders who can sense their environment (Denning, 2014; Scharmer, 2007). Dynamic businesses desire information professionals; therefore, the laid-off manufacturing workforce was not rehired (American Society for Training and Development, 2012; Beach, 2013; Elkeles & Phillips, 2007).

Traditionally, the games industry relied on the razors and blades business model (or "tied products model"). It is based on providing consumer goods that can only be used in combination with, and are unusable without, a complementary base product. The purpose is to tie a customer to an ongoing stream of supplies over time. Notable examples include printers and ink
cartridges, mobile phones and air time, as well as game consoles and game cartridges (Cruea, 2011). Through the advent of the Internet, two new models were possible: online subscription model and microtransaction model. In a subscription business model, a customer must pay a subscription price to gain access to the product or service. The model was patterned after magazines and newspapers companies, but is now used by many online businesses including video games. Microtransaction is a business model where users can purchase virtual goods via micropayments. For example, all players may be able to ride a horse to travel around a game world, or a player can pay twenty five U.S. dollars to own a crystal Pegasus in order to fly and explore faster (Cruea, 2011).

Other reason for the skills gap was an increase in outsourcing. There is agreement among several scholars that the shift in the IT needs was due partly to the proliferation of outsourcing (Benamati et al., 2010; Feeny & Willcocks, 1998; Mann, 2004; Shao & David, 2007). Some businesses require specialized skills (e.g., video gaming) and their specificity leads to skill shortages (Benamati et al., 2010; Hemphill, 2012; Shao & David, 2007; Thibodeau, 2014). To help alleviate the skills crisis, some gaming studios provide training to their workers so that they will gain specialized skills that were not taught in academia and harness skilled talent to business strategy and goals (Galagan, 2010a, 2010b; Hemphill, 2012; Thibodeau, 2012).

Modern age video games, that is, post arcade era, are those that are connected to the Internet and run on gaming consoles and high-end computers (Stahl, 2005). The industry is less than two decades old (CNBC, 2006; Chatfield, 2009; Cruea, 2011; Stahl, 2005). Modern video gaming as a form of entertainment did not join mainstream culture until the late 1990s (CNBC, 2006; Chatfield, 2009; Cruea, 2011; Stahl, 2005).
In academia, video game development is part of the information technology discipline, and developing games requires computer programming skills; therefore, information technology literature was also included in the literature review. Due to a regularly-changing business model, the video game industry undergoes constant renovation: the generation gap within the workforce, technological advances, and increasing globalization and outsourcing continue to transform the commerce. The aforementioned, made it difficult for academe to keep up with these rapid changes (Beach, 2013; Cappelli, 2012; Kung, Yang, & Zhang, 2006). On the other hand, some research argues that invariably, the industry shifts are too complex to predict (Beach, 2013; Christensen & Eyring, 2011; Denning, 2014). The following section of the literature review is devoted to tracing the curriculum development of video gaming from its seminal roots to its present stage of development.

**Updating of a Semi-Static, Contending, and Congested Curriculum Content**

**Curriculum defined.** A curriculum is a “sequence of content units arranged in such a way that the learning of each unit may be accomplished as a single act, provided that the capabilities described by specific prior units (in the sequence) have already been learned by the learner” (Gagné, 1967, p. 23). In more modern times, curriculum is defined as a planned, purposeful, progressive, and systematic process in order to create positive improvements in the educational system (Alvior, 2014). In a curriculum, the initial capabilities assumed to be possessed by the student are identified; the ongoing sequence of prerequisite competencies is described, and the terminal objectives are stated. In a broader context, curriculum refers to the total learning experiences of individuals in college and in society (Alvior, 2014; Bilbao et al., 2008). When the responsibility and control of curriculum development are given to specialists who know the subject matter best, the result is greater curricular innovation and better student
learning experiences (Christensen & Eyring, 2011). Thus, curriculum development becomes a
dynamic process capable of directly responding to the societal changes that are occurring.
Therefore, the concept has a broader scope because it is not only about the university, the
learners and the professors, but it is also about the development of a society itself (Alvior, 2014;
Christensen & Eyring, 2011).

**Origin of U.S. curriculum.** This section includes a very brief discussion and highlights
the key points of United States history relating to curriculum content, development and
assessment. The contemporary American curriculum inherited several perspectives, views, and
orientations (Marrou, 1956; McGee, 2001). The U.S. educational system’s genetic roots and
major contributors were the Greeks and the Romans (Marrou, 1956; McGee, 2001). For
example, in 146 BC, Athens advocated a sound mind and body based upon the principles of
balance and moderation achieved mainly through leisure by means of music, drama, art, poetry
and athletics. During this era, numerous Greek philosophers promoted particular goals in
education: Aristippus, pleasure; Epicurus, moderation and simplicity; Zeno, self-denial;
Socrates, intellectual inquiry; Plato, liberal education including music, mathematics and
gymnastics; Aristotle, political education including philosophy, ethics, sciences and morality
(McGee, 2001).

The Roman’s educational system was heavily influenced by the Greek’s (McGee, 2001).
Several Roman contributors who enhanced the Greek’s system of education and have influenced
Western education today included the following: Cicero, who contributed oration and rhetoric;
Plutarch, who advanced the educated gentleman; as well as Quintilian, who advocated a varied
and interesting curriculum (Marrou, 1956; McGee, 2001).
The combination of Graeco-Roman influence in the world of education is the basis for the liberal arts curriculum of the Western civilization (McGee, 2001). These subjects fall under two categories. The trivium of grammar, rhetoric and logic was useful for the development of mind and the seeking of truth, while the quadrivium of arithmetic, geometry, astronomy, and music was seen as a tool for the sharpening of the mind (Marrou, 1956; McGee, 2001).

In the 13th century and throughout the Middle Ages, the western curriculum was dominated by principles and beliefs of Christianity, yet this was problematic because on one hand the friars engaged students in argument and interpretation of ideas, but religious concepts held the high ground and sometimes conflicted with secular beliefs. The European Renaissance came and pulled the curriculum back to humanistic content and to the pedagogy of Greece and Rome. Renowned Renaissance educators like Vittorino de Feltre and Aenea Sylvio of Italy, Erasmus of Holland, Thomas Elyot of England, and Michel de Montaigne of France, all introduced literature in Latin and Greek. They also advocated and practiced various teaching methods and forms of curriculum content that are still evident in modern classrooms; for example, the criticality for faculty members to understand the needs and interests of individual students. The Renaissance restored a balanced curriculum by highlighting the intellectual, physical, aesthetic and moral aspects of education (Christensen & Eyring, 2011; Marrou, 1956; McGee, 2001).

The age of reason in the 17th and 18th century challenged the dominance of humanities as it emphasized science. This movement was strengthened by scientific discoveries including Newton’s breakthrough in the law of gravity. Reason and empiricism were the educational apogee during this era and advocated by distinguished philosophers like Thomas Hobbes, John Locke and Rene Descartes. In 1859, the cause of science was punctuated by Herbert Spencer’s
essay “What knowledge is of most worth?” arguing that science was the most important subject for an institution’s curriculum (Marrou, 1956; McGee, 2001).

Progressive education entered the educational arena in the 20th century (Lagemann, 1996; Reese, 2001) and has its roots from Jean Jacques Rousseau’s work who argued that education should be child-centered in order, “for children to be allowed to grow and develop naturally, from unnecessary adult constraints” (McGee, 2001, p. 5). Pestalozzi built upon Rousseau’s work and created experimental schools that featured object lessons and individual differences in curriculum (Pestalozzi, 2007; Reese, 2001). Froebel also developed a child centric kindergarten curriculum (McGee, 2001). The West and America were enthused by the idea of individually tailored curricula, and this approach can still be found in American education today (Christensen & Eyring, 2011; Hansen, 2007; Levine, n.d.; McGee, 2001). Stake (1967) purported that both government and private sectors have rolled out revolutionary curricula, and he advocated a “let the buyer beware” attitude as society consumes these educational products and programs.

Throughout the twentieth century, the American curricula oscillated between two opposing orientations: traditional and progressive (McGee, 2001). Curriculum development and maintenance is contested between these views (Ahmann, 1967; Falkner & Falkner, 2012; McGee, 2001; Mutch, 2006). The traditional perspective advanced the idea that content should be fixed and predetermined, to be delivered and learned, and to be the same for all (McGee, 2001). This view requires strenuous exercises in memorizing and reciting, and soft pedagogy (Brubacher, 1966; McGee, 2001). Progressive orientation, on the other hand, ascends from the humanitarian movement in Europe and the United States which held that curricula is an interaction between content, faculty member and student (Dewey, 1916; McGee, 2001). The
progressives advocated a child-centered curriculum and learning, greater freedom and creativity, project based methodology, problem-solving and inquiry learning (Lagemann, 1996; McGee, 2001; Reese, 2001).


In the 1990s and in recent years, the influence of the technologist became stronger and the United States curriculum was pushed towards narrowly-specified objectives and zealous assessment (McGee, 2001). These forces re-defined the professor’s classroom decision-making, and turned the U.S. education system into a precipitous obsession for accountability through a prescriptive national, suits-all curriculum (McGee, 2001).

The educational landscape of the last third of the 20th century was heavily influenced by a technological revolution affecting both content and reliance on it in the design and development processes of curricula (Christensen & Eyring, 2011; McGee, 2001). New changes in the socioeconomic conditions and political climate required changes in the U.S. curriculum (Ahmann, 1967; Falkner & Falkner, 2012; Kung, Yang, & Zhang, 2006; McGee, 2001).

Throughout history until the very present, curriculum development has been a matter of contestation due to several political, philosophical and technological viewpoints that influence its content (Christensen & Eyring, 2011; McGee, 2001; Mutch, 2006; Salvatore, Martin, Ruiz,
Sullivan, & Sitkoff, 2000). Gagné (1967) insightfully advanced the idea that curriculum development is a continuous process, rather than a discrete and a one-shot affair. The design and development of curriculum should be based firmly upon the kind of empirical evidence that can come from successive tryouts and systematic testing (Gagné, 1967). There is agreement among several researchers that the ultimate goal of curricula should be about molding the next generation to become good, productive citizens who are effective adults and lifelong learners (Birenbaum & Nasser, 2006; Fullan, 2003; McGee, 2001; Pestalozzi, 2007; Salvatore et al., 2000).

Taken together, the Greeks’ and the Romans’ influence in American educational culture is still evident in the modern U.S. educational system (Marrou, 1956; McGee, 2001). In the centuries that followed, changes to the political climate, to socioeconomic conditions, and to technological events required analysis and maintenance of an educational institution’s curricula (Ahmann, 1967; Christensen & Eyring, 2011; Falkner & Falkner, 2012; Tyler, Gagne, & Scriven, 1967). Both the design and maintenance of curricula are contested and a dichotomy of the right mix of two dominant and opposing orientations of traditional and progressive thinking ensued (Ahmann, 1967; Christensen & Eyring, 2011; Falkner & Falkner, 2012; McGee, 2001; Mutch, 2006). These ideologies are in agreement in goals, that the purpose of education should be to create productive citizens who are lifelong learners (Birenbaum & Nasser, 2006; Fullan, 2003; McGee, 2001; Pestalozzi, 2007; Salvatore et al., 2000). For citizens to be relevant in their era, educators continuously maintain their curricula in order to remain current (Christensen & Eyring, 2011; Gagné, 1967).
Governance

Open governance in higher education is fostered through a bottom-up, transparent, and collaborative decision-making process (Masson, 2011). Openness is a philosophical position that recognizes communal management by distributed stakeholders rather than a centralized authority. To put it in another way, decision making is open, community-driven, decentralized, and consensus-seeking (Masson, 2011). In an open, self-organizing environment, information and ideas are accessible and flow freely among the stakeholders, and there is an unfettered intellectual exchange within the different levels of management. There are barriers to open governance however. When organizations are satisfied with status quo, for example, they may embrace a wait-and-see approach, resulting in ambiguity regarding their institution’s direction (Masson, 2011).

Governance in higher education can be defined as the way policy and management is exercised: governing at a distance (Engebretsen, Heggen, and Eilertsen, 2012). This thinking is informed by Michel Foucault’s ideas of understanding the nature of power structure. Governance is no longer something that a sovereign ruler does by issuing decrees to subordinates. Instead it is about influencing the actions and self-understanding of the stakeholders (Engebretsen et al., 2012). The operation of power is seen as having a logic of its own, independent of rulers, much like a panopticon, the tower in the middle of a cylindrical prison that makes the prisoners feel visible and under constant surveillance. This type of governance is similar to the speed cameras along the highway, reminding each commuter that s/he can be seen at any time (Engebretsen et al., 2012). This pervasive power structure becomes internalized by stakeholders and guides their mentality, prompting individuals to play an active part in their own self-governance. With this structure, standards and criteria are measurements
used by accrediting entities and watchdogs (i.e. administration or accrediting organization). They are a constant reminder that the institution is under the shadow of the law and that the institution’s quality is clearly visible, measurable, and can be inspected at any time. The organization’s claim of quality must be articulated and the supporting available evidence recorded. In academia for example, accreditation inspectors are mostly educators from other colleges or universities, who in one instance apply control, but in the next instance may themselves be the object of the very same kind of control. The governmentality perspective becomes everyone’s perspective; and therefore, power can no longer be located because it now belongs to everyone and it is found everywhere. Power legitimizes itself by turning all parties into one another’s quality controllers (Engebretsen et al., 2012).

**Curriculum Design**

Curriculum design comprises different processes including: (1) diagnosing educational needs; (2) formulating objectives; (3) selecting content; (4) organizing content; (5) selecting the learning experiences; (6) organizing the learning experiences; and (7) determining the ways and means of evaluating the effectiveness of what is taught (Taba, 1962). In order to measure curriculum goodness, one must actually put it into use and then measure the results in terms of student achievement based on specified criteria (Gagné, 1967).

**Computing-Based Curricula**

The computing curriculum is divided into three groups (Bailey & Stefaniak, 2001; Benamati et al., 2010; Mansour & Reynolds, 2009). The first group includes information systems (IS) and computer information systems (CIS), while the second encompasses computer engineering (CE) and information technology (IT). The last cluster lumps together computer science (CS), software engineering (SE), and computer programming (CP). IS and CIS train
personnel who will be responsible for managing the business systems and information (Benamati et al., 2010; Mansour & Reynolds, 2009). CE and IT focus on identifying, planning, implementing, and maintaining computing infrastructures (Mansour & Reynolds, 2009). CS, SE, and CP are responsible for coding software components--the video game development discipline is included in this last group (Alford, Carter, Ragsdale, Ressler, & Reynolds, 2004; Bailey & Stefaniak, 2001; Mansour & Reynolds, 2009). Because video game development requires computer programming knowledge, the skills sought by video gaming studios are the same specialized talents that most software engineers possess (Cruea, 2011; Galagan, 2010a, 2010b). The problems encountered and the processes used to mitigate the issues are largely the same for both game developers and traditional software engineers (Murphy-Hill et al., 2014). Therefore, the study of game development processes can be analyzed from the viewpoint of software engineering (Kasurinen, Strandén, & Smolander, 2013; Murphy-Hill et al., 2014).

Content is the description of the expected capabilities the student will learn, stated as course objectives and reflected goals that are independent of pedagogy (Gagné, 1967). Invariably, curriculum content goes through constant changes as it is pulled in many directions from differing conflicting forces (Gagné, 1967). Some higher education institutions are laggards (Foster, 1986) in making changes, while others are foisting new curriculum with no meaning or no clear objectives as to why it is being changed (Jorgenson, 2006; Oliver & Hyun, 2011). Peter Senge (2006) warned about the gradually-eroding goals and declining growth underneath the continuous changes and compromises. For example, colleges and universities even allow the quality of the courses slip until they lose accreditation (Senge, 2006).

The continuous innovation (Christensen, 2006; Seelos & Mair, 2012) aspects of the OCCI framework highlight the importance of constructing new knowledge that is aligned to both
the college’s mission and the industry’s skill needs. Systems thinkers must think differently, for the answer is not obvious and not intuitive (Meadows, 2008; Senge 1994, 2006). Similar to Henry Ford in the 1900s, the answer is not “faster horses” (Beach, 2013). Curriculum leaders must respond to the rapid innovation in the market place in a timely (Denning, 2014) and effective manner, continuously testing their vision against reality (Benamati et al., 2010; Denning, 2014). Inaction will yield to a static curriculum (Darling-Hammond, 2010) resulting in graduates with missing or irrelevant skills (Darling-Hammond, 2010). Therefore, inaction can widen the skills gap, while the continuous change of a curriculum based on industry needs can narrow the gap.

Mismatched Skills

Common findings in several research studies, including Bidwell (2013), Galagan (2010a, 2010b), Simon et al. (2006) and Watson (2011), focused on skills that were not emphasized in colleges and universities but have a huge demand in industry: big data handling and analytic skills (Bidwell, 2013); leadership skills (Watson, 2011); communications skills (Florentine, 2015; Galagan, 2010a, 2010b; Murphy-Hill et al., 2014; Watson, 2011); critical thinking (Florentine, 2015); listening skills (Simon et al., 2006); decision-making (Florentine, 2015); industry-specific skills (Galagan, 2010a, 2010b); ambition (Stansbury, 2015); effective work in a team environment (Florentine, 2015; Watson, 2011); managerial skills (Benamati et al., 2010; Florentine, 2015); adaptability (American Society for Training and Development, 2012); ability to read, understand, and modify computer programs written by others (Bailey & Stefaniak, 2001); knowledge of ethics (Narayanan & Vallor, 2014); knowledge of legal compliance (Outlay & Krishnan, 2010); consumer-oriented design skills in SMAC (social, mobile, analytic and cloud) (Afshar, 2014; Florentine, 2015); cloud computing skills (Florentine, 2015; Venkatraman,
database management (Florentine, 2015); information security (Bateman, 2015; Florentine, 2015); and knowledge of soft skills (Byrd & Turner, 2000). Bailey and Stefaniak (2001) argued that general skills are more valued by industry than specific skills.

The Shifting and Evolving Skills Gap

The nature of work in the computing industry has evolved (Alford et al., 2004; Benamati et al., 2010; Byrd & Turner, 2000; Feeny & Willcocks, 1998; Murphy-Hill et al., 2014; Outlay & Krishnan, 2010). In the 1970s, mainframes were popular, and the industry valued technical skills. In the 1980s, micro and mini computers were common, there was an increased demand to develop business applications, and the industry sought technical and business skills. In the 1990s, the Internet hit critical mass. There was an increased demand for the creation of web applications, outsourcing and offshoring became mainstream, and industry valued technical and soft skills. The dawn of the 21st century brought the year’s 2000 (Y2K) anomaly and made COBOL programming language and mainframe computers popular again; and there was an increase in outsourcing demand. Then, the bubble burst; cloud computing arrived; and soft skills are now as vital as technical skills (Benamati et al., 2010; Feeny & Willcocks, 1998). In recent years, IT skills in mainframe programming and systems administration have become less important (Carson, 2014).

Ramping Up Under-Prepared Students to Become Work Ready

While 50 percent of American jobs require a college degree (Galagan, 2010a, 2010b), research conducted by Arum and Roksa (2011) revealed that colleges and universities in the United States graduate under-prepared students. In order to stay competitive in an increasingly globalized and knowledge economy (Alvior, 2014; Beach, 2013; Elkeles & Phillips, 2007;

Arum and Roksa (2011) conducted a longitudinal study of 24 institutions involving more than 2,000 participating students, and using the collegiate learning assessment (CLA) as the instrument to measure critical thinking, complex reasoning, and writing skills. Their research study revealed that 36 percent of Bachelor graduates showed no improvement in CLA performance, while the rest showed minimal gain.

The problem. The majority of the students enrolled in video game development are Millennials, and they carry with them new norms, a new culture, and a different perception (Beard et al., 2008; Kumar & Lightner, 2007). For example, they want freedom of choice and expression; they want to use customizable media; they look for openness in their environment; they want entertainment and interactive play in their work, education, and social lives; they love to collaborate; and they desire speedy responses (American Society for Training and Development, 2012; Galagan, 2010a, 2010b). These qualities bring a multitude of challenges for educators who come mostly from the Baby Boomer generation (Beard et al., 2008; Gennett, 2010).

Scholars recommend ramping up college students’ skills: global access 24/7 of resources so learning can continue outside of the classrooms (Elkeles & Phillips, 2007); partnering with industry (Bidwell, 2013; Bigman, 2014; Hays PLC, 2013); and setting up learning modules into bite-sized learning (Elkeles & Phillips, 2007).

The Widening Skills Gap

Widening skills gap defined. Several descriptions have been used to describe the widening skills gap: it is an increase in the gap between the skills available versus what
industries are looking for (Hays PLC, 2013); a growing skills shortage in the workplace (Bateman, 2015; Federation of Small Businesses, 2014); a compounded growth of the skills gap (Kar, 2013); not finding enough qualified applicants for skilled jobs that organizations desperately need to fill (Bateman, 2015; Bigman, 2014); a negative gain in narrowing the skills gap (Hays PLC, 2013); as well as the dwindling supply of skilled workers in America and the growing demands of the modern workplace (Deloitte Consulting, 2012). The widest gap can be found in the technology space (Bigman, 2014; Federation of Small Businesses, 2014; Hays PLC, 2013; Kar, 2013). Some researchers put the blame on the inefficiency of educational institutions in turning out graduates with the right skills (Hays PLC, 2013).

Several of the skills required in the workforce are not being taught in colleges and universities, causing a mismatch between the institutions’ graduates and the job candidates industry seeks, contributing to the widening skills crisis (Beach, 2013; Benamati et al., 2010; Oliver et al., 2007a; Outlay & Krishnan, 2010). Both Joy Watson (2011) and Cho (2011) argued that there is alignment in the technical skills, but there is misalignment in the soft skills arena. Watson (2011) encouraged higher education institutions to emphasize soft skills training in their curricula.

The widening skills gap is real because industry increasingly has difficulty finding qualified staff to fill jobs (Bateman, 2015; Beach, 2013; Deloitte Consulting, 2012; Hays PLC, 2013; Kar, 2013). Several studies (Bigman, 2014; Kar, 2013; Hays PLC, 2013) claimed that it is difficult to hire and keep talent that can fill a position. Compounding the problem is Beach’s (2013) assessment that the world is on the threshold of the “Knowledge Era,” requiring an entirely new skills set, while higher education institutions continue to prepare students for the
American students’ continued disdain for science and math contributes to the reality of the widening skills gap (Beach, 2013; Bigman, 2014).

There is evidence that the science and engineering workforce has stalled in the U.S., and the industry has difficulty finding candidates who possess the correct skill set (Hemphill, 2012; Thibodeau, 2012). Drastic changes in the U.S. economy, including merger or acquisition and cuts in training investments, decrease the ability of corporations to find qualified workers (American Society for Training and Development, 2012).

Research Data Support Widening Skills Gap

This section of the literature review included research studies conducted by both business organizations and consulting firms. This shift in approach was carried out to validate the findings of individual research studies.

Several research studies, including Federation of Small Businesses (2014), Kar (2013), Hays PLC (2013), and Deloitte Consulting (2012) have been conducted, and their findings lend support to the existence of the widening skills gap. For example, the latest Federation of Small Businesses’ (Federation of Small Businesses, 2014) small business index, showed a growing skills shortage in the workplace. One third of the businesses surveyed reported skills shortages that hampered their organization’s growth.

Kar (2013) surveyed 600 hiring managers across the globe and found that the demand for cloud computing will grow annually by 26% until 2015. This widening skills gap created seven million cloud-related vacancies worldwide. As social media and mobile apps require instant data access that are stored in the Internet, the need for cloud computing continues to increase. Yet, about 1.7 million cloud computing-related jobs globally could not be filled in 2012 because applicants lacked the skills needed to work in a cloud-enabled environment (Kar, 2013). Kar
(2013) also forecasted that the overall skills gap in information technology globally will have a compounded growth of 4.3% for the next three years.

Hays PLC, a global recruiting firm, surveyed the skills gap in thirty developed countries around the world and showed increasing skills gap. The majority of these thirty countries registered a negative gain in narrowing the talent gap. These data are indicators that overall, job mismatches in these countries were widening. Following Japan, America is second in countries experiencing a challenge in finding qualified staff to fill jobs, and the gap between the skills available versus what industries are looking for has increased since the year before this research (Hays PLC, 2013). Skills shortages are not directly linked to the state of the economy in any individual country, but are more closely aligned to government policy, the efficiency of educational institutions in turning out graduates with the right skills, and the effectiveness with which employers train their workers (Hays PLC, 2013). The talent mismatch worsens as a country’s economy improves (Hays PLC, 2013).

Deloitte Consulting (2012) and the International Society of Certified Employee Benefit Specialists conducted an online survey of 330 participants from diverse industry in the U.S. Data revealed a dwindling supply of skilled workers in America and skill demands that are growing in the modern workplace (Deloitte Consulting, 2012). This problem will be prominent in the next three years, and the widening skills gap may put the country’s ability to compete globally in a vulnerable position. Deloitte’s data showed that talent shortage has had a substantial increase of over 16 percent from the previous year.

As the U.S. economy continues to recover, there will be more pressure for colleges and universities to train and educate students to fill skill-intensive jobs in the new knowledge economy (Alvior, 2014; American Society for Training and Development, 2012; Beach, 2013;
Elkeles & Phillips, 2007). To do this, colleges and universities need to collaborate and seek feedback from industry (Oliver et al., 2007a, 2007b; Watson, 2011). One reason for partnering with industry is because industry’s needs shift (Outlay & Krishnan, 2010); the technologies used within industry also evolve (Newton, LeRouge, & Blanton, 2003), and business models, including outsourcing, changes (Benamati et al., 2010; Cruea, 2011; Dick et al., 2007; Mann, 2004; Shao & David, 2007).

Although the U.S. economy appears to have recovered at the time of this writing, unemployment is still a chronic problem in the United States (Bigman, 2014; Dalitz et al., 2011). Employers in most industries complain that they do not see enough qualified applicants for the skilled jobs they desperately need to fill (Bigman, 2014). A significant segment of today’s labor force does not have the requisite skills that employers demand (Dalitz et al., 2011). Researchers have varied reasoning as to the cause of the gap: inequality of access to the same information between the information “haves” and “have-nots” (Van Dijk, 2000); a disconnection between higher education institutions, contractors, and manufacturers (Dalitz et al., 2011); students not understanding what their choices are (Bigman, 2014); employers not part of the education decisions (Bigman, 2014); educators at a loss in face of accelerated technological changes (Bigman, 2014); and educational institutions that take too long to redirect their resources to the jobs that are opening up (Hays PLC, 2013). There is consensus among researchers that industry should partner closely with academia to help build a roadmap to the skills businesses need. There should also be close collaboration between college and PK12 so students can start thinking about career choices early.
Summary

The review of the literature revealed several realities, chief among them is the widening skills gap problem in the United States (American Society for Training and Development, 2012; Beach, 2013; Cappelli, 2012; Deloitte Consulting, 2012; Federation of Small Businesses, 2014; Hays PLC, 2013; Kar, 2013). As the American economy struggled to rebound from the 2008 recession, old jobs were eliminated and new ones were created. The new digital, knowledge-based economy emerged, a new workforce was required, and the laid off manufacturing type workers were not rehired. New training and highly-educated thought workers are needed (Beach, 2013). Higher education leaders can help mitigate the skills gap crisis in America through a coordinated effort (Beach, 2013; Benamati et al., 2010). One reason for the enduring skills gap is that the computing industry’s needs—which include the video game industry—are constantly changing (Bailey & Stefaniak, 2001; Benamati et al., 2010; Cruea, 2011; Dick et al., 2007; Mann, 2004; Shao & David, 2007). More research is needed that specifically focuses on Bachelor’s degree graduates of video game development programs.

The literature review also showed that it is an individual who constructs knowledge (Meadows, 2008; Senge, 2006) and without individual learning, there is no organizational learning (Arumugam et al., 2013; Nakamori, 2011; Purcarea et al., 2013; Senge, 2006; von Krogh et al., 2012). Knowledge that emanates from an individual can be influenced, enhanced or hindered by the organization’s mission and culture (Arum & Roksa, 2011; Ron et al., 2006).

Part of the challenge for curriculum leaders is how to maintain a curriculum that meets the needs of industry, is in alignment with the college’s vision and strategy (Elkeles & Phillips, 2007; Seelos & Mair, 2012), and is implemented in a continuous and timely manner (Christensen, 2006; Meadows, 2008; Seelos & Mair, 2012; Senge, 2006).
Chapter 4: Research Design

Research Question

To identify and capture unique processes for updating a curriculum; to determine how professors can detect industry shifts and changes; to learn diverse mechanisms to institutionalize new group dynamics; and to learn ways to adjust college policies in order to minimize institutional resistance to innovation, this research study asked:

*In video game education, how can an institution take in, make sense of, and distribute knowledge in order to continuously align curriculum with the rapidly-changing video game industry and prepare students with the right skills to be knowledge workers and work ready at the time of their Bachelor’s Degree completion?*

The research question was a basis on which to formulate practical interview questions (Appendix A) useful in generating sufficient data. The collection of voluminous descriptive data is what Merriam (1997) refers to as rich, “thick” description. In order to be informed on the curriculum update process at Oceanfront College, a meaningful data set was needed. As postulated, and as described in the “Problem of Practice” section, college leaders do not understand fully how effective changes are or whether the curriculum they put forward equips students with relevant skills that industry seeks.

This research study examined how one video gaming department in one college made changes in curriculum development, while taking rapid industry changes into account.

Methodology

Because the focus of this research was to understand how one college sought to align skills taught with those needed by the rapidly-evolving video game industry, a qualitative study using interpretive and inductive paradigms was used (Creswell, 2007; Mehdi & Mansor, 2010;
Strauss & Corbin, 1990). The qualitative research approach is a situated activity that locates the observer in the world; that studies things in their natural settings and converts them into a series of representations such as interviews, recordings, and memos to the researcher (Denzin & Lincoln, 2003). Burrell and Morgan (1979) explained the importance of an interpretive paradigm in comprehending the subjective analog world—the interpretive paradigm focuses on understanding the world as it is by seeking explanations within the realm of individual consciousness and subjectivity.

An explorative (Kyburz-Graber, 2004) case study (Yin, 2009) research tradition at the organizational level was fitting because: (a) It allowed an investigation of a contemporary social phenomenon within its real-life context, using multiple data sources (Creswell, 2011; Yin, 2009); (b) It examined a single, holistic, bounded unit, (Merriam, 1997; Stake, 2005; Yin, 2009), the video game department at the Oceanfront College; (c) The approach favored semi-structured, open-ended questions (Creswell, 2009); (d) It lent itself to face-to-face interviews (Creswell, 2007); (e) It allowed a deep and thorough study of a specific time period (Creswell, 2007; Mehdi & Mansor, 2010); (f) It provided an explanation and detailed information to describe the story (Neale, Thapa, & Boyce, 2006); (g) It allowed for investigating topics that are not easily investigated using other methods (Yin, 2009); (h) It studied many variables that could not be considered in isolation with relatively few participants—eight in this research study; (i) It observed one disciplinary orientation, in this situation, the video game development (Merriam, 1997); (j) It examined in-depth insight into an issue (Creswell, 1998; Stake, 2005); (k) It articulated the ‘how’ or ‘why’ about a set of events, e.g. industry shifts (Yin, 2009); (l) It concentrated on experiential knowledge of the case and paid close attention to the influence of social, political and other contexts (Stake, 2005); (m) It was anchored in real-life situations and
investigated complex social units (Merriam, 1997); (n) It occurred in a naturalistic setting (Cousin, 2005); (o) It involved the widest variety of methods for collecting data as the researcher attempted to build an in-depth picture of the case (Creswell, 1998; Creswell, 2011; Stevenson, 2004; Yin, 2009); and (p) The development of a theory or model was not a requirement (Yin, 2009; Thomas, 2006).

To help minimize biases and to add to the study’s trustworthiness, data were collected from three different types of sources, professors, administrators, and the curriculum committee, to get insights into the potential underlying systemic issues. A triangulation (Merriam 2002; Stake, 1988) of qualitative methods using document reviews, observations, and interviews was also employed to address holistically the research question. This technique helped thicken the description by gathering raw data from as many different points of view as possible (Merriam 2002; Stake, 1988). The use of the case study methodology was critical to the understanding of how faculty members and administrators at Oceanfront College spawned innovative knowledge (Christensen, 2006) to maintain their video gaming curriculum in order to sustain college relevance.

The site selection was due to the pioneering work of the Oceanfront College which was the first to offer a video game development track in the Northeast United States in the summer of 2006. Access to the site was obtained through gatekeepers, and through gaining confidence and rapport with participants (Creswell, 1998).

Practical interview questions (King & Horrocks, 2010; Seidman, 2006) that are germane to this research were identified and carefully designed to net useful information from each stakeholder that directly addressed the research question (see Appendix A). Responses to these
queries provided insight into the processes and into the breadth of knowledge acquisition and diffusion at the college.

**Limitations of the Study**

The study included the interview of eight participants from a higher education institution ranging from its senior managers, to middle-level managers and academic specialists, and professors. All of these participants were from academic affairs. Also, the number of participants may be a limiting factor in seeing the bigger picture. Another limitation is the research site itself—a single, privately-owned college, with an open enrollment policy where students commute to college and the organization employs non-tenured faculty. Other institutions may have different approaches to narrowing the skills mismatch.

It is important to know that when this research study was first begun, the video game industry was still young and experiencing tremendous growth (Chatfield, 2009), and there was a scarcity of video gaming research studies in the literature. After several years, and at the time of writing this chapter, gaming studios have become more mature, and their business models and hiring practices may have already evolved. Despite these limitations, this research provides a detailed account of how one private college went about making continuous changes to its video game department’s curriculum.

**Participants**

The population interviewed consisted of educational leaders who were responsible for the creation and modification of the video game curriculum at the Oceanfront College. A purposeful sampling (Creswell, 2007) of eight participants was selected: the vice president and provost, an assistant provost, the information technology department chairs, the head of the curriculum committee, a faculty resource administrator, and three video gaming professors. These data
sources were chosen because of their intimate knowledge of industry needs, their knowledge of College infrastructures and mission, their experience with students’ readiness factors and missing skills, their connection to industry, and their familiarity and experiences of processes and procedures involved in changing the curriculum.

These participants were selected because they were directly involved in and responsible for the updating process of the video gaming curriculum at the Oceanfront College. The professors teaching at the Bachelor and Associate level classes had attended conferences, networked with industry leaders, and maintained a connection with alumni who were already working in the field. Some professors maintain professional relationships with part-time faculty members who are working in the field and who are able to transfer critical insights to these full-time professors regarding the current state of the part-timers’ work organization. As part of the interview, faculty members and administrators were asked about their involvement and thought processes following the last curriculum maintenance. Responses to these questions provided data on the curriculum maintenance process.

There were a number of additional participants apart from the professors. The provost was selected because of his knowledge of what other departments within the College were doing to update their curricula, and because he had information about the College’s mission and vision. The chairperson of Information Technology (IT) was included because of his knowledge of the previous curricula, the nature of the change requests from other stakeholders, the policies involved in the change process, hindrances to the frequency of updates, and the pending state of a fluid, ever-changing video game curriculum. The chairperson of the curriculum change committee was selected because of his knowledge of the curriculum change process. Finally, the perspectives of the vice president were sought because of his strong connection to business
leaders in the area, his relationship with local and regional politicians, and his association with the College president. Other academics who are not directly part of the curriculum changing process were not included.

A single semi-structured, open-ended, in-depth, face-to-face interview with each participant was conducted, adhering to Seidman's (2006) three-step interview process: having participants re-construct the past, asking them specific details of their current situation, and soliciting their description of what they anticipated in the future. This technique helped to elicit details as well as provided insight into the meaning-making of individuals.

The interviews were audio recorded (Creswell, 1998) and lasted approximately 60 to 90 minutes for each participant. Following Seidman's (2006) advice, the investigator listened more and talked less in order to remain objective during the interview sessions. After every interview, the recording was transcribed immediately, and an email appreciating the contribution of the participant was sent.

The participants were at least 18 years of age, and they were free to decline participation if they chose to do so. Upon accepting participation, the researcher asked them to sign an interview consent form (Appendix B) a copy of which was provided for their own records. The interview was held in a location of the participant's choice and was recorded and transcribed for analysis. The interview questions were sent to the participants in advance. After the data were transcribed, participants were asked to clarify any information that was confusing or unclear in the transcription. This process only took 15 minutes of their time. There were no known risks to the participants associated with the procedures of this study. While it is not possible to identify all potential risks in research procedures, the researcher took reasonable safeguards to minimize any potentially-unknown risks. Participation in this research was voluntary. If a participant
decided to participate in the study, he/she was given an option to withdraw his/her consent and stop participating at any time without penalty. Participants were not paid for the interview. There were no direct benefits to the study participants. Also, there were no monetary costs for participants to take part in this study, but there was a small time commitment to participate in an interview.

Participants’ identities were confidential to the extent allowed by law. All interview participants were given a pseudonym, and the location where the interview occurred was not identified. Only the researcher of this study and a confidential transcription service were able to see information about the participant. In rare instances, an authorized individual could request to see the research information from this study. This is done to ensure that the research has been conducted properly. The researcher would only permit people who are authorized by organizations, such as the Northeastern University Institutional Review Board, to see the information.

**Interview Questions**

The interview questions for the research study were pre-determined, although they were open-ended to allow for probing, and follow-up questions in order to allow the interviewees the opportunity to fully present their perspectives in depth. They began with introductory questions asking participants how they came to be in higher education and their length of service at the research site. The remaining interview questions asked about the extent of their involvement in curricular changes at the Oceanfront College. These questions were guided by the research question itself (see Appendix A). Therefore, all questions were designed to help gain an understanding of how professors and administrators go about making changes to their curriculum from identification to implementation. To limit the scope of the research study, the interview
questions focused on academics, analyzing the development and maintenance of a curriculum in order to help bridge the skills gap.

**Data Collection**

Specific data sources were identified prior to the data collection phase. Special care was considered during this phase to ensure that data collected yielded answers to the research question. For example, professors were asked about what mechanisms or sources they used in order to know the current state and the future trend of the video game industry. The IT department chair was asked why the changes in the curriculum were made. The vice president was queried about the prevailing skill sets and trend needs that are represented by the industries’ employment requests. The provosts were asked questions regarding the reasons behind any new program offerings, and regarding any other insights about the College’s expansion and future vision. The Provost was asked about the College’s mission and goals and how these helped or hindered a department’s growth and innovation. Lastly, the curriculum chairperson was sought for his experience with the change process. He was asked about his curriculum change process experience. A thorough document review was conducted, including the syllabi, courseware, college’s brochure and catalog. The level of data collection and analysis (Anfara & Mertz, 2006; Klein et al., 1994) was at the organizational level.

Prior to the interview, each interviewee completed a consent form (Neale et al., 2006), shown in Appendix B. Additionally, as part of the main face-to-face interview, the researcher went over the purpose of the study, the amount of time that was needed to complete the interview, and the plans for using the results of the interview (Creswell, 2007). A journal was kept during the research study to jot down observations as each interview transpired (Creswell, 2007; Alford et al., 2004).
An electronic folder structure was prepared, and a naming convention was decided before the start of the interview. To maintain confidentiality of data, a locked cabinet was used to secure the research artifacts. These artifacts included electronic recording files, signed consent forms, hard copies of transcripts, and profiles. The storing of these artifacts inside the locked cabinet ensured security for all materials and maintained confidentiality during storage. These data will be preserved for at least three years after the approval of the dissertation and then subsequently destroyed.

Seidman's (2006) advice was adopted. For example, each participant's artifact was organized and stored in one folder. The folder contained the original electronic file containing the actual interview, the unedited transcribed interview in electronic format and in printed form, the consent form, and the profile version of the interview with participants’ names coded. The other artifacts in storage were partially processed data, coded data, coding scheme, and memos (Huberman & Miles, 1998). The maintenance of a chain of evidence and the collection of artifacts formed a case study database (Yin, 2009). Northeastern University procedures are being followed with regard to the length of time that each type of artifact will be stored.

**Data Analysis and Coding**

The type of information collected were those data that were critical to covering the research questions. In order for this to happen, a wide net was cast and open-ended questions were used in order to collect as much data as possible; and then several data analysis techniques were used to enable data mining and to filter out the unnecessary, irrelevant data (Anfara & Mertz, 2006).

MaxQDA was used to code the scripts, and codes were collapsed into themes. Saldaña (2009) posited that there is no universal way to code qualitative data, so the investigator thought
through the implied meaning of the participants’ responses in order to arrive at a code. While Creswell’s (2009) categorical aggregation technique was used to guide the data analysis and interpretation, Seelos and Mair’s (2012) Organizational Capacity for Continuous Innovation (OCCI) theoretical framework was used to scaffold the categorization of the data.

Creswell (2009) and Butin (2010) posited that there is no one way of presenting a case study. Nevertheless, the investigator opted to use a theory-guided format advocated by Chenail (1995). To help understand the curricular change events at Oceanfront College, Seelos’ and Mair’s (2012) OCCI constructs were used during the analysis of the qualitative data. Forces that prompted a development of a new program or a modification of an existing curriculum were presented as external and internal influences. The OOCI framework captures external and internal events that influence internal decisions. For transparent reporting (Seidman, 2006), the scripts were reviewed several times, contexts were added (Kasurinen et al., 2013) through thick description (Merriam, 1997) including participants’ backgrounds and how they viewed the last program update.

A close read (Saldana, 2009; Thomas, 2006) of the transcript was carried out by reading it multiple times in order to get a feel for the realities of the interviewee. This was followed by parsing (cleaning up) the original transcripts and creating the participant’s profile where their true identities were hidden behind a pseudonym (Seidman, 2006). The location where the interview occurred was also masked.

In order to gain depth of study (Cousin, 2005), similarity and regularity--a pattern of meaning--in the scripts was identified and themes were highlighted (Saldana, 2009; Stake, 1988; Thomas, 2006). These themes were labeled, and the label (categories) became the code for a theme. A tag or a label is a unit of meaning to the descriptive or inferential information
compiled (Miles & Huberman, 1998); it is a “word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (Saldana, 2009, p. 3). Coding technique was used because it is not the words themselves that matter, but the meaning behind the words (Miles & Huberman, 1998). It is a unit of analysis that involves differentiating, combining, and reflecting on the retrieved information (Miles & Huberman, 1998). Coding is not just labeling, it is linking; it led the investigator from the data to the idea, and from the idea to all the data pertaining to that idea (Saldana, 2009). Coding generates the bones of the researcher’s analysis; it progresses from real to abstract and from particular to general (Saldana, 2009). In the context of this research study, the code represented the skills most needed or the new ways to update a curriculum. Data-driven, inductive, or emic coding (Miles & Huberman, 1998) was used, instead of theory-driven code (Boyatzis, 1998); data collected were reviewed in detail, segments labeled and contrasted, as well as categorized into more abstract code.

To establish themes, a participant's information was combined with information from other people taking part in the study. Themes were combined and other phrases encapsulated within a theme. The definition or meaning of each label was established. The text was reduced or condensed (Seidman, 2006; Thomas, 2006; Yin, 2009) by marking what was interesting, and by organizing excerpts from the transcripts into categories (Seidman, 2006; Yin, 2009). A software program, MaxQDA, was used to help winnow themes and analyze thematic connections (Seidman, 2006). Once the themes were identified, their interconnection(s) to other theme(s) were revealed. These links may form a hierarchy, network, composition, sequence, or loosely coupled topology (Miles & Hubberman, 1998; Thomas, 2006). The arrangement of constructs
formed propositions which became a basis for a rudimentary model (Anfara & Mertz, 2006; Creswell, 2007; Mehdi & Mansor, 2010; Ravitch & Riggan, 2011; Thomas, 2006; Yin, 2009).

The investigator conducted a thorough document review looking at syllabi, and the College's catalogue and brochures. These unobtrusive data collections and analyses of events afforded meaningful context as supplemental materials to the participants' narratives. Seidman (2006) advocated an open attitude during the analysis of data, seeking what emerged as important and of interest from the raw text.

To reveal meaning from the collected data, the investigator followed Saldana’s (2009) approach to look for patterns through discovering similarities, differences, sequences, correspondences, and causations. To do this, data were coded inductively first. Miles and Huberman’s (1998) general coding domains were considered when developing codes inductively. In this same vein, Miles and Huberman’s (1998) interactive analysis model was recursively utilized: as data were collected, they were reduced, displayed, verified, and conclusions were drawn. In other words, making sense of data was conducted as soon as data collection began—interview, collect and code data; and revise code as the data collection continues (Miles & Huberman, 1998). Data quality was assessed using Miles and Huberman’s (1998) advice, which included looking for outliers, triangulating data sources, and planning deliberately for members’ verification. Once all the themes were identified, condensed, and connection structures were known, results were generalized and reported (Thomas, 2006).

Validity and Credibility

Several methods were used to ensure validity and credibility of the data, including verification through triangulation by analyzing a research question from multiple perspectives (Merriam, 2002; Stake, 1988; Stake 2005): through member checking, feedback from
stakeholder groups were compared to determine agreements as well as areas of divergence (Creswell, 2007; Shenton, 2004; Stake, 1988); through code reliability where there was the consistency of judgment among participants (Miles & Huberman, 1998) calculated as a ratio between number of agreements over the sum of number of agreements and number of disagreements; and through advice on displays where the researcher clarified, added detail, got feedback from a colleague, stayed open to interpretation, and prevented over-reducing of data because it could obscure understanding (Tufte, 1990, as cited in Miles & Huberman, 1998).

There are other techniques that were used to improve trustworthiness of the research study. Confirming findings by assessing data quality, looking at “unpatterns,” testing explanations, evaluating spurious relations, weighing evidence (because some data are stronger than others), and getting feedback from participants demonstrates the trustworthiness of the results (Creswell, 2007; Miles & Huberman, 1998; Yin, 2009). The research findings were discussed with at least two peers that were not part of the study sample, and the investigator inquired whether the findings were sound, logical, or if they could be improved in any way to help make the research report more accurate, objective, and decrease any inadvertent personal biases (Creswell, 2007; Yin, 2009). Confidentiality was maintained throughout the entire process.

Finally, Miles’ and Huberman’s (1998) four ways of knowing a good qualitative finding were used. Credibility is the measure of how congruent the findings are with reality. Rich, “thick” description (Merriam, 1997; Miles & Huberman, 1994), triangulation, consideration of rival explanations, and peer scrutiny are some ways to increase credibility. According to Miles and Huberman (1998), confirmability asks if findings reflect the experiences of the participant, rather than the perspective of the researcher. The use of audit trails, admission of investigator’s
biases, and in-depth description of methodology is one way to bolster confirmability.

Dependability refers to the replicability of the research and asks if the process of the study was consistent. Some techniques to improve dependability included the use of overlapping methods, peer feedback, in-depth description of methodology, and coding reliability checks.

Transferability seeks to ask if the findings of the study can be applied to another situation. To advance transferability, background data was included to establish context, and detailed descriptions of events were provided to enable comparisons.

**Limitation and threats to validity.** The interview protocol was original and has not been tested in other contexts. To deal with this limitation, the investigator had the interview instrument peer reviewed and pilot tested. With only eight participants, data saturation (Wallen, 2009) may not have been achieved. This puts transferability (Lincoln & Guba, 1985; Miles & Huberman, 1998) to other similar private colleges in question. Creswell (2007) argued that the meaning extracted from the data is more important than the number of responses. Also, the investigator believed that a reasonable and purposeful sample of participants had been selected.

Investigator's bias (Machi & McEvoy, 2008) might have been unintentionally introduced—a threat to the validity of data collected. To increase the trustworthiness (Shenton, 2004), several steps were observed including data triangulation, allowing for the examination of competing explanations and discrepant data, checking with participants on the adequacy of interpretations, and designing a rigorous data collection and analysis. Without these precautions, the investigator's bias could limit the generalizability and transferability of the study results to other private, open-enrollment college populations.
Positionality

The investigator built the original Bachelor’s curriculum for the video game development at Oceanfront College. The curriculum has gone through a few changes between 2007 and 2014, and this researcher does not perceive that his levels of involvement have influenced the conduct of the project, but they are important to disclose. Due to the investigator’s experience in the creation and maintenance of a video gaming curriculum as well as his long-standing employment at OC, several steps were pursued in order to add fairness to the inquiry, findings and interpretations. Wallen’s (2009) advice was followed including guarding against threat to internal validity by providing the participants the opportunity to offer alternative explanations of the results.

Protection of Human Subjects

Formal permission was obtained from OC’s administration to interview faculty and administrators. Informed and written consent were solicited from each participant. The selection process was designed to be purposeful, fair and nondiscriminatory. Participation in this project did not present obvious risks to the participants during this process. The interview questions were geared towards analyzing what transpired during previous curriculum change processes. In fact, participants may benefit from involvement in the study by having an opportunity to replicate and optimize what procedures worked in the past, as well as what operational pitfalls to avoid. They may experience empowerment through contributing to the systematization and dissemination of their practices, which offered recognition of their viewpoints, knowledge and experience.

According to Creswell (2007), a research study may raise issues of power and risk to the researcher, the participants, and to the site. Thus it was worth mentioning some theoretically
potential risks. The majority of the participants were directly involved in the maintenance of the curriculum. While overt evidence points to the participants’ willingness to establish a meaningful and relevant learning community, it was important to recognize that a power dynamic exists between the provost, department chairs, and department professors. Theoretically, threats to a participant’s employment status or performance evaluation could result from a revelation of detailed practices that would normally not be evident in meetings. More simply, a participant could fear embarrassment over revealing unsuccessful curriculum change process moments. Though these threats seem unlikely, the investigator safeguarded participants’ well-being through several means. They received full disclosure, and respondent validation techniques were utilized to ensure participants of their right to approve or request change of any aspects of the results that they felt may have been personally damaging (Creswell, 2007; Shenton, 2004).

Research results are commonly reported without revealing the identity of participants. Because this inquiry is examining a group whose work is known within their department, anonymity at the local level is not entirely possible. However, pseudonyms (Seidman, 2006) were used in all reports to maintain anonymity.

Summary

The goal of this research study was to analyze how the game development department at Oceanfront College went about making continuous changes to their GDSP curriculum so that their Bachelor’s Degree graduates would be work-ready. The process used by OC’s change agents to dynamically update their curriculum can serve to inform others who are concerned about alleviating a widening skills gap.
This research illustrates a number of potential gains for the various stakeholders. First, the U.S. economy can benefit from knowledge that helps to coordinate a synergistic relationship between curriculum development and industry demands in order to remain competitive in the global market. Secondly, educators will similarly benefit as they continue to consider innovative techniques to maintain a curriculum. Finally, students will benefit as they will be the ultimate recipients of the relevant and timely skills that industry seeks.

Since the focus of this research was to understand how a private institution takes in, makes sense of, and distributes knowledge in order to continuously align its curriculum with the rapidly-changing video game industry, a qualitative paradigm was chosen and the use of a case study methodology was executed. To minimize biases, data triangulation was employed by collecting data from three different sources: professors, administrators, and the curriculum committee. A triangulation of qualitative methods using document reviews, observations, and interviews was also employed to address holistically the research question. These techniques helped thicken the description by gathering raw data from as many different points of view as possible at the organizational level.
Chapter 5: Report of Research Findings

Organization of Chapter

The purpose of this case study was to address the question: *In video game education, how can an institution take in, make sense of, and distribute knowledge in order to continuously align curriculum with the rapidly-changing video game industry and prepare students with the right skills to be knowledge workers and work ready at the time of their Bachelor’s Degree completion?*

Participants' background information explaining how they became involved in higher education and in the curriculum change process will be detailed. Lastly, composite themes from all interviews are discussed, presenting the collective experiences of the participants.

The Setting

The Oceanfront College served as the research site. It is a technical college where 3,500 students commute to participate in 59 offerings of Associate and Bachelors Degree programs, as well as three Master programs. The College has an open-enrollment policy. It employs more than 300 non-tenured professors, and maintains a vocational career focused philosophy. From its humble beginning as a vocational institution 75 years ago, the College’s goal has always been to prepare students for the workforce so that they can earn a degree and successfully find gainful employment. The College also focuses on making their students lifelong learners.

The institution’s mission is to be supportive of its students by making student success the center of its activities. The organizational structure is extremely lean, guided by a president, eight vice presidents, and a provost. The Executive Committee is responsible for answering to the Board of Trustees, who oversee the College. While department heads report to an assistant
provost, all non-tenured faculty collaborate with a chairperson. Oceanfront College has no tenure system.

The Case

In 2007, Oceanfront College rolled out an Associate in Video Game Development and Simulation Programming (GDSP) in response to the increasing needs of the video gaming industry. This industry is fast growing, volatile to market shifts and technological changes, and earning billions (Chatfield, 2009; Cruea, 2011). Young men and women who enjoy playing games flock to colleges and universities that offer degrees in building these games. Some of the students are under-prepared for college, but eager to learn the game and technology processes. A year after the GDSP program was deployed, it was updated to add a Bachelor's program and the Associate track was revamped. There were several changes to the curriculum subsequent to the major change. The success of the new curriculum since its last modification will be addressed.

Demographic Participant Data

The participants. Eight participants were identified through a purposeful selection process. They all hold graduate degrees and have differing backgrounds, and they all worked in the field of education at the time the study was conducted. All expressed agreement with the College's mission of effectively teaching students with the goal that the students are employable at the time of graduation. The investigator carefully selected the interview candidates to ensure that all levels of the organization involved in the curricular development and changes were represented. Two of the participants represent the higher echelon of the College; three are middle-level managers, and three are non-tenured professors. The combination of professors and a department chair formed an ad hoc team that worked consistent with OC’s shared governance process during a curriculum modification. Because the participants have different backgrounds,
different experiences, and are employed at different levels in the College, their versions of what happened during the last curriculum update made rich textural data germane to this research study.

**Interview Data, Document Review, and Investigator’s Observation**

The following information is based on individual participant’s interviews with the researcher. Documentation provided by each participant included. Observations from the investigator’s field notes also supplement the interview data. (See Table 5.1 for types of information and sources).

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<th>Information Source</th>
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**Participant 1: Donald, Assistant Provost**

**Biographical information.** Donald is an experienced teacher in both the public setting and in the private sector. He had extensive experience as a videographer. Due to changes in the U.S. economy, Donald made life changes by accepting a full-time faculty position at OC. He was involved in the creation of several programs at the College and managed most of them.
**External organizational context.** Since the beginning of his career twenty-five years ago, Donald was involved in curricular changes and became a member of the College’s curriculum committee. In his time with OC, he saw several shifts in technology that changed the classroom and instructional methods. Examples include the shift from typewriters to computers, from transparencies to PowerPoint, and from label makers to word processors. He observed that changes in technology necessitated training for the faculty members.

Donald knows about the information technology skills gap from what he reads, and what he hears from employers, faculty members, and other constituencies. As an administrator, he is a member of several consortiums and has attended conferences where he has had conversations with other college administrators and discussed the industry and student readiness. From these collaborative meetings, the administrators learned that the skills gap problem is a result of issues from a lot of different areas. There is no one book to explain it, and it keeps on changing. The skills gap is a layered problem that includes college readiness, as well as the standardized testing and the common core curriculum being phased into elementary and secondary education.

Based from the survey and the lessons learned from these collaborative meetings and from the experience of creating and maintaining a curriculum, several initiatives were implemented at the Oceanfront College. First, each department has a technical advisory committee made up of professionals from that industry who counsel professors and administrators on what skills new hires need. The list of advice includes information on the skill sets sought by industry combined with the information the College gets from other sources.

According to Donald, the number one characteristic that employers say they need and want from a new hire is the candidates’ interpersonal communication skills: an ability to read, write, and the ability to work with others (Technology skill is number six on the list.) He went
on to say that the College needs to reimagine how to introduce and reinforce these soft skills into the technical courses to help improve quantitative reasoning in those courses.

The most recent external influencer is the Davis Educational Foundation Grant where administrators and professors were challenged to rethink the educational process and their roles, not to teach as they were taught, but to explore innovative and dynamic ways of engaging students to help increase learning. A consultant was brought in to lead the discussion between faculty members and administrators as they met weekly for twenty weeks. Central to these conversations was innovating teaching in order to advance interpersonal communication and quantitative reasoning to each class. Educators evaluated their previous experiences and kept an opened mind as they looked at everything, including the content and how the content was disseminated to the students in a classroom.

Donald stated that all of the programs at the College are sequential. The administration’s assumptions are that a student comes in without knowing much; in eighteen months they will gain knowledge from zero to sixty percent, ready for an entry-level position. The secret to Oceanfront’s effective way of ramping up students’ skills is through hands-on education, which is an active and engaged learning process. The faculty members’ biggest challenge is how to actively engage the students who come from a generation different from theirs. Within a year and a half, professors need to get students ready to learn by themselves, be capable of working with others, gain the technology background, and develop the willingness to listen to new information and learn new ways of thinking.

Donald stated that the College’s initiative of having professors meet with technical advisors is the starting point of determining what skills industry needs. In these annual meetings, faculty members sense the industry need, and they combine that with what they know are skills
Donald stated, “The faculty who brought up the idea that we need a more specific gaming program had some idea to begin with. There is some deconstruction of the process, which happens probably organically from the faculty.”

Following a major curriculum change, and after the first class goes to work, the administrators and professors alike start hearing from graduates. Based on these alumni and the alumni’s employers’ feedback, additional refinements to the existing curriculum and the associated processes are made. The maintenance of a curriculum is a continuous change process. “I think we continually develop the process or fine tune it.” The maintenance of a curriculum is shared between a few key faculty members and an administrator. Donald indicated that the key to successful shared governance is an engaged faculty that will listen to peers, know their students, be connected with industry, and remain abreast with pertinent research.

Donald indicated that both external and internal organizational contexts are the reasons that will prompt a change in a curriculum. The following are some of the external influences that will shatter the previous system and force a new direction: a new tool, and a new gaming engine. Many times, employers have approached the College administrators for a hybrid curriculum that will produce graduates with mixed skills, and within nine months, a customized degree program was implemented for those employers.

**Internal organizational context.** Donald explained that one of the key findings from the Davis Grant exploration is that by concentrating more on interpersonal skills in students’ activities, their quantitative reasoning skills will also improve. Donald indicated that the research was right. The old model of passive, talk-and-chalk, sage-on-the-stage approach to teaching does not work—active participation is better. By lecturing less and interspersing lectures with engaging and relevant activities, students understand and retain the knowledge
longer. This is because the human brain is not made to memorize content separately from its context. Both the students and the faculty had a hard time getting used to this new classroom dynamic because their expectations of their own roles were counter to the established norm and culture within their previous educational framework. For example, professors assumed that their job was to stand in front of the class and deliver the content because that was what they were paid for, and students simultaneously thought that their role was to sit leisurely, take notes passively, memorize some data, take an examination, and move on. In spite of several research studies that showed that this traditional classroom interaction does not work, colleges and universities continued to practice an outdated, failed system.

Driven by the changes that they made in their courses, the Davis Grant volunteer professors disseminated their experiences to the rest of the faculty members through “hallway conversations.” Referring to these volunteers and the knowledge they gained from the exploration, Donald stated, “We also asked many of them to make presentations at faculty development days.” However, Donald observed that, “It’s been a year since we’ve done anything, and as [things] happen, they ebb and flow; we're not hearing too much about that again. We're actually looking for ways that [Oceanfront College] can revitalize that.” The institution’s administration is looking for ways to replicate the successes of the Davis Grant experiment.

In his meeting with faculty, Donald talked about innovative ways to make curricular and structural changes. Donald continued that since educators cannot change the quality of students who enroll, they should think of different ways of motivating students. Perhaps by creating a “spark” that will convince them to take ownership of their own education, and engaging them in diverse modes of active learning.
Donald pondered on different ways to get students actively engaged. He posited that it is certainly not by lecturing them. He stated that when in front of the classroom, while content is important, educators’ vigor and enthusiasm are far more important. The faculty member’s attitude towards a class is what makes the difference. Their approach can push students to excel, draw them into conversations, and get them to class prepared to have a discussion. Professors’ weekly preparation should include rethinking the syllabus modules and asking what weekly sparks can energize and excite students.

Since the process of rethinking a classroom is hard work and requires sustained energy on the part of a professor, according to Donald, colleges can help by lowering faculty contact hours per week and keeping class size smaller. Administrators also can help new faculty by removing barriers to the potential of success, in addition to trying to “light a fire.” There are a lot of barriers to learning, including students’ lack of readiness and room equipment failures.

In order to design or maintain a curriculum, Donald indicated that there are lots of conversations and collaborations happening:

Lots of people have that conversation. They run it by the technical advisory committee.

A document is created, which has the course sequence and the course descriptions. A lot of people start reading it, and they say, ‘This feels right.’ It goes to the curriculum committee, it goes to career services, it goes to the executive committee; everybody has a chance to look at this and say, ‘Yes, I agree this is what we should do,’ and then they start teaching. As soon as they start teaching it, it starts doing a 360 evaluation. We're always saying, ‘Hey, is this working? Are things changing? Are there new tools? Are there new applications? Is the industry changing and asking for different things?’
When asked how was the need for change first detected or sensed, Donald was convinced and confident that it came from faculty. He indicated that the professor best knows not only what the student “is able to do, but how the student is able to do connect to that industry.” An engaged faculty member “knows when something is out of date,” is able to “see” and “feel” the need, and can contribute greatly to keeping the curriculum current and relevant. According to Donald, one should think of a faculty member as a champion who can give the College a new spark, a new idea. Likewise, when faculty are not staying abreast of their industry, the connection gets broken, and the College and students end up with a stale curriculum. One of the niches of Oceanfront College is that they hire industry professionals who come with “a refined sense of what the industry needs.” Not only do those professors intuit what skills industry needs, this implicit knowledge is also reinforced from conversations and from working collaboratively with peers.

According to Donald, once a skill mismatch or a misalignment is discovered, it leads to making a change in the curriculum. He expressed the importance of keeping the curriculum current and applying the changes as quickly as possible. Not doing so is a failure to serve the students.

Donald indicated that because of Oceanfront’s agility, many students have benefited and they are getting jobs. Part of the success of the College is the combination of the hands-on approach and of understanding the theory behind the experiments. Typically, new programs are built in the same fashion, through a combination of conversation with employer, using existing courses, rebuilding courses that are needed, and constant interaction with employers. The College recognized the need of an industry and they put the curriculum together.
Donald thinks that the right measure of a curriculum’s success is when students go into employment right after the completion of their degree and employers are happy with the students’ skills set. Another measure is when the students are paid above market value and are trendsetters in their discipline. Donald explained that administrators and professors can sense when a program is approaching a disaster zone because students do not enroll “They don’t come. They know.” Also, many who are in the program are unhappy and will withdraw. The faculty members, too, are unhappy—“If something’s not working, nobody’s happy.” Donald reported that you can see a program is failing because their “enrollment numbers are just on this long terrible slide. You can see it happening.” The results from student evaluations are another measure of whether the curriculum is effective. He continued to say that when there are far more positive comments than negative comments, “that gives you a good feeling that we are in the right direction.” Students’ feedback is analyzed, given appropriate discussion, and is a ground for terminating ineffectual faculty. According to Donald, if after the process of evolution, a dead end is reached, then it is time for a revolution. This does not happen too often at the College. Donald believes that a curriculum can evolve for “a good thirty years before the industry changed.” An example of an evolutionary process is an internal initiative that added critical thinking component to all the programs. The appliance and radio repair programs were stopped and replaced with electronic and electrical engineering, this is an example of the revolutionary approach.

Another college initiative conducted fifteen years ago is making sure that all syllabi have alignment among course objectives, measurable outcomes, and the College goals. The review also looked at weekly activities to make sure they connect to outcomes and incorporate appropriate balance between theory and practice as well as for employing proper levels of
Bloom's taxonomy (Bloom et al., 1956). This initiative was in response to an accreditation requirement from the U.S. Department of Education to tighten up the process of awarding of credits. According to Donald, the awarding of credits should be a transparent process so that informed reviewer should be able to look at a syllabus and objectively agree that a course is worth its credit. The syllabus should convey a clear message of what the students will be learning and doing in order for reviewers to ascertain whether students have succeeded. In order to sustain the success of this process, Oceanfront College built the course outcome assessment system made up of a set of policies and procedures needed to conduct a thorough program or course evaluation. Communication between administrators and professors play a vital role in order to effectuate a successful departmental change.

Part of the evolutionary curriculum maintenance is the use of Curriculum Mapping Process (CMP). “CMP is another tool in the process of evaluating and defining the curriculum,” Donald remarked. He stated that over time, the curriculum content, sequences, and integration slip because of changes from within the College or from outside influences, including faculty interpretation, new technology, new ideas, and the normal drift that is simply due to time. The initial connectedness of the curriculum is lost; and therefore, faculty members should take the time to review and reconnect components of the curriculum to make it functionally cohesive and aligned again.

Changes to the curriculum are happening, “all year long, all the time,” indicated Donald. A simple change like a course sequence can be approved and implemented in ten minutes. As soon as something is identified, Donald wants the process to start immediately, and “it usually never takes longer than six months” to implement a new course. As long as there is job availability, a new program can be implemented in a year and a half. Donald goes on to say, “a
year and a half might be the extreme from where first conversation to delivery” takes place. As part of the change process, on a weekly basis, all minute changes are communicated to the registrar and department chairs so that they know that these things are happening.

Some pitfalls to be considered during the curriculum change process include resistance to change by both the faculty and students. In Donald’s opinion, to help mitigate this risk, changes should be communicated way ahead of their delivery. A conversation space should be created with students in the classrooms and with professors in the hallways, as well as within the department meetings. The goal is to make curriculum changes, not to defeat the students. It is the educators’ job to bring them to a successful conclusion. When students are consistently failing, then there is a problem in the curriculum. Look at the course scaffolding, the student support systems, and the grading rubric. Donald believes that educators should look to themselves and the process first, and not on blaming students.

A curriculum is developed collaboratively as a department. Specialists are needed because no one person can get his/her mind around the entire program. Donald explained this collaboration this way: “I want to be a master of some and I want to be connected to other masters of some, and together we're going to put together a program that is hopefully going to make a well-rounded student.” The original idea of a program comes from all directions in the organization, both up and down the management hierarchy: from the president, to the provost, to the faculty conversations. No one person within the organization will turn down generated ideas or monopolize ideation.

The culture of Oceanfront is agile in approach and conservative in process. According to Donald, “You can’t go off on everything, but we're very interested in everything.” If it is a quality idea, it gets kicked around, and if a consensus is reached, ideas get implemented rapidly.
Although the College is an open institution, it does not mean that everybody is accepted. The mission of the College is very much the same from its inception 75 years ago: a life changer to students so they can get a degree in the area they want and find gainful employment. “We would be failing our students if they can’t get jobs,” Donald went on. He is amazed how much students learn in such a short time. He said, “I’ve seen some student projects where I just can’t believe they did this quickly.”

When students come with a dream, it is the institution’s duty and moral responsibility to help them achieve that goal. In Donald’s eyes, unfortunately, not everyone can do everything; proper guidance and advising are integral to the execution of the organization’s mission. The College’s documented change process works; but in addition, he would consider preparing the change agents ahead of time so that they can be better equipped for the marathon they are going to run. Donald is immensely optimistic about the future of the Oceanfront College. He sees growth in many directions, including in student enrollment and more program offerings.

**Document review.** Donald and the Provost shared the Oceanfront College’s new program development process checklist found in Appendix H. It is a sequential process with five steps: (a) Develop program idea, (b) Document overall plan, (c) Create curriculum, (d) Develop infrastructure, and (e) Deliver program. At the end of each step, a critical decision point (Go/No Go) is made by the executive committee and the office of teaching and learning (OTL). This document is maintained by OTL and revised dynamically as new lessons are learned during a new curriculum development. Inputs and consensus from different departments are coalesced, and approval from the president, the executive team, and the provost are sought in order to move forward a new program. Through a transparent process, internal teams, such as the president’s team, the executive committee, the provost’s office, career services, area institutions with similar
programs, the technical advisory committee, and the curriculum committee are consulted. During the entire development, the admissions office and the facilities committee are briefed on the new program’s status.

The new program development process starts with an ideation and the approval of an idea by the executive committee and the office of teaching and learning (OTL). Once approved, an OTL champion and a program developer are identified who will shepherd the development progression. This is followed by a robust review and research of internal and external influences, including a job outlook study by the career services. If required, a market research is conducted by surveying students, alumni, and industry leaders. Tandem research studies examine other colleges and universities’ course offerings. Step one ends with the identification of required course offerings, an assessment of the impact of the new curriculum on existing programs, its alignment with the College’s mission, its suitability and fit to the current department’s structure, the resources needed, the necessary instructor qualifications, and an estimated budget.

Step two is the documentation of the overall plan. The new program documentation should include what makes this new program unique: its mission statement, its program description, and its educational objectives and outcomes. The documentation should also enumerate in detail the requirements and its associated costs. For example, necessary software, equipment, and/or specialized rooms are specified. This phase also closes with a more detailed budget.

In step three, a detailed curriculum is developed. Courses description and requirements are finalized, and ensuring that two-thirds of its credits are technical and one-third are general
education. Also, before meeting with the curriculum committee, the program’s entry requirements are also established.

If the new program is still a “go,” step four is pursued by developing the program’s infrastructure. Personnel are hired, including a department chair. If needed, architects are hired to construct specialized laboratories, classrooms, and offices. A three-year budget is projected and reviewed by the finance department. Finally, the required equipment is purchased. After all departments have been briefed, in step five, the new program is delivered as indicated by the deployment of its artifacts on the College’s intranet and website.

**Observations.** Donald emphasized the dynamic nature of Oceanfront’s program development process checklist and indicated that the provost or any of the four assistant provosts are able to fine-tune the process documentation in real-time, especially during the creation of a new program. It was observed that Donald is the champion of the College’s skills mapping initiative. He wrote a follow-up email to the investigator about the purpose and the need to have each academic department conduct a skills mapping session.

**Participant 2: Alan, Information Technology Chairperson**

**Biographical information.** Alan has been the Chair of the Information Technology department at the Oceanfront College for 10 years. He was a professor in the past and remained in higher education, and now has been involved in curricular changes at the Oceanfront College for ten years.

**External organizational context.** The Information Technology department, which Alan oversees, found out about the skills gap primarily through their relationship with a Technical Advisory Committee (TAC). TAC is comprised of a number of industry leaders and experts employed locally. Once or twice a year, college administrators and faculty connect with them to
solicit feedback regarding the department’s curriculum. Through conversation with selected faculty members, the information Alan gathers from TAC is shared with the selected faculty. If a skills gap is identified, a sub-committee is assembled to discuss and examine where changes in the curriculum might be prudent.

Alan described the creation of the video gaming curriculum as due to a large demand coming from the admissions department. Potential students frequently inquired about a video gaming program. Research ensued on the job market for video gaming by examining relevant job postings, similar programs at other colleges, and the Oceanfront College offerings. After studying the data, it was recognized that the College already possessed the necessary knowledge in-house, and it closely matched what was required in the gaming industry. Hence, the Game Development and Simulation Programming (GDSP) track was created by combining courses already taught in the software engineering program and the graphics department.

The creation of the GDSP program was mainly student-driven and market-driven, according to Alan. One unique feature of the GDSP program is its intrinsic backup plan: the skills set GDSP students gain is also sought in the software engineering disciplines; hence, “a lot of our students who don't end up in the game industry end up in traditional software engineering jobs.”

**Internal organizational context.** Alan pointed out that the maintenance of the GDSP program is conducted iteratively. For example, administrators and professors remain in close contact with industry through the Technical Advisory Committee, and other means, including attending local and international conferences. With a renewed view of the gaming industry, professors generate new ideas. Alan stated, “We match those ideas to what's in our curriculum, and if there's a gap, or if there's a need to change, then we change.”
Every time a discrepancy is found, it always leads to a change. Sometimes classes are phased out because the skill, the tool and the information are no longer necessary in the industry. When major players in the industry make changes, this event will most likely necessitate a change in the curriculum. Alan and his team constantly monitor trends exhibited by industry giants to see if curriculum changes are necessary. “We look at Microsoft, we look at Unity, we look at Adobe, we look at some of the big players and what they do. When they make changes, we adapt pretty quickly.” Some of the changes are subtle, including in the areas of teamwork and written communications.

In a typical curriculum change process, the change agent will follow the documented college procedure. There are checks and balances to make sure that the courses are using enough variety to deliver course content. To change a course, a faculty member needs to write a proposal, and to be reviewed by the department chair, the office of teaching and learning, and the curriculum committee. The change process has transformed over the years to strictly review alignment between syllabi assessments, program outcomes, and the College’s mission. A full-time resource coordinator helps professors review these alignments.

Alan asserted that changes must be done in a transparent manner and a consensus is reached among professors with the content knowledge. Through meetings, a dialog ensues, and consultation and collaboration are sought to come to an agreement on how best to make a change. In a department as large as the IT department, a unanimous decision is sometimes hard to achieve, but when a reasonable consensus is reached, the change process moves forward. When asked about egos, Alan indicated, “We're all industry professionals, we all understand the processes. Sometimes we have different ways of thinking about things, but I need a buy-in from the team.” When the Game Development and Simulation Programming track was first
developed in 2007, there were many changes applied to it, including new courses to be
developed each academic term; but now the program is a lot more stable. A change to a
curriculum can be implemented as quickly as the next quarter.

Alan posited that the right measure of a curriculum’s success is when students hit the job
market. Also, the College sends employers surveys regarding Oceanfront graduates' readiness to
take on a job in the industry. A good indicator that the curriculum is current is when these
surveys reflect positive feedback; otherwise, input from industry will be used for making further
changes.

In the course of eight years since the video gaming program's inception, the department
became much larger. An increase in student enrollment necessitated hiring more faculty and
made curriculum changes more complex. Alan found that, “with the number of faculty comes a
lot of different opinions on how we make changes. You know, some people want to make
changes instantly, other people are more in favor of doing that over time.” For the most part,
there is good team collaboration. When a faculty member has an idea, he/she will take his/her
idea through a vetting process with his/her peers before it gets to the department chair.

Sometimes there are real philosophical differences among the faculty, and that is when the
chairperson has to make a decision. When conflict arises, Alan resolves the differences through
a delicate process: “It's a balance of faculty opinion, what does the industry say, and then I'll
determine if a change is prudent or not.”

Not only does the IT department embrace a collaborative culture, their senior leaders do
not dominate or monopolize the idea-making process. Alan believes in shared governance
through collaborative teamwork, and by having a faculty idea vetted by his/her peers. He is
“strongly opposed to making a change based on the opinion of one or two faculty members.”
At the organizational level, the College does not push the department in any specific directions. Alan also does not see any hostile forces that stifle innovative efforts. The organization's leadership encourages innovation and is open to changes that will lead to curriculum improvements and better experiences for the students. A change process is also in place; and according to Alan, if there is an important change that needs to be made, they can implement it quickly.

The right measure of a curriculum’s success is making sure that graduates of the program gain employment opportunities in the field. This is consistent with the mission of the College, and this drives the creation of a program and is central to the reason why a change is applied to the gaming curriculum. Alan posited that “If there's a really good idea, and there's a lot of students but there's no job opportunities, it won't happen.” He believes the job of educators is to help students go from Point A to Point B, and faculty members have to make sure that by the time students get to Point B, they are employable. Another good measure of a curriculum's success is employers’ satisfaction; it is when the College receives accolades from employers about how skilled the graduates are.

Faculty members are the key to a student's employability. “It's the strength of individual faculty who can bring both the well-prepared and the under-prepared student from Point A through Point B,” Alan explained. To keep employers happy, educators must maintain a close contact and listen to industry, and the department must have checks and balances. The College must also hire talented faculty who can motivate students, and who have the ability to get along with students and peers alike. In applying curriculum changes, he learned to make those changes in existing cohorts, but not for all the students in the program. For example, Alan said, “We'll make this change only for the students who start in the fall,” but everyone else that is already in
the program will not be affected. He advocated for a more gradual, rolling conversion process by making a change follow a cohort; this approach lessened the discomfort level for faculty members.

The speed of change in a curriculum is affected by the size of the department and the comfort level of the instructors. When the program was first started in 2007, there were fewer students and fewer professors. Fewer faculty members mean fewer communication links between the subject matter experts. In recent years, the department experienced increased student enrollment, which necessitated hiring more professors. So when a change idea comes, “we talk things through a lot more, and I like that.” The slower pace of change means less discomfort for the professors. Alan continued, “I think we're rolling things out just a little bit slower than what we did earlier, and I think there's a little less discomfort with the faculty because we do that.”

Document review. Although it is not possible to know where all the previous graduates are now working, the Career Services team at Oceanfront College tracks where their Associate and Bachelor graduates are employed. Through the collaboration of an academic department and Career Services, a specific program survey was created and an invitation was sent to industry to help assess curriculum success. Alan provided the recent employer surveys. These surveys were completed by some of the industries that hired Oceanfront College graduates. (The questionnaire is contained in Appendix I.)

The questionnaires are specific to Associate or Bachelor graduates of a specialized Information Technology track. For the video gaming department, the survey queries employers on their opinion regarding the gaming program at OC. Employers were asked to rate their level of agreement on whether OC graduates possessed certain critical skills.
The goals of the video gaming program are to equip students with the following skills:

(a) Demonstrate web, procedural, and object-oriented programming skills using several programming languages; (b) Develop flowchart, utilize pseudo-code, analyze, code, test, debug, and document their game programs; (c) Develop 2D and 3D multimedia graphics animations and simulations; (d) Form a team and design and publish an interactive game that implements game balance and project management within several game genres; (e) Analyze and utilize industry standard game engine components; (f) Design and develop database driven structures and game applications; and (g) Demonstrate oral and written communication skills, function as a member of a team, act ethically and responsibly, and respect all people and cultures. All seven program objectives of the Game Development and Simulations Program are enumerated in the questionnaire next to its own Likert Scale, where the respondents were offered five pre-coded responses from “strongly agree to strongly disagree,” and with the neutral point being “neither agree nor disagree.” The names of the employees (i.e., previous OC students) were not identified: only the name of the respondent and his/her title were labeled.

Alan provided the results of thirteen surveys. These surveys were conducted between the years 2012 to 2014, and they are specific for Associate and Bachelor graduates of the Information Technology (IT) department. Of the thirteen survey results that were shared with the investigator, only one was for an Associate’s Degree graduate in video gaming. This employer hired two of Oceanfront’s video gaming graduates. The rest are for the other IT technologies. The answers provided by this respondent range from agree to neutral. The employer did not answer some of the questions.

Observations. It was observed that Alan relies on Information Technology team consensus through consultation before arriving at a decision. If there is no clear agreement
among the involved parties, then he makes the final call. The investigator also observed that the questionnaire has no space for employers to explain the reasoning behind their choices. To help assess the College’s curriculum better, adding a text area in the survey would allow participants to detail their thought processes. This approach may add value and additional relevance to this important feedback mechanism.

**Participant 3: Ada, Faculty Resource Coordinator**

**Biographical information.** Ada came to Oceanfront College 27 years ago as a tutor for the Academic Skills Center with extensive experience as a seventh-grade language arts and reading teacher and a Master’s Degree in Education. The dean at that time felt that she was the right candidate to support newly-hired faculty who came from industry with no teaching background. Through this service, she developed a rapport with the faculty. Ada also provided writing workshops in the classroom to help faculty members and students with specific research papers. Part of the training she provided to new faculty was how to create an active learning environment in the classroom.

**External organizational context.** According to Ada, the College embraces a three-tier strategy in equipping students with new skills: (a) introduce the topic, (b) reinforce it, and then (c) mastery of the skill. A curriculum mapping process (CMP) is used to determine what specific skills are taught in a program. The sequence and alignment of skills taught are reviewed using CMP. The course mapping process helps align the course assignments, program and course objectives, and the College mission. According to Ada, CMP is “looking at the courses and trying to figure out, where we introduce this topic and in what other courses do we teach it so students can master it.” Part of this alignment analysis is a continuous “looking at what the employers are saying and what our tech advisory board is saying.” If a course, tool, or skill is no
longer being used in industry, then it has to be revamped or taken out of the curriculum, and faculty members need to think about what new relevant classes must be added.

Ada stated that the professors are “pretty much on top of things in terms of trying to get a feel on what industry needs.” Because many of them are working in the industry and others are keeping in contact with industry, they are able to detect industry changes, and she indicated that “they are pretty good at doing that and they are very quick in getting these programs started. They try to jump on these things.” According to her, the ability to change the curriculum quickly is one of the best attributes she liked about the Oceanfront College. To determine what new courses to offer and which ones to discard, Ada thinks that the College should inquire from the Tech Advisory Committee and from the adjuncts because they are working in the industry.

Ada aids professors in aligning class activities to course objectives and assessments, to program outcomes, and to the College’s mission. Faculty, including those who taught in the video gaming program, go to her for help to make sure that there is alignment in their syllabi. A provost, Ada, a chairperson, and key professors will meet and look at all the courses and every skill those classes are teaching. Ada said that the important thing to do is to be looking at what has been done and to make sure that everything is aligned.

She asserted that the institution “really lives its mission,” to train people and equip them with the necessary skills that industry seeks so that they will be employable at the time they complete their Associate Degree. While some colleges and universities major in theoretical knowledge, OC tries to get a balance between applied fields and the theoretical aspect. She posited that this is good news for the College because research shows that “a lot of the skill gap involves things that don’t really require a four-year degree or a Master’s Degree.”
Ada believes that when administrators and faculty members at OC sense a need for change, it actually leads to making the change. “That’s how all of our programs get started,” Ada indicated. At OC, the College gives more opportunities to a wider audience because of the open enrollment policy, but that strategy also ushers in a different set of problems.

**Internal organizational context.** When designing and maintaining curriculum, Ada is an advocate of the principles laid out by Dee Fink’s book, *Creating Significant Learning Experiences*. Instead of picking a textbook and designing the course based from the textbook, change leaders should ask, “What is it that the students need to remember and how do we help them to remember?” She argued that long-term memory retention can be achieved by creating significant learning events. For example, capstone projects should be connected to their community so students will remember their experiences.

Anytime students do something outside of themselves, “they learn to value themselves or they find out more about how they learn and who they are.” Knowledge will be gained and retained longer. Ada explained that when designing a curriculum, the designer should be intentional and create courses that incorporate significant learning experiences. This approach requires reflection; therefore, the College should not do things too quickly.

Bringing in people with no teaching experience and asking them to design a curriculum can be a problem. That is when Ada comes in as an in-house consultant to help the individuals who used to be industry experts, and who are considered inexperienced in academia and in building courses and curriculum. Regarding business experts who are now teaching and tasked to develop a curriculum, Ada advised to “give them some background, some support.”

Part of the pitfalls encountered during the curriculum development or change process is the extra time involved in thinking of experiential class activities that are meaningful. This
process is labor intensive and hard work, and it involves creativity. From Ada’s experience, the change process teams were collaborative and operating in the spirit of trust. They were self-organized, and many volunteered to be on the team. Also, Ada indicated that the College’s senior leaders do not monopolize the idea making process. Instead, they facilitate the department chairs, they find out what the faculty needs, they determine what is going on in the department, they are always listening to what their constituents have to say, and they discuss these issues with the Provost's Council.

The current curriculum appears to equip students with technical skills, but she thinks communication skills are probably still lacking. This deficiency is a combination of students not putting much effort into the humanities courses because they do not see the need for it. Research shows that employers want soft skills including written skills, oral communication skills and critical thinking skills. Therefore, Ada stated that curriculum designers should be intentionally thinking about what more can be done so that these students can practice more critical, creative, and management skills.

Syllabi that are too prescriptive will inhibit student's creativity, according to Ada. Give students room in the syllabus to add their own interests, including how they are graded and whether the course outcome is relevant to their future. Giving students more role and autonomy exemplifies how we want them to be in the workplace. She advanced an idea that the institution should hire a full-time resource who knows about curriculum design and who will guide all departments in the design, development, and maintenance of curricula.

**Observations.** Ada is a huge proponent of the techniques laid out in Dee Fink’s book, *Creating Significant Learning Experiences*. She was observed holding a copy of the book during the interview and referenced it to the investigator a few times in the course of the conversation.
She advocated that when modifying a course or curriculum, or when creating a curriculum for the first time, a program developer should analyze and adhere to the principles and examples laid out in the book. The researcher secured a copy of the book, and the section that follows is the review of Ada’s recommended material.

**Document review.** Dee Fink’s book, *Creating Significant Learning Experiences*, is intended for higher education professionals who are tasked to design or make changes to courses or curricula. To increase student engagement and learning, Dee Fink endorsed the idea that the change agent should ask the question, What do you want your students to learn? The book is replete with charts, diagrams, principles, ideas, and realistic examples to aid educators formulate a new way of thinking about course planning and assessment in order to provide students with a more in-depth learning experience. For example, the book presented a robust chart to help transform the old paradigm of teaching and learning into Fink’s alternate framework of thinking that he contends will result in significant and lasting learning.

The author details ideas for how to create beauty and meaning in classroom activities: in lesson plans, in lectures, in rubrics, and in assessments. Fink also proposes that curricula and teaching methods should be revisited, and if possible, changed to meet the ever-changing educational needs of today’s students. He provided justification for modifications in educational environments and offered a framework how to build classes that reach beyond memorization and regurgitation. The book advocates setting students up for success by tying subject matter together with other subjects, such as personal life experiences, and with the student's social context. Fink believes that the logical effect of his step-by-step processes will help students retain the materials longer.
The author’s taxonomy of significant learning expands Bloom’s Taxonomy and systematically integrates it with active learning and educative assessment. By shifting classes from a traditional content-centered approach to a learning-centered approach, students will be more engaged and involved in the educational process. Fink believes his rationale will produce a dynamic educational experience, stimulating adults to become life-long learners. To make the shift though, faculty members should continually ask: What kinds of learning will be significant for students, and how can I create a course that will result in that kind of learning?

Many of the guidelines in the book will help both professors and administrators make responsible class and curriculum decisions. The insights into designing student-centered and outcome-centered learning experiences can give curriculum developers a deeper understanding of the design process and may encourage faculty members to design innovative courses for significant learning.

Participant 4: Anders, Assistant IT Department Chair

Biographical information. Anders taught math for thirty years in the public sector before joining the Oceanfront College 27 years ago. For sixteen of those years he was a part-time instructor, and then he attained his Master’s Degree. Having had the experience working in an MIS department, he applied and was hired at the College. For the last five years he has been involved in curricular change.

External organizational context. Anders explained that because of the open admission policy of the College, faculty members assume that their students have no idea what they are getting into, and therefore, faculty members teach their classes starting at the very bottom. However, those students who enter with prior knowledge of technology are encouraged to take challenge tests so they can move forward more quickly. He quoted a popular mantra from a past
department chair regarding student learning: “They all have to reach a standard, but they don't all have to reach it at the same time.”

Anders described the mission of Oceanfront College as: “teach the students and prepare them for the workforce.” In order to determine what specific skills should be taught that industry needs, each department in the College has a Technical Advisory Committee (TAC). Professors and administrators meet with industry experts regularly twice a year. TAC advisors give educators feedback on what technologies are obsolete and what skills are relevant and are coming down the pike.

According to Anders, by listening to all influences including inside the department and outside, each need to change the curriculum is detected. A change leader will think of an idea, investigate it, and after much conversation between the stakeholders, the change will be applied to the curriculum.

**Internal organizational context.** Some of the events that lead to a change are internally generated by faculty members and students. For example, seven years ago, in the video gaming curriculum, the College only offered the programming side but not the design track. Then “a lot of the students came here looking for the art side of it. We didn't have the art side of it. A couple of instructors felt that we should probably look into that,” recalled Anders. After a year and a half, a new game design program was rolled out.

Some external events influence internal policy; for example, due to a regional accreditation directive, adherence to standardized syllabi is now a college policy. Another inside event is a college policy where it is mandatory for all professors to use the College’s electronic portal so students can continue to engage in classroom activities remotely.
Like the majority of the participants, Anders stated that when the need to change is detected, it always leads to making a curriculum modification. A faculty member first sees a need and brings it to the department chair. The chairperson sometimes forms a committee to discuss a faculty member’s idea. Sometimes the department head will concur that it is a good idea, but will need more information, including whether there is a need for it in the workforce. However, Anders went on to say that, “once you decide to go one way, you've got to change your whole curriculum.” A curriculum may be tied to another program; therefore, both curricula have to be considered, and both programs may have to change.

Anders posited that the curriculum is always changing. “We look at the curriculum and say, ‘Is everything here relevant?’ If it's not, what do we need to add to it?” Based on the Course Mapping Process and input from industry, new courses are added, and outdated courses are discarded. All the courses in the curriculum are checked for gaps, overlaps, and replication of content. If a skill set in a class was already covered in another one, then that course will be replaced with a newer and more relevant subject.

In making a change to the curriculum, “you have to have somebody develop it . . . it's discussed with instructors . . . the syllabus is put together . . . basic activities are put together . . . complete the curriculum forms . . . and then it goes to the curriculum committee.” Anders warned that once a curriculum is ready to roll out, “we've got to wait until the quarter comes in to fit it in.” Timing in implementing the new changes is critical.

Anders showed a partial list of changes to a curriculum, and it was evident that it was changed twice per year in the last three years, or every other quarter. He pointed out that the curriculum was modified “maybe because we took a class out, added a class, or we rearranged some classes.” The changes to the curriculum are also posted on the College’s website. Some of
the changes are minor like rearranging the sequence of some classes, while other changes are major including taking out courses and replacing them with new ones.

Responsible governance is the key to developing and maintaining a curriculum, although the curriculum change process is typically instigated when a faculty member “feels” and sees a need for a change. Nevertheless, a faculty member who develops a program or a course “can’t be an island anymore.” The idea should be brought to the chairperson. If there is good data to support the thought, the department chair “has never said no if the majority of the department wanted it.” Anders stressed that, “when we develop a new course, we’ve got to make sure that the person developing it is in contact with the people, the other instructors, who may have the ability to deliver that course.” With one person leading the change, a consensus is sought among all stakeholders. To know what right courses to offer, industry input is sought, including the Technical Advisory Committee. A meeting is called for all affected faculty members, and through conversation and collaboration, and through taking into consideration students’ complaints on final evaluations, the team agrees on the right balance between the number of lectures and the number of hands-on activities that should be used in a given course.

One innovative idea that the designers of video game development instituted at Oceanfront College was the embedding of a backup plan. If gaming graduates cannot find a job in a gaming studio, they can apply to any software engineering company. The professors at OC purposely wove a backup plan thread across the entire video game development program so graduates can learn a skill set that is sought in similar industries.

**Document review.** To know what changes were made to the curriculum over the years, Anders advised reviewing the College’s intranet and compare the differences among versions of the curricula. A screen shot of the Game Development and Simulations Programming Associate
and Bachelor’s Degree curricula is shown in Appendix J. The list revealed that both curricula were changed every year from 2012 until 2014. On the College intranet (see Appendix J), the years prior to 2012 are no longer shown because the cohorts enrolled at that time already had graduated.

At the Associate Degree level, the curriculum was changed twice in 2014 and 2013, and once in 2012. The modification included changes to course titles, course numbers, and the electives allowed within a term. Other changes included a change in course sequence and the elimination of a laboratory component for a class. Appendix M shows the latest version of the Associate Degree curriculum at the time of this writing.

At the Bachelor’s Degree level, the curriculum was changed once in 2014, twice in 2013, and once in 2012. The curriculum updates included changes to laboratory time, class time, and number of credits. Credit changes are needed when new classes are added to the program. Other modifications involved minor changes in course names, and course numbers. The latest version of the Bachelor’s Degree curriculum is in Appendix M.

**Observations.** It was observed that the video gaming curriculum was updated every year, sometimes twice a year. It appears course titles were changed to be more content specific instead of merely promoting a commercial label. For example, the course title “Flash I” (the name of a commercial product) was renamed to “2D Assets and Animation,” which more accurately described the true intent of the course, and of the skills the students needed. The senior class project became compulsory for the graduating students, even for those who opted for cooperative learning with industry.
Participant 5: Dennis, Associate Professor

Biographical information. Dennis has an extensive background in the art and design area. He has a Master’s Degree in Art Education and a Bachelor’s Degree in Fine Arts with a major in sculpture; he has worked in the corporate world for five years; and was a freelancer for all the major companies in the toy industry and theme park for twenty years. He was also doing a television show for a state located in New England and the Public Broadcasting Service (PBS). Dennis came to Oceanfront College as a part-time drawing instructor until a full-time teaching job in the video game department opened up. He has been working at the College for five years and has been involved in the design and curricular changes at OC since the beginning of his employment. In fact, in his first year, he was involved right away in the Curriculum Course Mapping initiative that the video gaming department was conducting.

External organizational context. Dennis remains aware of the skills gap “by talking to people from companies and looking at periodicals like game developer magazine . . . hearing what new trends are, who they’re hiring, who they're not.” Through word of mouth he acquires new knowledge that is dispersed to the department. Dennis’ connection with industry affords him the knowledge of what appropriate changes can be applied to the curriculum.

Dennis modified the gaming curriculum so that it would split on the third quarter between the design track and the development track. Prior to making that change, Dennis had “to find different job opportunities for the crew services people so that they could justify the split. There had to be enough job opportunities available.” Engaging in extra-curricular events, attending conferences, talking with industry experts, and knowing the current state of the whole video gaming curriculum gave him a sense of what was important to the industry. “I could see areas
where we were weak and areas where we might be stronger.” After detecting a change, and vetted by peers, he pointed it out to the higher ups.

Through his connection with industry, he was able to invite several corporate leaders to come to the College as speakers for a one-day event. He also invited industry experts as consultants to provide training on a new tool. Dennis noted that when a new tool or service was offered in industry, there was a time lag before academia started to recognize it; “It took almost 3/4 of a year to get something new in the industry, actually, to be recognized by everybody to say, ‘Yeah, we should be doing this.’” He claimed that as a change agent, sometimes you felt alone, but you keep pointing at the prevailing event until the college shifts paradigms.

Some of the planned changes in the curriculum may affect other programs or another department. For example, an idea Dennis learned from a conference about a game laboratory and honors program evolved into an inter-departmental program. He found resistance to his proposal from other departments’ leaders. He noted that cross-pollinating an idea may have been harder than he had thought. He pointed out that he can observe some resistance to change within his department and in his collaborative work with other departments. This is a pitfall that a college or university has to watch because he thinks, “the problem is not apathy, but people not wanting to do more than what they're already doing.”

**Internal organizational context.** The way the Oceanfront College generates new ideas is through faculty members: “People just bringing things up when they hear about something is what works for us here.” The idea is talked about with the department chair, formalized through a proposal and backed up with research data. From his past experience as a manager, he recognized that the chairperson had “more access to corporate information for the big picture. . . He has a bigger window at what's going in the College than what we have as a faculty,” and it is
up to his superior’s judgment if “he wants to run this up the flagpole to the administration or not.” The initiative may be forwarded to either the video gaming provost, vice provost or the main provost, and a decision will be made.

Dennis talked about the culture in classes where faculty members try to mimic what it is like working in the industry so students will know and gain real experience. For example, professors “try to be more demanding,” and students are required to follow sound business practices like adhering to a file’s “naming conventions.” Regarding the culture of the College or the department, he claimed that there are no constraints or formal structures to generating new ideas. Dennis viewed ideation as ad hoc, loose, and depending on what the individual instructors sensed was going on in industry. “Just throw things up and if it looks good and everybody says yes then it can go.”

The College culture at the organizational level is open to radical and innovative ideas. As a professor, you can keep sending proposals up the chain, but senior leaders have checks and balances before deciding on an idea. Dennis explained that, “any idea you come up with that is going to be monetary, requiring money, that’s the major check, and there’s two or three checkpoints upstairs.” The senior management will give proper attention to your ideas, but they have “the bigger picture,” and they may know something entirely different, or your project may negatively impact another critical development in the College.

Major changes like adding a class, discarding a class, and changing course sequences have to go through the curriculum committee where they meet three times a quarter. This frequency of meeting affords the College the ability to make a major change in a quarter. “Things can pretty much change from one quarter to the next. You can have a new course in
place, where I know in some [colleges or universities] it may take a year to get a whole new course in place.”

According to Dennis, the College’s vision includes “to get people jobs or give them the best preparation for getting a job. We can’t get them a job but we can get them to the door as best we can.” Achieving this goal is a tough balance between student learning and college retention. In an open enrollment college, this is challenging. Faculty members want graduates to acquire employable skills that will get them the nice jobs. Looking at other colleges that ranked higher in the Princeton Review, Dennis learned that students from highly-ranked colleges and universities are “required to not only do their capstone, their capstone has to be entered in a major game competition.” Maybe that kind of rigor is what OC’s gaming students need.

Invariably, there are some students who have shown themselves to be intellectually incapable of absorbing the course materials.

What is needed is a full-time person or “a small committee of people that are looking at the curriculum and looking at a bigger picture” all the time. Their job includes: determination of skills learned by students in class, identification of what foundational classes are needed, investigation of what competing colleges and universities are doing in their program, and figuring out the logic behind the course sequences in other institutions and how a change in the video gaming curriculum will affect other related curricula. The video gaming department is experiencing such tremendous growth that this is actually creating a problem because the investment to expand the infrastructure, such as additional specialized rooms and equipment, are “just too slow at this point.”
Document review. Dennis provided the institutional questionnaire sent to Oceanfront’s administration (see Appendix L) by a nationally-recognized organization with the goal of surveying and ranking U.S. colleges and universities based on their video gaming program.

Observations. It was observed that Dennis was the main contact person between Oceanfront College and the nationally-recognized company. The information he provided was reviewed by OC’s administration and was not intended to be shared with other faculty. Through the interview, it was learned that as part of the ranking process, the nationally-recognized group made an unannounced visit to OC’s gaming department. The scout joined the College’s group tour of the video gaming department without the prior knowledge of any professors or administrators. She then reported her observations back to the surveyor. It was observed that some questions in the survey can be a good tool to help assess and improve a curriculum. For example, the survey gave emphasis to businesses’ best practices, such as team-based and cross-disciplinary projects.

Participant 6: Mark, Associate Professor

Biographical information. Mark’s educational background was in technology, including a dual Master’s in Computer Science and Education, a Bachelor’s in Computer Science, and an Associate’s in Electronics and Computer Engineering. After working in the field, it occurred to him that he enjoyed tutoring, sharing information with others. Through a previous acquaintance at Oceanfront College (OC) he was hired to teach in the Information Technology (IT) department. Since the beginning of his employment, 18 years ago, he has been involved in curricular changes at OC.

External organizational context. Mark learned that there are different levels of skills gap. New students, with no experience in the use of computers and how to program computers,
need an introduction to computer technology and its use. For working students who have little experience with personal computers (PCs), a professor may be able to spend “more time focusing on the programming rather than how to utilize the computer.” Mark articulated that as students move from quarter-to-quarter within his department, faculty members are having conversations and sharing information about a student or a class struggle so that the next faculty member can prepare and make sure he/she covers any skill deficits. Through professional and personal skills and experiences, Mark argued that a professor can “sense” when a student does not understand the meaning behind a particular content. “You can feel this through the kinds of questions they ask, and you can detect the depth of their understanding through their work.”

Another way to detect missing skills is by educators’ reflecting on their courses or the program and evaluating the weaknesses and strengths. Faculty should review other colleges’ video gaming curricula, for program trends across multiple colleges.

Also, Mark recommended connecting with other educators at other colleges and asking for feedback. Oceanfront College professors should solicit input from other colleges that OC has relationships with or has an articulation agreement with, as well as talk with students from other higher education institutions. Additionally, listening to different organizations that review college programs, and looking at their rating systems, such as the different review processes, is also beneficial. Finally, the College should maintain a Technical Advisory Board that consists of industry professionals who will inform professors regarding industry trends and industry changes as well as feedback on what skills graduates are lacking when they enter their businesses.

**Internal organizational context.** The majority of the aforementioned sources of potential changes came externally from the College. Sometimes the sources identifying whether there are problems in the curriculum are from within the College, including instinct of a
professor. Mark is interested in each of his student’s needs, and he senses this by giving a formative assignment at the beginning of his classes. This approach gives him a “kind of gauge where each student is.” After detecting a trend, he makes a tailored adjustment for that class to include something that addresses those deficiencies to help young men and women. Mark analyzes the formative exercise to look for trends and then uses the data to recommend a curricular change.

It is important to Mark that all his new students gain the foundational knowledge of the program because the lack of it will cause problems for students as they progress through the curriculum. He likens learning to a ladder: if it is missing the first three rungs, it is going to be tough to reach the top. There are typical steps that Mark follows as he introduces changes to the curriculum. First, he brings the problem to the attention of the department chair and asks permission to speak with other faculty members more informally to get their thoughts. Then as a group or individually, he report the information gathered back to the department chair. Thirdly, he gets feedback or requests from the department chair as they go forward looking into an idea. From there, he works with his peers, and together they come up with a solution or research the thought further.

When a professor senses a problem, it usually leads to a research inquiry into the situation. For example, “Are other [professors] that are teaching the same course having the same problem? Is it remotely connected to a particular group?” Mark explained that sometimes the problem is not in the curriculum, but in a mismatch between a professor’s teaching style and the mood of a cohort.

Mark believes that listening to students’ feedback and observing how they perform on class projects constitutes an internal mechanism that helps professors determine if a change in
curriculum is in order. If a professor observes a lacking skill, then the professor should trace the problem back to previous classes where the student may have missed or failed to acquire that skill. Maybe students have gained it already in the past, but just need the content to be reinforced, and then the faculty member can help them grow forward with it.

When asked how the design and maintenance of a curriculum is conducted at the Oceanfront College, Mark articulated the following steps: (a) for the initial creation of a program, a committee of faculty along with a department chair assumes governance of the process; (b) the goals and objectives of the new program are identified, including the determination of skills students need in order to reach those objectives; (c) the prerequisite skills needed in order for a student to gain the critical skills are examined; (d) classes are then built that will give students those abilities; (e) benchmarks are placed for each class or each quarter; (f) the classes are sequenced to maximize student growth; for example, programming logic should come first before programming languages; (g) after introducing a topic, it should be reinforced or repeated in the middle of the curriculum, and later in the program in another class so students can master it; (h) courses then are logically assessed to see if all the goals are being met; (i) confirmation is established with the department chair; if questions exist, adjustments may be made; (j) the process is repeated until the end goals are reached; and (k) the proposal is then sent to the curriculum committee for acceptance.

On the maintenance side of the curriculum, a department representative helps mediate any decisions and adjustments. Several internal and external factors, including new technology or industry trends, will cause a ripple effect change to a program. Mark underscored his penchant for systems thinking by warning against a Band-Aid fix, and to avoid this temporary approach, he suggested looking at the mechanics as a whole. He said to look at the entire system
and ask: “What does it need to change the prerequisite courses and how does it affect the outcomes of the future courses that rely on that class, and then how does it affect the overall goal for the curriculum?” Lastly, on maintenance, keep an eye on and evaluate the skill set acquisition of students at the end of the program, making sure they meet those benchmarks.

Mark noted that a decade ago, Oceanfront College resorted to Band-Aid approaches, but now ascribe to a more systems-thinking approach. Two situations influenced this change: the New England Association of Schools and Colleges (NEASC) accreditation and the fact that many changes negatively affected both faculty and students. According to Mark, the good news was that a change to the curriculum can be implemented in a short as a quarter, or in as long as a year.

Oceanfront College has made steps towards infrastructural changes to maintain consistency among several instructors and to sustain the level of relevant skill acquisition. For example, a primary faculty member—the specialist—is assigned to overseeing a course “so that, as other [professors] teach, the primary [faculty members] are the guides to make sure that the class is taught successfully, geared properly towards the students and is preparing new faculty to lead that success.” Another initiative is small committees that listen to industry feedback and make small changes and amendments in order to improve skill sets that faculty find lacking.

Mark stated that the faculty at OC has an overall common goal: to help students. “Even with differences among different personalities, that is a common core. When we see a problem that affects students or delays their growth or their potential, we usually come together to try and solve those problems.”

There are different ways to measure the success of the current curriculum, according to Mark. One way is to keep an open eye on a new cohort and follow their progress through quarter
by quarter: quarterly tracking. Then at the very end, observe their capstone or senior project: overall tracking. Professors should ask if “students are capable of bringing all those skills together in a final cumulative project that they have to build.” The other ways to measure curriculum successes are the following: review feedback from employers or organizations that hire students or accept our students in internships and externships; look at feedback from students, and consult alumni as to what they may have been lacking or where they seem to really succeed.

Mark believed that the most recent curriculum change was handled well and has been a success because graduates are getting positions in gaming companies, and getting praises from those organizations. Other graduates who did not get a position specifically in video gaming gained employment in software engineering.

The pitfalls during the change process of a specialized curriculum include structural issues, human resource challenges, and political conflict of interests, according to Mark. The limited number of specific classes one can put on an Associate or Bachelor’s degree is an example of a structural problem. The more specialized your curriculum is, the harder it is to find faculty members who can teach courses in those specific areas. Mark also articulated the human resource challenge; while there is a proliferation of newer technology and techniques occurring in the video gaming industry, the experts who are now teaching in a classroom have knowledge that can easily become outdated in the use of the latest trends. He said that it is beneficial for a college to provide more training to educate its professors and foster overall growth. Instead of looking for a new book, for a new tool and “learning in a vacuum,” Mark suggests bringing in industry professionals to help professors create practical hands-on class activities and to become proficient with new and alternative products.
Equipping students with the necessary skills to be employable and with lifelong learning in mind, the video gaming designers at the Oceanfront College decided first what core and foundational classes had to stay. These classes represented underlying skills that are necessary in order to build newer and specialized skills. Mark explained to his students that the purpose of these core classes is to help them attain those skills and be ready to use those skills as a basis for future learning.

The stakeholders, including “alumni, current students, faculty, game industry and just industry professionals,” provided feedback to faculty members. Based on stakeholders’ input, and once the students achieved mastery of the prerequisite subjects, the curriculum can be built up to add specificity. Changes may mean reducing the number of class offerings; for example, instead of offering graduated content through three different classes, maybe combine the content and offer it only once. If a major industry trend can be supported with data and it makes sense, then evaluate the appropriate place to add a class, either at the Associate level, the Bachelor’s level, or if there is a need, open a Master's track.

The change process team is created based on content specialties and is usually made up of three primary instructors. As professionals, Mark declared, we “work together to create the best of a win-win situation for our students and our program.” Each instructor respects the others’ skills set and the ideas they bring to the conversation. The senior leaders at the Oceanfront College do not monopolize or dominate the idea-making.

Mark recalled that there were ideas turned down in the past due to the wrong timing of deployment, or because the institution was not ready for it. However, administrators listen and respect the faculty. At times, they like an idea and are eager to get the project done. The one exception, Mark observes, is when the administration will push the department because senior
management sees industry trends and a program does not exist. Then the College will “try to be on the forefront of offering the new programs as long as the [college] believes that there is . . . a large enough audience that would want to participate in that curriculum.”

Oceanfront College is student-centric and is driven towards the success of its students, according to Mark. This culture urges its faculty members to stay connected to industry in order to stay up to date with relevant skills in hopes of bringing industry reality to the classrooms. The professor's goal is to prepare students to get their foot in the door, to take on a job in a career that they like, as well as to prepare young men and women for the future. Because computing in general and video gaming in particular are constantly changing, educators must help students not be idle or stagnant.

In order to help students to be successful in life, there are core values that need to be taught that are inherent in the curriculum, even though they are not codified or written explicitly. These skills include time management, self-management, self-studying, how to study, how to be prepared for class and how to be an efficacious and successful citizen. These attributes are necessary principles to learn in order to be successful in life.

Mark sees a future of Oceanfront College that includes an online curriculum. He believes he can help revisit and reformulate that initiative. (The online curriculum was initiated several years ago but never caught on.) For him, online or on-campus classes include “the same sets of goals, there are still the same topics to be learned.” The critical part is how faculty successfully and efficiently teach online classes. Mark posited that the electronic means should not rely on just one tool, but offer a variety of ways students can learn, in order to allow for varied learning styles, and multiple intelligences.

**Document review.** Mark did not provide a document during the interview.
Observations. Mark was a proponent of systems thinking, advanced by Peter Senge. Senge’s book, *The Fifth Discipline*, has been examined by this researcher and is part of the literature review chapter.

Participant 7: Steve, Assistant Professor

Biographical information. After completing his Master's, Steve joined Oceanfront College's (OC) video gaming department. The last six years of his eight years at Oceanfront, he was involved in the curricular design and changes at the College.

External organizational context. Through his connection with industry professionals, Steve learned about the skills gap. Through his outreach into the industry, he met with game developers working in nationally-recognized gaming companies, with independent developers, and everyone in between. In order to help the video game curriculum at OC and in order to know what skills industry needed, Steve asked these experts a direct question: “What do you need?” The data he received were then shared with college administrators who were very open to hearing his suggestions about how to address those gaps. The same information was informally shared with colleagues through conversations. Steve indicated that once a hunch turns into something more profound, he will communicate it to the department chair. The department also has a Technical Advisory Group made up of people from industry who provide input to professors and administrators alike. There are also many internal studies conducted across OC's video gaming curriculum, and the results of the study are used to tweak the program. For example, “we use post mortem of the previous class to drive 2 or 3 key improvements in the next class.”

The need to change was first detected through conversation with current industry professionals. Steve noted that several of the classes that were added to the curriculum spring
from his connection with industry experts, including the Analytics class. Other critical topics that came out of that conversation included the need for Extreme Development, Test-driven Development, and Maintenance Programming classes.

Steve said that when a need to change is detected, in most cases a change to the curriculum is applied. Some of the reasons to change are slow moving and subtle. For example, when a class has been taught for several years, professors may add current content resulting in some closing of the skills gap. However, this class evolution, down the line, then necessitates the discontinuation of other classes upstream in the program due to overlapping information caused by the advanced knowledge included in the previous classes. Therefore, the ideal curriculum change process is “having some flexibility in all courses, so that you're able to make adjustments” in real-time. However, one way of keeping the integrity of the sequence is by tracking a cohort from quarter to quarter, discovering trends, and making adjustments as needed.

**Internal organizational context.** Part of the curricular policy change that the department has implemented to increase students' success in the workforce is to pay attention to the syllabus, and to make sure that outcomes are clearly written. Then course outcomes must be mapped to align with the program's outcomes, as well as with correlating results with the technical advisors recommendations.

Steve remarked, “There's flexibility within the curriculum to do minor changes,” but the major changes can be implemented in a one-to-three quarter time frame. In a major change, the faculty member writes a case study for peer review, holds a discussion, runs it through the curriculum committee, and then has it approved.

After attending a recent international conference on video games, Steve perceived and has anecdotal data that the game industry is in crisis and “there’s a glut of really good developers
out there” waiting to be hired. The industry is experiencing fewer jobs than there are graduates with degrees by a wide margin. While nationally-recognized huge organizations—also called triple A’s, or AAA—are focused on getting specialists with experience; the small independent companies—Indies—are looking for multi-specialty generalists who are self-made, extremely sharp graduates, or who have fallen out of the AAA industry. Steve posited that in “neither of those scenarios is there a really clear pipeline for our graduates.” If a student has insight into this problem, he/she can strive hard to be a great computer programmer and will probably have a place in those two destinations. The aforementioned state of the gaming industry should drive colleges and universities to teach students “good general skills that almost any kind of software, Internet, hardware, and game development company would want to hire.”

Steve argued that if the public perceives a college as only a vocational college specializing in a trade, then it will have trouble in this new reality. He indicated that Oceanfront College positioned itself as a career college as well as a general education college, preparing people to be successful lifelong learners, which is consistent with its mission. With that mission and vision, he thinks that the current industry situation is less of a problem for OC graduates and for OC.

Part of the pitfalls in curriculum development and change is how one shifts the public perception of the college, according to Steve. For example, the root of Oceanfront College is as a vocational institution; and it transformed itself into a technical college and then into a career college. The future direction of the institution is to move towards the general education space. Offering a game design track is counter to the traditional technical branding of OC. Steve thinks that this shift has to be carefully managed. For example, every course that will be designed
should be evaluated on what the net result would be at the end of the educational experience for the student.

There is usually one person who leads each change process where faculty members generate an idea and conversation follows. The driver does not necessarily dominate the idea making; rather, he/she presents cases and the rest of the colleagues respond. Once a consensus is achieved, the proposal is submitted to the chairperson, the provost, and the curriculum committee. There are no hostile forces within the team or the College that stifle growth. Steve pointed out that “the greatest inhibitor to innovation is the lack of space, the lack of room in the curriculum.” The big changes are sometimes resisted or slowed down because of the work involved with the faculty learning to use a new tool and recreating an entirely new lesson plan with no mechanism for remunerations. So big changes “get slowed down and maybe it happens in a less dynamic, less responsive way.” Steve showed confidence with the students’ stamina in dealing with a dynamic environment and with how they have proven to be fast learners. This observation meets the parameters of the mission of the College, which includes student success and lifelong learning.

If he has to lead the curriculum design and maintenance process, the first thing Steve will do is to “move the philosophy towards a general education.” By avoiding too much specialization, the video gaming graduates will also be poised to work in similar disciplines, including the software engineering arena. The other change Steve would like to see is offering the first three quarter’s classes in every quarter as opposed to the present system where core classes are offered every other quarter. This approach is better for the student because the topic is still fresh in their minds. Additionally, it is better for the stability of the curriculum, and for college retention because students who failed a class will be able to recover quickly rather than
waiting a quarter. In a similar vein, he would also advocate that fundamental tools and techniques such as Agile Development, Extreme Programming, and Version Control be moved down to the Associate level and reinforced in several classes.

Where he sees the future of the college is towards “the ability to do cross disciplinary work with other departments in the [college],” because software impacts every other technology. This approach will afford students real-world experience in the area of collaboration and in developing a variety of software. There are several challenges that need to be overcome before OC will be ready for it, according to Steve. First, the video gaming curriculum is tight, and there is no room for any electives. Second, all curricula in all programs would have to be adjusted, and this option is resisted by other department heads.

Document review. Steve, Donald, and Ada all described the work they have done in skills mapping for the majority of the programs at the Oceanfront College. In 2010, OC conducted a skills mapping for the Game Development and Simulations Programming. This initiative was guided by Donald (the Assistant Provost) and was attended by the entire video gaming faculty at the time, as well as the information technology department head. The team met several times before they completed the skills map for the Associate Degree. Steve shared the spreadsheet in Appendix K, which is the outcome of the skills mapping effort. At that time, Steve was the recorder and used Microsoft Excel to document the group’s decisions. The column headings are grouped into six quarters. OC uses a calendar quarter to frame an academic term. Within a quarter column, all three major courses became the subheadings. The team decided to label the rows by the potential job titles students would pursue after they graduate. The job titles are followed by the specific skills the students need to be qualified for a particular position.
After the column headings and row titles were established, the professors analyzed the classes in which particular skills were taught. Part of the culture of the Oceanfront College is their belief that when equipping students with a skill it should be introduced first in a class, reinforced in later class(es), and then finally mastered in future class(es). To reflect the College’s ideology in the spreadsheet, a numeric one was used to identify that a skill was introduced in a particular class. Numeric two signified that a class reinforced a skill, and the number three indicated a class in which the skill could be mastered. The subject matter expert (the professor) of a class decides whether the skill is going to be introduced (a ‘1’), reinforced (a ‘2’) or mastered (a ‘3’), and other faculty who subsequently teach the same class validate or reject the primary professor’s opinion. Agreement among the primary instructor and other lecturers is sought out by the department.

The skills mapping team began their analysis with the first class, GDS 110, and while in that same column, the group went down line by line and decided what level of teaching was employed. For example, in the column for GDS 110 class, was the object-oriented (OO) skill introduced, reinforced, or mastered? The primary professor was then consulted, and consensus was sought with other professors who will teach the same class. This evaluation process was repeated for all skill cells within that column. Numbers that are enclosed between brackets mean that a skill level is partially taught in a particular class.

After the skills mapping session, a follow-up meeting was conducted where all members were asked what other soft skills were not captured and were not represented correctly. These skills were colored red in the spreadsheet and included problem solving, artistic ability, communication, listening, teamwork, collaboration, and ethics.
The skills mapping process exposed several problems. An example issue that needed to be mitigated was when a skill was taught at the mastery level (indicated in a cell as number three) the first time it appeared in the curriculum, but had not been introduced or reinforced in earlier classes. Also, referring to the numbers on the skills map, if a skill’s numbers are not distributed in ascending order, as mapped in the spreadsheet, then this means that the order of course sequences was wrong or the content within courses needed to change.

**Observations.** Steve advocated cross-disciplinary projects and cohort tracking. He taught the senior project and capstone classes and vigorously invited gaming professors to critique students’ work. After the video gaming faculty members had inspected a cohorts’ video games, Steve advanced the thinking that faculty should reevaluate their own individual classes. If possible, they should make the necessary adjustments based on the weaknesses and the strengths of the video games a cohort had created. This approach is a form of feedback loop to enhance the quality of the curriculum continually. It was also observed that Steve is well connected with other departments within the College and the video game industry.

**Participant 8: Wilhelm, Provost**

**Biographical information.** Wilhelm started as an adjunct instructor at Oceanfront College in 1995. A quarter later, he was offered full-time status and taught full-time for four years (1996 – 2000). He later worked in the telecommunications industry practicing his fiber optics specialty while teaching part-time at the College. In 2008, he was asked by the President of OC to oversee the development of the College’s new campus project and then was later promoted to Provost. He was involved in curricular changes since the beginning of his employment at the College. He designed successfully an accelerated 9-month program in
electronics engineering technology for a high-end data storage corporation. In recent years, as the College provost, he has been involved in overseeing curriculum development.

**External organizational context.** Wilhelm learned about the skills gap from different sources including the Defense Industry Partners organization, and from “various groups in the State that have done similar skills gap studies.” In a similar vein, the College also has Technical Advisory Committees for all of its academic programs, which are made up of six to ten industry experts who meet with the College's faculty at least twice a year to talk about trends in the field and the skills students should have coming into the field.

Knowledge diffusion and dissemination flow in both directions: from the bottom-up and vice-versa. Information regarding the skills gap, industry trends, skills gap studies, or other changes occurring external to the College, or decisions made internally that may affect the curriculum, are shared by the provost with the department chairs. Likewise, input from industry experts through the Technical Advisory Group are shared directly with the faculty and department chairs. If there are major changes to be implemented due to ideas emanating from employers, the chairperson will share them with the Office of Teaching and Learning—the Provost office—so the senior management can help allocate the appropriate resources.

In order to determine what specific skills to teach, Wilhelm offered the following explanation: through the utilization of input gathered from the Technical Advisory Group, faculty members and the chairperson tweak their curriculum. The need to change a curriculum usually comes from sensing external influences, acknowledging skills gap studies, and listening intently to local and regional leaders regarding unmet needs in the field. The Career Services Department—a team focused on helping students find employment opportunities—is consulted and asked to do an employment study to see what kind of jobs are available. “If all of this input
comes together, we'll make changes to existing programs, or we'll initiate the development of a new program,” Wilhelm explained.

When the need to change is detected, it always leads to a quick change or to the development of a new program. From Wilhelm's experience in other institutions, he recognizes that Oceanfront College changes curricula very quickly. When opportunities in the field emerge, a program is evaluated to determine whether a change is needed. Administrators and faculty at OC understand that continuous change in the curriculum helps prepare students for a professional career in a technical field, and this is a big part of the College's mission. Invariably, curricula, including the video gaming curriculum, are monitored purposefully. Depending on the level of change, or the level of development required, the task is completed in a time frame ranging from one quarter to nine months.

Due to professors’ and administrators’ close contact with industry, slow and subtle external events are captured and are the main drivers to curricular development and changes. In one instance, education professionals within Oceanfront College collaborated with six nationally-recognized employers. Together, through several meetings and incremental changes, they created a hybrid Associate Degree track by modifying two existing programs. A specialized Bachelor’s Degree curriculum was also created, and a pathway for previous program graduates to enroll in the new composite Bachelor’s was identified.

**Internal organizational context.** Wilhelm explained the formal program development process, which has been documented and followed by all departments at the Oceanfront College since 2009. It is a three-page, five-step process that identifies all the key things that needed to be done. In each step, there is a checklist that determines what procedures a developer has to go through, including a designated decision point that allows the process to either continue or to
stop based on the accumulated information. The process document is a living document and is maintained by the provost team; in this way, any additional new issues that are encountered during a development process can be immediately addressed.

The Office of Teaching and Learning also undergoes infrastructural changes to help monitor and support students’ success. For example, the College provides a walk-in academic skills center which provides free tutoring in math, writing, reading, and science. For maximum use of these services, and to support student success, faculty members are asked to promote students’ use of this facility. For the specially-accredited programs, where students have to pass a licensure exam, the pass rates are monitored closely. If the result of these exams is trending down, the provost team will intervene with cohorts that are coming toward the end of the program.

To help increase the pass rate, the institution provides tailored tutoring and a specialized test prep program. A professional student advisory group works with the faculty to monitor struggling students and determines what services the students might need. The provost team is composed of five assistant provosts, each assigned to oversee multiple academic programs. An assistant provost, department chair, and in some cases faculty member, will meet periodically, and “it’s up to them to identify potential problems” within their respective programs. Wilhelm indicated that the organization’s student support system works very successfully.

The time involved to modify a curriculum will depend on the complexity of the change. Minor changes to a course to make it more relevant to what is happening in the field may be implemented within one quarter. Not-so-minor changes may take two quarters to complete. The major changes, including the development of a new program, will take nine months to a year.
Big indicators that the current curriculum is successful are the licensure pass rate, employment placement rate, and the number of students inspired to advance to a higher degree program, including a Master’s Degree. “We are in the business of preparing students for careers in professional and technical fields.” That is essentially the mission of the College, according to Wilhelm. To help fulfill the College’s mission, the aforementioned measures are queried from industry and students. This is done by surveying graduates six months to a year after their graduation to understand the nature and scope of their current employment. The institution also maintains an alumni office and a career services office to help maintain connections with previous students.

To learn from the mistakes of the past, the Office of Teaching and Learning maintains a new program development process checklist. Any of the five assistant provosts and the Provost can modify this living document as new pitfalls are encountered. This is a dynamic process that can be altered in real-time so that mistakes made will not be repeated in the future. For example, as part of the checklist in phase one of the process, before a curriculum is developed several issues have to be addressed first: “look at what job opportunities there are locally and regionally.” The College does not want to develop a program in which no one will enroll and for which no company has need. Next, look at what the competitors are doing. If one of your competitors already has the program, and has been offering it for the past twenty years, then that college already has the branding advantage. The public perception is already swayed: “If I want to get an education in this discipline, I go to that college.” Finally, what is Oceanfront College’s differentiation? Very carefully, up front, answer the questions: What makes our program different? What is our special niche?
Wilhelm explained that the curriculum committee is a long-standing group within the College that “takes responsibility for curriculum change very seriously.” The team consists of academic administrators, department heads, faculty, student support services personnel, and other representatives of different divisions at the College whose functions revolve around ensuring student success.

All significant changes pass through the curriculum committee’s table, and they make sure that a change will abide the process, pass the College’s rigorous class requirements and conform with the policies of the institution, Wilhelm explained. For example, is a change “relevant and do employers want the skills that are going to come out of this curriculum?” Also, is the syllabus in compliance with the College’s template? Did the faculty member correctly complete the course proposal? While the content is owned by the professor, the curriculum committee ensures that “all aspects of the introduction to the course, or to the new program follow and adhere to all the rules, regulations, and policies that we have in place for new programs and new courses.”

Regarding the curriculum modification, rarely will the committee reject a proposal. There are times that the professor is asked to iterate because of an incomplete proposal or the professors “haven’t thought through the impacts to [Oceanfront College’s] processes.” When the gaps of the request are addressed, the instructor can then come back to the curriculum committee. For a new program development, there have been several occasions where the curriculum committee has said, “this is not going to be a good program,” and they stopped the development. However, the proposal does not get to the committee until towards the end of those steps outlined by the College.
The senior leaders at the Oceanfront College do not monopolize the idea-making, nor turn down generated ideas. Wilhelm remarked that ideas come from a faculty member: “The program idea has to come up, for the most part, through the department, or through somebody from industry that has a close connection to the College.” When an idea is created, an “ad hoc committee will be put together to take a look at the idea, to meet with the person who has the idea, and to listen to why they think it’s a good idea.” After the investigation, if the team deems the idea to be valuable, the new program will be developed.

The organizational structure of the Oceanfront College is extremely lean, with not a lot of levels of bureaucracy. “There’s nobody holding us back from adding new programs,” asserted Wilhelm. The College president and eight vice presidents (VPs) make up the executive committee. They are responsible for answering to the Board of Trustees, which oversees the College. Under those eight VPs are lean structures as well. In the academic division, there are five assistant provosts who oversee multiple academic programs. Assistant provosts work with a department chair to make sure a program is operating efficiently.

Wilhelm described the culture of the organization as very collaborative. As a result of this structure and collaborative spirit, program development and curriculum maintenance can happen rapidly. Every time a program is developed, the documented process is followed. Lessons that were learned over time are captured in the process document. There is a “Go, no go” decision point in each step, including step one. At the end of step one, all appropriate parties at all levels of the organization are invited to collaboratively decide to fund or stop a project. Stakeholders include the President, the CFO, the financial specialist, the student support professionals, the admission officers, and the academic personnel. An exhaustive conversation will ensue, and a consensus is sought as to whether to proceed with the new program or discard
the idea. Several hindrances are talked about, including what will be the appropriate tuition levels that will not hurt student recruitment. The critical decision and the removal of barriers down the road are sought very early in the process so not to waste everyone’s resources.

The mission of the Oceanfront College is well understood by administrators and faculty members, Wilhelm commented. It is essentially to prepare students for careers in professional and technical fields in the discipline of their choosing and in a supportive way, through a hands-on and student-centered approach. This mission is communicated to new faculty members at the time of their interview and employment. While research is an endeavor that a faculty member can pursue, professors at OC understand that their primary focus is teaching to prepare students for a career.

Wilhelm explained that the main differentiation of Oceanfront College from other technical colleges is the adoption of a hands-on approach and career-focused educational model. It is student-centric, and with its close ties with industry, it is focused on getting students jobs when they graduate, resulting in the College’s high placement rate. The institution hires passionate faculty members who have industry experience, not career academics. Professors without teaching backgrounds go through an “Independent Professional Development Process” with the faculty resource center that includes multiple workshops on pedagogy and on how to be effective in the classroom. Finally, OC utilizes an accelerated academic schedule—“It’s four, 10-week quarters per academic year.” Wilhelm asserted that “we can graduate our students in 18 months for an Associate’s degree. Three years for a Baccalaureate degree.”

To help ensure that faculty are teaching students relevant skills that industry needs, Wilhelm encourages professors to connect with employers and to inquire what industry needs. He also encourages professors to attend conferences so they can discern key topics and trends
related to their fields. Wilhelm noted that several of the College’s professors are doing consultation; and “it’s through that consulting that they understand what industry is requiring.”

Part of the mission of the College is to give every student who comes through the door the opportunity to obtain a college degree. However, Wilhelm explained, “students are coming to us less prepared.” To fulfill the College’s mission, a student is given a placement exam to help evaluate his/her academic readiness. They are evaluated based on math, reading, and writing. Based on the results of the exam, some students are given the opportunity to remediate. The Academic Skills Center will put the students through a remedial course before they are allowed to matriculate into an academic program. Once a student is on track, the College relies on the faculty to connect with industry and bring to the classroom emerging trends or change the curriculum to include the new trends or tools going forward.

The College’s change process is a dynamic checklist that captures all the lessons learned from past experiences of implementing curricula, according to Wilhelm. While the current change process works very well, administrators are always looking for new ways to develop or maintain curriculum and are constantly updating the documents. Some of the changes occur in real-time, as new and unique situations are encountered for the first time in the middle of a curriculum update or development. When a new program is developed in which the College has no expertise, a consultant is brought in to help the Office of Teaching and Learning. New ideas that the subject matter expert may bring to the table that were not previously considered will be dynamically added to the change process document. “Any process is always subject to change as things change,” and administrators are always looking at ways to make the living document better.
Document review. Wilhelm and Donald provided Oceanfront College’s new program
development process checklist (Appendix H). This document has been reviewed exhaustively
under Donald’s section.

Observations. Wilhelm was observed as student-oriented and energetic as he described
the immediate and long-range plans for the College. Included in the plan were infrastructure
expansions, the continued rigorous adherence to the College’s culture, and the continuous
improvements of 57 unique programs, as well as the concurrent development of five new
programs.

Summary

Data provided by the participants were summarized above. The documents they provided
were reviewed, and the investigator’s observations were noted. The following section presents
several consequent themes resulting from the analysis of these data. The data analysis process
that was used was described in Chapter 4.

Composite Emergent Themes

Using Stake’s (2005) advice, the researcher must place her or his best intellect into the
thick of what is going on during a curriculum change process. The investigator identified six
overarching themes involved in the curriculum change process at Oceanfront College. The
composite emergent themes were developed through analysis of data and were guided by the
primary research question of the study: In video game education, how can an institution take in,
make sense of, and distribute knowledge in order to continuously align curriculum with the
rapidly-changing video game industry and prepare students with the right skills to be knowledge
workers and work ready at the time of their Bachelor’s Degree completion? The themes that
emerged are presented in Table 5.2 and include: (a) Innovative ideas were introduced by an
individual faculty member who then collaborated with peers and administrators to adopt the idea and integrate it into the curriculum; (b) Changes that were needed to fill the skills gap were identified by individual educators (faculty members or administrators) who then integrated both external industry views and internal college procedures to initiate curriculum modifications; (c) Industry involvement with the College, through faculty members reaching out to industry experts, was central to narrowing the skills gap; (d) Unceasing change in industry directions and needs required ongoing adjustments in internal college policy to bring about dynamic curricular change; (e) Dynamic curriculum change needs to be prompt, but well-paced, ranging from implementation in as short a time as one quarter to implementation in less than one year; and (f) The culture and climate must be one of teamwork: honest thinkers, who trust, collaborate and unite to support shared goals.

| Participants | Innovative ideas were introduced by an individual faculty member who then collaborated with peers and administrators to adopt the idea and integrate it into the curriculum. | Changes that were needed to fill the skills gap were identified by individual educators (faculty members or administrators) who then integrated both external industry views and internal college procedures to initiate curriculum modifications. | Industry involvement with the College, through faculty members reaching out to industry experts, was central to narrowing the skills gap. | Unceasing change in industry directions and needs required ongoing adjustments in internal college policy to bring about dynamic curricular change. | Dynamic curriculum change needs to be prompt, but well-paced, ranging from implementation in as short a time as one quarter to implementation in less than one year. | The culture and climate must be one of teamwork: honest thinkers, who trust, collaborate and unite to support shared goals. |

Table 5.2
Participants’ Responses and Composite Emergent Themes
Emergent Theme #1: Innovative ideas were introduced by an individual faculty member who then collaborated with peers and administrators to adopt the idea and integrate it into the curriculum. The first theme punctuated the importance of professors and the ideas they bring to the table to help student success.

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Table 5.3

Theme 1: Innovative ideas were introduced by an individual faculty member who then collaborated with peers and administrators to adopt the idea and integrate it into the curriculum.

Ada “I think they’re pretty much on top of things in terms of looking out and trying to get a feel on what industry needs. . . . I think that they are pretty good at doing that.”

Alan “We have faculty who attend conferences, come back with ideas. So, we match those ideas to what’s in our curriculum, and if there’s a gap, or if there’s a need to change, then we change.”

Anders “For the most part, the instructors are on top of it. They see a need, they tell us about it, and we try to fit that need.”

Dennis “I think it’s pretty much dependent on what the faculty brings to the table. There’s no form [application] of go find this, I want to know this kind of stuff and all that.”

Donald “I think an engaged faculty is an integral part of that process. I don’t think it happens without it.”

Mark “. . . at the beginning of a quarter, I’ll usually give . . . a formative assignment . . . If it seems to be an overall trend, I’ll usually bring it to a [professor]. If the trends might be connected to a [faculty member], I might talk to that [instructor] particularly. If I see it as a trend overall in the department, we bring it up in a department meeting or a group meeting so that we can try to figure out what’s the best course of action.”

Steve “Informally, I’ll have conversations with my colleagues. Then once I feel a hunch has turned into something more profound, I’ll communicate it to the department
Wilhelm said, “. . . many of our faculty . . . through professional colleagues, or perhaps attending conferences related to gaming, they’re providing feedback to the institution about what changes need to be made to make the curriculum relevant.”

All participants were in agreement that knowledge or ideas all came from a person: a member of the faculty. For example, Dennis commented that “people just bring things up when they hear about something.” A professor “knows” where they are at, said Anders, and they have “the data” to back up their claim.

An idea comes from many sources: external and internal to the college. Anders indicated that it comes from “instructors who stay in contact with colleagues in the field,” from research, and from consulting. Dennis stated that knowledgeable change comes from “talking to people from companies, looking at periodicals,” hearing the current trends and noting the applicants who companies hire. Mark indicated that knowledge comes once a faculty member gains more professional and personal experience. Mark also advocated giving a formative exam to gauge where students are. Wilhelm added that program ideas come “through somebody from the industry that has a close connection to the College,” or through the Technical Advisory Committee, and through the administrators in the College, based on their past experiences.

The majority of the participants noted that through collegial conversations, whether formally in a meeting or informally in the hallways and in the office, an idea is conceived and enhanced. Donald, Mark, and Wilhelm agreed that professors and administrators are constantly looking for opportunities to better the students’ academic experiences and employable skills.

After the initial conversation, knowledge was then shared to the department chair where an ad hoc committee was put together to take a look at the idea. Both Wilhelm and Alan underscored this process. For example, Steve explained that “once I feel a hunch has turned into something more profound, I'll communicate it to the department chair.” In response to a
professors’ idea, Alan, the chairperson, pointed out that, “When a faculty member has an idea, they’ll go through a vetting process with their peers before it even gets to me.”

Emergent Theme #2: Changes that were needed to fill the skills gap were identified by individual educators (faculty members or administrators) who then integrated both external industry views and internal college procedures to initiate curriculum modifications. There was assent among the majority of participants—although hard to express—that they know, sense, and feel that something is not right with a student, or cohorts of students, or the curriculum. Table 5.4 captured some noteworthy quotes articulating faculty members’ intuition.

<table>
<thead>
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<th>Table 5.4</th>
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<tr>
<td>Theme 2: Changes that were needed to fill the skills gap were identified by individual educators (faculty members or administrators) who then integrated both external industry views and internal college procedures to initiate curriculum modifications.</td>
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<tr>
<td><strong>Ada</strong></td>
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<td><strong>Alan</strong></td>
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<tr>
<td><strong>Anders</strong></td>
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<tr>
<td><strong>Dennis</strong></td>
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<tr>
<td><strong>Donald</strong></td>
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<tr>
<td><strong>Mark</strong></td>
</tr>
<tr>
<td><strong>Steve</strong></td>
</tr>
<tr>
<td><strong>Wilhelm</strong></td>
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</table>
The following are additional insights from participants about how professors sense:

“I know where we’re at. I know the system and stuff which you wouldn’t know first coming in. Knowing what the whole program is” (Dennis, Associate Professor).

“[Professors] instinctively know what is happening in industry . . . I really believe that the faculty knows best as to what not only the student is able to do, but how what the student is able to do connects to that industry” (Donald, Assistant Provost).

Mark, Dennis, and Steve agreed that when an idea turns into something profound, then they bring it up to the department chair. Steve went on to say that, “once I feel a hunch has turned into something more profound, I’ll communicate it to the department chair.”

The sources of information being sensed or detected by educators come from many sources from outside the College or within the organization.

“[Sources of information] come from outside . . . and from inside” (Anders, Assistant Chairperson).

“The need for change to our curriculum comes from many different sources. Some of the sources that we have close contact with, we talk to over time and we make the change over time” (Wilhelm, Provost).

Faculty and administrators know the state of the industry through the “Technical Advisory Committee” (Alan), “industry experts” (Dennis), “conferences” (Dennis), seeing trends from outside the College (Mark, Dennis, and Steve), reading periodicals (Dennis), “who they’re hiring, who they’re not” (Dennis).

Professors also sense students’ progress inside the classroom through knowing the College curriculum (Dennis); hearing and seeing new trends of a deficiency within the classroom
Emergent Theme #3: Industry involvement with the College, through faculty members reaching out to industry experts, was central to narrowing the skills gap. All participants are in agreement that industry needs to be involved in academia. They pointed out that the College’s Technical Advisory Committees are made up of between six to ten representatives from industry who counsel faculty members and administrators of Oceanfront College at least twice a year. Representative statements from the participants are included in Table 5.5. Their experiences highlight the role industry plays in the curriculum and the importance of educators to be connected to their field in order to keep up with the latest changes.

Table 5.5

<table>
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<tr>
<th>Theme 3: Industry involvement with the College, through faculty members reaching out to industry experts, was central to narrowing the skills gap.</th>
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<tbody>
<tr>
<td>Ada</td>
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<td>Alan</td>
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<td>Anders</td>
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<td>Dennis</td>
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<td>Donald</td>
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<tr>
<td>Mark</td>
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</tbody>
</table>
| Steve | “We’re very responsive to the skills gap, partly because I do a lot outreach into the industry. I meet with people who are currently game developers, Indie, and AAA,
and everything in between. I ask them very directly, ‘What do you need?’ If they hired our students, what more do they need is more or less the question that I get or give. As far as the College, I think the [College] is very open to hearing what our tech advisors and industry connections have to say about that gap. They’ve been very open to hearing my suggestions about how we address those gaps.”

Wilhelm

“We have such close relationships with local and regional industry, that quite often we’ll have industry leaders come to us and say, ‘Listen. There’s an unmet need in our field. We think that you can meet this need, whether it’s through the development of a new program, or through the modification of an existing program.’”

Alan, Anders, and Wilhelm articulated who made up the Technical Advisory Group, and the critical role they play in each department at the Oceanfront College.

“We find out about the skills gap primarily through our relationship with a Technical Advisory Committee. The Technical Advisory Committee, as you know, is comprised of a number of local organizations that we stay in close contact with” (Alan, Department Chair).

“...we have the Technical Advisory Committee... We meet once a year, sometimes twice a year. They tell us where they think the technology is going, what they need in terms of a workforce” (Anders, Assistant Chairperson).

“...we have Technical Advisory Committees for all of our academic programs at [Oceanfront College]. This is a group of, you know, anywhere from 6-10 industry experts that meet with our faculty at least twice a year to talk about the trends in the field, and to talk about the skills that students need coming into the field. Many of these fields change very, very rapidly” (Wilhelm, Provost).

Connection to industry means professors and administrators go off campus and meet with industry experts, and it also implies that industry leaders come into the College to help enhance the curriculum. For example, Wilhelm and Anders spoke about an adjunct faculty member who is working in the industry advising the department to “move from the current operating system to
this new operating system,” because it is no longer used in businesses. The College leaders listened and implemented the change. Dennis and Donald both identified that full-time faculty members can also attend “conferences, one-day event type things, workshops and whatever,” and if the messages coming from those events are consistent, then a shift is happening.

“It’s because of our close ties with industry through our faculty, through our Technical Advisory Committee, and through the administrators in the College, based on their past experiences, that we’re able to adapt programs to meet the needs of industry” (Wilhelm, Provost).

**Emergent Theme #4: Unceasing change in industry directions and needs required ongoing adjustments in internal college policy to bring about dynamic curricular change.**

From the Provost, to the administrators and professors, all agree that the curriculum is invariably in a constant change. Minor and major changes are occurring in every quarter. Example statements are compiled in Table 5.6.

| Table 5.6 |
| Theme 4: Unceasing change in industry directions and needs required ongoing adjustments in internal college policy to bring about dynamic curricular change. |

| Ada | “… an adjunct instructor for example says, ‘We’re not using this program for example anymore.’ He says that to the department chair . . . By the next semester or maybe two semesters then that course is changed and that’s no longer taught.” |
| Alan | “One of the things we did when we first started, and we made a lot of changes, we always tried to make those changes available for everyone.” |
| Anders | “The first curriculum rolled out, the one I have here is March 2012. It was updated in January 2013. It’s updated on October 2013, then updated on January 2014, then changed again in October 2014. That may be because we took a class out, added a class, or we rearranged some classes. I can give you the whole list here. You can go right down and judge it, if you want. . . . We always look at it, we look at the curriculum and say, ‘Is everything here relevant?’ If it’s not, what do we need to add to it?” |
| Dennis | “At the course level, within your own courses, I have probably changed every quarter. . . . Things can pretty much change from one quarter to the next.” |
| Donald | “When it works the best, it is a constant process of improvement where you are . . .” |
Mark: “... there are going to be some students that are going to have issues, so the first thing that I would do is have some formative exercise so that I can kind of gauge where each of the student is ... if I saw a trend of a deficiency ... make a slight adjustment to maybe include something with that deficiency to help them build that deficiency up.”

Steve: “... the tracking a cohort from quarter one, and then looking at their outcomes at the end of the quarter, and making adjustments to the next quarter’s classes ...”

Wilhelm: “We’re constantly making changes to curriculum.”

Donald refers to continuous change using different terminology including “constant evolutions rather than revolutions ... constant improvement ... fine tuning ... and constant change.” Alan, Anders, Dennis and Donald believe that changes are “occurring every quarter ... all year long.” Ada noted that it is usually a faculty member who recommends different changes.

As administrators, Wilhelm and Donald indicate that not only is the video gaming curriculum constantly changing, also other college curricula are always changing. Wilhelm said:

... we’re always in a curriculum change process at some level. ... We’re constantly in a curriculum development process ... We’re constantly looking at opportunities in various fields that we currently have programs in, to see whether or not we need to make a change.

Changes occur at a class level, curriculum level, or the change process itself. For example, Mark articulated that he makes constant adjustment to his classes by giving students “a formative assignment” at the beginning of each class, and figuring out trends based on the results and making adjustments in real-time. “If I see it as a trend overall in the department, we bring it up in a department meeting or a group meeting so that we can try to figure out what’s the best course of action.” Steve advocated tracking cohorts to know what adjustments to make. Anders explained that sometimes the changes are minor, such as changing the sequences of courses. For
example Anders said that the, “IT Project Management course was offered in quarter seven, the first quarter in the Bachelor’s. They felt that was too early. The students needed it closer to the Senior Project, so we moved it to quarter ten because they start the Senior Project in quarter eleven.” Not only are the subjects and the curriculum changing, the change process itself is changed dynamically. Wilhelm stated that “I think we continually develop the process or fine tune it” as an issue is encountered for the first time.

**Emergent Theme #5: Dynamic curriculum change needs to be prompt, but well-paced, ranging from implementation in as short a time as one quarter to implementation in less than one year.** While the majority of the participants agree that for the most part, the department makes changes very quickly, there are some subtle differences in how they view the speed of change. Ada suggested that the College makes changes too fast. Mark, Alan, and Dennis said changes are applied in just a matter of months; minor change can be deployed in a quarter. Anders, Donald, and Wilhelm think a year and a half is extreme and is considered too slow. Steve implied that, major or minor change can be implemented in one to three quarters. Putting this all together, the ideal appears to be between one quarter to a year. Table 5.7 is a compilation of the varying responses from participants when asked how soon a change can be implemented.

<table>
<thead>
<tr>
<th>Ada</th>
<th>“They are very quick in getting these programs started. They try to jump on these things. . . . they do things quickly but maybe it is too quick.”</th>
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<tbody>
<tr>
<td>Alan</td>
<td>“. . . the change process is really quick. It’s typically just a matter of months. If you come to me today, you had a really good idea for a curriculum change, . . . we could have that in place by next quarter.”</td>
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<tr>
<td>Anders</td>
<td>“That was probably over about a year, a year and a half, we looked into that. That was slow, and we moved that part of the curriculum.”</td>
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<tr>
<td>Dennis</td>
<td>“Things can pretty much change from one quarter to the next.”</td>
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</table>
Donald: “As soon as something is identified . . . I want to get that process started immediately. We put this into a process where it can be instantaneous or it can take us six months to get it to market, but it usually never takes longer than that six months. From first conversation to delivery, a year and a half might be the extreme.”

Mark: “A change process can be as short as a quarter, I would say.”

Steve: “That is a one to three quarter time frame.”

Wilhelm: “. . . it could take a quarter to change one course to make it more relevant to what’s happening in that field. It could take two quarters for the introduction of a couple of new courses. Or it could take nine months to a year for the development of a new program. That’s really depends upon the type of change that we’re implementing.”

Dennis observed that there is a lag time before academia recognizes or embraces a new product, service, or trend that industry is using. He went on to say that, “It took almost 3/4 of a year to get something new in the industry, actually, to be recognized by everybody to say, ‘Yeah, we should be doing this.’” Not only is there a delay in recognizing an industry trend, there is also a delay in the College’s infrastructural support to cope up with the extreme growth experienced in a department, Dennis remarked.

We keep growing. But if we don’t have the infrastructure, like right now, we’re having class labs that aren’t adequate for the courses being taught because of the overcrowding.

That surprised everybody that we filled up this building so fast.

Whatever the nature and the level of the change, Ada thinks faculty and administrators “jump on it right away.” Ada’s observation is joined by administrators and faculty members alike: they are committed to making a change quickly.

Alan observed that when change is made too fast, it brings discomfort to the affected professors. So he is regulating these changes at the right speed. “I think we’re rolling things out just a little bit slower than what we did earlier, and I think there’s a little less discomfort with the faculty because we do that. . . . In the past, we were smaller, made changes a lot quicker.”

Smaller departments tend to make quicker responses, while the larger makes slower ones. In
general, minor changes can be made immediately or in one to two quarters. A new program can be offered in nine months to a year.

**Emergent Theme #6: The culture and climate must be one of teamwork: honest thinkers, who trust, collaborate and unite to support shared goals.** There was consensus that professors and administrators work collaboratively and in the spirit of trust. They respected each other’s strength and they were willing to work together for the benefit of the students. Table 5.8 is a collection of the varying responses from participants when asked to describe the interaction between stakeholders during a change process.

<table>
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<tr>
<th>Table 5.8</th>
<th>Theme 6: The culture and climate must be one of teamwork: honest thinkers, who trust, collaborate and unite to support shared goals.</th>
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<tbody>
<tr>
<td>Ada</td>
<td>“[Faculty members and administrators] function collaboratively and in the spirit or trust. I think a lot of times they’re self-organized . . . It’s part of what they do. They all say, ‘I can help you with that.’”</td>
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<tr>
<td>Alan</td>
<td>“I think, for the most part, we collaborate well as a team. For the most part, I think faculty trust each other’s opinion and respect their professional background. For the most part, it is very self-organized, in that when a faculty member has an idea, they’ll go through a vetting process with their peers, before it even gets to me.”</td>
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<tr>
<td>Anders</td>
<td>“In the change process, we get together, and we see a need for a course or change in a course. We all agree on it before it gets to the curriculum committee. . . . If we do it collaboratively, we agree together that we needed this course. Now, if we can develop it collaboratively, with one person leading it, it’s a much better process.”</td>
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<tr>
<td>Dennis</td>
<td>“I think everybody has the good intention to make it better as a team. Again, we’re all different individuals, different backgrounds and different whatever, different work practices and things like that. . . . I think everybody is working towards the same thing. Pretty much everybody is willing to listen to a comment.”</td>
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<tr>
<td>Donald</td>
<td>“I think it works best when it is developed collaboratively as a department. I don’t think there is any one person who can get their mind around the entire curriculum at one time. You need specialists. I want to be a master of some and I want to be connected to other masters of some, and together we’re going to put together a program that is hopefully going to make a well-rounded student.”</td>
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<tr>
<td>Mark</td>
<td>“The teams are centered or created almost based off of our specialties. . . . When those [professors] come together, we each have our own ideas, but I would say that we’re usually pretty respectful, each of us comes with a certain skill set that the others may or may not have, . . . we’re going to try to work together to create the best of a win-win situation for our students and our program.”</td>
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Steve: “I’m loosely given the parameters and then I write it, and then my colleagues review it. . . . When we launched the design curriculum, the process leading up to that was I think we took a bunch of ideas, plus we referenced a few other programs and we looked at what talents we had and what talents we needed, and built the curriculum based on that.”

Wilhelm: “I think we have a process which is collaborative . . . in the development of a new program, if we find out that we’re missing something that we should have in the process, we’ll add it. It’s a dynamic process. It’s changing whenever we think it needs to change. I don’t think anybody’s holding back change. If anything, it’s collaborative and we’re looking at ways to make it better.”

Wilhelm indicated that “the faculty is the content expert,” and the curriculum committee relies “on the faculty proposing the course to ensure that the content is good and in accordance with what industry is requiring.” According to Wilhelm, “There’s nobody holding us back from adding new programs. It’s a very collaborative process.” The administrators are “not going to get involved in evaluating a new program development idea without having the appropriate faculty, department head, and academic administrators involved.”

Summary

This chapter presented and summarized the data collected from the interviews and described participants’ perspectives during the creation and maintenance of the video game development curriculum at the Oceanfront College. The participants were asked to describe their role during the last curriculum update and what their thoughts and experiences were. Data from the interviews were coded using MaxQDA, then analyzed and organized into six emergent themes.

In the next chapter, the themes will be discussed in terms of the meaning, connections, and the significance of the data in light of the central research question, the theoretical framework, and the literature on the topic. Interpretation of these themes within a larger context will be presented, implications for professional practice will be discussed, and recommendations for future research will be offered.
Chapter 6: Discussion of Research Findings

Introduction

The purpose of this case study was to investigate and analyze how one private college makes continuous change to their video game department’s curriculum. The changes were made despite some of the millennium-old constraints that colleges and universities abide by when updating curriculum (Christensen & Eyring, 2011; Jorgenson, 2006). The research question that guided this study is: *In video game education, how can an institution take in, make sense of, and distribute knowledge in order to continuously align curriculum with the rapidly-changing video game industry and prepare students with the right skills to be knowledge workers and work ready at the time of their Bachelor’s Degree completion?*

Each participant had at least 20 years of experience in the gaming or the computing industry. These professionals were asked about the pillar practices advocated by Drago-Severson (2009) including teaming, mentoring, and providing leadership roles and collegial inquiry. Extracting the participants’ tacit knowledge (Polanyi & Prosch, 1977) and documenting in a rich, thick description (Merriam, 1997; Miles & Huberman, 1994) revealed experiences and knowledge that helped address the research question.

Six Themes Emerged From the Findings

Table 6.1

*Six themes emerged from the findings.*

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<tr>
<td>1)</td>
<td>Innovative ideas were introduced by an individual faculty member who then collaborated with peers and administrators to adopt the idea and integrate it into the curriculum.</td>
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<td>2)</td>
<td>Changes that were needed to fill the skills gap were identified by individual educators (faculty members or administrators) who then integrated both external industry views and internal college procedures to initiate curriculum modifications.</td>
</tr>
<tr>
<td>3)</td>
<td>Industry involvement with the College, through faculty members reaching out to industry experts, was central to narrowing the skills gap.</td>
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These findings reinforce and are consistent with the existing literature regarding how organizations learn (Arumugam et al., 2013), how an individual constructs innovative knowledge (Nakamori, 2011), and with the systems thinking (Meadows, 2008; Senge, 2006) approach to solving dynamic and multi-faceted problems (Meadows, 2008; Senge, 2006). The findings also resonate with Seelos and Mair’s (2012) Organizational Capacity for Continuous Innovation (OCCI) theoretical framework, which posited that there are external and internal contexts and events that influence organizational decisions. This case study contributes to the research literature focusing on bridging the skills gap by focusing on a specialized discipline -- the video game curriculum and the skills needed in the industry.

**Overview of the Chapter**

This chapter discusses the research findings in light of the theoretical lens of Seelos and Mair’s (2012) OCCI theory and to existing literature. The findings generally align with existing research on knowledge creation, organizational learning, and systems thinking, and those connections and relationships are discussed. The chapter also presents the implications for theory and practice, as well as recommendations for future research.

When examining at the bigger picture, the OCCI theory is evident and central to the dynamics in Oceanfront College, in that the institution is influenced by the external and internal contexts; these events are the overarching reasons why the video gaming curriculum was created and repeatedly modified. Not only does the theoretical framework serve as a lens to help
understand the curriculum change process at OC, the literature also validated and aided in articulating the majority of the College’s practices. The following sections of this chapter will relate the theoretical framework to findings in the research study, followed by how the six identified themes relate to the body of literature regarding what academia can do in order to narrow the skills gap.

**Review of Theoretical Framework**

Seelos and Mair’s (2012) Organizational Capacity for Continuous Innovation (OCCI) theory provided scaffolding for understanding the diffusion and dissemination of ideas within Oceanfront College as faculty members and administrators developed and then continuously modified their gaming curriculum in order for their graduates to be relevant in the field. Not only did the OCCI theoretical framework allow for a bounded and focused data collection (King & Horrocks, 2010; Seidman, 2006), it was also used to guide the understanding and analysis of the interconnected processes educators use to explore and exploit innovations.

To drive the constellation of interconnections, Figure 6.1 below depicts a condensed rendition of the OCCI framework as higher education professionals at the Oceanfront College take in, make sense of, and distribute knowledge in order to continuously align curriculum with the rapidly-changing video game industry. In doing so, they help prepare students with the right skills to be knowledge workers and work-ready at the time of their Bachelor’s Degree completion.
Figure 6.1. A simplified model depicting Seelos and Mair’s Organizational Capacity for Continuous Innovation (OCCI) theoretical framework (Seelos & Mair, 2012, p. 9). The arrows represent diffusion and dissemination of knowledge.

The OCCI framework activities are dynamic and flexible. All of its elements can be performed concurrently or initiated manually in a sequential manner. There is no one definite starting point; to innovate in an organization, a change agent can enter the OCCI model through any component. Based on what was observed at Oceanfront College, one way of interpreting the OCCI theory is that there are external influences or internal forces that instigate the innovation initiative. An insight might be prompted by a faculty member after he/she attends a conference (an external influence), or after a professor learns something from observing a senior project presentation (an internal activity). Other novel ideas may be generated externally from an adjunct faculty member who learns to use a new tool at his/her work and wants the college to adopt this new technique.

The events internal and external to the college are fluid and concurrent. Educators may be on a search process to better their curriculum, and industry maybe also looking for a college
that wants to collaborate with them in the training of their employees or in encouraging an
institution to generate a talent pipeline with specialized skills. The OCCI model can also be
explained through a linear and sequential mode where the innovator is intentional about making
a change. A professor might approach the department chair and request that changes are needed
to the curriculum, or a chairperson might call a formal meeting within a department for the
purpose of revamping a program.

Once a change process has started, ideas for improving the curriculum can come from
exploring external sources or exploiting internal data and forces. In the case study at the
Oceanfront College, external sources of innovative ideas include the following: the Technical
Advisory Committee; industry leaders who speak at a college function; business experts who are
hired as consultants; corporate partners who collaborate on a talent pipeline; and trusted alumni.
Other external sources that may set off a program modification are business changes in the main
tool providers; new regional and/or national accreditation requirements; customers’ demands,
and trends and enrollment in other institutions.

Referring to Figure 6.1, innovative thinking at Oceanfront College can be exploited
internally within the organization, such as through a curriculum skills mapping effort; by
reflecting on senior capstone projects; by evaluating the critical thinking component in each
class; by aligning syllabi objectives with program’s objectives and college’s mission; and by
redesigning relevant student assignments that span multiple terms. Other internal initiatives
include encouraging students to make side projects or join apprenticeship programs. In academia
as well as at OC, exploitation is not a negative notion; it means taking advantage of years of data
that the college has and mining and analyzing them. For example, the employer survey between
2012 and 2014 did not include wide participation by video game studios, so maybe the College
must aim its advertisement efforts more towards the employer and not just towards potential students.

Professors may intuit a new way of thinking after reaching out to industry, observing employers’ trends, completing training on a new technology platform, connecting with other educators, examining other colleges’ curricula, and reviewing ranking systems criteria. Through socialization with colleagues or participating in departmental meetings, a faculty member externalizes his/her knowledge, and the new idea is interpreted by the team. For example, in the skills mapping effort at OC, a primary professor may declare that a skill is mastered in a specific class, but that decision will have to be confirmed by other professors who also teach the same class. In Figure 6.1, the interpretation stage is where external influences from other education professionals are introduced. Other faculty members’ knowledge regarding a new proposal will be integrated until a common understanding is achieved by the group. At the Oceanfront College, the institutionalizing phase of the OCCI model means the implementation of new changes and that the lessons gained by the video gaming department from a skills mapping or program alignment may be replicated in another similar subdivision at the College.

Putting all of these observations of the findings together in the exploration of innovative ideas stage, there is an amalgamation between industry involvement in academia and educators’ initiatives to get connected and learn what industry wants. These dynamics are critical to keeping a curriculum current. In the exploitation phase, professors and administrators implement internal changes, but also reach out to industry through formal or informal search processes. In the case at OC, in order to sense industry needs, professors and administrators attend conferences, partner with industry, maintain connections with other academic leaders, survey industry, and review the criteria used by other organizations to rank colleges and universities.
Internally, professors can evaluate their classes at the end of every semester, while administrators can conduct surveys and exit interviews for students. Similarly, both instructors and administrators can conduct curriculum mapping to help align class activities with the program’s objectives and with the institutional strategy (Elkeles & Phillips, 2007). The activities that faculty members engage in within the College and externally in industry are leverage points (Meadows, 2008) and learning mechanisms (Ron, et al., 2006) that will help shift the college and its curricula in order to align to industry needs and the organization’s strategic mission. Not only do educators go to employers, they also collaborate with industry experts who get academically involved to help influence internal decisions.

Relating Findings to the Literature and Theoretical Framework

The findings from this study connect strongly with the literature and the theoretical framework. Exploration of external contexts and events in the video gaming industry influence internal actions and decisions in Oceanfront College; and at other times, ideas are generated internally through the exploitation of previous experiences. Both behaviors are congruent to the OCCI (Seelos & Mair, 2012) theoretical framework.

Data suggest that what was observed at OC is not a departure from what was learned from literature: that the video game industry is continuously evolving (Beach, 2013; Cappelli, 2012; Cruea, 2011; Kung, Yang, & Zhang, 2006). At Oceanfront College’s case, what was observed was that the video game industry shifts through the use of newer tools, innovative business models, and optimized processes, which in turn necessitated newer student skills. The shifting skills need was identified by several scholars including Alford et al. (2004), Alvior (2014), Benamati et al. (2010), Byrd & Turner (2000), Cruea (2011), Feeny & Willcocks (1998), Murphy-Hill et al. (2014), and Outlay & Krishnan (2010) and this is the same behavior discussed
by participants. As expected from McGee’s (2001) and Mutch’s (2006) research, there was contention among educators as to how to update a congested curriculum. At Oceanfront College, these contending views were resolved through steady conversation and collaboration among stakeholders in order to arrive at a common understanding and consensus. These dynamics and views are consistent with several researchers’ findings, including Ahmann (1967), Falkner & Falkner (2012), Gagné (1967), McGee (2001), and Mutch (2006). What is seen at OC that is not evident in the research literature reviewed is the speed at which the education professionals coalesce to resolve their contentions when addressing a consistent complaint from the students (or a concern from faculty). One explanation might be that when honest thinkers remain amiable as they collaborate and seek to understand one another’s perspectives, when the team is united in their goal, which is the betterment of student skills, and when there is good evidence in the data to support the change, then educators are able to more efficiently navigate the decision-making process.

Other success factors that are apparent in the Oceanfront College’s case are the amalgamation of several perspectives, views, and orientations (Marrou, 1956; McGee, 2001) in updating a curriculum; the need for project based assignments (Lagemann, 1996; McGee, 2001; Reese, 2001); and the importance of teaching students to be lifelong learners (Birenbaum & Nasser, 2006; Fullan, 2003; McGee, 2001; Pestalozzi, 2007; Salvatore et al., 2000). In sum, these findings reinforced the existing literature on the impact of continuously changing a curriculum in response to the shifting needs of the industry so that students will graduate with employable skills.
Faculty Member Generates Ideas

Researchers Meadows (2008) and Senge (2006) asserted that it is often an individual who generates ideas in an organization, and therefore he/she becomes central to ideation. This was observable across all of the participants’ responses that the majority of ideas to transform the video gaming curriculum came from individual faculty members. Professors reach out to industry and socialize with business leaders and experts. Through this process, faculty members can feel and sense what industry needs. At the practical level, it may be beneficial to have a professor take a sabbatical to volunteer his/her time to work in a gaming studio in order to gain a deeper understanding of the employer needs. Although none of OC instructors took the aforementioned approach, there are signs that the idea generating processes practiced by the faculty members are efficacious because Oceanfront College ranked in the top twenty-five gaming institutions in the nation two years in a row. To know what employers need, instructors educate themselves regarding new tools and platforms through conferences and colloquia, and they then engage the department chair and one other colleague to adopt these technologies in the classroom. Through this process, Oceanfront College learned and implemented changes to their video gaming curriculum.

Without individual learning, there is no organizational learning (Arumugam et al., 2013; Bui, 2010; Nakamori, 2011; Purcarea et al., 2013; Senge, 2006; von Krogh et al., 2012). These findings are supported by the procedures at OC since many of their faculty provided feedback about what changes were needed to make the curriculum relevant. What is not clear in the research literature reviewed was how a professor got “to know” (Crossan et al., 1999; Nonaka & Takeuchi, 1995) what needed to change in the program. At OC, a professor gets his/her insight after engaging in skills mapping sessions, reviewing results of employer surveys, attending
conferences, socializing with industry leaders and experts, having a conversation with alumni and students, and by incorporating tacit knowledge from his/her past industry experiences.

These analyses are connected and are supported by a body of research on knowledge creation that posits that it is an individual who constructs knowledge (Meadows, 2008; Senge, 2006) and without individual learning, there is no organizational learning (Arumugam et al., 2013; Bui, 2010; Nakamori, 2011; Purcarea et al., 2013; Senge, 2006; von Krogh et al., 2012). Once tacit knowledge (Polanyi, 1977) is externalized (Crossan, et al., 1999), a conversation will follow to draw out individuals’ mental models (Nonaka, 1991) and to integrate their ideas with existing knowledge that will help the team to reach a common understanding (Crossan et al., 1999; Wilson, 2002). Knowledge that emanates from an individual can be influenced, enhanced or hindered by the organization’s mission and culture (Arum & Roksa, 2011; Ron et al., 2006).

To systematize curriculum changes, proper governance is needed. Program governance at OC is self-organized (Meadows, 2008) and is shared among a chairperson and two or more key instructors who possess content knowledge. Because professors can learn from each other (Bandura, 1994; Drago-Severson, 2009), through dialogue (Tsoukas, 2005) and joint action, change leaders come to a consensus to adopt, disseminate, and implement an idea in the organization. The open office policy of middle level and senior level managers affords a conversation space for faculty members to externalize tacit knowledge. Management should also encourage and support professors to attend conferences, symposia, and other computing colloquia.

In a greater context, since the professor is critical to knowledge creation (Arumugam et al., 2013; Nakamori, 2011; von Krogh et al., 2012), it is of utmost importance that higher education institutions carefully hire knowledge workers (American Society for Training and
Professors who are knowledge workers can think differently, connect to industry by attending colloquia and symposia, motivate students, introduce sparks in classroom activities, inspire, enlighten, and champion a change.

Furthermore, an instructor who is a knowledge worker, in the opinion of Meadows (2008) is a systems thinker who is not afraid to keep pointing at the prevailing errors. These are professors who care about their students, who look at trends in the industry and in other colleges and universities, who take the time to interview and survey alumni and industry experts, and who engage in a pipelining project at the college.

This theme has given great insight as to how Oceanfront College takes in, makes sense of, and distributes knowledge in order to continuously align curricula with the rapidly changing video game industry and to prepare students with the right skills to be knowledge workers and work ready at the time of their Bachelor’s Degree completion. A faculty member who generates knowledge is the same person whom Meadows (2008) describes, as one who does not waste time with reactionaries; rather, it is one who can work with active change agents and with the vast middle ground of people who are open-minded. This will be a “thought leader” (Elkeles & Phillips, 2007) who can help architect a learning system (Bui, 2010) that will support a dynamic college environment. An engaged professor intuits (Barlow, 2000; Nonaka & Takeuchi, 1995) what is going on externally in the industry and knows internally the state of the students in the classroom.

**Sensing**

Another finding in this research study is the ability of an educator to perceive industry environment changes on the horizon. When a member of the faculty is able to proactively dialog (Tsoukas, 2005) with industry experts and the Technical Advisory Group, as well as alumni,
peers, and students, he/she will become a learner and can create a culture of learning (Bui, 2010; Elkeles & Phillips, 2007) within the college. When he/she is engaged academically and connected to industry, he/she is able to sense and feel the changes on the horizon and can preemptively know what necessary curriculum changes are needed. Interacting with industry professionals early and often is one of the emergency response mechanisms that Meadows (2008) advocated. The ability to see the imminent and emerging future is supported by Denning (2014) and Scharmer (2007) who both advance that thought leaders can sense their dynamic environment’s subtle changes. Sometimes educators can sense while having pragmatic and world-opening conversations through social media, with peers, with an industry expert, with an alumnum, or with a student. This second finding connects with what Denning (2014) put forward that when in a world-opening conversation, change agents should “tune in on concerns, sense moods, articulate possibilities, notice anomalies (disharmonies), harbor contradictions, and suspend judgments” (p. 29).

Conversation from within the organization and from engaging external agents, including industry, align well and are consistent with the OCCI theoretical framework where Seelos and Mair (2012) posited that there are external organizational contexts and events that will influence internal organizational decisions. It is critical that, in order to sense milieu, change leaders should include in the search processes the external contexts by reaching out to peripheral sources outside of the academic arena. Knowledge diffusion and dissemination (Seelos & Mair, 2012) will ensue when instructors listen to what industry is saying, evaluate students’ progress, and create conversation space for a collegial dialog with peers. These initiatives are similar to what was researched in literature where change leaders (Fullan, 2011) are likened to a wave surfer
metaphor (Denning, 2014). They have developed a special sense regarding when a curriculum needs to be changed that is based on industry trends and the students’ current skills.

Linking this theme to the research question, a faculty member preemptively connects, communicates, and collaborates with industry, as well as dialogs (Tsoukas, 2005) with peers, students, and alumni, and also keeps abreast of current research, that is, can sense industry shifts and curriculum drifts. For example, in the OC case, several professors talked about constantly looking for any new tools or game engines that gaming studios and independent developers are using. They also advocated evaluating senior projects to know what skills the graduating students are missing. A few of the professors also reviewed employer surveys and the national college ranking criterion. Using systems thinking (Meadows, 2008; Senge, 2006; Seelos & Mair, 2012), faculty members use these observations as feedback mechanisms to inform classes and improve the curriculum.

**Industry Involvement**

A theme that interviewees repeatedly described was involvement of industry, including the Technical Advisory Group, in the affairs of academia. Industry involvement at OC is observable: for example, about half of the faculty in the Information Technology department are part-time instructors who also hold full-time employment and bring to the College the latest tools and methods industry uses. All the participants emphasized the importance of industry involvement. At Oceanfront College, the change agents’ linkage to industry is by providing each department a Technical Advisory Committee, hiring adjuncts who are directly working in a video gaming studio, staying in close contact with colleagues and alumni in the field, researching what is coming down the pike, presenting the current gaming curriculum to industry leaders and asking for their feedback, and engaging employers in a conversation about unmet needs in their
field. Staying in close contact with industry allowed OC’s professors and administrators to maintain an understanding of the deeper market intelligence of the video gaming arena. What is not found in the research literature reviewed, but which the investigator deemed important, is the utilization of employer surveys and the ranking questionnaire sent by a nationally-recognized organization. The employer survey (Appendix I) contains candid comments as to what skills the students need to improve as well as where they are proficient. A college ranking questionnaire (Appendix L) may provide additional ideas as to what else a college can do regarding its academic programs, faculty, and infrastructure to help provide a better career path for its students.

This study’s findings support the need to have industry involvement in academia in order for employers to garner the talents they need. This is also supported in the literature. For example, several studies and scholars made the same observations; these include American Society for Training and Development (2012), Beach (2013), and Galagan (2010a, 2010b). In terms of systems thinking, Meadows (2008) argued that educators and administrators should connect and interact with industry professionals early and often as part of the balancing loop in an organization.

Referring to Figure 6.1 above, the OCCI theoretical framework shows the interplay between industry and academia, exploring innovative ideas externally will help create growth and value for the future. Also, as part of educators’ search processes, Bidwell (2013) advocated that educational leaders should reach out or partner with industry to get a feel of what the external context needs. Oceanfront College has pipelines created for several nationally-recognized corporations in the field of engineering, but not in the video gaming discipline. The process of linking closely with industry and tying a college’s programs and services to
employers’ needs is also supported in literature (American Society for Training and Development, 2012; Galagan, 2010a, 2010b). In all cases there was a pipeline or a specialized curriculum created; it was industry that approached the College first for an unmet need.

Industry provides both positive and constructive feedback. Through employers’ input, OC learned which of their graduates’ skills are strong or weak. As reported by the participants, some gap skills that can enhance their video gaming graduates’ abilities are: analytics, databases, test-driven development, maintenance programming; lifelong learning skills; interpersonal communication skills; teamwork; critical thinking, problem solving, multicultural cooperation, environmental awareness; management skills; and self-management.

Connecting this finding to the research question, in order to catch up with the rapidly-changing video game industry, higher education institutions have to continuously change their curriculum with the same pace as industry shifts (Kira & van Eijnatten, 2008; Meadows, 2008; Senge, 2006). When the speed of curriculum change is in sync with industry changes (Beach, 2013; Cappelli, 2012; Kung, Yang, & Zhang, 2006), it will most likely keep the curriculum relevant, and thereby graduating students will be well prepared.

**Continuous Change Process**

This finding revealed one of the best practices that Oceanfront College professors and administrators engage in so as to keep their video gaming curriculum current: making continuous changes to the program. The continual modification to the gaming curriculum was evident during the document review of the Associate and Bachelor’s Degree curricula (Appendix J) namely, changes are applied every year, in some cases, more than once. This strategy is apparent at OC as several professors make slight but constant improvements at the course level every term to make their classes relevant. Other professors track a cohort, review students’
senior projects, and make adjustments to the next term if a trend toward deficiency is uncovered. Faculty members should be reviewing employer surveys (Appendix I) and the nationwide college ranking criteria (Appendix L). Another practice was evident at OC that is not obvious in the research literature reviewed was that any impending changes to the program are open and made available for all the faculty in the department to critique and a consensus is sought. The change team’s openness (Masson, 2011) and transparency is a part of their governance strategy: a subtle form of decentralized surveillance, an intellectual panopticon (Engebretsen et al., 2012). Another aspect that also emerged from data that departed from the literature reviewed is the real-time change applied to the program development process checklist (PDPC, shown in Appendix H). During a curriculum change procedure, administrators may catch a loophole or a problem in the PDPC. If necessary, they make the correction to the document promptly.

This continuous change process finding is supported in literature. For example, Christensen (2006) and Denning (2014) advanced the idea that in order for an organization to sustain its growth, it has to continuously implement innovative products and services. In OC, knowledge created is always followed with implementation. The pattern of knowledge creation and propagation at OC has been extrapolated from the interviews, and is in alignment with literature: individual creates knowledge, knowledge is shared to the group, and knowledge is institutionalized in the organization (Arumugam et al., 2013; Nakamori, 2011; Nonaka & Takeuchi, 1995; Purcarea et al., 2013; von Krogh et al., 2012). Both Meadows (2008) and Christensen (2006) argued that systems are resilient, and if left alone will invariably atrophy, and if not corrected will default to the old equilibrium. Therefore, periodic improvements (Senge, 2006) are needed to prevent erosion.
Referring to Figure 6.1 above, the OCCI theoretical framework, an institution’s professors and administrators can purvey new ideas by internally exploiting previous experiences through organizational learning (Crossan, 1999) and by exploring new ideas through searching externally for what industry or competing colleges and universities are doing. Interview data showed evidence of organizational learning within Oceanfront College. Through exploration and exploitation, the value-creation potential of innovations is realized (Seelos & Mair, 2012), and through systematic approaches, an organization can repeatedly create new knowledge that will disrupt stagnation (Bateman, 2015; Christensen, 2006) of the old status quo, thereby sustaining growth (Kira & van Eijnatten, 2008; Meadows, 2008; Senge, 2006). Through thought leaders (Elkeles & Phillips, 2007) who have the ability to sense the future and are voracious learners, they continuously create new knowledge, which serves as leverage points (Meadows, 2008). They are able to evolve the video gaming curriculum, and they will help transform the culture (Denning, 2014) of Oceanfront College into a knowledge-creating organization (Nonaka & Takeuchi, 1995).

This theme directly links to the research question. Continuous innovative change within a college’s curriculum will help maintain alignment (Elkeles & Phillips, 2007) between the skills taught in the classrooms and the skills industry demands. If this approach is iteratively followed, the talent mismatch between industry and academia will most likely be narrowed, and the students whom the college graduates will have the timely and relevant skills needed to gain employment. The researcher observed that the majority of the skills that are misaligned are soft skills and are identified by the participants in the previous section and assented to by many scholars including Darling-Hammond (2010), Murphy-Hill et al. (2014), Oliver et al. (2007a, 2007b), and Watson (2011). The participants’ remarks are supported by several scholars
(Meadows, 2008; Seelos & Mair, 2012); with industry feedback and the proper governance and check and balances, bad ideas are filtered out and good ideas are promoted quickly.

**Not Too Fast, Not Too Slow**

While the majority of the participants concurred that at Oceanfront College changes can be implemented rapidly, there were some who cautioned about making the modifications too quickly. At OC, the following measures regarding curricular changes were observed: a minor tweak to a course can take one-quarter; two terms are needed to introduce a new class; and nine months to a year are required to develop a new program. While program modifications should not be made simply for the sake of change, but made in order to stay relevant, a curriculum must not be stale or static. A concrete time frame for curriculum alteration turnaround was not evident in the research literature reviewed. On the other hand, reactive changes must be minimized, and instructors must think thoroughly the implication of a change on the remaining classes of a program (Meadows, 2008; Senge, 2006). Through proper governance, changes to the curriculum must be coordinated with all stakeholders to maintain curriculum integrity and to minimize course overlaps and gaps (Christensen & Eyring, 2011; Hansen, 2007; McGee, 2001; Mutch, 2006; Salvatore, Martin, Ruiz, Sullivan, & Sitkoff, 2000; Watson, 2011).

The participants’ comments are in alignment with literature. Several scholars observed that the speed in generating and implementing innovative ideas, whether the source is external or internal, is critical to an organization’s ability to sustain success (Kira & van Eijnatten, 2008; Meadows, 2008; Senge, 2006). Both Meadows (2008) and Senge (1994, 2006) spoke about the criticality of a timely response. "A system just cannot respond to short-term changes when it has long-term delays" (Meadows, 2008, p. 151). To put this another way, responses cannot be too
long or too short. Delays that are too short cause overreaction; long delays cause damps; over-long delays cause an overshoot and collapse (Meadows, 2008).

At OC, smaller course modifications are executed with high-velocity changes (Teece, 2007) from within minutes to within the quarter. Although counterintuitive, Meadows (2008) posited that “slowing the growth” (p. 156) of an entity is a powerful leverage point. Managing the frequency of change behavior was observable at OC; when program changes were implemented too swiftly, administrators noted discomfort on the part of some of the primary professors. Also, slowing the pace of change allows the previous modification to take full effect, and provides the time needed to measure discretely the efficacy of a change. Similar to Denning’s (2014) analogy of a surfer, change leaders should have the intuition and “a sense of when it is too early or too late to join a wave” (p. 29). Both Meadows (2008) and Senge (2006) also warned about a time delay for a system to react to a change: slowing the pace of change and the growth of a department will help manage the lag by giving the tests of time to come to fruition.

Referring to Figure 6.1 above, the OCCI theoretical framework portrayed at a high level the dynamic relationships and the interconnectedness between industry and academia. Educational leaders should avoid reactive responses (Senge, 2006), but should be proactive in learning by pulling data from industry or inviting industry to get involved with the curriculum development and maintenance (Elkeles & Phillips, 2007). Industry experts’ responses are used to incrementally apply small and well-focused actions. This approach is shared by Senge (2006), who believes that the best results come not from large-scale efforts but from small, well-focused actions.
**Symbiotic Bottom-up Cooperation**

Educators at OC conduct ongoing conversations and regularly collaborate throughout the quarter regarding the employability of their graduates. This cooperative culture stems from the College’s mission and is well communicated to newly hired instructors and administrators. Preemptively, a professor or professors self-organize to search genuinely for innovative and pioneering idea(s) to better equip students with relevant skills. They conduct idea-making through a nimble and bottom up approach within the parameters of OC’s open governance. Sharing purpose and goal, faculty members and administrators trust each other’s strengths and integrity as they amiably engage in honest thinking while seeking to understand each other. Administrators and faculty combine their experiences and perspectives to identify ideal and pragmatic solutions.

**Implications for Professional Practice**

There are several best practices that can be gleaned from OC’s educators’ experiences that can be adapted for use in other institutions. For example, the themes from the study have practical implications for professional practice in higher education in various disciplines. These findings are important when change leaders want to understand what they can do to help align classroom to program objectives, to the college’s strategic direction, and to industry’s shifts and trends.

A key finding is that in the tech industry, including the video game discipline, the skills gap is real because the industry’s skills needs are evolving, shifting and moving at a rapid pace. As a result, colleges and universities must hire innovative faculty members who are purveyors of knowledge and can sense industry changes by means of conversations with peers, industry leaders, and students. When the college perceives a delta between industry and academia, it
makes continuous and timely adjustments. In doing so, the curriculum will most likely remain current and aligned with the industry that it serves. It will also enhance students’ abilities so they graduate with employable skills, and in thus help narrow the skills gap.

**Becoming Social**

At the individual level, this research analysis shows that faculty members who want to innovate must become “social.” The more they build relationships and communicate, and have a process in place to continuously update a curriculum, the higher the potential to revolutionize a program. Going social means reaching out to industry leaders and experts, collaborating with colleagues, conversing with students and alumni, consulting and researching the Internet, studying competitors’ prospectuses, reviewing national and international ranking systems, and participating in educational forums, conferences, and colloquia. When an educator becomes social, his/her perspective of the technological and academic horizon will most likely widen, his/her tacit knowledge will increase, and as a result, he/she is most likely to contribute to the curriculum updating. Socialization (Crossan et al., 1999; Nonaka, 1994; Seelos & Mair, 2012) also means that faculty must continuously engage both inside and outside their classroom, department, institution and community. An organization will experience growth in the modernization of a program when professors are reaching out to other educational professionals and when they are well connected. To help narrow the skills gap, professors and administrators must network and collaborate to constantly make relevant and timely changes to a program.

Once a curriculum change is approved and implemented, to know how effective the curriculum change was:

- Higher education professionals should monitor the job placements of their graduates.
- Survey industry as to employers’ satisfaction with the graduates’ skills.

- Query alumni about which skills helped them in the field and/or which skills they might have been lacking.

- Evaluate a cohort’s senior capstone and portfolio.

A faculty member who is engaged internally in the classroom and externally with industry will be able to perceive both his/her industry and college environments by exploring external, innovative ideas and exploiting previous internal experiences. Higher education institutions should provide and encourage conversation spaces where knowledge can freely be shared and diffused across faculty and departments, so contentions can be resolved rapidly, and the best course of action can be implemented at the correct pace and in a timely manner.

As soon as a trend in deficiency is discovered, the department should conduct a quick, mini skills map session to realign course outcomes to the program goals and the college’s mission. College administrators and professors can implement a change as early as the following term in order to sustain growth and equip students with the relevant skills. The new tweaks to the curriculum needs to be communicated clearly and succinctly to the cohort; when students have a positive view of their future career, they are most likely inspired and will study and work ardently.

In the end, what was observed at Oceanfront College were creative, innovative, passionate thought leaders, who through trust and in the spirit of collaboration, self-organized themselves to incrementally and iteratively add, change, or evolve their curriculum, their policies, and their system structure. College administrators and professors will most likely survive almost any fluctuations in industry and any changes in cohort profiles, through their ability to swiftly adapt and change.
Recommendations

The following recommendations are made for private college change agents wishing to implement dynamic changes to a curriculum based on the findings, the analysis of the data, the literature review, the theoretical framework, and the subsequent discussion and conclusions.

- The document review of the GDSP curriculum (Appendix M) exposed the criticality of the Cooperative Learning subjects. These coop and intern programs could help tighten the coupling between college and industry that may lead to a formal establishment of a pipeline between the two institutions.

- Through internal conversations the professor is able to distribute knowledge gained to his/her administrators and peers so that the immediate course of action can be executed in order to continuously align the curriculum to a rapidly-changing video game industry. Because of the ability of a faculty member to sense changes in the horizon, the curriculum will be continuously updated, resulting in students having relevant and employable skills at the time of their degree completion.

- An institution’s ability to take in, make sense of, and distribute knowledge across the organization (Elkeles & Phillips, 2007) should be timely and at the right speed (Meadows, 2008; Senge, 2006). Because the industry shifts are too complex to predict (Denning, 2014), academia should be flexible and change at the same rate of speed as the industry it supports (Beach, 2013; Cappelli, 2012; Kung, Yang, & Zhang, 2006). Doing so will increase the college’s curriculum relevance, and will most likely result in work-ready students. By identifying skills and knowledge gaps before they can become a problem for the students and for the college
(American Society for Training and Development, 2012), constant vigilance and proper governance is the key. Too much growth in an establishment can be a detriment.

Implications for Future Research

The lack of case studies focused on bridging the skills gap offered the opportunity for this case study to participate in the national dialogue related to improving the design and maintenance of a college curriculum. The findings in this study add solid information to the research literature and to the practical field about the ways in which higher education professionals can make their curriculum current so that students will graduate with employable skills. Higher education institutions alone cannot fix the skills gap problem.

The need to bridge the skills gap is critical for both businesses and higher education institutions. Ideas for further research include a qualitative study to investigate or survey how the industry side could bridge the skills gap. Another study could conduct a skills mapping process for both an industry and an academic curriculum. Then the results could be used to compare and contrast the differences, in a follow-up longitudinal study to perform another skills mapping the following year to determine if the skills gap is widening or narrowing. The newly-hired graduates could also be interviewed regarding whether the skills they gained helped them in the field or whether they were lacking some skills.

Final suggestions would include a survey of how many of the graduates actually worked in their specific field of study. Also, a research study could be conducted on colleges and universities partnering with government and industry in order to help narrow the skills gap. Since the industry is experiencing a shortage of skilled workers (Benamati et al., 2010; Federation of Small Businesses, 2014; Hemphill, 2012; Shao & David, 2007; Thibodeau, 2012),
it is incumbent on and a moral (Fullan, 2003) and an ethical (Hansen, 2007; Starratt, 2004) obligation for colleges and universities to be persistently looking for ways to graduate students with the relevant skills industry demands.

Summary

The participants in this research study shared their perspectives regarding the value of the strategies they employ to help develop and modify the video gaming curriculum at Oceanfront College. Changes are continually formulated in order to help students acquire relevant skills so that they will be employable at the time of their graduation, and in doing so, the institution helps bridge the skills gap between what industry seeks and what academia is teaching. The findings revealed that professors play a critical role in the sustained maintenance of a program, especially faculty members who immerse themselves in the industry’s orbit. These instructors are propelled by the desire to graduate well-prepared students and through their connection to industry, they increased their propensity to generate knowledge. Through their active engagement with students, their conversations with peers, and their dialoguing with business leaders and experts, they are able to sense the needs of both the industry they serve and the students they care to help.

To bridge the skills gap, colleges and universities should hire professors who care about the education of the next generation by staying closely connected with the industry that they serve and research. These are instructors who act on what they perceive industry is using in terms of tools and processes; they also monitor the professional profiles industry seeks to hire. The more they comprehend the industry, the more they comprehend the needs of their institution and its students.
To help manage and consolidate ideation in an organization, a person(s) is needed who will advance and collate generated ideas from individuals, and who will be a purveyor of radical and innovative knowledge within the institution. This is someone who invariably looks at the curricula and the bigger picture. Elkeles and Phillips (2007) called this individual the Chief Learning Officer (CLO). This individual becomes the focal point for all sensing, putting together the constellations of ideas, knowledge generation, and institutionalization from what has been learned across all departments. Part of the CLO’s job would be to connect with industry leaders, understand the future direction of the college, as well as to inform senior management as to what future capabilities the establishment should develop to support a dynamic learning ecosystem (Bui, 2010). Other responsibilities of a CLO include working with faculty members on the design and maintenance of curricula, as well as updating curriculum processes, and reviewing whether slippage exists in the curriculum integrity. Additional responsibilities would include assisting faculty with the syllabus/objective alignment, with the program's objectives, with industry needs, and with the college’s strategic mission.

While professors are central to making modifications to a curriculum, industry must also be involved. Business leaders can proactively approach institutions of higher learning and provide feedback or collaborate on pipelining, or partner in designing a customized track. Educators also can reach out to corporations by engaging their leaders and experts in a dialog, and by inviting them as speakers, trainers, or advisers to the college’s program. Professors equilaterally exploit the college’s previous experiences to fine tune their organizational learning mechanisms, to explore external influences, including industry’s, and to experiment with radical ideas that can help to generate innovative new processes to enhance the college’s internal systems.
Through responsible governance within a task-force oriented department, and in a timely fashion—not too fast, and not too slow—the institution continuously applies changes to the curriculum based on what was tacitly perceived in their industry milieu. These little changes are consistent with Peter Senge’s (2006) principle of economy of means, where the best results come not from large-scale efforts but from small, well-focused actions.
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Appendices

Appendix A: Interview Questions

Northeastern University, Doctor of Education Program

Principal Investigator: Carolyn Bair, PhD

Student Investigator: George Saban, Doctoral Student

Title of Project: Analyzing the Dynamic Curriculum Change Process to Bridge the Skills Gap

Objective

In order to gain a better understanding of how professors and administrators sense that a curriculum change is needed, and in order to see a different perspective of the change process dynamics, the investigator plans to recruit the eight change leaders for interviews using a face-to-face semi-structured style.

Interviewee introduction:

Thank you for agreeing to participate in this research. You have been selected because you have been identified as someone who has a great deal to share about the curriculum content, the curricular change process, and the reasoning behind the changes. This research study focuses on the maintenance of a curriculum with particular interest on the dynamic change process based on events external and internal to the college. Through this study, I hope to gain more insight into the how innovative knowledge is created to dynamically update a curriculum. Hopefully, this will allow professors and administrators to understand the change process better and the subsequent effect of changes in order for graduates to be work ready.

Because your responses are important, and I want to make sure to capture everything you say, I would like to audio tape our conversation today. I will also be taking written notes during
the interview. Rest assured that all responses will be confidential, and only a pseudonym will be
used when quoting from the transcripts. I will be the only one privy to recordings which will be
eventually destroyed after they are transcribed. To meet our human subject’s requirements at the
college, you must sign the form I have with me (form will be provided). Essentially, this
document states that: (1) all information will be held confidential, (2) your participation is
voluntary and you may stop at any time if you feel uncomfortable, and (3) I do not intend to
inflict any harm. Do you have any questions about the interview process or this form?

We have planned this interview to last no longer than 60 to 90 minutes. During this time,
I have several questions that I would like to cover. If time begins to run short, it may be
necessary to interrupt you in order to push ahead and complete this line of questioning. Do you
have any questions at this time? Let us begin!

These questions will be asked in a semi-structured face-to-face recorded interview.

**Introductory Questions:**

1. Can you tell me how you came to be in Higher Education?

2. How long you have been working at the Oceanfront College?

3. How long have you been involved in curricular changes in Oceanfront College?

**Main questions:**

1. What do you know about the skills gap and how do you disseminate this knowledge to
   your department (who else has access to this information)?
2. What initiatives or processes were conducted by the department in order to determine what specific skills are taught to the video gaming students and what is currently on demand in industry?

3. How was the need for change first detected or sensed?

4. Did sensing or detecting the need for change lead to actually making a change? Explain.

5. What were some of the reasons or events that then prompted the change (not just sudden events, but also slow, subtle shifts)?

6. What would an ideal curriculum change process look like (steps or activities conducted from detection to implementation) and is this process different from the past change procedures?

7. What kinds of instructional, curricular, policy, and infrastructural changes have you and your team in the past five years implemented to help increase students’ success in the workforce?

8. What are the procedures that encourage you to influence departmental changes?

9. How often do you make curricular changes in a year? Is there any waiting period, and how long does the change process take (from detection to implementation)?

10. Think about the current curriculum. How do you know whether the current curriculum is successful? How do you know when curriculum changes have been successful?

11. What pitfalls have you encountered? What trades-offs have been weighed, and what benefits, risks and safeguards have been considered during the change process?
12. How will it be known what new course(s) to offer, what rules should be used to discard courses, who are the stakeholders whose inputs were consulted, and who are the decision makers?

13. Reflecting on your time in the change process team. Describe the team, are they built ad hoc or self-organized: does your team function collaboratively and in a spirit of trust? Describe ways in which it does or does not.

14. Is the team dominated by senior leaders who turn down generated ideas, or monopolized the idea making? Explain.

15. Describe the college culture at the organizational level: does the college push the institution in specific directions, and are there hostile forces that stifle innovation efforts suggested by individuals?

16. How do you understand the college mission and vision?

17. Knowing the needs of the video game industry and the mission of the college, please express how you feel about the skills acquisition of your graduates as they enter the workforce?

18. Given that some students are unprepared for college, and given that industry needs are changing, how do you understand the role of an educator and can you tie your response to the college’s goals, mission, and vision?

19. If you had to start and lead the change process all over again, what main advice would you offer, or is there anything that you would do differently in making curricular changes?
20. Given what you have described, where do you see yourself, your department, and the college going into the future?

Closing: We are pretty much at the end of the interview, but before I finish, I have one last question for you.

21. Is there anything else you would like to share, or do you have a question for me?

Thank you so much for taking the time to speak candidly with me about your thoughts and experiences. Once I have finished my interviews, I will contact you so you may review a draft of my findings and give any recommendations for improvement.

Emailed Interview Questions:

The following questions will be sent to the participants by email in order to allow time for these professors and administrators to locate the college documents necessary for the information they are going to provide.

1. Did college administration survey employees concerning a curriculum change? If so, what were the results? Are there college archival records of the surveys that I can analyze and present as part of my study findings?

2. Did the past curricular changes affect long-term strategic plans for the college and in what ways? Are there any artifacts regarding these initiatives that I may analyze and include in my report?
Appendix B: Interview Consent Form

Northeastern University, Doctor of Education Program

Principal Investigator: Carolyn Bair, PhD

Student Investigator: George Saban, Doctoral Student

Title of Project: Analyzing the Dynamic Curriculum Change Process to Bridge the Skills Gap

Request for Consent to Participate in a Research Study

Dear Participant:

You are invited to take part in a research study. This document informs you about the study, but the researcher will also explain it to you. You may ask the researcher any questions that you have. When you are ready to make a decision, you may tell the researcher if you wish to participate or not. You do not have to participate if you do not want to. If you decide to participate, the researcher will ask you to sign this statement and will give you a copy to keep.

Why am I being asked to take part in this research study?

You have been selected to speak with us today because you have been identified as someone who has a great deal to share about the experience of updating a curriculum.

Why is this research study being done?

You have been selected because you have been identified as someone who has a great deal to share about the college's curriculum content, the curricular change process, and the reasoning behind the changes. The other reason why you are being asked to participate may include one or more of the following reasons:

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Northeastern University - Human Subject Research Protection
Rev 3/28/2014
• You have intimate knowledge of industry needs; you have knowledge of the college infrastructures and mission; you have experience with students’ readiness factors and missing skills, you have a connection to industry, as well as familiarity and experience with processes and procedures involved in changing curriculum.

• You are directly involved and responsible for the updating process of the video gaming curriculum at the college.

• You have knowledge of what other departments within the college are doing to update their curricula, and you have information about the school’s mission and vision.

• You have professional relationships with part-time teachers who are working in the field and who are able to transfer critical insights to you regarding the current state of the part-timers’ work organization.

• You have a strong connection to business leaders in the area, and/or you have relationships with local and regional politicians.

This research study focuses on the maintenance of a curriculum with particular interest in the dynamic change process based on events external and internal to the college. Through this study, the student researcher hopes to gain more insight into how innovative knowledge is created to dynamically update a curriculum. Hopefully, this will allow teachers and administrators to understand better the change process and the subsequent effect of changes in order for graduates to be work ready.

**What will I be asked to do?**

You will participate in one interview. The interview will last approximately 60 to 90 minutes and will be comprised of 20 questions. The questions will be sent to you in advance. As part of qualitative research, you will be asked to approve particular aspects of the data interpretation to

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NU IRB
VALID 2-10-15
THROUGH 3-9-16

Northeastern University - Human Subject Research Protection
Rev. 3/28/2014
establish trustworthiness. In addition, the questions will be sent to you in advance in order to allow you time to gather college documents that may help your answers. Lastly, a copy of the transcript of the interview will be sent to you for verification to ensure that it has been transcribed accurately.

Where will this take place and how much of my time will it take?

Your interview will be held at the location of your choice. Each interview will last approximately 60 minutes. Upon transcribing the data, you will be asked to clarify any data in the transcription. This process will only take 15 minutes of your time.

Will there be any risk or discomfort to me?

There are no known risks associated with the procedures of this study. It is not possible to identify all potential risks in research procedures; however, the researcher has taken reasonable safeguards to minimize any known and potentially unknown risks.

Will I benefit by being in this research?

There are no direct benefits to the study participants. At the time of this writing, there was moderate growth in selected technical areas in technology, but the skills gap problem has hurt the U.S. economy in the past. Therefore, the U.S. economy could possibly benefit from knowledge that helps it to remain competitive in the global market. Moreover, higher education teachers and administrators may also benefit as they continue to consider innovative techniques to maintain a curriculum. Finally, students may benefit as they will be the ultimate recipients of relevant and timely skills that industry seeks.

Who will see the information about me?

Your part in this study will be confidential, to the extent allowed by law. If the researcher feels you are a threat to yourself or others, legally the researcher must report the information to
appropriate authorities. All interview participants will be given a pseudonym and the location
where the interview occurs will not be identified. Only the researchers of this study and a
confidential transcription service will see information about you. This form will be maintained
in a locked drawer for three years after completion of the study. All other data will be destroyed
within three year of the completion of the study. To establish themes, your information will be
combined with information from other people taking part in the study. In rare instances,
authorized people may request to see the research information from this study. This is done to
ensure that the research has been conducted properly. The researcher will only permit people
who are authorized by organizations such as the Northeastern University Institutional Review
Board to see the information.

What will happen if I suffer any harm from this research?

No special arrangements will be made for treatment solely because of your participation in this
research.

Can I stop participation in this study?

Your participation in this research is voluntary. If you decide to participate in the study, you
may withdraw your consent and stop participating at any time without penalty.

Who can I contact if I have questions or problems?

You can contact the Principal Investigator, Dr. Carolyn Bair, at [redacted] or call her at
[redacted]. You may also contact the Student Investigator, George Saban, at
[redacted] or call him at [redacted]

Who can I contact about my rights as a participant?

If you have any inquiries about your rights in this research, you may contact Nan C. Regina,
Director, Human Subject Research Protection, 960 Renaissance Park, Northeastern University,
Boston, MA 02115. Tel: [Redacted] Email: [Redacted]. You may call anonymously if you wish.

**Will I be paid for my participation?**

You will not be paid for your interview.

**Will it cost me anything to participate?**

There are no monetary costs for you to participate in this study, but there is a small time commitment to participate in the interview.

**Is there anything else I need to know?**

You must be at least 18 years of age to participate in this study,

**I agree to take part in this research.**

_________________________  ____________________
Signature of person agreeing to take part        Date

_________________________
Printed name of person above

_________________________  ____________________
Signature of person who explained the study to the participant above and obtained consent        Date

George Saban
Printed name of person

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**APPROVED**

NUIRB# CS15-01-08
VALID THROUGH 9-9-16

Northeastern University - Human Subject Research Protection
Rev. 3/28/2014
Appendix C: (Email requesting administrators and professors to participate in an interview for a research study for a Doctoral Candidate at Northeastern University)

[Date of the letter/email]

[Name and address of participant]

Dear Mr./Ms. Participant:

My name is George Saban, and I am currently a Doctoral candidate at Northeastern University. My area of concentration is in Education-Curriculum, Teaching, and Leadership. My thesis title is "Analyzing the Dynamic Curriculum Change Process to Bridge the Skills Gap." The purpose of this proposed research study is to investigate how one college went about making continuous changes to their video game department's curriculum. The changes were made in order to generate a program that will prepare students with relevant skills sought by the dynamic tech industry.

I would appreciate the opportunity to meet with you and discuss your views regarding the skills gap and how NEIT makes curriculum changes to align skills taught in the classroom with skills sought by industry. Any further insights you have would be greatly appreciated, and I sincerely hope that you will consider participating in this interview. I will be contacting you via telephone or email in the near future to confirm your interest in being interviewed. Please feel free to contact me as specified below with any questions.

The interview will last 60 to 90 minutes and will be audio recorded digitally. The one-time interview will be conducted at the place of your choice. An information sheet on the project is attached for your reference. I have also attached the questions so you can prepare ahead of time.

Your privacy is important to me. Therefore, all information gathered as part of this study will be kept strictly confidential. You will be given a pseudonym so that your identity will remain anonymous. Your participation in this study will be voluntary, and you can decide to withdraw at any time. The study does not provide a cash reward, and there are no monetary costs for you to take part in this study, but there is a small time commitment to participate in an interview.

Thank you in advance for your interest and assistance.

Sincerely,

George Saban
Northeastern University Doctoral Candidate
Tel: [Redacted] Email: [Redacted]
Appendix D: (Email confirming administrators and professors to participate in an interview for a research study for a Doctoral Candidate at Northeastern University)

[Date of the email]

[Name and address of participant]

Dear Mr/Ms. Participant:

Greetings Bridging the Skills Gap Participant,

I hope this email finds you well. I am extremely pleased that you are willing to participate in the research study on “Analyzing the Dynamic Curriculum Change Process to Bridge the Skills Gap.”

I have attached the interview consent form and the guidelines of the study. Please read and review the document in its entirety. Furthermore, I will discuss this form with you during our meeting and prior to the interview. I will answer any questions you may have regarding the research study and the consent form. Finally, I will need you to give your consent by signing the form before we can start the formal interview.

Please prepare any artifacts that will help inform the interview and that may help elucidate your answers. These artifacts may include old and current syllabi, current or previous courseware, the college’s brochure and catalog, old and latest video gaming curricula, a job wanted list database based on industry partners’ input, and documentation regarding the prevailing skill sets and trend needs that are represented by the industries’ employment requests.

Our meeting will be on [Date of the interview meeting] at your office [or location specified by participant]. If you have any questions regarding the interview consent form, or if you need to speak to me personally, please contact me at:

George Saban
Northeastern University Doctoral Candidate
Tel: [Redacted] Email: [Redacted]
Appendix E: Research site IRB Approval

IRB Approval from [the Oceanfront College] (the study site)

APPLICATION FOR APPROVAL OF RESEARCH INVOLVING HUMAN PARTICIPANTS

Please type, or print legibly. Do not write in shaded areas.

| TYPE OF REVIEW: (Check only one. Refer to policy for definitions and/or requirements for each.) |
|----------|----------------|
| New: Project # | Continuation: Project # | Action Taken: (do not write in this box) |
| _X_ Expedited review | _No modifications_ | Disapproved |
| ____ Full review | _Modified (provide explanation)_ | Approved from dates |
| George Saban | | From: February 1, 2015 to January 30, 2016 |
| Chair: | | |

| 1. PROJECT TITLE: Analyzing the Dynamic Curriculum Change Process to Bridge the Skills Gap |
|----------|----------------|
| 2. INVESTIGATOR: George Saban, IT, N240-C, x3625 (name and department) | Provide faculty supervisor’s name and department. |
| ____ check here if student investigator | |

| 4. DATES APPROVAL REQUESTED (maximum of one year) |
|----------|----------------|
| From: February 1, 2015 to June 1, 2015 | |
| January 30, 2015 | |

| 5a. PROJECT DESCRIPTION: Attach a description of the proposed project that includes items a-l “project description” as outlined in the NEIT Policies and Procedures. |
|----------|----------------|
| 5b. SPECIAL CONSIDERATIONS: Identify any special considerations for the proposed project. |

<table>
<thead>
<tr>
<th>SIGNATURE OF INVESTIGATOR: George Saban</th>
<th>SIGNATURE OF ADVISOR (IF STUDENT INVESTIGATOR):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: 1/19/2015</td>
<td>Date</td>
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</table>
Appendix F: IRB Certificate Form

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that George Saban successfully completed the NIH Web-based training course “Protecting Human Research Participants”.

Date of completion: 06/22/2012

Certification Number: 940985
Appendix G: NEU IRB Approval

NOTIFICATION OF IRB ACTION

Date: March 11, 2015
IRB #: CPS15-01-08

Principal Investigator(s): Carolyn Bair
George Saban

Department: Doctor of Education Program
College of Professional Studies

Address: 20 Belvidere
Northeastern University

Title of Project: Analyzing the Dynamic Curriculum Change Process to
Bridge the Skills Gap

Participating Sites: NEIT approval forthcoming

DHHS Review Category: Expedited #6, #7

Informed Consents: One (1) signed consent form

Monitoring Interval: 12 months

APPROVAL EXPIRATION DATE: MARCH 10, 2016

Investigator’s Responsibilities:

1. The informed consent form bearing the IRB approval stamp must be used when
recruiting participants into the study.
2. The investigator must notify IRB immediately of unexpected adverse reactions, or new
information that may alter our perception of the benefit-risk ratio.
3. Study procedures and files are subject to audit any time.
4. Any modifications of the protocol or the informed consent as the study progresses must
be reviewed and approved by this committee prior to being instituted.
5. Continuing Review Approval for the proposal should be requested at least one month
prior to the expiration date above.
6. This approval applies to the protection of human subjects only. It does not apply to any
other university approvals that may be necessary.

C. Randall Colvin
C. Randall Colvin, Ph.D., Chair
Northeastern University Institutional Review Board

Jan C. Regina, Director
Human Subject Research Protection
Appendix H: Document Reviews (New Program Development Process Checklist)

NEW PROGRAM DEVELOPMENT PROCESS CHECKLIST
March 06/2015

STEP 1 – Develop Program Idea
New program idea is approved by Executive Committee/OTL
Identify OTL champion
Perform Job Outlook Research - Career Services
Evaluate area institutions with similar programs – OTL
Conduct market research (if required)
Survey students
Survey TAC members and/or Industry leaders
Survey alumni
Identify Curriculum requirements – Program Developer
Collect sample existing programs:
What courses would be required?
Are there existing courses that could be incorporated into the program?
What impact will new program have on existing programs?
Can program be completed in 18 months?
Suitability/Fit:
with NEIT Mission
with current department structure
Identify champion(s) for the new program
Identify instructor qualifications/requirements
Degrees, certifications
Number of faculty
Program requirements for certifications or accreditation
Define facilities needed
Define specialty equipment needed
Define hardware and software needed
Define unique program requirements (ie, off site clinical sites, etc)
Develop an estimated budget

Review with Career Services/CTI
Review with President and Provost

DECISION POINT: Go/No Go to Step 2

STEP 2 – Document Overall Plan
Develop Program highlights (what makes this program unique?)
Develop Program mission statement
Develop Program Educational Objectives and Program Outcomes
Develop Program description
Identify detailed requirements (specific list with costs):
Facilities
Faculty qualifications
Accreditation/Certifications
Equipment
Determine Accuplacer Cut Scores with ASC
Other
Develop a more detailed budget
**Brief Admissions**

**DECISION POINT:** Go/No Go to Step 3

**STEP 3 – Create Curriculum**
Detailed Curriculum development:
- Create curriculum matrix
  - Ensure 10 Technical credits in each quarter
  - Ensure 2/3 Tech credits and 1/3 GenEd credits
- Course Descriptions
- Develop supporting documents (w/ASC and Admissions input)
  - Technical Standards
  - Q & A
  - Program entry requirements

Meet with Curriculum Committee

**Review with Executive Committee sub committee**

**Brief Admissions**

**DECISION POINT:** Go/No Go to Step 4

**STEP 4 – Develop Infrastructure**
Preliminary deployment activities:
- Hire program chair/coordinator
- Hire required personnel
- Work with architects to design unique labs required
- Review detailed facility requirements with Facilities subcommittee
- Develop 3 Year Budget Projection and review with Finance
  - Build out specific facility requirements:
    - Office space
    - Lab space
- Purchase required equipment
- Develop new courses
- Meet with Curriculum Committee

**Review with Facilities Committee**

**Review with President and Executive Committee**

**DECISION POINT:** Go/No Go to Step 5

**STEP 5 – Deliver Program**
Implement new program
- Post on intranet
- Post in Banner

Brief all other departments.
Appendix I: Document Reviews (Employer Survey)

Employer Questionnaire

Game Development & Simulation Programming Technology (AS)

Thank you for your interest in our online survey. We would like your feedback about the quality of the degree program from which you hired [name redacted] graduate.

Please take a few minutes to complete the following survey. As you will see the survey asks you to evaluate the program and not to evaluate an individual employee. Your response will enable us to assess the strengths of the college's program and to continue to improve it in the future.

If you have any questions or would prefer to speak with me about the survey or the program, please call me at [phone number redacted].

Sincerely,
[Name redacted], Director of Career Services

* indicates required fields

*Your Name: [Name redacted]
*Company: [Company redacted]
*Address: [Address redacted]
*City: [City redacted]
*State: [State redacted]
*Zip Code: [Zip Code redacted]

Title: Principal Software Engineer
Department:
*Phone: [Phone redacted]
Web Site:
E-mail Address:

Position/Title of Employee: (Not Name) Application Developer/Analyst
Duties and Responsibilities:

How many [name redacted] graduates have you hired? 2
Most recent hire: December / 2012
Would you hire other [name redacted] graduates? * Yes ☐ No

Comments:
The Associate in Science degree in Game Development and Simulation Programming (GDSPA) identifies the abilities listed below as important to success in the field. Please respond to the statements below rating each one with the level of your agreement.

Upon graduation from the GDS AS program, the graduate was able to:

1. Demonstrate web, procedural, and object-oriented programming skills using several programming languages. ◯ Strongly Agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly Disagree

2. Flowchart, pseudo-code, analyze, code, test, debug, and document their game programs. ◯ Strongly Agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly Disagree

3. Develop 2D and 3D multimedia graphics animations and simulations. ◯ Strongly Agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly Disagree

4. Form a team and design and publish an interactive game that implements game balance and project management within several game genres. ◯ Strongly Agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly Disagree

5. Analyze and utilize industry standard game engine components. ◯ Strongly Agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly Disagree

6. Design and develop database driven structures and game applications. ◯ Strongly Agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly Disagree

7. Demonstrate oral and written communication skills, function as a member of a team, act ethically and responsibly, and respect all people and cultures. ◯ Strongly Agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly Disagree
Appendix J: Document Reviews (Associate Degree Curriculum Changes)

**Video Game Development and Design - AS**

Previously Game Development and Simulation Programming

Degree Progress Checklists

Please print, fill out and save for future reference.

For students in the Video Game Design Track entering October 2014 or later
For students in the Game Development and Simulation Programming Track entering October 2014 or later
For students in the Video Game Design Track entering April 2014 to September 2014

Curriculum

For students entering October 2014 or later
For students entering April 2014 to September 2014
For students entering October 2013 to March 2014
For students entering January 2013 to September 2013
For students entering October 2012 to December 2012

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**Bachelor Degree Curriculum Changes**

**Game Development and Simulation Programming - BS**

Degree Progress Checklists

Please print, fill out and save for future reference.

For students entering October 2014 or later
For students entering October 2013 to September 2014
For students entering January 2013 to September 2013
For students entering October 2012 to December 2012

Curriculum

For students entering October 2014 or later
For students entering October 2013 to September 2014
For students entering January 2013 to September 2013
For students entering October 2012 to December 2012
## Appendix K: Document Reviews (GDSP Associate Degree Skills Mapping)

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Skills</th>
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<tbody>
<tr>
<td></td>
<td>GD3 - 10 - Intro Cc++</td>
</tr>
<tr>
<td></td>
<td>GD3 - 112 - Intro Graphics</td>
</tr>
<tr>
<td></td>
<td>GD3 - 114 - Intro Game Dev</td>
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<tr>
<td></td>
<td>GD3 - 121 - Int. Cc++</td>
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<tr>
<td></td>
<td>GD3 - 122 - 2D Prog. Torque</td>
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<tr>
<td></td>
<td>GD3 - 124 - Game Design</td>
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<tr>
<td></td>
<td>GD3 - 131 - Adv. Cc++</td>
</tr>
<tr>
<td></td>
<td>GD3 - 133 - Adv. Games</td>
</tr>
<tr>
<td></td>
<td>GD3 - 134 - Game Persistence</td>
</tr>
<tr>
<td></td>
<td>GD3 - 129 - Ah! Progs</td>
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<tr>
<td></td>
<td>GD3 - 201 - Character Modeling</td>
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<td>GD3 - 202 - MLO</td>
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<td></td>
<td>GD3 - 203 - MLO</td>
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<tr>
<td></td>
<td>GD3 - 230 - Internet Game Dev</td>
</tr>
<tr>
<td></td>
<td>GD3 - 231 - Internet Mgmt</td>
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<td></td>
<td>GD3 - 232 - Algo &amp; Struct</td>
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<td></td>
<td>GD3 - 233 - GD MVC</td>
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<td>GD3 - 236 - Portfolio</td>
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<td>Software Engineer</td>
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<td>Database</td>
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<tr>
<td>Gameplay Programmer</td>
<td>Scripting</td>
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<td>Moding</td>
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<td>AI Developer</td>
<td>AI</td>
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<td></td>
<td>Algorithm</td>
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<tr>
<td>2D Game Programmer</td>
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<tr>
<td>Casual Game Developer</td>
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<td>Game Designer</td>
<td>Photoshop</td>
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<td></td>
<td>Hardware/platform</td>
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<td>2D Drawing</td>
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<tr>
<td>Level Designer</td>
<td>3ds Max</td>
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<td>Mission Designer</td>
<td>3D Modelling</td>
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<tr>
<td>Gameplay Designer</td>
<td>Sound</td>
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<td>Project Manager Producer</td>
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<td>Game Tester</td>
<td>Testing</td>
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</tbody>
</table>

### Skills Levels:
- 1 = Introduced
- 2 = Reinforced/used
- 3 = Mastered
Appendix L: Document Reviews (Nationally-Recognized Survey Criterion of Undergraduate and Graduate Game Design)

Thank you for participating in The [Redacted] Review's survey of undergraduate and graduate Game Design Programs. We appreciate you taking the time to provide us with this data.

If you are unable to answer any of the questions, please leave them blank. If you are submitting data for both an undergraduate and a graduate program, a separate survey must be filled out for each.

If you have any questions, please contact us at [Redacted].

1. Respondent Information (Not for Publication):
   - Name of parent institution (school name): _______________________
   - Name of gaming program (or equivalent department): ________________
   - Your name: _______________________
   - Your title: _______________________
   - Your phone number: _______________________
   - Your email: _______________________

2. Are you reporting data on your undergraduate or graduate offerings (select only one)? Note: If submitting for both please submit one survey for each.
   - [ ] Undergraduate
   - [ ] Graduate

3. Who should students contact with questions about gaming at your school?
   - Name: _______________________
   - Title: _______________________
   - Address: _______________________
   - City/Town: _______________________
   - State/Province: _______________________
   - Zip/Postal Code: _______________________
   - Telephone: _______________________
   - Email: _______________________
   - URL: _______________________

(End of Page 1 )
ACADEMICS

4. Does your school have course offerings relevant to students interested in the field of game design?
   ☐ Yes
   ☐ No
Additional comments.

5. Please check all types of course offerings:
   ☐ Critical Game Studies
   ☐ Games and Society
   ☐ Game Design
   ☐ Game Programming
   ☐ Visual Design
   ☐ Audio Design
   ☐ Interactive Storytelling
   ☐ Business of Gaming
   ☐ Game AI
   ☐ GPU programming and “game platform” hardware architecture programming
   ☐ Graphics
   ☐ 3D Modeling
   ☐ Animation
   ☐ Game Engine Scripting
   ☐ Game Research (e.g. HCI, Playtesting etc.)
   ☐ Music Scoring
   ☐ Project Courses
   ☐ Other (please specify)

Additional comments.

6. Does your school offer an undergraduate or graduate major, minor or concentration in a course of study relevant to the field of game design? (Check all that apply)
   ☐ Major
   ☐ Minor
   ☐ Concentration
   ☐ Certificate
   ☐ Masters
   ☐ PhD
7. Which of the following skill types does your program teach?
   - Art Creation
   - Level Design
   - Software
   - Visual Design
   - 3D
   - Object-oriented programming
   - AI
   - Software engineering practices (such as scrum)
   - Graphics
   - Hardware Architecture
   - Other (please specify)

Additional comments.

8. In total, how many gaming-related courses will your school offer during the 2014-15 academic year?
   ______________________________

9. Does your school host an annual gaming competition, showcase or symposium?
   - Yes
   - No

Additional comments.

10. If your students have entered outside competitions and festivals have any placed or won?
    - Yes
    - No
Additional comments.

11. If yes, which competitions and years?

Additional comments.

12. Does your gaming program use a team-driven approach?
   - Yes
   - No

Additional comments.

13. If yes, in that team are students paired with other students from different disciplines? (coding, art, marketing, etc.)
   - Yes
   - No

Additional comments.

14. Is it a requirement for students in your program to have created a functional game before graduating?
   - Yes
   - No

Additional comments.

15. What kind of research, if any, are your students involved in?
   - Course-based research projects
   - Paid research assistantships
   - Internal student research grants
   - Independent study or project work
   - Other (please specify)

Additional comments.

(End of Page 2)
FACULTY

16. What percentage of your total gaming faculty have started, run or worked for a game studio?
   ________________________ %

17. Total gaming faculty (include any faculty teaching a gaming related course):
   ________________________

18. Number of departments represented by gaming faculty:
   ________________________

19. Percentage of those gaming faculty with PhDs (or terminal degree equivalent):
   ________________________ %

20. Percentage of total gaming faculty that are tenure track:
   ________________________ %

21. Does your faculty have funded research in game design?
   ○ Yes
   ○ No
   Additional comments.
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

22. How many graduate/undergraduate students are supported by funded research in game design?
   ________________________

23. Additional comments:
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

24. List up to five of your institution's most prominent faculty and their titles or fields of endeavor prior to joining your program:
   1) Faculty __________________________
   1) Field __________________________
   2) Faculty __________________________
   2) Field __________________________
   3) Faculty __________________________
   3) Field __________________________
   4) Faculty __________________________
   4) Field __________________________

(End of Page 3)
INFRASTRUCTURE

25. Does your school offer game labs for students to use?
   - Yes
   - No
   Additional comments.

26. If yes, how many labs?

27. Does your school offer a game library for students to use?
   - Yes
   - No
   Additional comments.

28. Does your school use proprietary technology that is licensed for academic use?
   - Yes
   - No
   Additional comments.

29. Which technologies or engines does your school utilize?
   - C++
   - Java
   - Maya
   - ActionScript
   - Unreal Engine
   - Flash
   - Unity
   - XNA
   - Torque
   - Processing
   - Gamebryo
   - Other (please specify)
Additional comments.


30. Please tell us about 3 of your schools distinguishing facilities and/or infrastructure:


(End of Page 4 )
CAREER

31. Please check all of the opportunities available for gaming students listed below that your school helps facilitate:
   - [ ] Internships
   - [ ] Paid Internships
   - [ ] Opportunity to consult for game design companies
   - [ ] Portfolio review
   - [ ] Portfolio development with professionals
   - [ ] Internship recruiting events
   - [ ] Student-led mods
   - [ ] Team-based classes
   - [ ] Other (please specify)

   Additional comments.

   __________________________________________
   __________________________________________
   __________________________________________

32. What percentage of 2014 graduates have worked on a game that has shipped?
   ________________________________ %

33. What percentage of 2014 graduates have taken a job in some aspect of game development?
   ________________________________ %

34. How many students has your program graduated since it started?
   ________________________________

35. How many different game design studios have hired your graduates?
   ________________________________

36. List up to five of your institution's most prominent alumni/alumnae and their titles or fields of endeavor:
   1) Graduate ____________________________
   2) Title/Field __________________________
   3) Graduate ____________________________
   4) Title/Field __________________________
   5) Graduate ____________________________
   6) Title/Field __________________________
37. During the 2013-14 academic year how many game companies visited your school for any of the following reasons: recruiting, lectures, seminars, demos, collaborations?

__________________________________________

38. What was the mean base salary (do not include any bonuses) of 2014 gaming graduates who accepted employment by 3 months after graduation?

$ ____________________________

(End of Page 5)

__________

TELL US ABOUT YOUR PROGRAM

39. What else should we know about these programs/class offerings? Please use this space to brag:

__________________________________________

__________________________________________

__________________________________________

40. What features do you consider to be distinguishing aspects of your program in game design? Please explain:

__________________________________________

__________________________________________

__________________________________________

41. We realize that game design is sometimes about more than just launching a game, and that programs that teach gaming are dynamic and changing. Please tell us about those special or non-traditional aspects of your program:

__________________________________________

__________________________________________

__________________________________________

42. Please provide us with up to 5 links to pages on your game design website that you think we should see:

1) URL: ____________________________

2) URL: ____________________________

3) URL: ____________________________

4) URL: ____________________________

5) URL: ____________________________

(End of Page 6)
# Game Development and Simulation Programming Curriculum

## Quarter I

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<td>GDS 128</td>
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**Total:** 10, 10, 15

### Quarter VI

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**Total Quarter Credit Hours = 97**
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<td>Tools and Engine Development</td>
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<td>Software Testing and Quality Assurance</td>
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### OR Quarter XI

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