UNDERGRADUATE GAME DEGREE PROGRAMS IN THE UNITED KINGDOM AND UNITED STATES: A COMPARISON OF THE CURRICULUM PLANNING PROCESS

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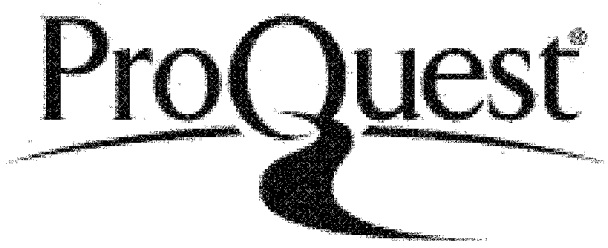

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Digital games are marketed, mass-produced, and consumed by an increasing number of people and the game industry is only expected to grow. In response, post-secondary institutions in the United Kingdom (UK) and the United States (US) have started to create game degree programs. Though curriculum theorists provide insight into the process of creating a new program, no formal research contextualizes curriculum planning for game degree programs.

The purpose of this research was to explore these processes when planning undergraduate game degree programs. The research methodology included an explanatory mixed-methods approach, using a quantitative survey of participants in the UK and the US, followed by an interview of several participants selected on the basis of their institution's demographics. The study provides insight into the curriculum planning process, including factors that influence the final program content, and a list of

recommendations for educators, trade associations, and the games industry to improve game degree programs.

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The reward of a thing well done is to have done it.

Ralph Waldo Emerson

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M. M. M.

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CHAPTER 1

INTRODUCTION TO THE STUDY

Since the inception of programmable electronic systems, digital games have been a part of the computing culture. One of the first known digital games, created in 1952 by A.S. Douglas at the Cambridge Mathematical Laboratory, was OXO (also known as XOX), a tic-tac-toe program that provided an interactive interface for the user using a cathode ray tube (CRT) display (Kelly-Bootle, 2007). As technology has progressed, humans' fascination with games and game play has lead to an exponential growth in the number of digital games that have been created and the number of genres of games. Today, digital games are marketed, mass-produced, and consumed by an ever-increasing number of people. The game industry currently creates more revenue than any other branch of the entertainment industry and it is projected to rise to $65 billion in 2011 (ABIresesarch, 2006). Despite the recent economic downturn, market analysts predict that the digital game industry will continue to grow in areas such as gaming on mobile devices (e.g. phones, personal digital assistants), consoles (e.g. Wii and Xbox), and gaming on the Internet (Gartner, 2008; NPDGroup, 2009a, 2009b, 2009c).

People have played a wide-range of non-electronic games throughout the ages (Falkener, 1892). Games provide the player (or players) a variety of elements, including a

sense of autonomy, control, and competence; boost self-esteem; provide a venue for escapism, fantasy, and competition; and facilitate social activities that meet players' social needs (Bowman & Tamborini, 2008; Klimmt, Hefner, Vorderer, & Roth, 2008; Ryan, Rigby, & Przybylski, 2006; Tanis & Jansz, 2008). Digital games also provide many of the same motivations as physical games, and the entire game development industry now leverages their appeal by incorporating games and game-like features in more serious contexts, including health and fitness, training, education, science, business simulation, and engineering, with an anticipation that there will be further growth of digital games incorporated into these areas (Faria, 1998; Ke, 2008; Randel, Morris, Wetzel, & Whitehill, 1991; Zumbach, Schmitt, & Reimann, 2006). Games have even been created to teach basic software development skills required for learning how to develop games (Eagle, 2009).

This interest in digital games has catapulted the growth of the game industry in both the United Kingdom (UK) and the United States (US) (Valentine, 2009). From 2007 to 2008, Verdict Research predicted a 42% increase in growth in games software alone, growing 1.37 billion GBP, noting that the sector has doubled in value over the preceding five years. Verdict predicts that it is likely that the video game industry will become the largest entertainment sector in the UK (MarketWatch: Global Round-up, 2008). According to the UK Department for Business Innovation & Skills, the UK games market is the largest in Europe and the UK is the fourth largest producer of games, behind Japan, the US, and Canada (Department of Trade & Investment [DTI], 2007). In 2006, 8,000 game developers were employed in the country and the majority of multinational games

companies have chosen to locate their European headquarters within the UK. The UK also has more games development studios than any other country in Europe. In fact, the vision of Tiga, the UK's trade association for the game industry, is to promote this growth within the UK by making "...the UK the best place in the world to do games business" (2009).

According to IBISWorld (2009), the game industry revenue in the US in 1997 was $16 billion and employed 108,143 employees. More recent statistics show that the industry revenue in 2005 was $25 billion and grew to $39 billion in 2008. During that same time period, the number of enterprises grew from 4,060 to 5,364 and the number of employees in the industry grew from 163,790 to 213,228. Predictions increase the industry revenue to $71 billion in 2014, accelerating at a rate of growth averaging over 10% per year for the next five years.

According to Tiga's State of the Industry Report (2009), "[t]he mean annual turnover [revenue production] of developers in the survey was £1,511,600." Game development companies in the UK have expressed their intent to expand their businesses into the US, Japan, and China. As of February 2009, there were 9,860 employees in the game industry, including traditional publisher studios as well as independent game studios.

The global nature of game production is similar to that of entertainment, financial markets, and corporations ("Britain's games developers," 2003). The marketing of game products across countries continues to grow, in part due to the increased presence of the Internet and the ability to easily purchase and, in some cases, download game products

and the increase in demand for games for mobile devices (Gartner, 2008; NPDGroup, 2009a, 2009b, 2009c). Game production also occurs among team members who are physically located around the world (Keighley, 2005). This collaborative trend is partly due to economic factors and partly due to advances in technology that facilitate off-site communication within and among companies.

With the UK and US game industry markets poised to increase, one of the side effects is that more qualified individuals are needed to create serious as well as entertainment-based games (Palmer, 2009). Digital games are often created and developed by a multi-disciplinary team of individuals who have specific talents and skills (International Game Developers Association Game Education Special Interest Group [IGDA-GESIG], 2008). These skills can vary depending on the type of game being developed. One can frequently find game designers, visual designers, audio designers, storytellers, game programmers, and producers working collaboratively on game development teams.

Game degree programs, for the purpose of this research study, are defined as academic programs that may culminate in a degree or mark of completion at an educational institution for students. These programs, which did not exist a decade ago, are just now entering into the academic field. There has been an increased interest by universities around the world to create and implement game courses and game degree programs (Bayliss & Bierre, 2008; Korte, Anderson, Pain, & Good, 2007; M. Lewis, Leutenegger, Panitz, Sung, & Wallace, 2009; Morrison & Preston, 2009).

Current traditional undergraduate students were born in the 1980s and have played digital games their entire lives, giving them great exposure to the industry and the various elements of digital games (Prensky, 2003). Additionally, the use of games in education has been shown to engage these learners in various settings (Rankin, Gooch, & Gooch, 2008; Squire & Barab, 2004).

The motivations behind creating game degree programs differ across universities. For example, some universities are motivated to meet the growing needs for game developers within industry, while others are motivated to create programs to increase enrollment in more traditional programs, such as computer science (Coleman, Krembs, Labouseur, & Weir, 2005; Kessler, Langeveld, & Altizer, 2009). The growth in the number of these programs is reflected in the number of academic conferences that are specifically focused on game education, the increased number of publications, and the increase in the number of students graduating from game degree programs. In 2006, for example, the UK saw 1,200 students graduate from game degree programs, which are the latest numbers available under a large scale research analysis, and the number was expected to increase to 1400 and 1700 respectively in 2007 and 2008 (DTI, 2007).

It is widely known that the UK and the US share a strong historical, political, and economic relationship. Both countries are world economic powers with effective government, defense, social, and educational systems. For decades, scholars have sought to compare the two countries' educational systems in various ways in an effort to identify best practices in curriculum and instruction (Bryant & Morgan, 2007; Morrisset & Williams, 1981; O'Leary & Shiel, 1997; Unks, 1992; Watt, 2004). It is also widely

accepted that academic research and information on curriculum and instruction are shared globally through international conferences and journals that are accessible online.

Despite similarities in the countries, cultural factors remain, and a country's government policies, educational policies, and economic needs can impact its academic programs. This phenomenon and how it affects programs in different countries continues to be compared and analyzed (Gatfield & Chen, 2006; Naidoo, 2007; American Association of Universities, 2006; Yonezawa, et al., 2009).

Problem Statement

Curriculum theorists recognize the challenges in curriculum planning and have drawn from these experiences to create a variety of frameworks. For decades, curriculum theorists have addressed the issue of the highly complex process curriculum planners face as they consider objectives and criteria, deliberate program elements, and negotiate ideas and interest areas of those directly or indirectly involved in the planning process (Doll, 2008; Hunkins & Hammill, 1994; Taba, 1962; Tyler, 1949; Walker, 1971).

Several factors impacting the curriculum planning process can be mapped to four featured learning processes: assessment-centered, knowledge-centered, learner-centered, and community-centered (Brownsford, Brown, and Cocking, 1999). Knowledge-centered factors might include consideration of department goals, university initiatives, and best practices from other institutions and research. Assessment-centered factors include consideration of certifications and other forms of comprehensive exams, both internal and external. Student-centered factors include the consideration of students' knowledge bases as well as student (and alumni) feedback. Community-centered impact

factors include the consideration of input from professional organizations, input from the advisory board, and the input and feedback from the job market (Fry, Ketteridge, and Marshall, 2003). An additional factor that may impact each of these is the level of resources that a program or a department has or can potentially achieve. Each of these factors can impact the scale, content, scope, and direction of a program.

The consideration of these factors is not formalized or organized in the existing literature on game degree programs, though they can have significant bearing on the type of degree program that is planned and the type of student outcomes that are achievable (Morrison & Preston, 2009). Department goals and resources for one university might outweigh input from professional organizations, while another university may place more emphasis on input from professional organizations and the needs of game industry. This can result in programs that may not necessarily be identical, but ones that will have various focus areas based on the considerations given by the curriculum planners.

Each of the various areas of game development requires a diverse set of knowledge, skills, and dispositions that overlap each other (e.g., knowledge of team structure and the ability work in collaborative teams), while also having distinguishing attributes (e.g., ability to design game play or the ability to program games) (IGDA-GESIG, 2008; McGill, 2008). Due to the recent growth of undergraduate game degree programs at post-secondary institutions, little is known about the philosophies of the curriculum planners as they create their programs, including the problems and issues that arise during the process, the factors that impact the curriculum, and how these factors and philosophies affect student outcomes. There is also a limited body of knowledge

providing research about how to create, define, or assess a successful game degree program (Morrison & Preston, 2009).

With the recent advent of the game degree programs in both the US and the UK, there is a lack of literature on the curriculum planning process undertaken to create them. The aim of this study, therefore, is to inquire into the curriculum planning process of game degree programs at post-secondary institutions within the UK and the US, to compare patterns of the curriculum planning process between the two countries (including philosophies and factors considered that may impact the process and the curriculum), and to compare the efficacy of these patterns against extant curriculum literature. This educational research study is significant for game education researchers, departments who are interested in implementing or modifying game curriculum at their institution, and international and national associations that are responsible for the creation of curriculum framework for game degree programs.

Nature of the Study

This study employed an explanatory mixed methods design with the results of the qualitative study used to explain and elaborate upon the results of the quantitative study (Creswell, 2008). The quantitative study made use of a cross-sectional survey to gather data about the curriculum planning process from the target population. The target population included faculty responsible for the creation of existing game degree programs at post-secondary institutions within the UK and the US.

An electronic questionnaire with semi-closed ended questions was created and to inquire into the nature of the curriculum planning process. The survey instrument was reviewed to provide an additional measure of face validity (Creswell).

The survey was then distributed to the target population using criterion sampling. All post-secondary institutions identified as having game degree programs within the US and the UK that met the criteria were invited to participate in the survey. Once the data was collected, the data was aggregated by country. The aggregated data was then analyzed and compared using inferential statistics.

The statistical analysis resulted in a typology of patterns of similarities and of differences in the curriculum planning process. To further explain this typology and to further explore the results of the quantitative survey, follow-up interviews at four institutions were performed using purposeful sampling. The sampling criteria were determined once the analysis of quantitative data is completed. A detailed discussion of this research appears in Chapter 3.

Research Questions

Specifically, the overarching questions guiding this research are:

(a) Within the United Kingdom and the United States, what philosophies do curriculum planners draw on as they engage in the creation of undergraduate game degree programs at post-secondary institutions?

(b) Within the United Kingdom and the United States, what influencing factors do curriculum planners consider as they engage in the creation of undergraduate game degree programs at post-secondary institutions?

(c) What are the major differences between and similarities in the undergraduate game degree curriculum planning processes at United Kingdom and United States post-secondary institutions?

Purpose of the Study

The purpose of this study is to explore and compare the planning processes of institutions when planning undergraduate game degree programs within the United Kingdom and the United States. This includes considering the philosophical approaches undertaken by the curriculum planners and an examination of the different influencing factors that affect the adopted program. As part of this study, a review of existing programs in both the UK and the US will be performed. This information will be used to recommend to curriculum planners a framework for developing game degree program curriculum that develops student competencies appropriate for the current and future game industry.

Conceptual Framework

To begin to answer the research questions, peer-reviewed literature on existing game degree programs at post-secondary institutions is first reviewed and summarized. A comparative analysis of the themes and trends of the game degree program literature is then made against themes and trends of curriculum in the established fields of computer science and art, both fields from which game degree programs often derive. This review identifies gaps in the existing literature on game degree program curriculum and curriculum development.

Two areas of curriculum literature are then reviewed. The first area includes the academic literature of several modern and postmodern curriculum design theories. The major components of each theory are briefly summarized. A brief comparative analysis of these theories is also provided. The second area reviews the curriculum literature to explore additional elements that have been researched and shown to affect curriculum development. The findings uncovered in this portion of the literature review will serve as the basis for the questions posed in the quantitative survey.

Finally, a review is performed on existing literature comparing curriculum planning processes across countries. The findings uncovered in this portion of the literature review will provide additional rationale for the analysis of data from the UK and the US and into the research methodology.

The methodology employed in this study consists of an analysis of a mixed methods study that is based on surveys completed by curriculum planners of existing undergraduate game degree programs. The surveys address each of the three research questions. The follow-up qualitative portion of the study provided additional insight into the curriculum planning process at the participating institutions.

Operational Definitions

This section provides formal definitions for terms used in this study that are new to the field of game curriculum, terms that are ambiguous or duplicitous in nature, and terms that differ from their general usage. Several of these definitions are derived from the Curriculum Framework for game development presented by the International Game

Developers Association's (IGDA) Special Interest Group (SIG) on Game Education (2008).

Audio Design: Audio design is the design and creation of sound and sound environments used in games.

Curriculum Framework: A curriculum framework is often based on a curriculum theory and is used to define how to plan new curriculum or view or revise existing curriculum.

Curriculum Planners: Curriculum planners are those individuals who take part in the development of the curriculum for a post-secondary institution. Curriculum planners are typically faculty at academic institutions, although some institutions may use individuals from outside academia to participate in the curriculum planning process.

Curriculum Planning Process: The curriculum planning process consists of all formal and informal components of curriculum planning, from inception of the idea to the implementation of the program.

Curriculum Theory: A curriculum theory is a theory that has been proposed typically by an educational researcher specific to the development or implementation of curriculum.

Game Degree Program: For the purposes of this research, the term "game degree program" will refer to an academic program that may culminate in a degree or mark of completion at an educational institution for students. Game degree programs may be housed in various departments or may be independent.

Game Development: Game development is the process of creating and implementing games. This covers game play design, game software development, audio design, visual design, interactive storytelling, and production.

Game Play Design: Game play design is the "principles and methodologies behind the rules and play of games" (2008, p. 12). Elements in this term include interface design, interactivity design, information design, and game play. This also includes the integration of audio, visual, tactile, and textual elements.

Game Program: A game program is used to refer to lines or sections of code, or an entire software program, that provides the capability for the user to play a game when executed.

Game Software Development: Game software development includes all aspects of computer science and software engineering required for developing the software of the game. This includes game programming, game engine design, database development for games, rapid prototyping, artificial intelligence, and networks.

Interactive Storytelling: Interactive storytelling refers to the writing and designing of interactive narrative to build the story, dialogue, plot, character development, and world creation in a game.

Post-secondary Institution: Post-secondary institutions are institutions that educate beyond the secondary level. Other terms commonly used to define post-secondary education are higher education and tertiary education.

Qualifications: Qualifications are those skills, knowledge areas, and dispositions that are needed to succeed in a specified position.

Private for-profit institution: "A private institution in which the individual(s) or agency in control receives compensation other than wages, rent, or other expenses for the assumption of risk" (Integrated Postsecondary Education Data System [IPEDS], 2007).

Private not-for-profit institution: "A private institution in which the individual(s) or agency in control receives no compensation, other than wages, rent, or other expenses for the assumption of risk. These include both independent not-for-profit schools and those affiliated with a religious organization" (IPEDS, 2007).

Serious Games: The term "serious games" refers to games that are created for a purpose other than strictly entertainment. These games have a goal to motivate or engage the user in a situation that provides the capability for the user to learn, train, heal, consume, or perform other actions purposefully built into the game design.

Visual Design: Visual design is the design, creation, and analysis of the visual components of games. Elements include two-dimensional (2D) and three-dimensional (3D) graphics, animation, typography, graphic design, drawing, sculpting, and more.

Assumptions, Limitations, Scope and Delimitations

For the purposes of clarifying this research, the following assumptions, limitations, scope and delimitations are identified.

Assumptions

Industry defines a qualified prospective employee in ways that include various skills, knowledge, and dispositions (McGill, 2009a). It is assumed that there will be an

increased need in industry for qualified prospective employees who have matriculated from a game degree program, and, therefore, an increased need in quality game degree programs. It is also assumed that one goal of game degree programs is to develop skills, knowledge, and dispositions in students to be qualified to perform competently within the current and future game industry.

Another assumption is inherent to the belief that more mature academic programs have a wider set of educational research published and available, and that this information is parallel to what is needed to build the research and to improve less mature programs. The analysis takes this into consideration at a topical level only. Further research is needed to identify these areas exhaustively.

Limitations

The perspective of this research will include only post-secondary institutions in the UK and the US that have game degree programs. This research also focuses on the current status of game degree programs and does not analyze its history or growth in the literature.

Scope of the Study

The scope of the study is limited to post-secondary institutions within the UK and the US with undergraduate game degree programs that are identified in the formal body of research found through a thorough literature review. Game degree programs at traditional community colleges in the United States as well as game trade schools were not considered in this study. Game academies were specifically excluded based on

previous research illustrating the need for a degree in high-level educational facilities that focus on both research and education (Rezk-Salama, et al., 2006).

Within the field of computer science, in which many of the game degree program articles are published, the mark of standard acceptance for a paper includes peer-reviewed (many blind peer-reviewed) conference papers, due to the rapidly changing nature of the field (Computing Research Association [CRA], 1999). Therefore, the literature review includes journal articles, books, statistical data, and government documents as well as conference papers.

Delimitations

Though much of the information about existing game degree programs could be retrieved through online research of the promotional sites for undergraduate game degree programs, the use of academic literature in this research limits the knowledge about these programs. The search methodology for game degree programs is outlined in Chapters 2 and 3. Game degree programs that were not found through this method are not considered in this research.

Significance of the Study

During the last decade, game degree programs have come into existence as new academic programs at post-secondary institutions. Along with the absence of literature, there are indications within the UK that "ad hoc feedback from the industry suggests that most games graduates are not considered high enough quality by the industry" (Department of Trade & Investment, 2007, p. 58), indicating that game degree programs may be falling short of producing qualified graduates. The content of the game degree

program and how it was created can provide insight into unexamined areas. At the same time, the need for game developers with qualified skills is noted as a gap by the games industry. In a State of the Industry Report published by Tiga, for example, results of a survey found that 63% of developers in the UK have faced skills shortages over the previous 12 months (Tiga, 2009a, 2009b). The Report also noted that 88% of respondents noted that it was difficult to fill vacancies due to a shortage of applicants with the required skills, experience, or qualifications. It further stated that the impact of these shortages "...was an increase in workload for existing staff, delays in developing new products and services and an impediment to organizational growth" (p. 18).

This study identifies patterns in the game degree program curriculum planning process within the UK and the US, then compares those patterns against each other and against existing curriculum theories. In part, this study also identifies the lack of educational research for consideration by game education researchers, departments who are interested in implementing or modifying game curriculum at their institution, and international and national associations that are responsible for the creation of curriculum framework for game degree programs. Associations include the Interim Review Task Force of the ACM and IEEE Computer Society's Computing Science 2008 Computing Curricula (2008) document, a standard curriculum framework for computer science programs, the IGDA Game Education Special Interest Group's Curriculum Framework (2008), and, within the UK, the SkillSet organization provides criteria for accreditation of game degree programs (SkillSet, 2009).

Current curriculum research also explores the creation of educational programs that meets the needs of international students and opens the door for transferable coursework from comparable programs of study (Luxon & Peelo, 2009; Witte, Sequeira, & Fonteyne, 2003). As the international barriers drop and the global perspective increases in academia, the number of international students studying at universities continues to grow, (Organisation for Economic Co-Operation and Development [OECD], 2008; Yonezawa, Akiba, & Hirouchi, 2009). Between 2000 and 2006, the overall number of international students enrolled in over 20 countries counted by OECD grew from 1.9 million to 2.9 million, an increase of over 50%, "mirroring the growing globalization of economies and societies" (p. 352). The US and the UK are the two top countries that host the highest percentage of international students, accounting for 20% and 11% of all international students, respectively. With the increase in international students and students seeking an experience studying abroad, curriculum planners may also be interested in creating courses and programs with enough flexibility for students to be able to apply their study abroad coursework to their University's degree requirements.

This study is important for each of those groups and individuals. Game education researchers can build upon this research for explaining differences in game degree programs and potentially the competencies of students matriculating from those programs. Institutions who are interested in implementing or modifying game curriculum at their institutions will benefit from reviewing the analysis of influencing factors to consider when developing a game degree program (see Chapter 5). Associations responsible for the creation of curriculum framework for game degree programs can refer

to this research in creating recommendations for institutions. Additionally, curriculum researchers around the world, but particularly in the UK and the US, will be able to draw on this research to identify differences in philosophies employed and influencing factors considered when creating programs in general.

Summary

A casual review of program websites indicates that there are consistencies across game degree programs, but other programs are unique and appear to fit a particular niche. With the recent advent of game degree programs, the formal research about these programs has not yet matured, including a comparison of how programs are created and what considerations are given when developing game degree program curriculum. Due to this limited availability of formal research, the literature review contained in Chapter 2 first defines games, then reviews the formal educational research on existing game degree programs as well as the research for computer science and art. This includes an analysis of the major trends and themes found in game degree programs, including those major trends and themes found in the educational research of the more mature programs of computer science and art that appear to be absent in game degree program research. It also reviews the framework of curriculum planning models advocated by curriculum theorists and reviews other research that has mapped the curriculum planning processes to curriculum framework models. It concludes with a description of the available game degree programs both in the UK and the US.

Chapter 3 describes the methodology for this explanatory methods research study. The description includes the research design and setting, identifies the pool of

participants for the study, data collection techniques, instrumentation, ethical issues, and the data analysis procedure for the study.

Chapter 4 contains the results of the study. This includes the results of the quantitative survey instrument with respect to the three research questions and includes respondents' demographic information. It also includes the results of the qualitative study, including supporting statements from the participants for themes generated from the data.

Chapter 5 contains an analysis of the results of the study. It also includes research areas that addresses questions generated by the results of this study and that can be explored in the future.

Appendix A contains the survey instrument used in the quantitative portion of the research. Appendix B contains the list of semi-structured interview questions for the follow-up interviews. Appendices C and D contain the basic information about game degree programs in the UK and the US. Appendix E contains the themed responses from the open-ended questions in the survey. Appendix F contains the raw themes and codes from the follow-up interviews.

CHAPTER II

LITERATURE REVIEW

Introduction to the Literature Review

This literature review is divided into four major sections. A review of the definition of games and digital games is followed by a review of the formal, peer-reviewed literature on game degree programs at post-secondary institutions. A review of the literature on curriculum frameworks, including several modern and post-modern theories, follows. The literature review ends with an analysis of the literature on existing post-secondary institutions and game degree programs in the UK and the US. Each section also contains a summary section that provides an analysis of the literature.

Literature Defining Games and Digital Games

The literature review on the definition of games and digital games provides insight into the basis of what is taught in game degree programs. This section provides several definitions of games and digital games.

Games

The definition of games varies to some extent and can be based on the interpretation of an individual. Starting with the basic definition of *game* from Merriam-

Webster (n.d.), there are four definitions for the word. The relevant definition for *game* (as a singular noun) as it is referred to in play is:

> *3 a (1)* : a physical or mental competition conducted according to rules with the participants in direct opposition to each other *(2)* : a division of a larger contest *(3)* : the number of points necessary to win *(4)* : points scored in certain card games (as in all fours) by a player whose cards count up the highest *(5)* : the manner of playing in a contest *(6)* : the set of rules governing a game *(7)* : a particular aspect or phase of play in a game or sport <a football team's kicking *game*>

Similar to this definition, Salen and Zimmerman (2004) state that the term game has been defined in various ways historically, economically, and semantically. They analyze several definitions provided by scholars and practitioners, including sociologists, anthropologists, historians, and game industry professionals. Each of these contributors had a different perspective on what a game actually is. For example, Brian Sutton-Smith, a game industry professional, defined games as "...an exercise of voluntary control systems, in which there is a contest between powers, confined by rules in order to produce a disequilibrial outcome" (p. 78). David Parlett, a game historian, states that a "formal game has a twofold structure based on ends and means" (p. 74). He describes ends to be a "contest to achieve an objective" and means as "an agreed set of equipment and of procedural 'rules' by which the equipment is manipulated to produce a winning situation" (p. 74).

Salen and Zimmerman's comparison of the eight definitions yielded one common description for game. The common definition is that a game "proceeds according to rules that limit players" (p. 79)" Though other aspects of games may be included in definitions, many of these are based in context to particular games and are open for debate. For example, a game may or may not be goal-oriented. For the purposes of game development, the authors create the following definition: "A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" (p. 80).

Digital Games

Digital games are games that are contextualized in a digital setting, rather than a non-digital setting like physical sports games, board games, and physical games. Digital is representative of systems that are not analog in nature and that are typically based in hardware and software. The term digital games is widely used to represent computer games on a computer or laptop platform, consoles (e.g. Wii, Playstation, and Xbox), mobile handheld devices (e.g. iPhone, Nintendo DS), kiosks (or other interactive display units), online gaming, augmented reality games, and more. The accessories and platforms for digital games change rapidly and research continues on these devices for gameplay. Terms like digital games based learning are now standard in academia (Prensky, 2003).

Summary

There are many definitions for the word game throughout the ages and the definitions are available in a variety of languages and cultures. For this research, the author uses an adaptation of Salen and Zimmerman's definition, incorporating the digital

aspect of this research. A digital game is a system in which players engage in an artificial conflict in a digital environment, defined by rules, that results in a quantifiable outcome.

Game degree programs are designed for students to learn how to create digital games. There are many aspects to developing games, including creating the game rules and strategies, creating the artifacts used in the game, and programming the software for implementing the rules and incorporating the artifacts. The game degree programs reviewed and researched in this study are all digital game degree programs.

Literature on Game Degree Programs

The literature review on game degree programs has three sections resulting from a thorough analysis of journals, conference proceedings, and panel discussions. All of the materials reviewed in this section were peer-reviewed. This section is divided into three parts, a review of literature on game degree programs as a whole, a review of literature on individual institutions, and a review of literature of the related fields of computer science and art.

Collective Research

A review of the research on game degree programs found few articles. Outside of the author's own studies, only two formal, peer-reviewed research articles analyzing the game degree programs collectively could be found.

Games throughout the Curriculum

Morrison and Preston (2009) review the formal literature and found 44 programs that incorporate games into their traditional computer science curriculum, either through contextualizing games in courses, adding specific courses, offering a full degree program,

or offering a certificate or concentration. Of those found, 6 programs offered certificates or concentrations, 16 offered select courses, and 21 offered a full degree program.

The authors define the 21 full degree programs via a categorization of program courses as either game-related, computing, or arts/humanities. Percentages were calculated to determine the emphasis of each program in each area. This quantitative analysis illustrated that programs at different institutions offered a wide variety of coursework and their area of focus also differed.

Games Programs in the United Kingdom

The number of students in the Computer Games Development (CGD) courses offered in the United Kingdom (UK) have increased dramatically since their inception in 2004 (Ip & Capey, 2008). The authors report that, as of 2008, there were 319 CGD courses offered in the UK, which is comparable to other well-established fields like computer science (362), law (363), and mathematics (336). There are concerns within the UK about the lack of alignment of CGD curriculum with industry needs, the quality of students' skills upon completion of the program, and the lack of ability for programs to keep pace with the rapid change in technology, though these concerns have only been expressed in magazine articles.

Aligning Industry Needs with Program Curriculum

The author has contributed three articles to the literature that identify the qualifications of game professionals sought by industry and compare those with the qualifications being taught to undergraduate students in game degree programs (McGill, 2008, 2009a, 2009b). The studies include results of an analysis of data being collected

from online job advertisements for software development positions within the game industry and an analysis of survey results of both academic institutions with game degree programs and industry professionals. These studies shed light on the types of qualifications that academic institutions might want to include in their programs to ensure that their graduates have the qualifications sought by industry, including knowledge of specific areas, familiarity with specific languages and tools, and a development of attitudes and dispositions best suited for the game industry.

Individual Institutions

Only a handful of formal, peer-reviewed research and case studies about game degree programs at individual institutions currently exists (Morrison & Preston, 2009). An exhaustive search for papers and articles was performed by searching on keywords (such as game, games, curriculum, degrees, IGDA, and/or programs) and also by searching on known topics of interest to those who teach game curriculum (such as art, games, video, and capstone courses) in key educational, technology, and arts literature. Though many instances of incorporating games into traditional computer science classroom assignments were readily available, published research on game degree program curriculum was scarce (Becker, 2001; Leutenegger, 2006; Volk, 2008; Xu, Blank, & Kumar, 2008). The remainder of this section provides a brief summary into each of these papers.

The majority of the papers were descriptions of issues within particular courses that, in addition to the research on that issue, also provided a brief synopsis of the game

degree program. Only one paper could be defined as a case study of a game degree program, which is a concentration at Marist College.

DePaul University, USA

DePaul University's game degree program is jointly established between the School of Computing and the School of Cinema and Interactive Media and has two concentrations, Game Programming and Production and Design (Linhoff & Settle, 2008, 2009). Production and Design students take courses in game development, game design, game modding, programming, animation, project management, budgeting, contract negotiation, marketing, and quality assurance. Game Programming students take traditional computer science courses but apply the knowledge learned to game programming. Students take computer science, computer graphics, linear algebra, game physics, and artificial intelligence. Both sets of students come together in a culminating two-quarter capstone sequence.

Marist College, USA

Marist College has a game concentration housed within the computer science curriculum, focusing on the software development aspects of game development (Coleman, Krembs, et al., 2005). The Concentration does not incorporate elements of storytelling, visual design, or sound design. The program is in part based on the IGDA Curriculum Framework with the focus on Game Design and Game Programming. The motivation behind the Concentration includes attracting, retaining and preparing new computer science students.

The program started with a sequence of two Game Design and Programming courses. Math and physics have been added to the program. One area of concern noted is the workload of the new program on the faculty. The program uses a specific game engine to teach game engine programming (Coleman, Roebke, & Grayson, 2005).

Murdoch University, Australia

Murdoch University has a Games Technology and Simulation program resulting in a Games Technology degree. The program focuses on game software development, with the traditional computer science course load for students supplemented with topics such as mathematics, physics, art, audio, animation, story-telling, and additional topics in artificial intelligence. The program aligns with the IGDA Curriculum Framework, though no mention is made in the article about using the Framework as a guide in creating the program.

The program has specific objectives and aims that were created at the onset of the program creation. Faculty includes a game professional teaching game design.

Rochester Institute of Technology, USA

First offered in 2008, the Rochester Institute of Technology (RIT) Game Design and Development program is a Bachelor of Science degree program (major) (Bayliss, 2009; Bayliss & Bierre, 2008). Students in this program appear to differ from Computer Science students in that they have less previous programming experience and differ from Information Technology students in that they are not drawn to the field in search of higher salaries. The program also has attracted more female students.

The program consists of an introductory course on Information Technology and the program itself is heavily focused on computer science concepts. The program uses games as an application area in traditional computer science classrooms and one paper provides detailed information about how to use this technique successfully.

Swansea Metropolitan University, UK

Established in 2004, the Swansea Metropolitan University's (SMU) game degree program was one of the first in the United Kingdom (Ip & Capey, 2008). This program was created from an art and design perspective, where the focus is on artistry, ludology, production, and narrative (storytelling) components of games. It requires three years of study with students in years two and three completing an entire game project throughout each year. The program was also created using the IGDA Curriculum Framework and is regularly reviewed by industry professionals and academics.

University of Denver, USA

The University of Denver (UD) recognized that it would encounter resource issues and developed a program that uses a unified sequence for freshman Computer Science and Game Development majors (Leutenegger & Edgington, 2007). The computer science courses tend to have games as a primary concept. Additionally, the major requires knowledge of traditional computer science coursework, including data structures, algorithms, operating systems, graphics, and game programming.

University of North Texas, USA

There are two options that are offered in the University of North Texas (UNT) game degree program, one for traditional computer science curriculum and one for game

art and design in the progressive art curriculum (Parberry, Kazemzadeh, & Roden, 2006; Parberry, Roden, & Kazemzadeh, 2005). A key component of the programs requires computer science and art students to work in teams on joint game projects in a format similar to capstone projects, where a game is built over the course of one or two semesters. Another key component is UNT's close ties to industry and how these ties influence in-class projects.

Courses that are offered include topics on game design, game programming, and advanced game programming. UNT has a dedicated game programming laboratory with specific hardware, software, and space requirements for teams working on creating and implementing games.

University of Southern California, USA

Since 2007, the University of Southern California (USC) offers a game degree program as part of the Computer Science degree (Zyda, Lacour, & Swain, 2008). Part of the motivation behind the program was to increase the number of undergraduates in the Computer Science program. This program works within the framework of the existing Computer Science program, but the degree has been slightly modified to replace electives with game development courses. When creating the program, faculty spoke with game developers working in the industry to determine what types of skills students should learn in the program.

USC's program includes courses in game engineering, game design, and cross-disciplinary courses with students from interactive media, animation, and fine arts. The program consists of final game projects and advanced game projects (similar to capstone

projects) where students from the various areas (art, interactive media, etc.) collaborate to create a game throughout the semester. The projects end in a Demo Day experience, where game industry visitors come and preview the games.

University of Utah, USA

The University of Utah (UU) has a recently developed interdisciplinary program, a track, focusing on the instruction of video game development and computer animation and formed by the School of Computing and the Division of Film Studies (Kessler, et al., 2009).

UU received input from industry at the on-set of the curriculum planning process from a variety of game and animation studios. Through these discussions, UU identified the following two major themes: a program must be interdisciplinary in nature and studios wanted students that were either computer scientists or artists with "significant interdisciplinary experiences" (p. 535). This fit in with their overall goal of having their computer science graduates who chose the game track to be able to pursue traditional CS careers.

The curriculum planners were motivated to develop their program to stem the decline of enrollment in their computer science program by opening an avenue for entry by non-traditional computer science students. Likewise, there had been a decline in the number of students studying film studies and the adaptation of video games and 3D animation into the program in order to increase enrollment was also a motivating factor.

Coursework requires students to take many courses together and provide their specific skills in teams. Courses consist of video game theory and design, computer

science courses, film production, 3D digital character production and texturing for animation, video games, and machinima; computer animation; and game development history and genres. Additionally, two CS courses were contextualized in the entertainment arts. Students are also required to take an interdisciplinary capstone project that requires teams consisting of those found in industry. This course is team taught by CS and Film professors.

Curriculum Research in Related Fields

Curriculum in related fields, such as computer science and art, has been researched and formally disseminated through journals, conference proceedings, and more. This section contains a brief synopsis of the research in both the computer science and art education literature that provides insight into the research still to be performed on game degree programs at post-secondary institutions. Neither section is meant to serve as an exhaustive list, but rather an analysis of some of the major research themes found in each.

Computer Science

Though the field was relatively new at the time, Austing, Barnes, and Engil (Austing, Barnes, & Engel, 1977) performed a survey of the literature in computer science education. The extensive review included over 200 research articles on computer science education. The authors established five categories of research, Survey Reports (reporting on the curriculum at various institutions), Activities of Professional Organizations, Philosophy of Programs, Description of Programs, and Description of Courses within the programs. The survey included articles with titles such as

"Undergraduate Education in Computing Science—Some Immediate Problems," "Problems of Computer Science Education in Small Colleges," "Industry's Need and Computer Science Departments," and "Education in Information Science."

A review of additional papers indicates that the following areas have all been formally reviewed and peer-reviewed in computer science education. The number of search results found in each of these areas was vast. The referenced articles represent only a fraction of the number of articles published in each of these areas.

Curriculum content focus areas. The curriculum content research includes the focus areas (or contextual areas) of the computer science curriculum (Blum & McCoey, 2007; Cicalese, DeWitt, & Martin, 2005; Gellenbeck, 2005; Ralston, Chrisman, Jehn, Poirier, & Vecchio, 1981; Rine, 1978). These include areas such as math, engineering, accessibility, ethics, business skills, and more.

Curriculum structure. There are several papers that can be defined as case studies, where the authors have represented in detail their computer science curriculum and their rationale for its structure (Chua & Winton, 1983; Liberal Arts Computer Science Consortium [LACSC], 2007; Gibbs & Tucker, 1986; Streib & White, 2002).

Curriculum definition. The Association of Computing Machinery (ACM) is an international organization offers extensive curriculum guidelines for creating, revising, and implementing computer science programs. Many articles describe curriculum guidelines, while others compare or analyze the guidelines against their individual institution or a collective body of knowledge of institutions through quantitative or

qualitative means (Atchison, et al., 1968; Couger, 1973; Mitchell & Mabis, 1978; Paxton, Ross, & Starkey, 1993; Samaka, 2002).

Curriculum and instructional approaches. There are thousands of articles on improving classroom curriculum and instructional practices (Bennedsen & Caspersen, 2005; Bullers, 2004; Tolhurst & Baker, 2003). These include case studies, quantitative and qualitative studies, and theory analysis.

Assessment. Assessment of programs, courses, and projects within courses have been researched and published (Richards, 2009; Sanders & McCartney, 2003; Sitthiworachart & Joy, 2004; Yao, Liu, Grubb, & Williams, 2007).

Facilities. Articles on facilities, in particular laboratory facilities for computing, can be found throughout the literature (Hunt, 1970; Lang & Smith, 1993; Robert L. Tureman, 1994; Soh, Samal, & Nugent, 2005). Articles cover such topics as how to run and manage a laboratory, cost-benefit analysis of operating the laboratories, how laboratories are used in computer science education, and more.

Program issues and concerns. A number of issues and concerns are addressed throughout the literature, including issues related to gender, faculty, minorities, recruitment, retention, and more (S. Alexander, et al., 2003; Burge & Suarez, 2005; Clayton, Hellens, & Nielsen, 2009; Crenshaw, Chambers, & Metcalf, 2008; Mitchell, 1986; Richard G. Montanelli & Mamrak, 1976). Each of these issues directly impact curriculum and/or instruction in one or more ways.

Art

The world of art education is looked at more collectively than individual settings through case studies. One of the guiding forces of art education in the United States is the Handbook of Research and Policy in Art Education (National Art Education Association [NAEA], 2004; Dorn, 2006). This handbook, a project of the NAEA, breaks art education into several categories, including Historical Currents in Art Education, Policy Perspectives Impacting the Teaching of Art, Learning in the Visual Arts, Teaching and Teacher Education, Forms of Assessment in Art Education, and Emerging Visions of the Field. Each of these areas is supported by published, peer-reviewed research. Since art is taught at a much earlier age than computer science, many of the articles throughout the handbook as well as in the literature refer to the methods of art education for all grade levels and are not specific to undergraduate education.

Published works of art. Given the nature of this creative production field, publications present completed works of art for an individual or for a collective group of individuals (Allsop, 2006; EBSCO, 2009; Durgin, 2008). This can be found at curated and juried exhibits, but also through records of exhibits and works. Additionally, the College Art Association (CAA), a professional organization for art educators at the post-secondary level, provides formal critiques of books, exhibitions, and projects (College Art Association [CAA], 2009).

Curriculum structure. Many articles can be found on the structure of the curriculum, both individual case studies of institutions as well as reviewing the

curriculum of art education as a whole (Barnstone, 2008; Masudo, 2003; Narayanan, 2006).

Curriculum and instructional approaches. Researchers report on individual case studies of coursework activities, the study of a field of art as a whole, how new forms of media affect the curriculum, and methods of teaching art (Ebert & Bailey, 2002; Maslak, 2006; Motomura, 2003; Pike, 2004).

Assessment. Research on forms of assessment for overall programs as well as individual courses and students have all been reviewed and published (H. Alexander, 2003; Joe, Harmes, & Barry, 2008; Mansilla & Duraisingh, 2007; Yamada, 2003).

Program issues and concerns. Program issues and concerns range from teacher education, quality of faculty, introduction of new forms of media, intercultural issues in art education, and various other issues in art education (Ippolito, Blais, Smith, Evans, & Stormer, 2009; Kim, 2004; Mahoney & Schamber, 2004; Stostky & Haverty, 2004).

Major Trends and Themes within the Game degree program Literature

The major trends and themes of the educational research of game degree programs are based on the peer-reviewed research available through July 2009 and included in the literature review in the previous section. This section identifies nine themes and trends based on a qualitative review of the content found within the literature.

Curriculum development. Within the articles, three programs mention their usage of the IGDA Curriculum Framework for developing their curriculum (Marist, USC, and SMU). One program mentions the alignment of IGDA framework with their program

(Murdoch). Additionally, two programs (USC and SMU) have either received input from game industry professionals at program inception or during program reviews.

Curriculum structure. The majority of these programs were created from the computer science curriculum (Marist, UD, USC, RIT, DePaul, Murdoch). With this focus, the schools often require extensive knowledge of traditional computer science concepts. Two have two different game degree programs, one more game programming/software development focused and the other more art and design focused (UNT, DePaul). One of the programs is primarily focused on art and design (SMU).

Capstone project. Almost of all the programs utilize a capstone project approach to their courses, either as a final course or as a sequence of courses (UNT, DePaul, USC, SMU, Murdoch). Some of these programs (UNT, DePaul) bring together game students from various fields (like art, computer science, and interactive media) to create capstone games.

Courses. Types of courses offered vary across these institutions and their respective programs; however, since a majority of these programs are housed within the computer science curriculum, the curriculum is heavily centered on software development. Types of courses offered are traditional computer courses with an additional set of courses in math, physics, game development, game design, game modding, game engineering, game programming, animation, project management, budgeting, contract negotiation, marketing, quality assurance, computer graphics, and artificial intelligence.

Motivation for the program. Two programs expressed interest in increasing the number of students in their computer science programs (Marist College, USC).

Student placement within industry. Only University of North Texas provides information on placement of students within industry. USC has a Demo Day experience where game industry visitors come and preview the games.

Faculty workload. Two institutions (Marist, UD) remarked on the need of weighing faculty workload against the current computer science curriculum, due to no additional faculty being added to support the program.

Facilities. Only one institution (UNT) formally defines a game programming laboratory with specific hardware, software, and space requirements for teams working on creating and debugging games.

Student body demographics and composition. Only one university, RIT, has reported on an analysis of the types of students entering the program, indicating that there are more female students than in traditional CS and the students appear to have different motivations than traditional CS majors.

Gaps in Game degree program Research

When compared against the more mature academic programs of computer science and art, research on game degree programs lacks both breadth and depth. This section provides a categorized list of eleven umbrella areas of educational research that can help fill this gap and provide a richer source of collective knowledge for those institutions with existing programs and those who are seeking to create new programs. A variety of research using quantitative and qualitative measures, case studies, published creative

works, philosophies and theories, and working group reports will provide a robust perspective on game degree programs.

Activities of professional organizations. Activities of professional organizations related to game degree programs, such as the IGDA, ACM, Institute of Electrical and Electronics Engineers, and NAEA, are all missing from the research. Though there are documents with game degree program framework available from organizations, the framework themselves, including the usage, philosophy, and structure of the frameworks is missing from the literature. This is critical particularly for institutions interested in developing a program. Other than the framework itself, there is little to assist an institution in translating the framework into a living curriculum.

Philosophy of programs. Program philosophies within and across programs still are missing in the researched. This includes literature explaining different types of programs, the collaborative nature of programs, the motivations for creating programs, and the focus areas of programs (such as serious games, humane games, etc.).

Curriculum development. From inception to implementation, the obstacles, challenges, and successes of the curriculum creation, including the structure of the curriculum and any curriculum framework used, is non-existent and should all become part of the literature.

Curriculum and instructional approaches. There are many research papers that focus on incorporating games into traditional computer science courses and also research papers on game courses that are outside of a game degree program. However, there are only a handful of papers covering research on curriculum and instructional approaches

within the courses of game degree programs. More research on these areas would provide additional resources for faculty who teach new and existing game courses within game degree programs.

Description of programs. There is a lack of research on the description of existing game degree programs. The types of research that can be performed include case studies, comparative analysis, and quantitative and qualitative research. The comparative analysis can be across or within different types of game degree programs (major, minor, concentration, specialization, etc.).

Description of courses. There are few papers that discuss the structure of the course itself and what has been researched has focused on the nature of capstone projects. Case studies, quantitative and qualitative studies, and research on particular issues like scaffolding of curriculum within and across courses will provide additional information for others.

Tools and environments. Though some limited research exists on tools and environments used in game degree programs, this research can benefit those who are seeking new or alternative tools and environments for their students.

Facilities. Research about facility issues for game degree programs, specifically laboratory structure and management for use in the game curriculum, is currently completely missing from the research.

Published works. Several existing game degree programs require students to engage in a capstone course, where a team-based game project results in a fully-functional game. Similar to the creative production in art programs, games can be

researched as a case study, in a comparative analysis against other games, and, for serious games, quantitative or qualitative analysis of whether or not the objectives of the serious games have been achieved.

Assessment. Since many game degree programs engage both artists and programmers (and sometimes others) within a single course, this can present a unique challenge to assessment for the different students. Research on this issue, as well as effectiveness of programs, is currently missing and is needed to provide faculty and institutions with more resources to build and improve their programs.

Problems and issues. There are a plethora of problems and issues that have yet to be addressed in the research. One of these, alluded to in some of the existing research, is the evaluation of faculty and the faculty workload within these programs. Other issues that should be researched are the success of programs in placing their students within industry and the methods developed for creating relationships necessary to make those placements happen.

Research on the diversity of the program faculty and students is important as well as any steps taken to rectify the lack of diversity in programs. Student recruitment and retention can also provide insight into recruiting the right student for an institution's particular program.

Hiring qualified faculty (or training existing faculty) appears in the research for both Art and Computer Science, and it may also be an issue worthy of research in game degree programs. Additionally, with the rapid technology changes in hardware and input

devices, research on the success of faculty to learn and integrate new technologies into their game courses would be beneficial.

Summary

With the exception of the previously referenced articles, research on game degree programs at post-secondary institutions is virtually non-existent, particularly when compared to the mature, related fields of computer science and art. This is not unusual, since the field is relatively young and the majority of these programs have been implemented within the last decade. This review has outlined the areas of research that still need to be performed in order to advance the literature and to provide knowledge for creating new and improving existing programs.

Researchers can begin the process of explicitly identifying elements of their respective programs that could contribute to this knowledge. Case studies, quantitative and qualitative studies, and comparative analysis of programs published in peer-reviewed journals and articles are all necessary to advance and mature the field. Specifically, there is little information on the curriculum planning process and there are no studies comparing game degree programs across countries.

Literature on Curriculum Theories and Frameworks

This section of the literature review details several curriculum theorists and their frameworks. Theorists are grouped into two sections, one reviewing theories and frameworks proposed by modern theorists and the other reviewing post-modern curriculum theories. Rather than serving as an exhaustive review of all curriculum theorists, this section provides background needed to identify different philosophies and

influencing factors considered by curriculum theorists that may be relevant to the curriculum planning process. Several theories are discussed in detail to provide insight into the proposed theories and framework.

At the end of this section, a comparative analysis of the frameworks is provided with an emphasis on important artifacts proposed by the theorists that may influence game degree programs.

Modern Curriculum Theories

Modern curriculum theorists developed their theories based on science and turn of the century production theories like those espoused by Taylor's theories on scientific management (Taylor, 1916). They used an approach called scientism to employ logic, precision, and mechanics to solve the problems of society (Hunkins & Hammill, 1994). Education was one other mechanical system that could be used to contribution to the solution of these problems. These theorists viewed curriculum through the lens of science.

The field of modern theorists ranges from as early as Bobbitt in 1918, through Tyler, an educational theorist in the middle of the 20th century, and the many predecessors that built upon the works of these theorists. Bobbitt envisioned a system of curriculum development that defined and accounted for the curriculum aims and objectives, students needs, and learning experiences. He also argued that the curriculum planning process "...cut across subject matter," and was not inherent to any particular field or content (Hunkins & Hammill, 1994, p. 6).

Tyler built upon Bobbitt's views and proposed philosophies on curriculum planning that are still highly relevant today. Tyler's Rationale is a series of four questions that must be answered prior to planning (Tyler, 1949),. These four questions are (a) What educational purposes should the school seek to attain? (b) How can learning experiences be selected which are likely to be useful in attaining these objectives? (c) How can learning experiences be organized for effective instruction? and (d) How can the effectiveness of learning experiences be evaluated? He then follows these questions with an explanation of how institutions can proceed successfully through the curriculum planning process. Comparing these questions against Bobbitt's work, one can see that aims are considered in question 1, objectives are considered in question 2, and learning experiences are considered in questions 3 and 4. Tyler explores the needs of students in each of these areas.

Tyler states that in order to make relevant judgments about objectives for a program, curriculum planners must have a "comprehensive philosophy of education" (p. 4). He promotes the idea that there is not one single source of information about how to adequately provide a basis for decisions about the program objectives, but rather many sources from various perspectives that must be considered. He analyzes the groups, particularly social, that advocate these various perspectives and how they affect curriculum planning.

Tyler encapsulates those thoughts presented by more contemporary scholars when he discusses the concept of educators considering the present interests of their learners (Ladson-Billings, 1998). Tyler states that an educational program should only have

"...the number of objectives that can actually be attained in significant degree in the time available, and that these be really important ones" (p. 33). He states that an institution's educational philosophy should address the question "[s]hould the school develop young people to fit into the present society as it is or does the school have a revolutionary mission to develop young people who will seek to improve the society" (p. 35).

Tyler proposes that institutions or programs must adopt a psychology of learning that leads to an increase in the retention of learned material as well as the capability for the model to be used to achieve other predefined goals. In order to form objectives, Tyler presses on the idea of stating objectives in terms that can aid in the selection of learning experiences, but not in terms of what the instructor plans to do. The "learning experience," as he describes it, is the "...interaction between the learner and the external conditions in the environment to which he can react" (p. 63). He promotes sequencing activities and the importance of organizing learning effectively and details the creation of evaluation methods (or program assessment).

John Goodlad, a student of Tyler, took the Tyler Rational and incorporated it into three levels of curriculum planning, the instructional level, the institutional level, and the societal level (Posner, 1998). Each of these three levels can be defined as the level closest to the learner, the level that requires the formulation of general (or overarching) educational objectives, and the level that represents the institution's sanctioning body, like the school board or board of trustees. In so doing, Goodlad recognizes the many political and ethical questions that arise within curriculum planning that are brought up in each of the three levels. His model has been extended further to include state and national

levels. These levels include those requirements set forth by influencing state and national bodies. His work is important, as it gives another perspective about the different and sometimes competing criteria that curriculum planners must consider.

Hilda Taba is another scholar who has taken Tyler's Rationale and translated it into an outline for planning curriculum, though she acknowledges that the process itself is not linear (Taba, 1962). Her seven points include diagnosis of needs, formulation of objectives, selection of content, organization of content, selection of learning experiences, organization of learning experiences, and a determination of what to evaluate and the ways and means of doing that.

Diagnosis of needs seeks to diagnose the student and determine the backgrounds of the students. The objectives are based on the levels of students and what they can reasonably achieve. The objectives must also be formulated, and Taba considers this an "essential platform for the curriculum" (p. 12). It determines the importance of the content and as well as its organization.

Content selection will depend on the objectives, the level at which the content should be introduced, its validity and significance, and the ability to make distinctions between various content areas. Similar to selection of content, the organization of the content depends on objectives as well as other rationale specified in content selection.

Taba specifically defines the selection of learning experiences as involving "ideas about such matters as strategies of concept attainment and sequences in formation of attitudes and sensitivities" (p. 13). She emphasizes that this must be decided on during the curriculum planning process, rather than delegated to individual teachers in their

classrooms. The organization of those experiences relies on the selection of learning experiences. She suggests that selecting and organizing learning experiences are interdependent tasks.

At some point, Taba recommends that there must be a determination of what to evaluate and of ways and means of doing it. The quality of learning must be evaluated to "assure that the ends of education are being achieved" (p. 13).

Taba stated that curriculum development requires a level of expertise in the technical aspects of curriculum development, in the discipline being formed into a curriculum, in both the social and educational values that are necessary to make sound educational decisions, and in the processes involved, including the aspects of human engineering. Taba also recognizes the same levels of objectives and decision-making that must occur at the various levels of administration, similar to Goodlad. Similar to Tyler, Taba states that objectives must be rooted in the particular culture and society for the educational institution as well as the age, understanding, and knowledge level of the students.

Walker's work recognizes the human decision making factors that go into curriculum planning and a large piece of his model is centered on deliberation, which is a paradigm shift from other modern theorists. The three elements that it contains are "...the curriculum's platform, its design, and the deliberation associated with it" (Walker, 1971, p. 52). Platforms are those guiding beliefs and values curriculum planners bring to the development process, including their visions for the curriculum and outcomes. He recognizes that the conceptions, theories, and aims in the platform can be contradictory in

nature, particularly among different planners. Decisions must be made based on factual data and include a thorough deliberative process that results in policy and finally design. These decisions are not easy, since each influencing factor must be analyzed, and consequences and costs must be carefully weighed.

Walker refers to the curriculum's design not as a set of materials, but as the entire scope of curriculum that embodies all of the materials that affect the learners. He recognizes that the process is somewhat abstract. Through the planning process, the decisions that are made are then used to make the curriculum design explicit. Implicit design aspects of the curriculum are attributed to those elements included in the design by which decisions do not have to be made. Policy can be viewed as the assumptions and the criteria for the program curriculum and can be referred to in later curriculum planning.

Walker's model is dubbed the naturalistic model. Far from linear, this model de-emphasizes objectives. Objectives are stated in the platform through the aims and are addressed in and evolve out of the deliberation process. The heart of the naturalistic model, as Walker describes it, is the set of design decisions accounted for via deliberation. As defined by Walker, "[t]he main operations in curriculum deliberation are formulating decision points, devising alternative choices at these decision points, considering arguments for and against suggested decision points and decision alternatives, and finally, choosing the most defensible alternative subject to acknowledged constraints" (p. 54). Walker acknowledges that feelings run high in the deliberation process and that personal preferences are often intertwined with rationale

arguments. He states that this process is worthwhile and deliberations provide a venue for the justification of choices.

Postmodern Curriculum Theories

Modern curriculum theories are often a basis for postmodern curriculum theorists who often build upon, restructure, and revise these theories to create their own theories, then often compare these new theories to those of modernists (Hunkins & Hammill, 1994). Postmodern curriculum "...is essentially a metaparadigm encompassing all realms of thinking and action" (p. 5).

Postmodernism contextualizes the curriculum planning process. Rather than promoting a "one size fits all" paradigm, these theorists explore the process within disciplinary lines, thus providing opportunities for diverse thinking and new approaches based on the comparison of theories developed within different disciplines. Postmodern theories support the holistic approach to curriculum creation, understanding that the process is more organic than mechanical in nature. As Hunkins and Hammill state:

> In post-modern curriculum development, we are suggesting that the stress is not on the specific steps of action, but on the relations that result when people get together for the purpose of creating curricula. Rather than bring certainty to the process, there is a pragmatic doubt that results from realizing that decisions are not based on some privileged meta-narrative, but rather on the dynamics of human experiences within the local milieu. (p. 13)

The authors recognize that curriculum planning is "an ongoing social activity molded by myriad contextual influences," and by analyzing this activity and influences one can see a pattern of curriculum actions emerge (p. 14).

The authors use Doll as an example of a postmodern theorist. Doll proposes the theory that postmodern curriculum includes four elements: Richness, Recursion, Relations, and Rigor (Doll, 1993). Curriculum planners incorporate richness by determining how deep the curriculum should go in providing enriching experiences to the students. Recursion is attained by the planners acknowledging that the planning process is both stable and will change. There is no fixed beginning or end to the process, and there is a reflective nature within the construction (and reconstruction) of curriculum.

The Relations criterion is the emphasis on viewing the relationship between the different parts of the curriculum, rather than looking at each part individually. It also emphasizes the social activity required in curriculum building. This is similar to Walker's interpretation of deliberation. Doll's Relations criterion includes conversing, teaching, and learning that is influenced by the contexts experienced by the planners. The Rigor criterion also relates to Walker's naturalistic inquiry. This criterion requires planners to "constantly question their actions and the results of their actions" (p. 17).

Doll's Relations criterion relate to the theories put forth by Barone and Blumenfeld-Jones (1998). The emphasis of the theories they propose are grounded in the belief that individual curriculum planners bring their life experiences into the curriculum planning process. They state that the life experiences should be brought into the

deliberations of curriculum planning and that these experiences can (and should) be reflected in the curriculum, particularly in social issues of morality and justice.

Beyer and Apple (1998) edited a book on post-modern theorists based on factors that might influence curriculum planning. In describing the organization of their book, they list eight factors that must be considered when planning curriculum, including epistemology, political, economic, ideological, technical, aesthetic, ethical, and historical.

Epistemology accounts for the knowledge that should be attained in the curriculum, including knowing particular facts or the knowledge of a process. Political factors include identifying who controls the selection and distribution of the knowledge. Economic factors consider how the control of this knowledge is not only linked to society, but also how the knowledge is "...linked to the existing and unequal distribution of power, goods, and services in society" (p. 5). Ideological factors consider what knowledge is of most importance. Technical factors include how the knowledge should be made accessible to the students. Aesthetic factors include the linking of curriculum knowledge to the student and making it relevant. Ethical factors consider justice in education and ensuring that moral conduct and community are considered by curriculum planners. Historical factors include those traditions already in the field that may be considered when creating the curriculum.

Wiggins and McTighe (2005) developed a framework for curriculum and instruction planning. The Understanding by Design model is has three primary stages: identify desired results, determine acceptable evidence, and plan learning experiences and instruction. Though the emphasis of this paradigm is on the creation of curriculum for

specific instruction, it has important concepts that should be looked at in the context of curriculum planning.

The emphasis in the first stage, Identify Desired Results, is the development of clear objectives and goals that are to be achieved through the course. To facilitate this process, Wiggins and McTighe created a template to assist the instructor by asking questions about the overarching goal(s) for the course. The emphasis is always placed on the students, and the objectives are intended to be learner-centered. The defined goals are very clear and the objectives all support these goals. Goals should also be framed in terms of transfer tasks that relate to authentic development of the learner. This process also emphasizes true understanding, which is indicated when a student can explain, can interpret, can apply, has perspective, can empathize, and has self-knowledge (or metacognitive awareness). This understanding should be mapped into the objectives as well as the assessment for the course.

Authentic development is assessed via authentic assessment, which is the term used to define the process of evaluating a student using methods or techniques similar to those that the student might encounter in an applied situation. Assessments using this model should be authentic to provide a method of evaluating enduring understandings. Other traditional assessments, like quizzes, exams, and exercises, can supplement this by assessing the essential skills and knowledge areas required for the authentic assessment.

Once the objectives and authentic assessments have been determined, the final stage of creating the lectures and supporting materials can be completed. At this stage, all

lectures and supporting materials should be created with the goal of achieving student success in the authentic assessments.

Other theorists specializing in specific subject areas introduce additional influencing factors on curriculum planning. Dillon (2009) calls these factors milieu and defines them as powerful factors that must be taken into consideration. He states that time/timing and place, circumstances, surrounding conditions, contexts, environments, eras, classroom, school, community, and society all need to be taken into account.

Dlabey (1998) analyzed international business curricula and identified five factors that should be considered, including "1) geographic, historic, economic, cultural and political influences on business; 2) influence of cultural factors on organizational behavior and management style; (3) technology for international business transactions; (4) the global monetary marketplace; and (5) social and economic outcomes of international business activities." Koren, et al, (2008) researched curriculum planning for gerontology students and concluded that obtaining student input, including their learning needs and attitudes, can influence curriculum.

Peters (1975) examines influencing factors for changing and planning curriculum within rural school districts. He notes that the community is a heavily influencing factor, as well as the economic condition, ethnic and cultural character of the community, and political orientation. Resources such as space, size, time, and personnel may not be changeable, but may alter the curriculum. Organizational structure and timing of the curriculum changes must also be considered. Haskins (2005) considers balance and pace of program for sustaining student interest and effort, integrating and linking content from

within and across the program to increase student learning, and shared standards for assessment across the curriculum to increase program quality.

Analysis of Curriculum Theories

These theories and framework were reviewed for philosophies that can (and should) affect curriculum planning and for influencing factors that may affect curriculum planning. Table 1 summarizes the philosophies of various curriculum theorists, while Table 2 summarizes factors (or milieu) that can influence the curriculum planning process.

Philosophies can be broad or narrow. As discovered in the literature, these include philosophies on educational purposes, aims, and objectives; learning experiences; assessment and evaluation; culturally responsive teaching; sequencing; organization; political and ethical issues; epistemology; content selection; social and educational values; learning experiences; material inclusion; curriculum richness; rigidity or flexibility of the curriculum relationship between curriculum parts and planners/implementers; and due diligence (and deliberation) of the planning process.

There are also a variety of influencing factors that are supported by the literature and that planners may consider. These include experience the planners have in planning curriculum; overarching objectives of the program's governing body (or bodies); external or internal assessment measures and standards; age, understanding, and knowledge level of students; life experiences of the planners; political agendas; economic factors;

Table 1

Curriculum Planning Philosophies of Theorists

Theorist	Curriculum Planning Philosophies
Bobbitt	Based on scientific management theories Theories based on quantifying the process Generic rules apply to all curriculum planning regardless of context Scientism
Doll	Curriculum richness Rigidity or flexibility of the curriculum Relationship between curriculum parts and planners/implementers Due diligence (deliberation) of the planning process
Goodlad	Occurs at the instructional, institutional, and societal level Political and ethical issues are considered and addressed State and national bodies are considered Criteria are in competition
Haskins	Balance and pace of program for sustaining student interest and effort Integration and linking of content from within and across the program to increase student learning Shared standards for assessment across the curriculum to increase program quality
Landon & Beyer	Epistemology – emphasize nature and development of knowledge
Taba	Diagnose needs Formulation of objectives Selection and organization of content Selection and organization of learning experiences Determination of what to evaluate and how to do it Not linear in nature Should be performed by experts in curriculum development Human engineering should be considered Different levels of administration must be considered Objectives rooted in the culture and society of the educational institution

Table 1 *(continued)*

Theorist	Curriculum Planning Philosophies
Tyler	Seek out educational purposes/objectives Select learning experiences to meet objectives Organize learning experiences for effective instruction Evaluate effectiveness Comprehensive philosophy of education Respond to interests of the learners Number of objectives must be weighed against time available for teaching Learners should learn to fit into society *or* seek to improve it Adopt a psychology of learning
Walker	Consideration of human decision making factors Deliberation accepted as natural part of planning Elements contain the curriculum platform, design, and deliberation Curriculum planners beliefs, values, and individual visions considered Base on factual data Deliberation process results in policy and final design Entire scope of curriculum (resources and materials) Assumptions and criteria for the program curriculum
Wiggins & McTighe	Emphasize the identification of desired results based on objectives and goals Usage of templates for curriculum planning Emphasize authentic development and evaluate based on authentic assessment Build the resources and material around authentic assessment

ideological factors; technical factors; ethical factors; historical factors; cultural factors (including community); resources (like technology, space, personnel, time); social and economic outcomes; student input, learning needs, and attitudes; organizational structure; timing; and student interest and effort.

Table 2

Influencing Factors Considered in Curriculum Planning

Theorist	Influencing Factors in Curriculum Planning
Barone & Blumenfeld-Jones	Life experiences of planners Social issues, particularly morality and justice
Dillon	Time/timing and place Circumstances Surrounding conditions Contexts Environments Eras Classroom School Community Society
Dlabey	Geographic, historic, economic, cultural and political Technology Globalization Social and economic outcomes
Doll	Contextual experiences of the planners
Goodlad	Instructional influences Institutional influences Societal influences State and national influences
Koren	Student input, learning needs, and attitudes
Landon and Beyer	Political agendas Ideological and Economic Technical Aesthetic – relevance to student Ethical Historical and Cultural (including community)

Table 2 *(continued)*

Theorist	Influencing Factors in Curriculum Planning
Peters	Economic conditions of community Ethnic and cultural character of community Political orientation of community Resources (technology, space, personnel, time) Organizational structure Timing of the curriculum changes
Taba	Experience the planners have in planning curriculum Experience the planners have in the discipline of study Societal and educational values Experiences and levels of the students Experience planners have with the human engineering aspects of curriculum planning Age, understanding, and knowledge level of students
Tyler	Groups external to the educational institution Present interests of the learners Time to complete the learning
Walker	Emotional reactions of planners Personal preferences of planners
Wiggins & McTighe	Elements of authentic assessment

Summary

The description of these theories provides context for researching the curriculum planning process in game degree programs. The research questions posed require knowledge of the various types of philosophies and influencing factors that might be a part of (and therefore influence) the curriculum planning process. This review supports the notion that philosophies (individual, group, or unspecified) as well as influencing factors (including milieu) shape the curriculum.

The extent to which these various philosophies and influencing factors affect the curriculum planning process for game degree programs is unknown. Exploration of this process will provide insight into which philosophies and influencing factors are most important to institutions with existing game degree programs.

Patterns of Comparative Research

There have been many formal studies that compare the UK and the US in a variety of contexts, including educational systems and curriculum development. This section provides a brief overview of research comparing systems in the two countries outside of educational policies and also highlights a few areas in which the central focus of the research was to compare the post-secondary institutions within the US against those within the UK, Great Britain, and England.

Comparative Research of Non-educational System

There are many other research studies reporting on similarities and differences between the two countries demonstrating a general interest in how the countries approach issues and policies. Though this section is not meant to be exhaustive, it provides a brief synopsis of some of this comparative research.

Social policy (specifically devolution of responsibility from national governments to state and local levels) is compared historically over a 150 year time period (Dunlop, 2009). There are many other articles on social issue comparisons, such as identifying best practices in resolving social issues across countries and inequality (Irvin, 2008; Spratt, 2008).

A wide range of health issues are compared in studies, including a cross-cultural comparison of short and long sleep duration in the UK and the US, attitudes of occupational therapy students' towards individuals with disabilities, and physician migration (Arah, Ogbu, & Okeke, 2008; Brown, et al., 2009; Stranges, et al., 2008). Religious issues are compared in different studies to evaluate the level of individual religious commitment, anti-catholicism, and religious experiences of individuals (Drury, 2001; Hay & Morisy, 1978; Lindsay, 2008).

Cultural issues are compared, as in a study comparing the views of British and US citizens on Germany, a study comparing generosity and altruism in the US and the UK, and another comparing multiculturalism and immigration (Betts, Umbach, & Ledford, 2008; Joppke, 1996; Wright, 2001). Communications and media in the two countries are also compared, such as the impact of television and the effects of media on politics (Esser, 2008; T. Lewis, 2008). Governmental policies and political history are also compared in several studies (Cass, 2007; Joppke, 1996; Schain, 2008).

Comparative Research of Educational Systems

Educational systems, policies, and procedures have been compared across the two countries as well as against other countries. Morrisset and Williams (1981), for example, compare the curriculum content of both social and political education in three countries, Britain, West Germany, and the US.

Of more recent interest is the globalization of students at the undergraduate and graduate level. Naidoo (2007) examines international student mobility in the UK across a nearly 20 year time period ending in 2003. The author notes that the recruitment of

international students is becoming more competitive and the study focused on the main factors influencing international students studying in the UK. Luxon and Peelo (2009) researched the phenomenon of the impact of international students on the program curriculum planning process within the UK.

O'Leary and Shiel (1997) examines the similarities and differences in the UK and Australian curriculum profiles, particularly in assessment measures. They follow this comparison with an analysis of the implications of assessment for the US. The role of curriculum resources in the UK, the US, and Australia are reviewed in context of the impact of national curriculum reforms in a dissertation by Watt (2004). Watt uses Theory Planned Behaviour analysis of Taiwanese students choosing to study in each of the countries. This is similar to Gatfield and Chen's (2006) study of measuring how student choose higher education institutions in Taiwan, Australia, the UK and the US. Also along similar lines is a study by Rothon, Heath, and Lessard-Phillips (Rothon, Heath, & Lessard-Phillips, 2009) that compares the educational attainments of second-generation citizens in Britain, Canada, and the US.

Bryant and Morgan (2007) use qualitative methods to evaluate British and American university instructors' attitudes towards teaching ethics to bioscience students. Unks (1992) evaluates the Japanese, German, and British system of studying foreign languages, art, and music at earlier ages. They conclude that this information is important for US educators in examining the cultural content and values in the US system.

Faculty and staff issues have also been researched in depth. Whitchurch (2009) investigates and compares the role of professional staff at post-secondary institutions in

the UK, the US, and Australia. Moore, Newmann, and Terrell (2007) compare academic pay among university faculty in the UK and the US, noting the workload is similar in nature and the lifetime earnings gap for these faculty show the US faculty earning more over time. Swami, et al, perform a cross-cultural study comparing British, Malaysian, and US university students' preferences for personality traits in lecturers (Swami, et al., 2007). Other studies have been performed on the comparison of fundraising for higher education, including one by Proper (2009). In her research, Proper compares the models of fundraising in the US to the UK. She concludes that several influencing factors, including the legal environment, history, and culture, allow the US to proceed using this model.

Summary

This section demonstrates that a considerable amount of research has been performed comparing policies, issues, and educational systems in the UK and the US. The comparison of the countries is well established, is of international interest, and covers a variety of topics. Much of this research compares the influencing factors in curriculum development in each of the countries and how these influencing factors affect the program and the student outcome.

Post-Secondary Education in the UK and the US

The UK and the US have many similar and differing features in their educational system. It is widely recognized that the development of primary and secondary curriculum within the UK is centralized and tied to national educational policies. For post-secondary institutions, the UK's Higher Education Academy (HEA) is a centralized

organization for informing policy, performing research and assessment measure for institutions, and provides support for institutions and learning through conferences and resources ("Higher Education Bill," 2004; Sterling & Witham, 2008; Trowler, Fanghanel, & Wareham, 2005). The HEA has developed National Subject Profiles for several subjects taught in post-secondary institutions to establish a basis for shared curriculum goals within the universities. Emphasis is on sharing information and to enable post-secondary institutions in England, Wales, Scotland, and Northern Ireland to provide the highest quality learning experiences for their students. Bachelor degree programs are typically achieved upon completing three years of undergraduate courses and are granted through universities (World Higher Education Database [WHED], 2006).

The US system of governance for primary and secondary policies and procedures differs from the UK (WHED, 2006). Much of the curriculum for local schools is governed by state curriculum content standards. Additionally, the US Department of Education provides data collection on universities and colleges; however, colleges and universities may operate independently without adhering to specific curriculum standards (United States Department of Education [USDOE], 2009). Post-secondary institutions can receive guidance on policy and legislation from the Department; however, institutions voluntarily choose to be accredited from independent higher education boards. To become accredited, institutions must meet certain criteria and continue to uphold standards in curriculum, procedures, and policies.

This section of the literature review examines three areas for consideration for building the methodology and rationale for this study. First, an examination into the

differences and similarities in undergraduate education is provided. This includes a brief summary of the primary and secondary school requirements for students who attend universities. Second, a brief summary of formal research that compares the two educational systems is provided, demonstrating a pattern of comparisons of the two educational systems as well as providing the rationale for the comparisons. Finally, this section concludes with a summary of the game degree programs offered by universities within the UK and the US.

Similarities and Differences in Undergraduate Education in the UK and US

There are many similarities as well as differences in the undergraduate educational systems of the UK and US. This section examines the systems, including a brief examination of the differences in the primary and secondary schooling requirements, and also addresses the taxonomy of the systems.

According to the UNESCO data available from the Global Education Database (Global Education Database [GED], 2006), the entry age is five years old for primary students in the UK, while it is six for the US. The years in primary education are the same for both countries, standing at six each. The age of entering secondary education, then, is 11 for the UK and 12 for the US.

Further clarification of this data provides more insight into the educational system. The UK consists of 4 countries (England, Wales, Scotland, and Northern Ireland) and each country governs their own educational system. As shown in Table 3, the United States provides 12 years of schooling (excluding kindergarten), England provides 13 years of schooling (excluding reception year), Northern Ireland provides 14 years, and

Table 3

Years Required in US and UK Primary and Secondary Schooling

Country	Entry Age	Number of Years in Primary	Number of Years in Secondary	Sixth Form
United States	6	6	6	n/a
England	5	6	5	2
Northern Ireland	4	7	5	2
Scotland	5	7	4	2
Wales	5	6	5	2

Scotland and Wales provide 13 years (Department for Children, Education, Lifelong Learning and Skills, 2009; Northern Ireland Department of Education, 2009; Scottish Government, n.d.; Training and Development Agency for Schools, n.d.). The UK's sixth form differs from the US system, and it reflects the legal option students have of leaving school at the end of the secondary level at a younger age with a completed degree. Sixth form comprises two additional years of study to prepare students for college entrance exams (A levels). In the US, students are required to stay in school to the age of 16. Students who leave high school without completing all requirements for graduation do so without a diploma.

Scotland provides a different curriculum structure for its students and requires students to attend only four years of secondary education. This difference in educational levels is reflected in the post-secondary institutions in the different countries. Scottish universities (and colleges) often offer a "foundational year" of study for students who

require an additional year of education dependent upon whether or not the student completed sixth form (Quality Assurance Agency of Higher Education [QAAHE], 2001b).

Despite differences in curriculum and instructional levels prior to leaving secondary school, the US and the UK have undergraduate degree and graduate degree programs that result in similar conferred degrees. There is a system of community colleges, trade schools, technical schools, and colleges and universities within the US (Institute of Education Sciences [IES], 2001). A student can earn a certificate, an associate's degree, a bachelor's degree, a master's degree, or a doctorate. This is similar to the UK system; however, in the UK there is no associate's degree. A 2-year foundational degree offered by select universities might be considered comparable. Bachelor degrees are offered in undergraduate programs in both countries, and similar to the US, the UK offers degrees in Bachelor of Science (BSc) and Bachelor of Arts (BA), and also a Bachelor of Engineering (BEng) degree.

Without accounting for a foundational year, the universities in the UK often provide two options for study. One is the traditional 3-year program of study that trains students in their program of study full-time. The other is the optional 4-year program, also known as the sandwich or industry placement option. This program covers the same coursework as the 3-year program. However, between the second and third years of study, students are placed in a full-time job in industry that requires them to use their skills acquired in the first two years of study or might also choose to study abroad. This is

similar to summer and semester-long internships offered at many US institutions. US internships may be full-time or part-time in nature and may be paid or unpaid.

Some institutions offering undergraduate programs in the UK offer top-up programs. Top-up programs are designed for those who have Higher National Diploma (HND) qualifications (which requires two years of study in a higher education institution) to be trained in a specific area and attain a degree in 12 to 18 months (Higher Education Funding Council for England [HEFCE], 1998).

Honours level degrees are offered in the UK. In England, Wales, and Northern Ireland, undergraduate programs are established as honours programs, indicating that the program is a 3-year program (typically) and explores the subject at a higher level than "intermediate", as in a Foundation degree (QAAHE, 2001a). Programs in Scotland differentiate between Honours and non-Honours programs, and this framework is different due to the differences in education at the primary and secondary levels (QAAHE, 2001b). The Scottish programs with Honours are four-years in length and are considered equivalent to England, Wales, and Northern Ireland's three-year Honours programs. Students graduate with an Honours designation that indicates their graduating position (or class standing) when compared against their peers.

Within the US, it is common for universities to offer a major course study and also allow students to choose a double-major (studying two degree programs at one time) or to add one or more minors. In the UK, this is not as common and typically degrees are granted only for a single subject. Specific programs at universities offer a Joint or Combined Honours program.

Institutions in the UK refer to their major course of study (or academic program) as "course" and the "course" is divided into years. Within each year there are modules for learning specific subjects. Within the US, the term "course" often refers to one individual semester long class for learning a specific subject. Also, in addition to the core subject curriculum in US universities, students often study general education courses in order to supplement their learning.

This synopsis is important in understanding the basis of comparing game degree programs and the curriculum planning process for these programs. Beyond taxonomy, there are fundamental similarities and differences in the overall structure of post-secondary institutions, and specifically undergraduate programs, that must be considered when comparing these processes.

Game Degree Programs in the UK and the US

This section identifies the game degree programs currently offered in the US and the UK and includes a description of how the data was collected. It also explains differences that are specific to the game degree programs.

Programs in the UK

A search of the UCAS database (2009), the centralized system in the UK for student university applications, results in 326 game (or related) degree programs (referred to as courses) offered in the UK. However, many of the course programs are part-time, duplicated in the database due to the optional sandwich year, or do not have the word Game in the title. Additionally, different programs are offered that do not lead to a Bachelor's degree program, but rather a Master's or a Foundational degree.

To provide a review of the full-time, unique, undergraduate game degree programs in the UK, the researcher evaluated the program offerings through websites of each of the 166 UK universities listed from the Higher Education Statistics Agency (HESA) (2009). The results of this review are available in Appendix C and a summary is provided in Table 4. When completed, the list of programs was compared against the list of 326 degree programs in the UCAS database that are found when the word "game" is entered in the course search engine. This was done to ensure that no program was unintentionally excluded from the final list.

The degree program must also have the word Game in the title to distinguish it from similar programs that are not directly oriented towards game development. The university must also be in the list of universities in HESA and must offer a game degree program resulting in a Bachelors degree. This excluded two schools, Bradford College (Associate College of Leeds Metropolitan University) and Hull College, which both offer three-year programs resulting in Bachelor degrees.

Table 4
Comparison of UK Institutions Offering Game Degree Programs

Country	Institutions	Number with Programs	Number of Programs	Percentage Offering Programs
England	131	48	100	36.6%
Northern Ireland	4	1	3	25.0%
Scotland	18	4	6	22.2%
Wales	12	6	10	50.0%

Duplicated courses offered that resulted in different degrees only appear once in the final list. For example, the University of Central Lancashire offers both a BA and a BSc in Computer Games Enterprise and only appears once in the list. Some programs also offer joint programs. For example, according to UCAS, Staffordshire University offers a variety of joint programs, like Computer Games Programming and Logistical Information Systems and Computer Games Programming and Mechanical Engineering. Computer Games Programming is a core program at the University, so the joint programs do not appear in the final table. The course also must be offered in the UK. For example, the Computer Games Technology program at the University of East London is only offered in Malaysia and was not included in the list.

For the 2009 entry year at the 166 registered universities, there were 119 unique undergraduate game degree programs offered at 59 universities (or 35.5%). These programs resulted in a Bachelor of Arts, Science, or Engineering degree. Out of the 59 universities, 47 were in England, six in Wales, four in Scotland, and one in Ireland.

Of these 119 degree programs, 39 result in a BA, 82 in a BSc, and 11 in a BEng. A few could result in two different types of degrees, a BA and a BSc or a BSc and a BEng. The majority of these programs required 3 years of study, and approximately half (66) offered an optional industry placement (or sandwich) year. Students who opt for the sandwich year will require an additional year to complete the program.

Programs in the US

There are several types of post-secondary institutions within the US. The US Department of Education classifies institutions as public and private, with private

institutions classed as either for-profit or not-for-profit (National Center for Education Statistics [NCES], 2007-08). For profit institutions may be publicly or privately held and often offer vocational or technical programs (Lerner, 1987). Institutions may or may not be accredited. Not-for-profit and public universities and colleges typically provide traditional paths for studying one subject intensely in an undergraduate program lasting four-years supplemented with additional coursework, while for-profit institutions offer courses that are generally limited to the field of study (Lee & Merisotis, 1990).

Community colleges are publicly funded institutions that typically provide general education courses for students planning on transferring the credit to universities, adult education, two-year degrees, and certificate programs. Community colleges and proprietary (which are often for-profit) institutions are often compared due to the converging nature of the programs and services they offer (Outcalt & Schirmer, 2003).

According to Morrison and Preston (2009), there are 22 full game degree programs offered in the US, six certificates or concentrations, and 16 game courses added to existing program curriculum. Their research defined full game degree programs as programs offered in a four-year format. No mention is made, however, of whether these programs reside in profit or not-for-profit schools.

To compare the programs within the UK and the US, the review of game degree programs in the US required similar criteria for inclusion. For example, only not-for-profit and publics schools that conferred degrees in games were examined. This limit was added to be comparable to the review of the universities in the UK that were all publicly funded. Additionally, the majority of four-year institutions (approximately 80%) in the

US are public or private and not-for-profit and previous research illustrates the need for a degree in high-level educational facilities that focus on both research and education (Rezk-Salama, et al., 2006). The search was also limited to programs with the word "Game" in the title and to programs that resulted in a Bachelor degree.

The US has over 2,000 four-year, public and not-for-profit colleges and universities (NCES, 2007-08). In order to perform a systematic approach suitable for searching for information on game degree programs in the US, the author relied on programs found in her previous research to begin the identification process (McGill, 2009a). The researcher also revisited the IGDA Curriculum website for school information, gamasutra.com (a professional game publication), conference papers, and journals to find universities and colleges that have game degree programs. Additionally, two Google searches were performed in the .edu domain using keywords "university" and "game development" or "game design." Several hundred hits were reviewed to gather any information about programs that may not have appeared in the formal research, serving primarily as a crosscheck on information uncovered initially through journals, conferences, and professional sites.

For-profit schools like DigiPen and Full Sail offer programs with an intense focus on game development. Reputable programs from GuildHall and Carnegie Mellon University offer only graduate level certificates and degrees. Some universities and colleges offered game minors or concentrations, like Cornell University and Michigan State University. North Carolina State University and Weber State University both offer a certificate in game design or development. University of Southern California and

University of Utah offer Interactive Entertainment degree programs. Based on the criteria for game degree programs, each of these schools was excluded from the final list of schools providing game degree programs (see Appendix D).

As a result of this research, 20 universities and colleges were found to offer 22 game degree programs. Fourteen institutions offer a BS, four offer a BA, four offer a BFA (Bachelor of Fine Arts), and one offers a BAS. The University of Colorado at Colorado Springs offers a trademarked Bachelor of Innovation degree.

According to the US Department of Education, in 2007-08 there were 653 public 4-year institutions and 1,532 not-for-profit 4-year institutions for a total of 2,185 institutions (NCES, 2007-08). Of these institutions, only 0.9% of institutions in the US offer game degree programs.

Summary

This wide review of game degree granting institutions in the US and the UK illuminates a vast difference, as shown in Table 5. Though both institutions offer game degree programs resulting in Bachelor degrees, institutions in the UK have considerably more game degree programs both by number and by percentage of institutions. This indicates that there may be internal or external factors motivating institutions in the UK to create and sponsor these programs, while those in the US may not be as motivated. The reasons for this are open for investigation.

Program content may differ, since the UK offers their programs in three years with courses that focus almost exclusively in games and the US offers their programs in four years with courses in games supplemented by general education in a variety of

Table 5

Comparison of UK and US Institutions Offering Game Degree Programs

Country	Institutions	Number with Programs	Number of Programs	Percentage Offering Programs
United Kingdom	166	59	117	35.5%
United States	2,185	19	21	0.9%

subjects. Internship opportunities also appear to differ, with the UK institutions sponsoring industry placement in between second and third year of studies. How this structure might affect the curriculum planning process is also an open area for study.

Summary of the Literature Review

This review illustrates a large gap in the literature for game degree programs, including the lack of literature on the curriculum planning process for game degree programs. It also demonstrates that, according to curriculum theorists, a number of factors and philosophies can influence the content of any course or program. These influencing factors and philosophies have not been defined for the process of creating undergraduate game degree program curriculum.

Comparative research across countries has been performed in many areas, including educational systems, curriculum content and development, and instruction. There is a pattern of comparative research between the US and the UK and the exchange of commerce, students, ideas, and best practices continue. However, no comparative research between game degree programs in the formal literature currently exists.

The review of game degree programs in the UK and the US demonstrates a wide gap in the number of programs. Motivating factors for this, along with the program

content resulting from the curriculum planning, are all areas open for research that can provide important insight into these areas.

In its entirety, this literature review provides ample support and evidence for comparing the processes used in developing curriculum for game degree programs within the United Kingdom and the United States. It also supports considering the approaches undertaken by the curriculum planners and an examination of the different influencing factors that affect the adopted program.

CHAPTER III

METHODOLOGY

This chapter provides a detailed description of the methodology that was used to perform the study. It begins with a description of the research design, including the type of research and a justification of the method selected for this study. The research questions are reiterated, followed by the role of the researcher and the research setting. An explanation about the subject participants is then provided, including the criteria used to identify the participants and a description of the ethical procedures employed to protect participants in this study. This is followed by a description of the data collection and analysis procedures, including a description of the steps taken to analyze the data through software. Finally, an overview of the process is provided with special emphasis on the reliability and validity of the study.

Research Design

The design selected for this research was an explanatory mixed methods study (Creswell, 2008). A cross-sectional survey was created to collect quantitative data to understand the philosophies and theories used in the curriculum planning process. To supplement the survey data, this was followed by a qualitative study consisting of interviews at four institutions that were selected for participation based upon their unique

attributes. The purpose of selecting this approach was to provide a method of capturing a general picture of the curriculum planning process through the survey followed by a qualitative data process used "...to refine, extend, or explain the general picture." (p. 560)

More specifically, known philosophies and influencing factors from curriculum theorists can be manipulated into survey format for a quantitative study. The quantitative study can provide important data on these philosophies and influencing factors considered contextualized for curriculum planners who develop game degree programs.

The survey was created based on existing theories and frameworks. Since game degree programs may require new theories or frameworks that are different and unknown at the present time, new philosophies or influencing factors that are specific to game degree programs may not be wholly identified in the survey. The follow-up interviews provide insight into not only the game degree programs, but also some of the specific philosophies and influencing factors that are important to planners when creating new game degree programs.

Quantitative Data

The survey was first reviewed by three individuals, one from the US, one from the UK who has resided for ten years in the US, and one in the UK, in order to increase face validity (Creswell, 2008). The purpose of this review was to reduce measurement error by ensuring that the survey consists of unambiguous questions and response options. Requests for participation in this process were made electronically. Once the review was

completed and feedback received, the researcher revised the survey to address minor wording issues.

To identify those involved in the curriculum planning process at qualifying institutions (ie., those meeting the requirements set forth in Chapter 2), the researcher searched through each institution's website for contact information. For institutions that did not have their contact information for their game degree programs online, calls were placed to the university directory.

Once all of the names and addresses were collected, a survey mailing was sent to each individual in November 2009. The packet information contained the survey, the letter of consent, a cover letter, and a return envelope. The cover letter also contained a link to a website address for participants to take the survey online as an alternative to filling in the printed survey. Two weeks after the survey was disseminated, a follow-up email was sent to all participants reminding them to complete the survey prior to the survey end date. Upon completion of the survey, an analysis of the data was performed. This information was used to identify four institutions for inclusion in the interview process.

Follow-up Interviews

The researcher set up the qualitative portion of the study by first assembling the raw data from each institution from the quantitative portion of the study (Patton, 2002). The interview questions were then created based on this data and were designed to collect information about the curriculum planning process. Interviews were conducted with two individuals at each institution in the UK and with one individual at each institution in the

US. Since the researcher's inherent biases are US-based, interviewing an additional faculty member at each UK institution provided additional insight into the processes involved that are specific to institutions in the UK.

Research Questions

As previously described in Chapter 1, the purpose of this study is to compare the processes used in developing curriculum for game degree programs within the United Kingdom and the United States. This includes considering the philosophical approaches undertaken by the curriculum planners and an examination of the different influencing factors that affect the adopted program. The quantitative and qualitative components have been designed to answer each of the following research questions:

(a) Within the United Kingdom and the United States, what philosophies do curriculum planners draw on as they engage in the creation of undergraduate game degree programs at post-secondary institutions?

(b) Within the United Kingdom and the United States, what influencing factors do curriculum planners consider as they engage in the creation of undergraduate game degree programs at post-secondary institutions?

(c) What are the major differences between and similarities in the undergraduate game degree curriculum planning processes at United Kingdom and United States post-secondary institutions?

These three questions served as the overarching theme of all components of this study, including the survey design, participant identification, data collection, and data analysis.

Research Setting

Since survey response rates for online surveys have been shown to be lower than for traditional survey methods, and since the participant target pool is small (see below), the process of collecting data consisted of a survey packet (Neslin, Novak, Baker, & Hoffman, 2009). The packet also included a link to the online survey. Participants, therefore, were able to complete the survey at a time and place of their choice.

Once the four participating institutions were selected and participation confirmed for the follow-up interviews, the interviews with the curriculum planners were conducted face-to-face at the institution's location.

Participants in the Study

Purposeful sampling was used throughout the study. The population for this study included individuals who have participated in the curriculum planning process for undergraduate game degree programs in the UK and the US. Game degree programs in this study met the following criteria:

- They must have an established undergraduate game degree program in the 2009-2010 academic year;
- The word "Game" must appear in the program title;
- The program culminates in a Bachelor's degree; and
- The institution is a private, not-for-profit or public institution.

These criteria have been selected based on the literature review. Each institution that met the criteria is listed in Appendices B and C. All of the planners identified through the target population will serve as the sample group.

The population for the follow-up interviews was identical to the population for the survey. Four institutions, two in the UK and two in the US, were selected to participate in the study based on demographics and the analysis of the survey results. The individuals who completed the survey and agreed to potentially participate in the follow-up interview process were contacted via email.

To select the four institutions to participate in the interview process, the three primary criteria that were used included the length of time the program has been running, the number of students matriculated from the program, and the number of students currently enrolled in the program. Any institution with fewer than three individuals involved in curriculum planning was ruled out. The researcher chose to select institutions in both countries that were similar in these demographics. In each country, one institution was selected that had a more established program, a larger number of matriculated students, and a larger number of enrolled students. To provide a richer data set, one institution in each country was selected that had a more recently established program, a smaller number of matriculated students, and a smaller number of enrolled students. By selecting institutions with similar demographics, there is a strong basis for comparison of the qualitative data based on country. The demographics of the institutions are provided in Chapter 4.

Data Collection Techniques

For the quantitative study, the feedback from the informal reviewers was received electronically. Once the feedback was incorporated into the survey, as previously described, the survey was released to the identified participants. A reminder was emailed

to participants two weeks after the survey was mailed. After the deadline for data collection passed, the data was entered into SPSS. All data analysis was performed in SPSS.

For the qualitative study, the interviews were conducted at locations chosen by each of the participants. Five of the six interviews were conducted at or nearby the institution where the participants worked. All six participants signed a letter of consent prior to participating in the interview. One interview was conducted electronically via Skype. Interview locations were all private or semi-private. The qualitative interviews lasted between 45 minutes and 1 hour and 20 minutes, with the average interview lasting 1 hour and 5 minutes. Each interview was audio recorded by the researcher.

Instrumentation

The survey instrument, Game Degree Program Curriculum Development Survey, was created based on the literature review on game degree programs and curriculum theories. The attributes of curriculum theories as well as the impact factors considered during the curriculum planning process have been included in the survey. The survey was designed to identify those philosophies and influencing factors and also to provide a measure of prioritization for them, thereby providing a broad picture of the curriculum planning process.

The survey was designed to capture primarily quantitative information; however, the follow-up interviews were performed in an effort to augment and to provide insight into the quantitative data. The follow-up interviews identified issues that might have been

part of the planning process but could not be or were not captured through the quantitative portion of the survey.

The quantitative portion of the survey consisted of 14 questions, including two grid questions that use a 5-point Likert scale to evaluate the philosophies and influencing factors that went into the curriculum planning process. There were also two open-ended questions and one semi-closed question so participants could qualify their responses.

The researcher chose a semi-structured survey technique and questions for the qualitative portion of the study. The categories and questions were finalized once the quantitative data had been analyzed.

Ethical Issues

The rights and welfare of all participants were protected. The survey was completed confidentially and participants were asked to complete the survey voluntarily. The survey responses were kept in a locked cabinet in the researcher's secure office. Data entered onto SPSS from the responses were kept in a password-protected file. This data and the physical surveys will be kept until August, 2011, at which time they will be destroyed.

A small incentive was mailed with the survey packet. In order to increase response rates, a small magnet with an Abraham Lincoln quote (less than $3 in value) was mailed with the packet (Brennan & Charbonneau, 2009).

Additionally, an exempted review protocol was submitted to the Committee on Using Human Subjects in Research (CUHSR) at Bradley University Once approved, the request for courtesy approval was made to the Institutional Review Board (IRB) at

Illinois State University. After both universities approved the study, the survey was administered, followed by the follow-up interviews.

The interviews included one planner each at two US institutions and two planners each at two UK institutions. After the interviews concluded, the researcher transcribed and interpreted the notes and the participant's answers into text format. After all interviews were completed, the researcher used the TAMS qualitative software to review each interview and identify codes in the participants' responses (Weinstein, 2008). A total of 251 raw codes were identified based on participant responses. These codes were then grouped into themes and subthemes using mnemonic names. The interview recordings will be destroyed on or before August, 2011.

Ensuring Reliability and Validity

Steps were carefully taken to ensure the interviews were both valid and reliable. First, the participants were verified to be curriculum planners at their institution involved in the planning of an undergraduate game program. Second, the interview questions were peer reviewed by two academic colleagues who have performed qualitative research to ensure the questions posed in the semi-structure interview addressed the research questions. Third, the interviews were recorded and transcribed word for word by the researcher, coded, themed, and summarized with direct quotations. Fourth, care was taken to quote directly from the participants and to contextualize these quotes accurately.

Finally, the researcher is an educational researcher and a technologist and has been involved in the curriculum planning process for a game degree program. The researcher has developed non-commercial games for education and has overseen student

work in game development. The researcher is motivated to understand, from the perspective of a curriculum planner, the issues that planners face when developing curriculum for a game degree program at the undergraduate level.

Data Analysis Procedures

Descriptive and inferential statistics were used to analyze the data. For analyzing the quantitative data, the Likert scale responses were consistently scored using a value of 1 for "Strongly Disagree" and a value of 5 for "Strongly Agree" for processes being measured or 1 for "No influence" or 4 for "Significant Influence" for influencing factors being measured.

Once the data was collected from the participants, an analysis was made across the programs as a whole. Next, the responses were aggregated across the programs in the US and the UK. A comparison of means (independent t-test) was used to determine if there is a difference between the participant responses in the US and the UK.

Summary

This explanatory mixed methods study has been designed to address the research questions. The study considers the philosophies and influencing factors proposed by both modern and post-modern curriculum theorists, and also considers the possibility that the curriculum planning process for game degree programs may have unique philosophies and influencing factors that are relevant only to game degree programs . Participant information has been kept confidential and the study was conducted only after approval of an institutional human subject research review board. Both the quantitative and

qualitative portions of this study were conducted in accordance with formal techniques, including data collection and data analysis procedures.

CHAPTER IV

RESULTS

This chapter provides a detailed description of the results of the research study. The chapter is divided into two parts, results of the survey results (quantitative study) and results of the interviews (qualitative study). Each of the sections details the data collected. Chapter 5 is devoted to the analysis of this data.

Survey Results

The survey, detailed in Appendix A, consisted of both closed and open-ended questions. The data collected includes three primary sets of information, demographics, data on processes used when creating the curriculum, and data on factors that may have influenced the curriculum. This section details the participant response rate and demographics, followed by the data collected to answer the overarching research questions.

Respondents

Of the program leaders contacted for participation in the survey, 11 responses were received from programs in the United States. Of these responses, a respondent who did not participate in the curriculum planning process provided one, one was provided for an institution offering only a game degree concentration, and one was provided for a

graduate program. Since these three did not fit the definition of the requirements for participation, the responses were not considered as part of the final analysis. Therefore, as shown in Table 6, the total program response rate for the US was 38.1% (8 of 21 programs) and total institution response rate was 42.1%.

Twenty-two responses were received from programs in the United Kingdom. Of these responses, respondents who did not participate in the curriculum planning process provided two; therefore, those were not considered as part of the final analysis. Additionally, two more responses were from individuals whose programs were not full game degree programs, but specializations. Note that this also dropped the number of full degree programs from 117 to 115. These were also dropped from the final analysis. Lastly, two responses were provided for master degree programs, and these were also dropped from the final analysis. Therefore, the total program response rate for the UK was 13.9% (16 of 115) and institution response rate was 27.1% (16 of 59).

Given the exhaustive and methodical process used to identify the qualifying participants (as defined in Chapters 2 and 3), the researcher is confident that all programs in the United Kingdom were invited to participate and a majority of programs in the

Table 6
Percentage of Survey Responses Per Game Degree Programs

Country	Institutions with Programs	Number of Programs	Number of Responses	Responses per Program	Responses per Institution
United Kingdom	59	115	16	13.9%	27.1%
United States	19	21	8	38.1%	42.1%

United States were invited to participate. The number of valid response rates for both represent the 10-20% desired when collecting data from all participants.

Demographics

The demographics for the respondents are as follows (see Table 7):

- Programs, on average, have been offered for four years in both the UK (M=4.06, SD = 2.52) and the US (M=4.19, SD =1.93).
- The number of students currently enrolled in the academic year 2009-10 in the UK ranges from 7 through 522, with an average of 96 students (SD=127.31). The number of students enrolled for the same year in the US ranges from 22 through 325, with an average of 137 students (SD=95.50).
- The number of students graduated from programs in the UK ranges from 0-200 for the respondents, with an average graduating 47 students (SD=69.53). In the US, the number of graduates ranges from 0-80, with a mean average of 24 students (SD = 27).
- The number of individuals involved in the curriculum planning process ranged from 1 to 12 in the UK, with an average of 5.93 involved in the process (SD=3.54). In the US, the range was 1 to 7 with an average of 4.5 involved in the process (SD = 2.14).
- The incubation period ranged from 5-36 months in the UK, with an average 15.75 months (SD=7.95). In the US, the range was 6-36 months, with an average of 17.14 months (SD=8.78).

Table 7

Demographic Data from UK and US Participants

	United Kingdom					United States				
	n	Min	Max	*M*	SD	*n*	Min	Max	*M*	SD
Years Offered	16	1	9	4.06	2.52	8	1	6	4.19	1.93
Students Currently Enrolled	16	7	522	96.19	127.31	8	40	325	136.88	95.50
Students Graduated	15	0	200	46.67	69.53	8	0	80	23.88	27.06
Individuals Involved in Planning	15	1	12	5.93	3.54	8	1	7	4.50	2.14
Incubation Period (in Months)	16	5	36	15.75	7.95	7	12	36	17.14	8.78

Curriculum Frameworks and Guidelines

Various curriculum frameworks were used to guide the development of the program. Respondents had a choice of seven frameworks to choose (see Table 8). US respondents provided four open-ended responses and UK respondents provided eight. The US respondents also consulted with an industry advisory panel, through numerous discussions with faculty at another institution simultaneously creating their program, and referring to other programs within their own institution. Of particular note was one comment regarding the IGDA framework, "The IGDA framework was examined, but frankly was far from what we needed." Instead, the participant referred to established degree programs at other universities to guide their content.

UK respondents noted that "game industry requirements" were considered and "industry was also asked for their input." One respondent noted that "[o]ur own existing

Table 7

Curriculum Frameworks and Guidelines Used in Program Development

	United Kingdom			United States		
	n	#	%	n	#	%
International Game Developers Association	16	9	56.0%	8	6	75.0%
British Computer Society	16	9	56.0%	8	0	0.0%
ACM/IEEE Computing Curricula	16	2	12.5%	8	5	62.5%
Game Degree Programs at other institutions	16	6	37.5%	8	5	62.5%
International Art Education Standards	16	0	0.0%	8	0	0.0%
Skillset	16	11	68.8%	8	0	0.0%
National Art Education Standards	16	1	6.3%	8	0	0.0%

experience of design education at undergraduate level" was considered. Four respondents noted the QAA Computing Benchmarks, while one respondent noted the Scottish Credit and Qualifications Framework (SCQF).

Motivations for Creating Game Degree Programs

All of the respondents mentioned at least one motivating factor for implementing their university's game degree program. The comments were analyzed and fourteen codes were established from this analysis. Of these codes, four themes emerged: faculty interests, industry interests, student interests, and university/department interests. All of these are further defined in Appendix E.

The most frequent response as a motivating factor in the UK (48%) resided in the interests of the university/department, as shown in Table 9. Six of these responses

Table 8

Motivations for Creating Game Degree Programs

	United Kingdom		United States	
	Number of Codes	%	Number of Codes	%
Faculty Interests	3	13%	3	18%
Industry Interests	7	30%	1	6%
Student Interests	2	9%	7	41%
University/Department Interests	11	48%	6	35%

indicated that the gap in the market for game degree programs was a motivating factor. Additionally, two responses noted that the program was created to "improve portfolio of 'inter-disciplinary' programmes" and "to support, enhance and encourage collaboration with our other programmes." One response noted that the program relates to "external business activities" while another noted that the new program offering rounded out a "suite of computing provision." Only one response noted that "[s]tudent recruitment" was a motivating factor.

Seven of the responses (30%) noted that the needs of industry were a motivating factor, including one that was "[a]pproached by UK games industry to develop the programme," and the "number of graduates finding work in the games industry." Three of the responses (13%) noted that faculty interests were a motivating factor, including research opportunities for faculty ("compliments research"), in-house expertise, and "a strong interest...with the staff in faculty of computing." Lastly, two responses (9%) noted

that the interests of the students were a motivating factor ("an interest from students (current and potential).)"

In the US, seven of the 17 responses (41%) noted that the primary motivating factor for creating the game degree program was in the area of student interests. Of these, six specifically stated student interests ("[l]ots of student interest" and "significant interest demonstrated by potential students"), while one noted that "[t]eaching students how to be indie game developers with small startup companies" was a motivating factor.

Six of the responses (35%) mentioned interest of the university/department as a motivating factor. Three of these noted enrollment growth as a motivating factor, including one respondent who stated that "[r]apidly declining CS enrollments after the dotcom bust, which threatened the growth trajectory of the department." One response indicated that another department had an interest in developing a program, and their department was given "first shot." Another response noted that their department wanted to add another "[c]areer offering for new media students," while one more indicated that being able to "leverage much of our existing curriculum" was a motivating factor.

Finally, three responses (18%) indicated that interests of the faculty were the motivating factor, including "faculty interest" and the "potential for research." Only one response (6%) indicated that interests of industry were a motivating factor ("a growing industry").

Research Question 1: Philosophies in Curriculum Development

Processes provide insight into the philosophies used in curriculum development. The processes involved in the development of the curriculum were rated on a 1 to 5

Likert scale, where 1 represented Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, and 5 - Strongly Agree. Twenty-five statements reflecting the curriculum planning process were measured in the survey. The analysis consisted of a one-sample t-test against the Neutral value of 3. The test was performed separately on the data collected from the United Kingdom and the United States. Results provided in the tables represent the number of participants providing answers, the mean, the standard deviation, the t value, the degrees of freedom, and the p value. Statements with p values less than .05 were considered to be significant to the curriculum planning process.

United Kingdom

In the United Kingdom, all of the results for each statement were significant ($p < .05$) with the exception of two, "There were sometimes tense deliberations" and "The planners sought input from other departments within the institution." The 23 remaining processes are significant and are ranked in order of their mean in Table 10.

With a mean of 4.5 and higher, the majority of game degree program curriculum planners had extensive experience in curriculum development, considered the entire scope of the curriculum, formulated program goals and objectives, and integrated and linked content within and across the program. The planners sought input from organizations outside the institution. Student projects were considered that reflected current industry practices.

Table 9

Processes in the United Kingdom

During the curriculum planning process:	n	M	SD	t	df	p
The entire scope of the curriculum (including resources and materials) was considered.	16	4.75	0.45	15.65	15	0.00
Program objectives were formulated.	16	4.62	0.50	13.00	15	0.00
Planners had extensive experience in curriculum development.	16	4.62	0.50	13.00	15	0.00
Planners sought input from organizations outside the institution.	16	4.62	0.62	10.50	15	0.00
Integration and linking of content from within and across the program were considered.	16	4.56	0.63	9.93	15	0.00
Program goals were formulated.	16	4.5	0.52	11.62	15	0.00
Student projects that reflected current industry practices were considered.	16	4.5	0.63	9.49	15	0.00
An analysis of needs was conducted.	16	4.44	0.73	7.90	15	0.00
There was extensive deliberation.	16	4.38	0.72	7.65	15	0.00
Program assessment was considered to be of high importance.	16	4.38	0.81	6.82	15	0.00
Considerable time was spent on establishing the sequence of the program content.	16	4.25	0.68	7.32	15	0.00
Criteria for selecting program content was formulated and applied.	16	4.19	0.75	6.33	15	0.00
Decisions were made to respond to the anticipated interests of the learners.	16	4.19	0.83	5.69	15	0.00
Student learning experiences were selected.	14	4.14	0.54	8.00	13	0.00
Student learning experiences were organized.	15	4.13	0.74	5.91	14	0.00

Table 10 (continued)

During the curriculum planning process:	n	M	SD	t	df	p
Goals and objectives were given quantifiable measures to determine effectiveness of the program.	16	4.06	1.00	4.26	15	0.00
Balance and pace of program for sustaining student interest and effort were considered.	16	4	0.82	4.90	15	0.00
The planners considered creating a program that was flexible in nature.	15	3.93	0.88	4.09	14	0.00
Shared standards for assessing outcomes across the curriculum were considered.	15	3.93	0.80	4.53	14	0.00
The curriculum content was weighed against the time available for students to complete the program.	16	3.88	0.62	5.65	15	0.00
A psychology of learning was considered.	16	3.75	0.86	3.50	15	0.00
The individual beliefs, values, and visions of the planners were considered.	16	3.69	1.01	2.71	15	0.02
The planners were experienced with teaching game development.	16	3.62	0.89	2.83	15	0.01
The planners sought input from other departments within the institution.	16	3.62	1.46	1.72	15	0.11
There were sometimes tense deliberations	16	3.56	1.15	1.95	15	0.07

With a mean of 4.0 through 4.44, many planners conducted an analysis of needs, engaged in extensive deliberation, considered program assessment, and spent considerable time on establishing the sequence of program content. Criteria for selecting the content of the program was formulated and applied and goals and objectives were given quantifiable measures to determine program effectiveness. The process also

included a consideration of the learner through selection and organization of student learning experiences, and considering the balance and pace of the program for sustaining interest and effort of the students.

With a mean of 3.69 through 3.93, many planners considered the flexibility of the program (M=3.93, SD = 0.88) and the curriculum was weighed against the time available for students to complete the program (M=3.88, SD = 0.62). Shared standards for assessing outcomes across the curriculum were considered (M=3.93, SD = 0.80). A psychology of learning was considered (M=3.75, SD=0.86) and consideration was also given to the individual beliefs, values, and visions of the planners (M=3.69, SD = 1.01).

The lowest significant mean for the planners in the UK reflects that the planners had some experience with teaching game development (M=3.62, SD = 0.89).

United States

In the United States, only 15 of the 25 processes produced significant results and are provided in Table 11. Of these processes, the majority of game degree program curriculum planners considered the individual beliefs, values, and visions of the planners to be important (M=4.62, SD = 0.74). Program objectives were formulated (M=4.5, SD = 0.54), student projects that reflected current industry practices were considered (M=4.5, SD =0.76), and curriculum content was weighed against the time available for students to complete the program (M=4.5, SD = 0.76).

Table 10

Processes in the United States (n=8)

During the curriculum planning process:	M	SD	t	df	p
The individual beliefs, values, and visions of the planners were considered.	4.62	0.74	6.18	7	0.00
Program objectives were formulated.	4.50	0.54	7.94	7	0.00
Student projects that reflected current industry practices were considered.	4.50	0.76	5.61	7	0.00
The curriculum content was weighted against the time available for students to complete the program.	4.50	0.93	4.58	7	0.00
There was extensive deliberation.	4.38	0.74	5.23	7	0.00
Program goals were formulated.	4.38	0.52	7.51	7	0.00
Considerable time was spent on establishing the sequence of the program content.	4.38	0.92	4.25	7	0.00
The entire scope of the curriculum (including resources and materials) was considered.	4.38	0.74	5.23	7	0.00
The planners had extensive experience in curriculum development.	4.25	1.17	3.04	7	0.02
The planners considered creating a program that was flexible in nature.	4.25	0.89	3.99	7	0.01
The planners sought input from organizations outside the institution.	4.25	0.71	5.00	7	0.00
Integration and linking of content from within and across the program were considered.	4.25	0.71	5.00	7	0.00
Program assessment was considered to be of high importance.	4.00	1.07	2.65	7	0.03
Decisions were made to respond to the anticipated interests of the learners.	4.00	1.07	2.65	7	0.03

Table 11 *(continued)*

During the curriculum planning process:	M	SD	t	df	p
Student learning experiences were selected.	3.88	0.99	2.5	7	0.04
An analysis of needs was conducted.	4	1.20	2.37	7	0.05
The planners sought input from other departments within the institution.	4	1.31	2.16	7	0.07
Criteria for selecting program content was formulated and applied.	3.75	1.04	2.05	7	0.08
Balance and pace of program for sustaining student interest and effort were considered.	3.75	1.04	2.05	7	0.08
The planners were experienced with teaching game development.	3.62	1.30	1.36	7	0.22
Student learning experiences were organized.	3.5	0.76	1.87	7	0.10
There were sometimes tense deliberations	3	1.31	0.00	7	1.00
A psychology of learning was considered.	2.88	1.36	-0.26	7	0.80
Goals and objectives were given quantifiable measures to determine effectiveness of the program.	2.75	1.49	-0.48	7	0.65
Shared standards for assessing outcomes across the curriculum were considered.	2.62	1.51	-0.70	7	0.50

With a mean of 4.0 through 4.5, many planners engaged in extensive deliberation (M=4.38. SD = 0.74), formulated program goals (M=4.38, SD = 0.52), considered program assessment (M=4.0, SD = 1.07), and spent considerable time on establishing the sequence of the program content (M=4.38, SD = 0.92). The entire scope of the curriculum was often considered (M=4.38, SD =0.74) and most planners had extensive experience in curriculum development (M=4.25, SD=1.17). Consideration was given to

creating a flexible program (M=4.25, SD =0.89) and the planners sought input from organizations outside the institution (M=4.25, SD=0.71). Decisions were also made to respond to the anticipated interests of the learners (M=4, SD = 1.07).

Less likely to be considered, but still considered important, were the selection of student learning experiences (M=3.88, SD=0.99). The remaining processes that did not yield significant results beyond Neutral are listed near the bottom of Table 10.

Research Question 2: Influences on Curriculum Development

Factors are grouped into four categories, external, internal, resource, and learner and are described in more detail in Chapter 3. Briefly, external factors are those factors that influence the curriculum and are external to the institution. Internal factors are those that are internal to the institution. Resource factors are influencing factors that are related to resources needed to implement the curriculum. Learner factors are influencing factors that are rooted in past (alumni), present (students), or future (prospective students) learners.

Each set of factors influencing the development of the curriculum were rated on a 1 to 4 Likert scale, where 1 represented No Influence, 2 – Little Influence, 3 – Moderate Influence, and 4 – Significant Influence. The statistical analysis consisted of a one-sample t-test against the value of 1 (No Influence). To address the research question, the test was performed separately on the data collected from the United Kingdom and the United States. Results provided in the tables represent the number of participants providing answers, the mean, the standard deviation, the t value, the degrees of freedom,

and the p value. Responses with p values less than .05 were considered to be significant to the curriculum planning process.

External Factors

Thirteen external factors were measured in the survey. All of the external factors from the UK participants were significant, indicating that each had an influence on the curriculum to a varying degree. The two most significant external factors that influence game degree program curriculum are the current/future needs of industry (M=3.88, SD = 0.34) and input from industry professionals (M=3.75, SD=0.45). The least two significant external factors influencing curriculum development are political issues outside of the institution (M=1.63, SD=0.72) and globalization issues (M=1.50, SD=0.63). All of the results for the external factors for the UK are presented in Table 12.

Table 11

External Factors in the United Kingdom

	n	M	SD	t	df	p
Current/Future Needs of Industry	16	3.88	0.34	33.67	15	.00
Industry Professionals	16	3.75	0.45	24.60	15	.00
Professional Organizations	16	3.31	0.79	11.66	15	.00
Institutional Initiatives	16	3.13	0.96	8.88	15	.00
Industry Advisory Board	16	3.06	1.18	6.98	15	.00
External Program Assessment Measures	16	3.00	1.03	7.75	15	.00
National Initiatives	16	2.44	0.81	7.06	15	.00
External Certification or Standards	16	2.44	1.03	5.58	15	.00
External Proficiency Exams (e.g. National or Industry proficiency exams for students)	15	1.93	1.03	3.50	14	.00
Community Norms	16	1.88	0.89	3.95	15	.00
Societal Norms	16	1.81	0.83	3.90	15	.00
Political Issues outside of the Institution	16	1.63	0.72	3.48	15	.00
Globalization Issues	16	1.50	0.63	3.16	15	.01

Only eight of the external factors from the US participants were significant as presented in Table 13. The most significant external factors that influence game degree program curriculum are the current/future needs of industry (M=3.88, SD = 0.35). The least two significant external factors influencing curriculum development are national

Table 12

External Factors in the United States (n=8)

	M	SD	t	df	p
Current/Future Industry Needs	3.88	.35	23.00	7	.00
Institutional Initiatives	3.00	1.07	5.29	7	.00
Industry Professionals	3.00	.93	6.11	7	.00
Societal Norms	2.75	1.04	4.78	7	.00
Industry Advisory Board	2.63	1.06	4.33	7	.00
Community Norms	2.38	.92	4.25	7	.00
National Initiatives	2.00	1.07	2.65	7	.03
External Program Assessment Measures	1.88	.64	3.86	7	.01
Professional Organizations	2.13	1.36	2.35	7	.05
Globalization Issues	1.88	1.13	2.20	7	.06
Political Issues outside of the Institution	1.50	.93	1.53	7	.17
External Proficiency Exams (e.g. National or Industry proficiency exams for students)	1.25	.46	1.53	7	.17
External Certification or Standards	1.25	.46	1.53	7	.17

initiaties (M=2.00, SD=1.07) and external program assessment measures (M=1.88, SD=0.64).

Internal Factors

Thirteen internal factors were measured in the survey. All of the internal factors measured registered as significant for both the UK and the US. In the UK, the two most important internal factors influencing curriculum development are the experience of the

curriculum planners (M=3.81, SD=0.40) and the ability to recruit and retain students (M=3.69, SD=0.48). The three factors influencing the curriculum the least are social issues (M=2.19, SD=0.91), emotional reactions of planners (M=2.19, SD=0.75), and moral issues (M=2.13, SD=0.89). A list of all the internal factors influencing game degree program curriculum in the UK is provided in Table 14.

In the US, the top two factors influencing game degree program curriculum include the experience of the curriculum planners (M=3.63, SD=0.52) and the time for

Table 13

Internal Factors in the United Kingdom

	n	M	SD	t	df	p
Experience of the curriculum planners	16	3.81	0.40	27.91	15	0.00
Ability to recruit and retain students	16	3.69	0.48	22.46	15	0.00
Internal program assessment measures	15	3.13	0.64	12.91	14	0.00
Department initiatives	16	3.06	1.06	7.76	15	0.00
Economic outcomes of the program	16	3.00	0.82	9.80	15	0.00
Life experiences of the planners	16	3.00	0.73	10.95	15	0.00
Timing of the curriculum changes	15	2.93	0.96	7.79	14	0.00
Time for students to complete program requirements	16	2.88	0.96	7.83	15	0.00
Political issues within the institution	16	2.81	0.91	7.96	15	0.00
Personal preferences of planners	15	2.73	0.80	8.40	14	0.00
Social issues	16	2.19	0.91	5.22	15	0.00
Emotional reactions of planners	16	2.19	0.75	6.33	15	0.00
Moral issues	16	2.13	0.89	5.08	15	0.00

students to complete the program requirements (M=3.50, SD=0.53). The least factor influencing the program is the timing of the curriculum changes (M=2.25, SD = 1.04). Results are listed in Table 15.

Table 14

Internal Factors in the United States (n=8)

	M	SD	t	df	p
Experience of the curriculum planners	3.63	.52	14.35	7	.00
Time for students to complete program requirements	3.50	.53	13.23	7	.00
Department initiatives	3.38	.74	9.03	7	.00
Life experiences of the planners	3.38	.74	9.03	7	.00
Ability to recruit and retain students	3.38	.74	9.03	7	.00
Political issues within the institution	3.13	1.13	5.34	7	.00
Economic outcomes of the program	3.00	.76	7.48	7	.00
Personal preferences of planners	3.00	.76	7.48	7	.00
Moral issues	2.50	1.07	3.97	7	.01
Emotional reactions of planners	2.38	.52	7.51	7	.00
Social issues	2.38	.52	7.51	7	.00
Internal program assessment measures	2.38	.52	7.51	7	.00
Timing of the curriculum changes	2.25	1.04	3.42	7	.01

Resource Factors

Seven resource factors were measured in the survey. In both the UK and the US, the results were significant indicating that each resource factor had some influence on the curriculum to a varying degree. As shown in Table 16, in the UK, the two factors influencing the program include lab facilities (M=3.53, SD=0.52) and technology/equipment (M=3.33, SD=0.82). The least influencing factor was the administration of the program (M=1.93, SD=0.70).

In the US, the resource factors with the most influence on the curriculum are faculty availability (M=3.75, SD=0.46) and faculty with experience teaching game development (M=3.75, SD=0.46). The factor with the least influence was the administration of the program (M=2.75, SD=0.71). Table 17 shows the complete results.

Table 15

Resource Factors in the United Kingdom (n=15)

	M	SD	t	df	p
Lab facilities	3.53	.52	19.00	14	.00
Technology/Equipment	3.33	.82	6.10	14	.00
Faculty availability	2.93	.80	9.37	14	.00
Faculty experience teaching game development	2.93	1.03	7.25	14	.00
Classroom facilities	2.73	1.10	11.07	14	.00
Funding for program	2.47	1.13	5.05	14	.00
Administration of program	1.93	.70	5.14	14	.00

Table 16

Resource Factors in the United States (n=8)

	M	SD	t	df	p
Faculty availability	3.7	.46	16.80	7	.00
Faculty experience teaching game development	3.75	.46	16.80	7	.00
Classroom facilities	3.25	.89	7.18	7	.00
Lab facilities	3.13	.83	7.20	7	.00
Technology/Equipment	3.00	.93	6.11	7	.00
Funding for program	2.75	.89	5.58	7	.00
Administration of program	2.75	.71	7.00	7	.00

Learner Factors

Ten learner factors were measured in the survey. As shown in Table 18, seven of the ten factors significantly influenced the curriculum in the UK. The two most influential factors were the learning needs of the students (M=3.60, SD=0.63) and the level of knowledge of incoming students (M=3.27, SD=0.70). The least influential factor was the socio-economic status of students (M=1.47, SD=0.64). Ethnicity, gender, and age of students had no influence on the planning of the curriculum.

Table 17

Learner Factors in the United Kingdom

	n	M	SD	t	df	p
Relevance of program content to students	14	3.64	.50	19.89	13	.00
Learning needs of students	15	3.60	.63	15.92	14	.00
Level of knowledge of incoming students	15	3.27	.70	12.47	14	.00
Student feedback	15	3.07	.88	9.06	14	.00
Alumni feedback	15	2.93	1.03	7.25	14	.00
Attitudes of students	15	2.27	.88	5.55	14	.00
Socio-economic status of students	15	1.47	.64	2.82	14	.01
Ethnicity of students	15	1.33	.62	2.09	14	.06
Gender of students	15	1.33	.62	2.09	14	.06
Age of students	15	1.33	.62	2.09	14	.06

Table 19 shows the results of the impact of learner factors on the curriculum planning in the US. Seven of the ten factors significantly influenced the curriculum. The two most influential factors were the relevance of the program content to students (M=3.63, SD=0.74) and the learning needs of students (M=3.63, SD=0.52). The least influential factor was the age of students (M=1.88, SD=0.83). The gender, socio-economic status, and ethnicity of the students have no influence on the curriculum.

Table 18

Learner Factors in the United States (n=8)

	M	SD	t	df	p
Relevance of program content to students	3.63	.74	14.35	7	.00
Learning needs of students	3.63	.52	9.98	7	.00
Attitudes of students	2.75	.71	7.00	7	.00
Student feedback	2.75	.89	5.58	7	.00
Level of knowledge of incoming students	2.75	.89	5.58	7	.00
Alumni feedback	2.13	1.13	2.83	7	.03
Age of students	1.88	.83	2.97	7	.02
Gender of students	1.75	.89	2.39	7	.05
Socio-economic status of students	1.38	.52	2.05	7	.08
Ethnicity of students	1.13	.35	1.00	7	.35

Research Question 3: Differences and Similarities between UK and US

For evaluating the differences and similarities between the US and UK, a two-tailed independent t-test was conducted on each of the sets of data. For all values, equal variances were assumed unless the Levene's Test was significant ($p < .05$). In all cases, the null hypothesis stated that there was no significant difference in the data from the UK and the US. The alternate hypothesis stated that there was a significant difference. A p value of less than .05 in the t-test rejected the null hypothesis.

This section looks at the similarities and differences in the demographic data, the data related to the philosophies used when creating the curriculum, and the data related to

the factors that influenced the curriculum in the UK and US. This is followed by a summary section, which correlates the data and provides a narrative explanation.

Demographics

For the demographic data collected, there appears to be no significant difference between the UK and the US in the number of years programs have been offered, the number of students currently enrolled in the programs, and the number of students graduated as shown in Table 20. Additionally, there does not appear be any significant difference in the number of individuals involved in the curriculum planning process or in the length of time it took to create and implement the program. The programs have all been created in the last decade, with a majority of the programs having been implemented in the last five years.

Table 19

Comparison of UK and US Participants' Demographic Data

Game Degree Program Information	t-test Results			United Kingdom			United States		
	t	df	p	n	M	SD	n	M	SD
Years Offered	0.12	22	0.90	16	4.06	2.52	8	4.19	1.93
Students Currently Enrolled	0.80	22	0.43	16	96.19	127.31	8	136.88	95.50
Students Graduated	-0.88	21	0.39	15	46.67	69.53	8	23.88	27.06
Individuals Involved in Curriculum Planning	-1.03	20	0.31	14	5.93	3.54	8	4.50	2.14
Incubation Period (in Months)	0.38	21	0.71	16	15.75	7.95	7	17.14	8.78

The planners in the UK and the US turn to different curriculum frameworks and guidelines when creating the curriculum. 69% of institutions in the UK refer to Skillset, the Sector Skills Council for Creative Media, which has its own accreditation process and set of criteria for universities offering game degree programs. The criteria and assessment team was founded by industry professionals, providing a direct link for a practice-based program that meets the needs of industry. An accreditation process is not available yet in the US, and most planners relied on the IGDA for input into planning. This was closely followed by the ACM/IEEE Computing Curricula and by reviewing game degree programs at other institutions.

To a lesser extent, the IGDA and the British Computer Society guidelines played a larger role at UK institutions. Only a couple of UK institutions even considered the ACM/IEEE Computing Curricula. Game degree programs at other institutions are not always considered, possibly due to the fact that a set of criteria are already available from Skillset, while in the US no clear guidelines or frameworks are available except for the IGDA. Within the UK and US, no institution refers to international art education standards and only one in the UK refers to national art education standards.

The motivations for creating the programs also differ between the US and the UK. While both the UK and US planners were highly motivated to create programs based on the interests of the university/department, it is remarkable that the interests of the industry and students as motivating factors were almost reverse for the two countries. Industry is playing a significant role in motivating universities in the UK to create game degree programs, while in the US the role of industry motivating universities to create such

programs is almost non-existent. On the other hand, the interests of students is a significant motivator for planners to create programs in the US, while in the UK the role of students motivating the creation of programs is minimal.

Specifically, as coded and themed (see Appendix F), the programs in the UK were primarily motivated by the interests of the university or the department (48%) followed by the interests of industry (30%). The interests of faculty (13%) and of the students (9%) are also considered, but to a much lesser extent. In the US, the interests of the students (both current and prospective) ranked as the highest motivating factor (41%) followed closely by the interests of the university or department (35%). The interests of faculty ranked at 18%. Of lowest consideration were the interests of industry (6%).

Philosophies in the Curriculum Planning Process

The differences in the curriculum planning process were minimal. Only two processes were ranked significantly different between the two countries. For the process "Goals and objectives were given quantifiable measures to determine effectiveness of the program," the UK planners ranked this significantly higher ($M=4.06$, $SD=1.00$) than the US ($M=3.5$, $SD=0.76$), yielding $t(22)=-2.58$, $p=0.02$. For the process "The individual beliefs, values, and visions of the planners were considered," the US planners ranked this significantly higher ($M=4.62$, $SD=0.74$) than the planners in the UK ($M=3.69$, $SD=1.01$), yielding $t(22)=2.31$, $p<0.03$, as shown in Table 21.

Table 20

Comparison of Processes in the UK and US

During the curriculum planning process:	T	df	p	UK n=16 M	UK n=16 SD	US n=8 M	US n=8 SD
The entire scope of the curriculum (including resources and materials) was considered.	-1.31	9.61	0.22	4.75	0.45	4.38	0.74
Program objectives were formulated.	-0.56	22	0.58	4.62	0.50	4.50	0.54
The planners had extensive experience in curriculum development.	-0.87	8.32	0.41	4.62	0.50	4.25	1.17
The planners sought input from organizations outside the institution.	-1.34	22	0.20	4.62	0.62	4.25	0.71
Integration and linking of content from within and across the program were considered.	-1.10	22	0.28	4.56	0.63	4.25	0.71
Program goals were formulated.	-0.56	33	0.58	4.50	0.52	4.38	0.52
Student projects that reflected current industry practices were considered.	0.00	22	1.00	4.50	0.63	4.50	0.76
An analysis of needs was conducted.	-1.12	22	0.28	4.44	0.73	4.00	1.20
There was extensive deliberation.	0.00	22	1.00	4.38	0.72	4.38	0.74
Program assessment was considered to be of high importance.	-0.96	22	0.35	4.38	0.81	4.00	1.07
Considerable time was spent on establishing the sequence of the program content.	0.34	11	0.74	4.25	0.68	4.38	0.92
Criteria for selecting program content was formulated and applied.	-1.19	22	0.25	4.19	0.75	3.75	1.04
Decisions were made to respond to the anticipated interests of the learners.	-0.47	22	0.64	4.19	0.83	4.00	1.07
Student learning experiences were selected.	-0.83	20	0.42	4.14	0.54	3.88	0.99

Table 21 *(continued)*

				UK n=16		US n=8	
During the curriculum planning process:	T	df	p	M	SD	M	SD
Student learning experiences were organized.	-1.94	21	0.07	4.13	0.74	3.50	0.76
Goals and objectives were given quantifiable measures to determine effectiveness of the program.	-2.58	22	0.02	4.06	1.00	2.75	1.49
Balance and pace of program for sustaining student interest and effort were considered.	-0.65	22	0.52	4.00	0.82	3.75	1.04
The planners considered creating a program that was flexible in nature.	0.82	21	0.42	3.93	0.88	4.25	0.89
Shared standards for assessing outcomes across the curriculum were considered.	-2.29	9.16	0.05	3.93	0.80	2.62	1.51
Curriculum content was weighted against the time available for students to complete the program.	1.98	22	0.06	3.88	0.62	4.50	0.93
A psychology of learning was considered.	-1.94	22	0.07	3.75	0.86	2.88	1.36
Individual beliefs, values, and visions of planners were considered.	2.31	22	0.03	3.69	1.01	4.62	0.74
Planners were experienced with teaching game development.	0.00	22	1.00	3.62	0.89	3.62	1.30
Planners sought input from other departments within the institution.	0.61	22	0.55	3.62	1.46	4.25	0.71
There were sometimes tense deliberations	-1.08	22	0.29	3.56	1.15	3.00	1.31

Types of Influencing Factors

There are several types of influencing factors that were built into the survey, including external, internal, resource, and learner. This sections examines the similarities and differences of the UK and the US survey data in each of these areas.

Five external influencing factors were found to differ significantly, as shown in Table 22. Planners in the UK ranked external program assessment measures, industry professionals, external certification, and external proficiency exams significantly higher than US planners. US planners ranked societal norms (M=2.74, SD=1.04) significantly higher than UK planners (M=1.81, SD=0.83) yielding t(22)=2.40, p=0.03.

With respect to the internal factors, only one factor was significantly different between the two countries, as shown in Table 23. Planners in the UK ranked internal program assessment measures higher (M=3.13, SD=0.65) than in the US (M=2.38, SD=0.52), yielding t(21)=-2.88, p=0.01.

Table 21

Comparison of External Factors in the UK and US

				UK (n=16)		US (n=8)	
	t	df	p	M	SD	M	SD
National Initiatives	-1.12	22	0.28	2.44	0.81	2.00	1.07
Institutional Initiatives	-0.29	22	0.77	3.13	0.96	3.00	1.07
External Program Assessment Measures	-2.80	22	0.01	3.00	1.03	1.88	0.64
External Proficiency Exams (e.g. National or Industry proficiency exams for students)	-2.18	21	0.04	1.93	1.03	1.25	0.46
Current/Future Industry Needs	0.00	22	1.00	3.88	0.34	3.88	0.35
External Certification	-3.89	22	0.00	2.44	1.03	1.25	0.46
Industry Advisory Board	-0.88	22	0.39	3.06	1.18	2.63	1.06
Industry Professionals	-2.71	22	0.01	3.75	0.45	3.00	0.93
Professional Organizations	-2.29	9	0.05	3.31	0.79	2.13	1.36
Societal Norms	2.40	22	0.03	1.81	0.83	2.75	1.04
Community Norms	1.29	22	0.21	1.88	0.89	2.38	0.92
Political Issues Outside Institution	-0.37	22	0.72	1.63	0.72	1.50	0.93
Globalization issues	1.05	22	0.30	1.50	0.63	1.88	1.13

Table 22

Comparison of Internal Factors in the UK and US

				United Kingdom			United States		
	t	df	p	n	M	SD	n	M	SD
Experience of the curriculum planners	-0.98	22	0.34	16	3.81	0.40	8	3.63	0.52
Time for students to complete the program requirements	1.71	22	0.10	16	2.88	0.96	8	3.50	0.53
Department initiatives	0.74	22	0.47	16	3.06	1.06	8	3.38	0.74
Life experiences of the planners	1.18	22	0.25	16	3.00	0.73	8	3.38	0.74
Ability to recruit and retain students	-1.25	22	0.22	16	3.69	0.48	8	3.38	0.74
Political issues within the institution	0.73	22	0.47	16	2.81	0.91	8	3.13	1.13
Economic outcomes of the program	0.00	22	1.00	16	3.00	0.82	8	3.00	0.76
Personal preferences of planners	0.78	21	0.45	15	2.73	0.80	8	3.00	0.76
Moral issues	0.91	22	0.37	16	2.13	0.89	8	2.50	1.07
Emotional reactions of planners	0.63	22	0.53	16	2.19	0.75	8	2.38	0.52
Social issues	0.64	21	0.53	16	2.19	0.91	8	2.38	0.52
Internal program assessment measures	-2.88	21	0.01	15	3.13	0.64	8	2.38	0.52
Timing of the curriculum changes	-1.58	21	0.13	15	2.93	0.96	8	2.25	1.04

The planners in the US ranked two resource factors significantly higher than the UK planners, both yielding $t(21)=2.65$, $p=0.02$, as shown in Table 24. Faculty availability ($M=3.75$, $SD=0.46$) was much higher than in the UK ($M=2.93$, $SD=0.80$). Administration of the program in the US ($M=2.75$, $SD=0.71$) bore more impact on the curriculum than in the UK ($M=1.93$, $SD=0.70$).

Table 23

Comparison of Resource Factors in the UK and US

				UK (n=15)		US (n=8)	
	t	df	p	M	SD	M	SD
Faculty availability	2.65	21	0.02	2.93	0.80	3.75	0.46
Faculty experience teaching game development	2.11	21	0.05	2.93	1.03	3.75	0.46
Classroom facilities	1.14	21	0.27	2.73	1.10	3.25	0.89
Lab facilities	-1.46	21	0.16	3.53	0.52	3.13	0.83
Technology/Equipment	-0.89	21	0.38	3.33	0.82	3.00	0.93
Funding for program	0.62	21	0.54	2.47	1.13	2.75	0.89
Administration of program	2.65	21	0.02	1.93	0.70	2.75	0.71

With respect to the learner factors, there were no significant differences between the US and the UK, as shown in Table 25. The two most influential factors in this category for each were the "relevance of program content to students" and the "learning needs of students." The least influential factors were the age, gender, ethnicity, and socio-economic status of students.

Summary

With respect to the philosophies employed during the curriculum planning process, many were considered to have moderate to significant influence in both countries, including the planners themselves, the needs of the learners, and the program creation. The planners appeared to have extensive experience in curriculum development, deliberated extensively, and sought input from outside organizations. In the US, the

Table 24

Comparison of Learner Factors in the UK and US

				UK (n=15)		US (n=8)	
	t	*df*	*p*	M	SD	M	SD
Relevance of program content to students	-0.07	20	0.95	3.64	0.50	3.63	0.74
Learning needs of students	0.10	21	0.92	3.60	0.63	3.63	0.52
Attitudes of students	1.33	21	0.20	3.27	0.70	2.75	0.71
Student feedback	-0.82	21	0.42	3.07	0.88	2.75	0.89
Knowledge level of incoming students	-1.53	21	0.14	3.27	0.70	2.75	0.89
Alumni feedback	-1.73	21	0.10	2.93	1.03	2.13	1.13
Age of students	1.77	21	0.09	1.33	0.62	1.88	0.83
Gender of students	1.33	21	0.20	1.33	0.62	1.75	0.89
Socio-economic status of students	-0.35	21	0.73	1.47	0.64	1.38	0.52
Ethnicity of students	-0.88	21	0.39	1.33	0.62	1.13	0.35

planners also considered the individual beliefs, values, and visions of the planners. These are summarized in Figure 1.

The needs of the learners were considered by selecting student projects that reflect current industry practice, the anticipated interests of the learners, and the selection of student experiences. Planners also created the program by formulating goals and objects, considering program scope and flexibility, and considering integration and linking of content from within and across the program. Planners also considered the sequence of the

Planners

- Had extensive experience in curriculum development
- Deliberated extensively
- Sought input from outside organizations
- Considered individual beliefs, values, and visions of the planners (US)

Learner Needs

- Student projects selected that reflect current industry practice
- Responded to anticipated interests of learners
- Selected student experiences

Program Creation

- Formulated goals
- Formulated objectives
- Considered program scope
- Considered program flexibility
- Considered integration and linking of content from within and across the program
- Designed sequence of program content
- Considered program assessment
- Provided quantifiable measures for goals and objectives to determine program effectiveness (UK)

Figure 1. Summary of philosophies in planning game degree programs.

program content and program assessment. In the UK, planners also provided quantifiable measures for goals and objectives to determine program effectiveness.

Both countries ranked internal and external factors as having influences on curriculum planning, as shown in Figure 2. Three external factors as having between a Moderate to Significant Influence (value of 3 or higher) on their program creation. The three factors were current/future industry needs, institutional initiatives, and industry professionals.

External Factors
- Current/future industry needs
- Institutional initiatives
- Industry professionals

Internal Factors
- Experience of the curriculum planners
- Ability to recruit and retain students
- Department initiatives
- Life experiences of the planners
- Economic outcomes of the program

Resource Factors
- Lab facilities
- Technology/equipment

Learner Factors
- Relevance of program content
- Learning needs of students

Figure 2. Summary of influencing factors in planning game degree programs.

Five internal factors were rated the same, including the experience of the curriculum planners, the ability to recruit and retain students, department initiatives, life experiences of the planners, and economic outcomes of the program. Only two resource factors had moderate to significant influence on the program, including lab facilities, and technology/equipment. Likewise, only two learner factors had moderate to significant influence: relevance of program content to students and the learning needs of students.

Follow-up Interviews

Two institutions in the UK and two in the US were selected to participate in the explanatory study. A total of six participants, two from each institution in the UK and one from each institution in the US, were selected based on their response to a survey

question inviting them to participate, the size of their institution's program based on current enrollment, the number of matriculated students, and the number of years the program has been offered, as sown in Table 26. One institution in the UK and one in the US were selected based on their more established programs, and one institution in the UK and one in the US were selected based on their more recent addition of programs with no matriculated students and fewer students enrolled in the program.

After transcribing the interview data of the six participants, text from the interviews was coded. Initially, over 250 codes were established with 771 supporting statements, an average of 3.08 statements for each code. These codes were reviewed, and then further refined to ensure consistency across the coding process for all transcribed data. The codes were then grouped into preliminary themes. From this process, it became clear that there were two types of data, data that was related to the curriculum planning process of a new program, and data that was related to the evolution of the curriculum

Table 25

Demographics of Institutions Selected for Follow-up Interviews

	Country	Years Offered	Students Currently Enrolled in Program	Matriculated Students	Individuals involved in Curriculum Planning
UK1	UK	2	30	0	5
US1	US	2	70	0	6
UK2	UK	5	522	200	11
US2	US	4	325	25	3

once the program was implemented and the students were actively enrolled. Since these two meta-categories (new and evolutionary) played differing roles in the process, each of the codes was analyzed again by reviewing its supporting statements to determine if the code accurately reflected both the theme and the meta-category in which it had been placed.

The following section describes the themes as part of the creation and implementation of a new program, followed by a description of the themes involved in the curriculum planning process as the program evolves after implementation. Only the themes are described here, along with a rough analysis of how these themes function together. Chapter 5 provides a more detailed analysis of the curriculum planning process as a whole.

Creation of a New Game Degree Program

Four primary categories emerged that related to the creation and implementation of a new game degree program. First, the motivation for creating the game degree program describes the reasons for creating the game degree program. This is followed by the category containing a breakdown of the factors that influence the curriculum. The next category contains data collected that describes the deliberation of these factors and the decision-making involved in the planning process. Finally, the resulting game degree program contains themes related to the content of the game degree program. Table 27 summarizes these categories.

Table 26

Categories of Creation and Implementation of a Game Degree Program

Category	Description
Motivation for Program Creation	The motivation for creating the program sparks the curriculum planning process
Influencing Factors	Factors that influence the final curriculum; factors can be both internal to the institution and external
Deliberation and Decision-Making	Deliberation on all of the influencing factors leads to informed decision-making about program content
Program Content	Program content is the entire scope of the game degree program, including program requirements, structure, and course content

Motivation for Program Creation

The impetus for creating a new program was provided in comments made by the participants. Related comments were reviewed and grouped into the following three themes: enrollment/student interest, game degree programs at other universities, and industry growth.

The issue of increasing enrollment was also a motivating factor, particularly in the US. At the department level, one US participant responded "...we were so concerned about enrollments. And I knew that it would help us in that area." Another US participant stated that "Really, the entire future trajectory of the school of engineering was in jeopardy if there wasn't some fix to enrollments found." This was followed by clarification that "...there are a number of I think ideological reasons for why people liked [the idea of implementing a game degree program]. But in terms of politics, I think

the main driver was enrollments." This is related to the idea that the program was developed due to increased student interest, as noted by one participant in particular.

Participants commented on game degree programs at other universities as part of the motivation for creating their program. One university in particular was in a position to offer a program different from another closely related institution, with a more vocational rather than research focus. As student interest increased in more vocationally oriented programs, this institution sought to meet that need.

Another motivation for creating programs is the increased need in the game industry for qualified employees. A UK respondent noted that "[a]round this area of the country there [are] a lot of small game development companies and creative technology related companies. And I think this course was created as a desire to fill those companies' needs for potential employees." A US respondent noted that the location of the university potentially gave others involved in the approval of the program additional sway, since the university is located within or near a state that has an entertainment industry focus.

Influencing Factors

Influencing factors include both internal and external influences. Internal influences are defined as data, initiatives, constraints, and resources from *within an institution.* External influences are defined as data, initiatives, constraints, and resources from *outside the institution.* Each influencing factor cannot only be classified as internal or external, but it can also be classified as being formed from a single source of data, initiatives, constraints, or resources, or a combination of any of these four. Both internal

and external factors influenced the curriculum planning process in the creation of a new program as well as in its evolutionary stages.

From the interviews, eight themes of were identified as internal factors that influence the curriculum planning process, while five themes were identified as external factors, as shown in Table 28. The eight motifs for the internal influences are facilities, faculty, institution, interdisciplinary collaboration, learners, originating department, planners, and learning time and space. The five themes for the external influences are government, industry, other universities, society, and trade associations.

Table 27

Factors Influencing New Game Degree Programs

Type	Theme	Motif
Internal	Facilities	Learning Environment, Technology
	Faculty	Beliefs, Credentials, Credit, Interests, Game Development Experience, Resources, Opportunities
	Institution	Constraints, Efficiencies, Funding, History, Initiatives, Internal Assessment, Policies, Politics, Support
	Interdisciplinary Collaboration	Constraints, Issues, Scope
	Learners	Abilities, Accessibility to Software, Demographics, Interests, Knowledge, Satisfaction, Skills, Transfer
	Originating Department	Constraints, Efficiencies, History, Teaching Methods
	Planners	Driver, Experience
	Time and Space	Content Selection, Time to Complete Program
External	Government	Assessment, Funding, Policies
	Industry	Assessment, Currency, Industry Needs, Industry Relationships, Tools
	Other Universities	Programs, Relationships
	Society	Cultural Influences, Violence in Games
	Trade Associations	Accreditation, Assessment, Frameworks

Internal Factors

According to the participants, internal factors have played a significant part in influencing the curriculum planning for game degree programs. Each of the eight themes and their motifs (or subcategories of the themes) are described below.

Facilities. Two motifs were considered when planning the curriculum, the learning environment and the technology. Areas of the learning environment considered included changing existing policies, like "...a department policy that said 'Students cannot play games'" in the lab, and changing the technology so that computers with sound cards were purchased. Another participant stated that "[i]t was my experience that teams that were most successful were the ones that got together and programmed together and held a well-established common meeting space and could put stuff up and keep project context going...." Other considerations were furniture, lighting, and an area for playing games.

Technology motifs reflected comments made to establish currency and to research the tools to determine which tools would need to be used in the lab. One participant noted that "[t]echnology changes, and it's impossible for us to keep up with it. Because of the way education works, it always lags behind two or three years."

Faculty. During the planning process, motifs that emerged related to the this theme include faculty beliefs, credentials, credit, game development experience, interests, opportunities and resources. Beliefs were represented in statements that were based on past experiences, like one participant stating that "...15-20 years ago...all the kids did was play video games...." He further explained how having a multimedia film maker as

an instructor for those students who didn't approve of this behavior can affect learning. Credentials were reflected in a couple of significant experiences, including hiring individuals from the game industry to perform curriculum development and instruction without an academic background. This was reflected in one participant's experiences, who stated that "[w]hen I started here, I didn't know about academic systems and things like that. So I had to learn all the academic systems and all the quality systems, like writing the learning outcomes...." This same participant reflected on having a combination of instructors from academia and from the game industry, stating that "[i]t means that we are able to deliver a course [program] which is industry-relevant but does have solid academic underpinnings."

Another area that was reflected upon was the credit given to faculty for creation of the program. In the case of one non-tenured participant, he experienced a tenured faculty member who thought that the administration of the program should be handled jointly with this more senior member of faculty. The participant stated that:

> "it came off more about getting credit than they really, really wanted to participate in the hard work of managing the program. And that got resolved by—he went off and he did a masters degree in [another games related degree]. So that's sort of his baby. So I do the bachelors degree and he does the masters degree."

Game development experience in planners had an effect on the curriculum. One participant stated that "[t]he design was driven by [his and other instructors] experience in industry." Game development experience is not a problem for one of the US institutions, a participant from which stated that the lack of industry experience did not

affect their curriculum or instruction, stating that "[m]y sense is that the students have a pretty good sense of when you're teaching relevant or irrelevant knowledge." Another participant with an academic background created a game development company in anticipation of an implemented curriculum.

Along with serving as a motivator for the game degree program, faculty interest was a strong contributor to the curriculum planning process. One participant stated that "[i]f we hadn't had someone who said, 'Yeah, I'll teach all those courses,' we couldn't have pursued the program." Another stated that game development is

> ...a passion of mine personally. And I think – and I don't know if this is true, but I think that you'll probably find there are a lot of programs where there was one person or a couple of people who say we just ought to go do this because we'd love to teach these classes.

Opportunities were a motivator for arts faculty to become involved and contribute to the creation of the program. One participant stated that the University's art department was transitioning from creative production to a program emphasizing more theory, and "As a result, once you see research being more of a focus, you start realizing that the green pastures are much more in the digital arts. And I think they recognized that games were a part of that."

Faculty resources were mentioned 14 times during the interview process. In two cases, the participants noted that the administration "...knew we were working on this, so the computer science department put in a request...to hire a software engineer or database person. What came back was approval to hire a games person." Another

participant noted that "...a combination of the [faculty] skill set that we have available and the skills of the students that we are recruiting..." influenced the content of the curriculum.

Institution. Institutional considerations were grouped into several motifs: constraints, efficiencies, funding, history, initiatives, internal assessment, policies, politics, and support. Constraints considered at the institutional level included the approval process. Both US institutions referred to anticipating rejection of the program due to the current predominance of violence in games. One participant stated that "I was concerned when designing the degree program about backlash against games based on the violence of games and based on the fact that many games do have violent thematic content or violence as a game mechanic."

Efficiencies were commonplace considerations, particularly the reuse of existing courses. Comments from participants included "...we weren't allowed to add all new units [courses]. We had to use existing units." and "...we pretty much had to use as many pre-existing units as much as we could." This related to funding, which was also cited numerous times by participants. Specifically, one participant stated that:

> [t]he other major factor was the commitment of future technology. So we got commitments early on that we would have the facilities and technology. Commitment of money. That meant we could design the curriculum, for instance, involving virtual reality, which is expensive, or console development, which requires a large outlay of cash...So that influenced the design.

Several participants mentioned institutional history as influencing the curriculum at an institutional level. Two institutions were formerly vocationally oriented schools, whose previous vocational focus still led to a preference for more practice-oriented experiences for students. Two others referred to science versus arts issues, including the statement that "...the ongoing political issue has been our department subsumed another department that was arts based. To this day there is a lot of resentment effectively between the science and the arts sides."

Planners saw institutional directives and initiatives as components to be considered in the process. Participants made statements that "...it wasn't a formal initiative, just general institutional pressures to do particular things that the game development degree fit into very nicely," and "...to do it efficiently, so we get the ticks in the boxes from senior management."

Internal assessment was not mentioned much and the only comment made specifically with respect to an internal review was that "...one of the internal [reviewers] was from the arts school. So we got some valuable input from the arts school person."

Policies include the formal policies in place for creating a new program at each participant's institution. This included forms that needed to be completed, approvals of other departments that needed to be acquired, and the approval process from academic committees and management, encapsulated in statements like "...[t]he formal process is that the department will put forward a degree proposal. And that degree proposal is then—I believe it's voted on by the committee on educational policy, which is part of the academic senate."

Politics were more complicated by interdisciplinary considerations. One participant's program worked across two colleges, and he stated "...so who's getting credit in what things. And that's driven by the administration—you tell us what college the bean is in and we'll count it." Others also acknowledge politics in statements like "And that has more to do with the politics of the whole institution," and "...you're not just dealing with the quality system but also the internal politics of the university and how that works."

Support throughout the institution was also important, particularly from the administration. One participant stated that "[l]uckily our previous Dean of Engineering, he was supportive of the game idea. So I guess politically that helped a lot that the Dean was behind it.... And that allowed us to do something more special than we might have ordinarily been able to do."

Interdisciplinary collaboration. A number of motifs emerged from collaboration with other disciplines, including constraints, issues, and scope. Constraints that were mentioned by more than one participant included the scheduling and size of studio courses offered by the art and music departments. This had an effect on the number of students who could potentially be taking these courses. In one instance, the participant noted that "[i]t turns out there's a number of scheduling constraints in the courses that they offer. That was important in putting the curriculum together."

Participants mentioned several issues that influenced the amount and type of collaboration. These included statements such as "[t]he only other thing I can say about that is I think that there is part of this university culture, and I think because people have

told me, though they could not be accurate, but I believe there is some antagonistic relationship between..." the two colleges involved in the collaborative process. Another participant noted that collaboration was kept to a minimum, "[n]ot due to any lack of interest, we wanted to make progress quickly, and we didn't want to wait for people to come on board."

Scope played a large factor as well. One participant noted that his curriculum planning committee included "...a couple of computer scientists, a visual and performing arts professor, a women's studies professor, biology professor, and an education professor." It also may have influenced the approval process, including one participant's view that "I think that the computer game design degree offered a model for a way of doing interdisciplinary work between engineering and the arts. That was a combination that people hadn't seen and they welcomed seeing that."

Learners. Even before the curriculum was launched, planners took special care to build a curriculum around the potential learners. Motifs that were grouped together in the learner theme were student abilities, accessibility to software, demographics, interests, knowledge, satisfaction, skills, and the needs of transfer students.

Abilities of the learners and the accessibility of the software for the learners were both considered. One participant stated that "...we knew that our students, from experience in computing, that they wouldn't have the mathematical background and technical background required to do the sorts of graphics programming that would be required for gaming." Another participant stated that "[i]t wasn't my idea to create a degree program to accommodate people who had multiple failed courses along the way."

Accessibility to software was an issue for one participant, who stated that "[w]e use free tools mostly," partly to give students the ability to install of the software on their personal systems.

Some demographics of the learners were considered. One example of this was in a statement by one participant, who stated that "[b]ecause thinking that we were developing a curriculum for predominantly male, predominantly 18-year-olds, didn't affect in anyway what courses we were going to offer. Except perhaps that our insistence that we had something about diverse populations."

The interests of learners also had significant influence, with many participants commenting that this influenced the curriculum planning process. Participant comments included "I knew that there would be students coming in who had a strong interest in computer games and how to create computer games," and "[f]irst of all, we look at what do our likely applicants want. And the second would be what their aspirations would be." An additional supporting comment was that "...some people might want to be game developers, but not the entertainment game developers, they might want to build games for learning."

There was some anticipation that students would have limited knowledge about the game development process before coming into the program, but that they would be very satisfied in learning about it. One participant commented that

> [m]y sense is that the students' desire to learn things, for students coming in, a 17-year-old or an 18-year-old, they don't really know what goes into a game. They

don't really know what the technologies are, or what they're going to have to learn.

The same planner noted that "[m]y sense was that they were going to be very pleased about getting such knowledge of how to construct games." Both of these influenced planners to build a curriculum that started out with foundational knowledge about game development.

Skills of the learners were considered, particularly skills that they have when they would first enter the program. One participant noted that "...they wouldn't have the mathematical skills for the graphics programming and you need to think about that for the program." Another participant noted that the curriculum was built for students who have a "...college-ready education. They've taken up to pre-calculus. So they're ready to come in and take calculus. They're to come in and take their core curriculum.... A student who comes in college-ready, they're ready to go through...."

One US planner was committed to developing a curriculum that accommodated the needs of transfer students. He noted that "...transfer students are the reason why we only have five junior/senior technical electives. I would have preferred to have had six," and "I really wanted the degree program to be good for transfer students coming in from... community colleges....it's important as part of the rhetoric around support for public education...that that pipeline for community colleges be open and viable."

Learning time and space. Participants considered both the learning time and space in the curriculum. Participants remarked that "...it really is about having this core of innovation stuff and getting people to take this chunk of cross-disciplinary stuff in

addition to their major specific course work. Basically, it means that they get almost no free electives," and that "...because of the module system there isn't time or space to do everything." Additionally, participants were focused on the idea of "...getting people through in four years."

Originating department. The originating department influenced the curriculum planning process through its constraints, efficiency requirements, history, and culturally entrenched teaching methods. Constraints were reflected in specific statements about the departmental teaching requirements. One participant stated that "[s]o all along the way, we [including the department chair] basically said that to do this, I need to teach four classes a semester and do 20% service and no more research for me."

Efficiencies were also reflected at the department level. In one instance, a department chair specifically stated the number of new courses that could be created for the program. Another participant stated that "I decided we needed to rationalize the courses and get more efficiency."

Participants went into great detail about the history of the department. One participant described that "[h]istorically, computer science and especially in the dot-com years, computer science was half if not more of the students in engineering. When the enrollment in computer science dropped precipitously post-dotcom, all of a sudden there was this big collective "Uh-oh" in the School of Engineering because, even though our electrical engineering program were growing, they weren't growing as fast as needed to cover the drop in computer science." Another participant noted that "[w]e have a multimedia course [program]. So the games came out of the multimedia." In another

statement, one participant noted that plagiarism also needed to be considered. He stated that on "top of that, secondly, how are we going to do this and reduce the chances of plagiarism."

More than one participant mentioned culturally entrenched teaching methods in the computer science department. One participant noted that "[w]hereas in [the computer science] department it's lecture, tutorial, lecture, tutorial, and it's all mapped out," which differs from a more production-oriented program. Another participant noted that he thought the games program may open the door to introduce problem-based learning into the classrooms, in which he is a firm believer as a teaching paradigm.

Planners. Both the primary driver behind the curriculum and the experience of the planners played a part in the curriculum planning process. A couple of participants noted that the curriculum was driven primarily by one faculty member, as in the statement "I was mostly driving the train, so I said 'Hey, here's what I want to do.'" Additionally, experience of the planners was recognized as influencing the planning. One participant stated that "I've done a lot of computer science education research.... And the other members on the committee also had a lot of experience building courses, probably less experience building a full curriculum. So there was some research basis for some of the ways that I thought about how the curriculum would work. And most of the people have developed at least new courses, if not complete curricula."

External Factors

External factors were also prominent in the curriculum planning process. Each of the five themes and their motifs considered as an external factor are described in this section.

Government. A number of governmental influences were considered, particularly in the UK. These consisted of assessment, funding, and policies. Assessment includes a review process performed by internal and external reviewers every five years. One participant noted that this required "...two people from outside the university and at least one person from a different faculty inside the university..." to perform the review.

One participant noted that assessment was tied to research monies funded by the government. He stated that

> "...if the government is looking about where it's going to put its funding in the future, they're going to go straight to Skillset and say, okay these are real courses [programs], this is where we're going to fund research or educational stuff."

Another participant explained that "[t]he way that higher education works in the UK is that the government says we will fund you for this many students. Then you divide them between all the [programs] within the university."

Industry. Industry influences included several motifs, consisting of assessment, currency, industry needs, industry relationships, local industry, portfolios, and tools. Assessment from industry players was considered during the planning process. One participant stated that "...our first external examiner was...making mastery multi-player online games and is a world authority on that. And he works both with academics and

with industry. So, he was a very important, instrumental part of setting up the course [program] and making sure it was solid."

Implementing a current curriculum was also considered. One participant noted that "I went to the Game Developer's Conference and I talked to some folks there" when planning the curriculum. Another noted that he became current and maintained currency through "...direct contract with game developers...through trade associations like TIGA, and...through attending conferences, both trade and academic conferences, like DiGRA."

Industry needs were mentioned as influencing the curriculum planning process in several ways. One participant detailed his own experiences that made him realize the importance of addressing the cultural differences in engineers and artists, since they are required to work together in the game development process.

> Engineers tend to think in terms of –here's our deadlines, here's the set of tasks we need to do, let's schedule them each. And I've regularly had conversations with artists who say 'you can't put art on a schedule, it will be done when it's done. We do want to polish it a little more.' I understand, they want to do a good job, and they want to exercise their creativity. But when you put in a business scenario where, I'm sorry, but we have to deliver tomorrow, and we have to have it tomorrow at the latest--to be told, oh, well, when it comes, it comes.

Another participant noted that in or near his state, there is "...a large concentration of video game companies. So people who had their ear to the ground for industry were recognizing that [game development] was an important area for industry." Another noted that "...this comes back to picking the things that I, as a professional game

developer, felt that indie game developers would have to know to be successful...important for them to know so they can graduate and do it." He added "[t]hat made me feel confident that we were going to be putting out students who could go get jobs in the games industry and do a good job on the games that they were creating." Another participant stated that "[t]he more I talked with...people from industry, the more we started realizing that boy, everything we taught in computer science was relevant to computer games."

Industry relationships were mentioned, including by one participant who thought that "...talking to people from industry does make sense..." when planning curriculum. He noted that he was in touch with two people from industry who provided input into their curriculum.

One participant noted that the tools selected for the program were influenced by discussions with industry. He stated that

> So then they went and discussed with...colleagues the gaming pathways and as part of that I went to the Microsoft Academy.... I took a workshop there and investigated the Xbox situation. I went with another member of staff.... We were discussing about promoting the Xbox as the platform of choice.

Other universities. Programs at and relationships with other universities that offer game degree programs are two motifs that influenced the planning process. One participant noted that "[i]t's both keeping in touch with industry and academia and it all kind of mixes in." Another participant stated that he talked frequently to another university who was considering creating a game degree program. In reflection, he offered

this advice to others who might consider planning a game degree program: "I guess the advice I would give is certainly talk to other people who've made degree programs, get their curricula, try to understand what trade-offs they have made."

Finally, knowing what programs are being offered, to compare programs and determine their new program's niche, was important to participants. One participant stated that "[w]e had staff at the time who were more interested in the assets generation of the games and they did some research going out and finding out what industry required, what other courses [programs at other universities] were offering, and that sort of thing."

Society. Societies perceptions of games played an influencing role in the curriculum planning process. Games in general were thought to be infiltrating the culture, and one participant thought that "... people who were more pragmatically oriented could recognize that they didn't necessarily care about video games, [but] they could see that their kids were really into them. They could see that it was an emerging area of cultural importance." On the other hand, the persistent theme of violence in video games also had an influencing role:

> I was concerned when designing the degree program about backlash against games based on the violence of games and based on the fact that many games do have violent thematic content or violence as a game mechanic. And it seemed to me that in fact some of the violence in games is bad and the critiques are in fact warranted and many games are violent when they don't need to be. So my perception was that somebody was

> sooner or later going to raise these concerns. And it seemed to me that we were going to have a hard time (inaudible) them. So I wanted to make sure that there was something in our curriculum to address those concerns.

Trade associations. Several trade and professional organizations influenced the curriculum planning process through accreditation, assessment, and frameworks. One participant noted that "my sense was that we were probably going to have to create a new set of guidelines for game degree programs.... It didn't seem to be fair to be using straight computer science guidelines." In the UK, Skillset's criteria for accreditation were also reviewed. One participant noted that "[m]y basic take on Skillset is that—there's nothing wrong with it, but it's not right for every course [program]. But it's the only game in town, so really we ought to try and get accredited." Another noted that concerning Skillset,

> ...to a large degree still to this day, we disagreed with their vision of the curriculum, which very clearly separated students into categories, either art or programming. However, it was still a useful exercise, because we could see from our reference to the Skillset [criteria] what [it was that] we didn't want to do.

In the US, one participant commented that they

> ...used the IGDA framework as a basis for developing our curriculum. And that was a huge help, by the way. You sort of walk into it saying—I really don't know what we should have and that really—once we knew what would be this core and what our computer science focus would be, it really helped guide us a lot.

Deliberation and Decision Making

Both internal and external factors were considered during the deliberation process. This deliberation process was part of the process at each institution, including those where primarily one individual drove the curriculum planning process. This deliberation process led to decisions of what would or would not go into the game degree program. Deliberation was primarily internal to an institution and occurred at both the department level and at the institution level. Deliberation was compounded by interdisciplinary efforts, which was acknowledged by participants as adding to the effort and time involved in creating the curriculum.

Two motifs evolved related to deliberation and decision-making, the process involved in deliberation and the planners involved in the process. As previously stated, one participant noted that interdisciplinary collaboration was kept to a minimum, because "...we didn't want to wait for people to come on board." One participant noted that deliberation was "[c]onstant." Another noted that many people were involved in the process, including the "...Associate Dean, academics of the faculty. So there's quite a wide range. As well as the Dean of the faculty who was very supportive."

In terms of retrospective analysis of the process, one participant stated that planners should "...talk to other people who've made degree programs, get their curricula, try to understand what trade-offs they have made." These trade-offs are part of the deliberation process, and occur when the many internal and external factors are thrown together and decisions must be made as to how much the factors will influence the final curriculum.

With respect to the deliberation process, one participant noted that the deliberation process was between the department chair and the primary planner, and "...it was mostly very cordial and collegial conversations," though another planner remarked that occasionally the process was tense.

Program Content

Though the program content is beyond the scope of this study, an abstract view of the program content produced by the participants' curriculum planning committee provides a picture of what the internal influences, external influences, and the process of deliberation produce, as shown in Table 29. Program content was defined as having seven motifs, assessment, dispositions, instruction, knowledge, program requirements, program structure, and technology skills. Each motif had a number of individual components.

Decisions about assessment of students were made during the deliberation process. This included assessment of project work and whether or not a capstone course would be included in the curriculum as an authentic assessment measure.
Decisions on what dispositions will be developed in students included creating a learning environment that promoted camaraderie and networking among students, something that "...once they went out into industry and they would still know each other well, and kind of build upon those relationships in the future." Decisions were also often made to have artists and developers work together and to learn each other's professional jargon.

Decisions about instruction included making the course content and assignments culturally relevant to students, making the course descriptive and flexible rather than

Table 28

Components of Program Content of Game Degree Programs

Themes	Components
Assessment	Students
Dispositions	Camaraderie, Networking
Instruction	Culturally Relevant, Descriptive, Interdisciplinary, Methods, Pace, Practicum, Theory
Knowledge	Art, Business, Computer Science, Digital Media, Diversity in Games, Ethics, Film and Video, Game Design, Game Genres, Game History, Graphics, Independent Game Development, Mathematics, Motion Capture, Narrative, Physics, Production, Programming, Serious Games, Sound, Virtual Reality
Program Requirements	Electives, Entry Requirements, General Education Requirements, Internships, Student Laptops
Program Structure	Administration, Difficulty Level, Diversity, Facilities, Goals, Learning Outcomes, Niche, Sequencing, Technical and non-technical Balance
Technology Skills	Consoles, Digital Art Software, Game Development Software, Mobile Devices, PC

prescriptive, and making the courses interdisciplinary with artists, designers, and programmers. Decisions were also made that were related to instructional methods, pace of the curriculum, and the balance in creative production and theory.

In program content, knowledge area was the most frequently mentioned. Decisions were made to include course content on art, business, computer science, digital media, diversity in games, ethics, film and video, game design, game genres, game history, graphics, indie game development, mathematics, motion capture, narrative, physics, production, programming, serious games, sound, and virtual reality.

Program requirements were decided upon as well. These included such components as the number of electives to be taken, entry requirements for students, general education requirements for students, and participation in internships. Additionally, decisions were made by one institution to require students to purchase laptops to supplement their learning.

Decisions about the program structure include program administration, difficulty level of the program, diversity in the program, and program facilities. Additional decisions included the program goals, the learning outcomes, the program niche, sequencing of content, and the balance between technical and non-technical courses.

Finally, decisions were also made about technology skills that will be developed in the students. This includes the selection of consoles, digital art software, game development software, mobile devices, and personal computers.

Summary

The four categories described above provide a complete picture of the curriculum planning process for new game degree programs. The process begins with motivation to create the program. Both internal and external influencing factors are considered and deliberated among the curriculum planners in an effort to come to a decision about program content. Due to the many influencing factors, the deliberation process can be lengthy and take one, two, or even more years to complete. Once all decision have been made, the program content can then be implemented and the formal process of recruiting students for the program can begin.

Evolution of a New Game Degree Program

After the program has been implemented, new factors emerge that influence the program content. In each of the institutions programs have evolved, confirmed by one participant who stated "[i]t's changed somewhat over the course of the years," and another stating that "[e]very year we tweak." This evolutionary process can be grouped into several categories. Each category involves all of the preceding themes described when the program was first created, and also the additional categories relating to data, initiatives, constraints, and resources resulting from the implementation of the program.

As summarized in Table 30, the game degree program produces students, feedback from whom is often considered both implicitly and explicitly. Additionally, the implementation and assessment of the program itself has an inherent impact on organizational aspects of the curriculum. Finally, further evolutionary aspects are also considered.

Learners

Feedback from prospective and enrolled students is considered in the process of evolving the program. Alumni feedback is not really considered, primarily due to the fact that most programs have matriculated few students. Some of the information that has been used to evolve the program include the fact that, as one participant stated, "[w]hat we do find, though, is the kind of student who has completely misinterpreted the course [program] and instead of coming on the course to make games, they are coming on the course to play games. It's problematic."

Another participant stated that "I've had students come up to me and thank me for creating the game degree program and thank me having courses on games.... I never had that in other subjects, really." He went on to state that "[b]y and large students come in and are happy with the content of the degree."

Table 29

Evolution of New Game Degree Programs

	Themes	Motifs
Students	Prospective	Advisement, Interests, Knowledge
	Enrolled	Abilities, Attrition, Characteristics, Demographics, Feedback, Interests, Misperceptions, Rapport with Faculty
	Matriculated	Feedback, Placement in Industry
Impact	Faculty	Satisfaction Levels
	Institution, Department, Program	Enrollment, Entry Requirements, Recruitment, Reputation, Retention
Assessment	Formal	
	Informal	
Additional Evolutionary Issues	Facilities	
	Interdisciplinary Issues	
	Curriculum Content	
	Faculty/Program Currency	

Another participant commented about failing students and stated that

> ...[w]ith those failing students, they thought they could do gaming. But when they encountered code, it shocked a lot of them. We had a new module in gaming called coding concepts. And that threw an awful lot of people out of coding. I think 89% passed, out of 120.

Organizational Impact

The impact of the implemented program affected faculty, the programs, the department, and the university. At the organizational level, enrollment and retention, entry requirements, recruitment, and reputation had various impacts on the program, the department, and the institution. One participant also mentioned faculty satisfaction.

Faculty satisfaction. One participant noted that he is personally very satisfied with the creation and implementation of the program. He stated that "[i]t's intensely satisfying being at graduation and seeing the game design students file by with their degrees that started off as a Word file in my computer."

Enrollment. Enrollment had a significant impact, as noted by several participants. One stated that "...we only projected about 13 a year, and so getting 30 a year instead is more stressful than we originally expected." Another noted that "[s]imply because it's gaming, its gone from 15 the first year to 18-20 the second year and next year more people will arrive."

Another participant, who only anticipated 65 students per year, noted that "last year we over recruited a bit, so we ended up with nearly 90 students, 80, 90 students.

Which is a bit more than ideal." One other noted that, due to government limitations, "[w]e're stuck at 24. I'd actually like to make it 40 or 60." Finally, another participant noted that "[i]t's definitely increased student numbers."

Recruitment. Closely related to enrollment is the recruitment process. One participant noted that "[i]n the first year, neither [program] recruited a great numbers of students." Another noted that "...just this year, the gaming course [program] has more applicants in September than any of our other pathways for the first time. So obviously, there is something to attract them." Finally, another went on to state that "[i]t's the largest recruitment programming [at their university]." Another stated that

> ...last year we had 5 applications for every place in the course [program]. So it's that kind of popular. So we closed off the applications in February of the year in which the students were starting in October. We stopped taking any more applications. We had plenty, thank you, that was fine.

Entry requirements. Related to recruitment and enrollment are the entry requirements for students. One participant noted that they have increased their entry requirements due to the number of applications coming in to the program. He also made another interesting statement related to the type of requirements that should be in place for prospective students:

> [W]hen I started the course [program], I wondered if it was going to be more helpful to get more academic students in or people who just like games. I didn't know when the people who came in, when I ran open days, I'd say 'Look, I really don't know if having better grades on you're A-levels are going to more

important than you're passionate about games.' And the people who are passionate about games I always imagined might be better than those with good A-level grades. I think that the good A-level grades have won out a bit. That is maybe, certainly—I don't know. It might be one of those self-fulfilling prophecies. Because of the way we assess students and things there are inevitably the ones who do better academically will do better academically.

Program reputation. The reputation of the program is also a motivating factor in recruitment. One participant noted that their program is attracting students from further away than usual for his institution, because "...it's a good course [program] and it's been developing a reasonable, good reputation."

Retention. Retention is another issue that has come about only after the implementation of the program. One participant stated that "...at least 20-30% are probably done by the middle of their sophomore year. Because the programming stuff is not happening. My gut is that we're probably the same as straight CS. Which is to say good, but not great." Another hinted about the reasons for students dropping out, stating that "...I think there are a lot of them that are excited about it until they realize that it's hard work. And then they decide to go do something else."

Program Assessment

The use of both formal and informal assessment measures has been considered during the evolutionary process. On the formal side, one participant described that a "...questionnaire asks students about their experience with university modules and pathways." Another method of collecting data was explained by one participant, who

stated that "...every module has to be assessed by the module deliverer and we put a form out with the module explaining what's gone right with the module and what's gone wrong with it." Periodic reviews are also performed. One participant stated that "...we do things like periodic reviews as well as the yearly writing a report about how things are going. It works both from a course [program] level, but also from a module level, a unit level."

Those comments both refer to the entire program, though assessment also occurs at the course level. One participant noted that "[t]he other way is by monitoring the statistics in the class and the different levels of marks that people get. So if that's either too high or too low, then questions are asked."

Assessment is also performed informally and used to tweak the program. One participant noted that this can occur through "...informal discussions between members of staff [faculty]." Another noted that "[t]he bottom line of any program like this is whether students are getting the jobs. What industry thinks about it. The reputation that it's got. We can measure that by hearing about students getting jobs within the industry and also talking about people in industry and their opinion of the course [program]." Similarly, another participant stated that "...the ultimate test of whether or not the program is successful will be, how many of them are starting game development companies or getting jobs in the traditional game industry."

Observation of student learning, particularly in the final year of the program, is also considered. One participant stated that "...we do these collaborative units, one in particular where groups of students get set on a problem. I think we can see then if they

can solve the problem or not as a measure of efficacy—measure the previous two years in that case."

Additional Evolutionary Aspects

Additional aspects considered in the evolution of game degree programs include lab resources. One participant frankly noted that "Well, certainly, the funding and the equipment has become because of the program, because I see other departments not getting the same level of equipment we do seem to be getting.... I'm not sure which came first, but I think the success of the course [program] has led to the increase in funding for equipment."

Instructors for courses changed. One participant noted that

> "I think the computer science department still doesn't teach C++ programming, which is industry standard. When we were first setting up the course [program], we tried [using their courses]. It became rapidly clear that they had a whole bunch of useful skills but not in game development. So we've got our own lecturers."

Another participant, whose program included a course on women's studies, stated that "I don't think that the students were very receptive to a women's studies professor. And the women's studies professor was having problems with those students for a variety of reasons." This led to both the course being changed to a more holistic course that is focused on diversity in games as well as employing a different instructor.

Another participant noted that "...the fact that we had to cut back on the...courses [from another college within the university], the art courses and the music courses,

because of logistic issues was disappointing. I think it's okay in the long run, but it wouldn't have been my choice." At another institution, a participant stated that

> [s]ome changes are driven by having lots of students fail that first C++ programming. Okay, so we tried delivering it in a different way. And getting extra Ph.D. students to support the lecture, so when we have a workshop there are two people in there to help students.

Summary

The evolutionary process involved with curriculum planning begins once the program is implemented. In the game degree programs at the institutions involved in this study, program content has changed each year over the duration of the program as planners tweak and improve on it. Though the majority of the work shifts from curriculum planning to program delivery, the planning process continues and planners look at both the factors involved in the creation of the program and the additional factors that are generated from the program implementation.

Summary and Conclusion

This explanatory methods research study investigated the curriculum planning process for game degree programs. The quantitative portion of this study provided results of a survey instrument that was designed from the theories by both modern and post-modern curriculum theorists. The qualitative portion of this study provided results of interviewing several of the participants in the quantitative study to explain the results of the quantitative study. In the process of explaining the results, participants also provided insight into the entire curriculum planning process for their program, including elements

of the process that were not included in the quantitative study. Both the quantitative and qualitative data are presented in this chapter, and in Chapter 5 the data is analyzed in light of the research questions.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter provides a brief review of the problem statement, research questions, and methodology. This is followed by a summary of the data results, an analysis of the data, and conclusions drawn from the data. After this summary and analysis, recommendations are given for educators and for the game industry. A section follows that details areas of future research that can explore the curriculum planning process beyond this study. The chapter concludes with a reflection of the researcher's experiences with this research study.

Statement of the Problem

Both modern and post-modern curriculum theorists have proposed frameworks for curriculum planning. Modern curriculum theorists have proposed frameworks that are generic in nature and can be applied to any program area, whether it is history, engineering, or nursing. Post-modern curriculum theorists have supplanted the idea of generic frameworks with theories that are specific to particular fields of study.

Post-modern theorists have demonstrated that there are many internal processes that are involved with the curriculum planning process. Different factors can impact and influence the development of curriculum in specific fields. Despite the fact that these

factors can have a significant bearing on the type of degree program that is planned and the type of outcomes that are achievable, the consideration of these factors is not formalized or organized in the existing literature on game degree programs. With the recent advent of the game degree programs in both the US and the UK, there is little research on what factors impact the creation of undergraduate game degree programs, what philosophies curriculum planners employ as they create the programs, and how these factors and philosophies affect student outcomes. The recent creation and growth of undergraduate game degree programs has also left a void in how to assess a game degree program.

The aim of this study, therefore, was to inquire into the curriculum planning process of game degree programs at post-secondary institutions within the UK and the US, to compare patterns of the curriculum planning process between the two countries (including philosophies and factors considered that may impact the process and the curriculum), and to compare the efficacy of these patterns against existing curriculum literature.

Research Questions

The overarching questions for this research study focused on the curriculum planning process of undergraduate game degree programs in the UK and the US. The questions were as follows:

(a) Within the United Kingdom and the United States, what philosophies do curriculum planners draw on as they engage in the creation of undergraduate game degree programs at post-secondary institutions?

(b) Within the United Kingdom and the United States, what influencing factors do curriculum planners consider as they engage in the creation of undergraduate game degree programs at post-secondary institutions?

(c) What are the major differences between and similarities in the undergraduate game degree curriculum planning processes at United Kingdom and United States post-secondary institutions?

Each of these questions guided the methodology and the analysis of the data.

Review of the Methodology

To answer the research questions, an explanatory mixed-methods research framework was selected. Initially, a survey instrument with closed and open-ended questions was created. The survey instrument was developed directly from components of the frameworks proposed by both modern and post-modern theorists.

The survey was administered to individuals in the UK and the US at post-secondary institutions with undergraduate game degree programs. The criteria for the programs included:

- They must have an established undergraduate game degree program in the 2009-2010 academic year;
- The word "Game" must appear in the program title;
- The program culminates in a Bachelor's degree;
- The institution is a private, not-for-profit or public institution.

A total of 33 responses were received, 25 of which satisfied the criteria for inclusion in the study, resulting in a 27% institutional response rate in the UK and a 42% institutional

response rate in the US. Program response rates for the UK was 14% and for the US was 38%.

The survey data was analyzed using SPSS and the results of the analysis are explained in Chapter 4. Once the data was analyzed, the follow-up interviews were conducted. Six participants at four institutions, two in the UK and two in the US, were interviewed using a semi-structured interview methodology. The data from these interviews were coded and themed. These themes were then grouped into categories, and each of these categories played an important role in the curriculum planning process for game degree programs.

Summary of the Findings

An analysis of the quantitative and qualitative data provided by the participants provides a basis for a new framework to provide an understanding of the curriculum planning process for game degree programs. This framework identifies several core areas that are part of the curriculum planning process, including the motivation for creating the program, the consideration and deliberation of all internal and external influencing factors, and the content of the game degree program, as illustrated in Figure 3.

This study also identified five external and eight internal factors that planners considered during the process of curriculum planning. The deliberation of all of these factors led to informed decisions about the game degree program requirements, program structure, learning outcomes (dispositions, knowledge, skills), assessment, and instruction. This process resulted in the selection of the content for the new game degree program, as illustrated in Figure 4.

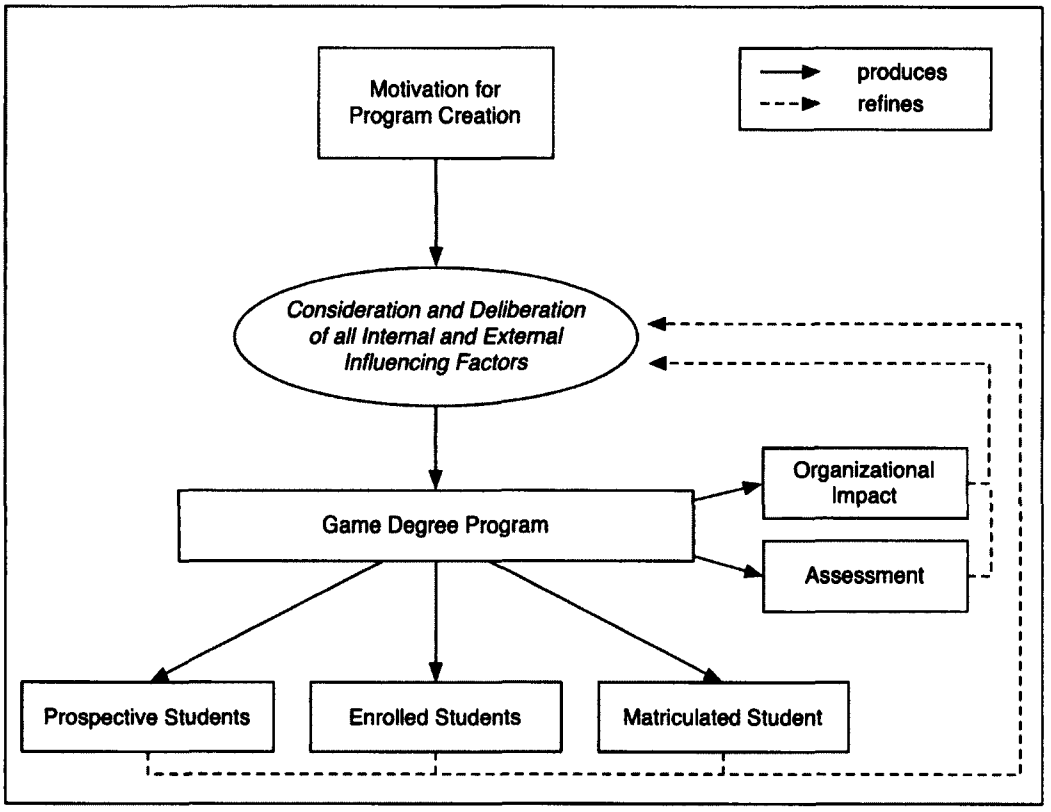

Figure 3. Curriculum planning process for game degree programs.

Once implemented, the program continues to evolve. It is refined through the feedback from prospective, enrolled, and matriculated students, from formal and informal assessment measures, and from the impact of the program on the institution, department, and faculty involved in its creation and delivery.

Interpretation of the Findings

Following the work previously done by other post-modern theorists, this research study proposes a framework for representing the development of new game degree programs at post-secondary institutions in the UK and the US. Though elements of this framework may potentially be applicable to other academic fields or at other types of

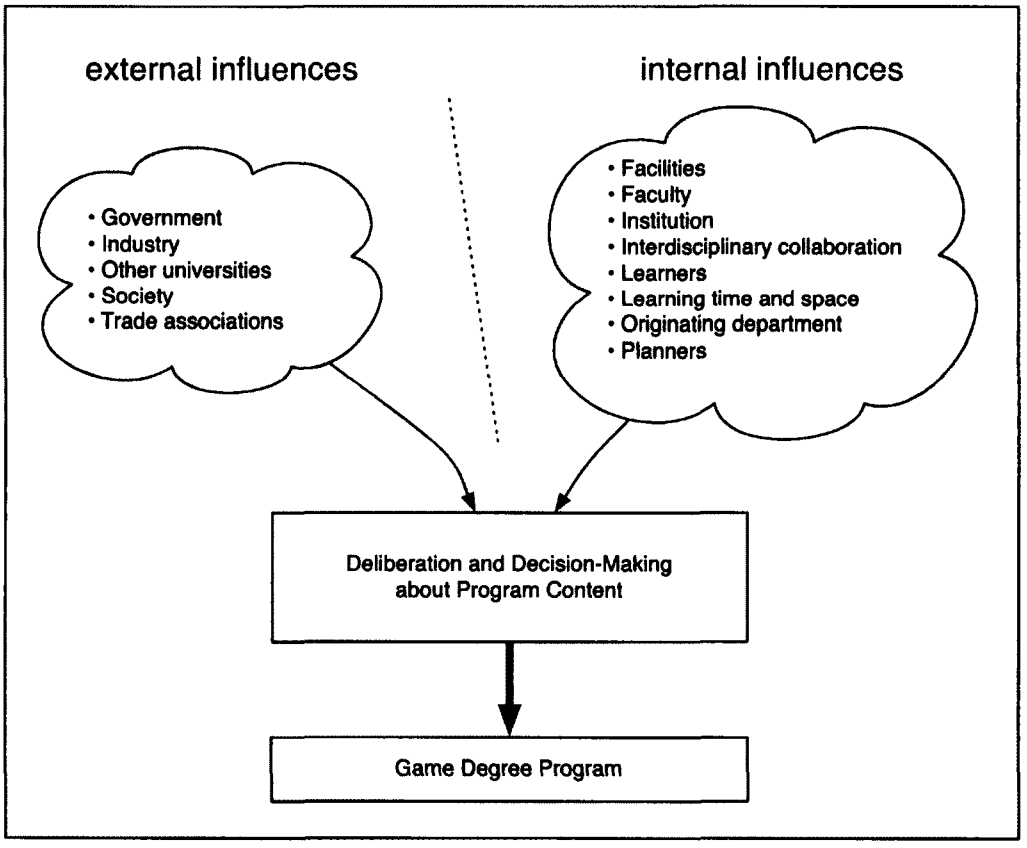

Figure 4. Process of consideration and deliberation of influencing factors.

institutions, the purpose of this framework is to represent the process for game degree programs. In this section, each of the components of the framework is described in detail,

from the motivation for creating a new game degree program to the implementation of the program. Also described in this section is evolution of the program after it has been implemented.

Motivations for Creating a New Game Degree Program

Before the process of creating a new game degree program can begin, an individual or group of individuals must be motivated to think about putting forth the effort to create a program. Though the reasons behind creating a program differ between the UK and the US, there are nevertheless real reasons behind the creation of these programs. All of the survey respondents mentioned at least one motivating factor for implementing their university's game degree program. Four themes emerged from this data: faculty interests, industry interests, student interests, and university/department interests. Three of these themes were directly supported by data provided by interview participants: industry interests (industry growth), student interests (enrollment/student interest), and university/department interests (game degree programs at other universities). The fourth theme, faculty interests, was indirectly supported in comments made by one participant stating that they were interested in creating a game degree program due to their own interests in game development.

Influencing Factors

Other theorists have stated that different forces or factors are involved in the curriculum planning process, many of which oppose each other. The decisions that must then be made about curriculum development are based on the deliberation process that takes place as all of these factors are considered.

The most important factors that are considered during this process were first defined through the quantitative study. Since the survey instrument was built on previous work performed by theorists in other fields, the breakdown of the philosophies and the factors, in retrospect, did not adequately represent the curriculum planning process for game degree programs. Through the follow-up interviews, it became apparent that the clearest way to represent these influencing factors was to identify them as either internal or external to the institution. Even though this paradigm resulted from the process of coding and creating themes from the interview data, the quantitative data in the philosophies portion of the study can also be classified as an internal or external factor, with the exception of those comments related to the deliberation process or those that related to the evolution of the program after it has been implemented. Additionally, the four factors provided in the survey, external, internal, resource, and learner, can also be classified as either external (external factors) or internal (internal factors, resource factors, and some learner factors).

The five external factors were themed as either influences considered from the government, from industry, from the programs or relationships at other universities, from society, or from trade associations. The eight internal factors were themed as either coming from the faculty, the institution, the result of interdisciplinary collaboration, the learners, the learning time and space, the originating department, or the planners.

Deliberation of Influencing Factors

The data from both the survey and the interviews supports the idea that planners must be prepared to deliberate extensively during the process of creating a new game

degree program. The range of factors that must be considered is wide and deep. Internal politics can play a part, particularly in collaborations that are attempting to be made by departments in different colleges. Trade-offs must be considered, for example when the number of new courses that can be created for the program are limited and planners are forced to leverage existing courses or what the balance between the technical and non-technical aspects of the curriculum should be.

Deliberation is the heart of the entire curriculum planning process for new game degree programs. It is where all of the decisions are made about the content of the game degree program. Participants noted that the deliberation process was an important part of planning and noted that deliberation was constantly recurring. Some noted that at times it could be tense, while others were able to plan the curriculum with cordial and collegiate discussions.

Program Content

The deliberation process enables informed decisions to be made regarding the content of the program. Program content was defined as having several components, including learning outcomes (including the desired dispositions, knowledge, and technology skills), program assessment, program instruction, program requirements, and program structure. Each of these areas plays a substantial role in the program and decisions about each were made prior to the program's implementation and prior to students enrolling in the program.

The majority of the data that supports the ideas of program content was gathered through the interviews. Participants offered significant amounts of information about the

program content and how decisions were made to include or not include various aspects of program content.

Evolution of Program Content

After implementation of the program, the program enters into its evolutionary stage. At this point, the previously considered internal and external factors still apply. In addition, the number of internal and external factors increases as data about the program and about the impact of the program is generated. Prospective, enrolled, and matriculated students will each have a different perspective about the program and feedback from their progress in the program can serve as a valuable tool in refining the curriculum. The impact on the organization, such as on enrollment or retention, can also influence future content of the program.

Informal and formal assessment of the program can serve as data that can be used to further refine the program. In the case of the interview participants, each has begun the process of adjusting the program to improve it for all stakeholders. Each participant also anticipates collecting more data through assessment, organizational impact, and students, in order to improve their programs.

Summary

The analysis offered in this chapter is solely based on the results of the quantitative and qualitative studies. The framework that is presented provides an abstract look at the curriculum planning process. The data provided in Chapter 4 represents a deeper look into each of the areas of the framework.

The curriculum planning process for a new game degree program is a task that takes considerable time and effort. The process has the potential to be highly complex with planners facing many challenges along the way. These challenges include many factors that are outside of their control. Planners must be skilled and motivated enough to maneuver through these potential problem areas and be creative enough to offer solutions to political issues that will arise. Though many academic fields may also encounter such problems, the field of game degree programs is unique in that the process typically involves collaboration with other departments, quite possibly in other colleges. Even though the faculty may come together at the planning stages to create a worthwhile program, the administration of the colleges can destroy this process. So, for example, collaboration must not only happen through a single strand from planners to top-level administration. Instead, there are multiple strands that must be willing to support the program.

Recommendations for Stakeholders

This section contains recommendations for educators who may be considering developing a game degree program, the game industry, and trade associations that provide frameworks and accreditation processes for game degree programs.

Recommendations for Educators

This section provides five recommendations to educators at post-secondary institutions who may be considering adding a game degree program. These recommendations are building relationships with industry, becoming familiar with the frameworks offered by trade associations, talk to others who have also gone through the

process of creating a new game degree program, understand the implications of performing interdisciplinary collaboration, and engage in research in games.

Build Relationships with Industry

When embarking on the creation of a new degree program, it is important for planners to understand the game development field at both the academic and the industry level. The researcher recommends that planners seek relationships with industry at the early stages of planning to gain an industry perspective of game development. This will provide planners with information about prospective learning outcomes they would like to include in their degree program, which is a critical step in defining their program's niche.

Many participants in this study had not been exposed to the game development industry prior to the creation of their program. These participants forged relationships with industry by attending academic and trade conferences on games, attending the large Game Developers Conference in the US, and attending workshops provided by industry. While doing this, the participants were able to establish relationships with industry employees who provided critical feedback on their new game degree program.

Become Familiar with the Frameworks from Associations

Two major associations, Skillset in the UK and the International Game Developers Association (IDGA), have spent extensive time and effort in creating curriculum frameworks specifically for planners of game degree programs. Tiga also provides information on the state of the UK game industry that can be useful when creating game degree programs. The researcher recommends that planners learn about the

materials offered by these associations. The materials provided will assist planners in making informed decisions about the content of their game degree program.

Talk to Planners of Programs at Other Universities

Though all of the participants in this study were from institutions with game degree programs that are under 10 years old, the planners of these programs experienced many of the same difficulties. The researcher recommends that planners of new programs talk to planners of already established game degree programs to gain insight and understanding of what to include in the program and how to develop a program successfully.

Planners of established game degree programs can provide possible contacts within industry who might be willing to provide critical feedback. Experienced planners may also be able to provide reasons why they decided on various aspects of their program content, for instance why they chose a particular balance of technical and non-technical aspects of a program or the difficulties they have encountered since program implementation. This type of information can serve as important influencing factors for planners during the deliberation process.

Understand the Implications of Interdisciplinary Collaboration

Interdisciplinary collaboration can increase the time and effort it takes for planners to create a game degree program. Many of the participants in this study recognized the importance of interdisciplinary collaboration in creating a game degree program with interdisciplinary coursework. Some included interdisciplinary coursework for their students so students would learn the context of their technical skills. Others,

particularly those who focused more on an indie game development track, included interdisciplinary coursework to provide a broader set of skills for their students.

The researcher recommends that planners understand the complex nature of interdisciplinary collaboration. Even in situations where the curriculum planning committee was successful in creating a game degree program proposal, the history and politics of the institution could have significant effects on the proposal. For example, in one participant's case, the collaboration took place across two colleges within the university. While the initiating college was able to get approval for the program at the college level, the other could not get approval at the college level due to concerns among the college faculty who were responsible for approving the proposal. Therefore, the initiating college sought to advance another proposal that limited the involvement of the other college.

Engage in Research in Games

Game development is not only a valid academic endeavor for students, but it is also a valid research area for academics. There are opportunities to advance the game development field in the technical areas of artificial intelligence, computer graphics, networking, haptic devices, and more. There are also opportunities to advance the field in non-technical areas, such as human-computer interaction, social networking and games, and contextualized games (e.g., games for learning or for advertising).

The researcher recommends that research in games be considered as valid research during the creation of new game degree programs and when hiring new faculty. Though some programs are more oriented towards creative production, and for-profit

institutions in particular have focused on skills development for creative production, one participant believes that there appears to be a void in games research. Not all programs must be focused on creative production, but understanding that there can be a blend of teaching with valid games research, particularly at research institutions, can open the door for new programs to be established.

Recommendations for the Games Industry

The games industry can contribute to the creation of meaningful game degree programs. This section provides two recommendations for individuals in the games industry, provide input on program content and understand that evolution of new programs take time.

Provide Input on Program Content

The game industry can benefit significantly from the game degree programs that have been and continue to be established. Students who enroll in these programs are self-selecting and are already demonstrating a strong desire to learn about game development. Industry input for institutions creating new game programs will make these programs stronger.

The researcher recommends that the games industry develop relationships and liaisons with academics that can serve to strengthen the programs. This may include providing low-cost or no-cost development kits, providing grants for research, and providing grants for conference attendance by both students and faculty. It may also include offering and providing critical input into content of the game degree program.

This will need to be done with an understanding that different areas of the games industry might require different skills. Additionally, public and not-for-profit institutions often seek to educate students beyond mere vocational skills. They focus on the holistic development of students, including requiring general education courses such as those in the humanities and arts. The existing literature demonstrates the value of such an education, and many planners are bound by their institutions to support this breadth in education. As in other industries, the games industry may need to spend time and resources to train entry-level employees. Any one institution will usually not be able to provide the exact set of skills needed in students fully trained for a new position.

Understand that Evolution of New Programs take Time

In addition to feedback, it is necessary for those in the game industry to understand that the creation and evolution of a new program takes a considerable amount of time. This is a brand new academic field. As new programs are being created, trade-offs have and will need to be made to gain approval from some critics who question game development as a valid academic field. As the field becomes more established and gains more support, adjustments have and will continue to be made.

The researcher recommends that the game industry provide time for the evolution of these new programs. An important area of assessment is from alumni and from industry personnel who hire these alumni. Providing this information to institutions as it becomes available will enable growth and improve the quality of these programs.

Recommendations for Trade Associations

Trade associations like IGDA, Skillset, and Tiga, have all played a role in the curriculum planning process for new game degree programs. This section provides recommendations for consideration by trade associations that may assist institutions in planning successful game degree programs. These include seeking feedback from industry and academics, creating flexible frameworks and accreditation standards, keeping frameworks and accreditation criteria current, and providing a boilerplate assessment plan.

Seek Feedback from Industry and Academics

Curriculum planners have noticed and used the materials put forth by the associations. Some planners have followed the guidance found in these materials to make informed decisions about their game degree program. Others have found the materials to be too restrictive and, instead, have used the materials as an example of what not to do with their program. Due to the discrepancies found in statements made by various planners, the researcher recommends that associations actively seek input from curriculum planners on the usefulness of the materials that they offer. By soliciting such input, associations can assess the value of the materials and learn how to improve them to make them meaningful for planners. This should involve seeking input from industry as well, including those in the indie game development industry.

Create Flexible Frameworks and Accreditation Standards

Rigid frameworks and accreditation standards that only take into account one model of success for programs offer little to curriculum planners. The indie game

development movement has influenced the landscape for potential employment beyond large publishing companies. From the data collected in this study, it is clear that the skills a student may need for a large publishing company differ from those he or she may need at a small indie game development company. Employees of small indie companies may need to have a broader set of skills, including creative production skills, technical director skills, art skills, sound skills, and programming skills.

Institutions that are creating game degree programs to meet these broader sets of needs want their programs and their students to be successful. Frameworks or accreditation processes that are not flexible and instead force institutions to create curriculum that are geared to either artists or to programmers will not be useful to these institutions. Therefore, there is a need for associations to create and maintain flexibility in the frameworks and to offer accreditation standards that take a wide range of programs are taken into account.

Keep Frameworks and Accreditation Criteria Current

The game development industry is evolving very quickly. Frameworks and accreditation criteria that are not kept current may not be offering useful references for curriculum planners. Frameworks and criteria both must reflect the current state of the industry to be meaningful.

Changing criteria and frameworks every year, however, could also create the problem of curriculum planners attempting to aim at a moving target. To avoid such a scenario, criteria and frameworks should have a level of flexibility in them, in order to take account of new trends and technologies in game development as they become

available. Therefore, the researcher recommends that associations work to create a balance between a infrequently updated document and one that is updated too frequently.

Provide a Boilerplate Assessment Plan

One of the most challenging and untapped areas of new game degree programs is the lack of formal assessment measures. The creation of a new program takes considerable time in academia. Formal assessment measures appears to be the one area in the curriculum planning process that has been sacrificed for the sake of the implementing the program in a more timely manner.

Associations can help by creating and providing a boilerplate assessment plan. This plan can identify the significant quantitative and qualitative data that can be useful in gauging the strengths and weaknesses of the program. Though this can be challenging, since each program is developing its own niche, having measures that can be "dragged and dropped" into a program's master assessment plan will at least provide a starting point for assessment. For example, criteria for measuring the strengths and weaknesses of a "sound/audio for games" component of a program can be offered as a selection. If an institution offers sound and audio for games, the institution could choose to add that criteria to its master assessment plan for the game degree program. The institution could then choose to tailor the criteria even further.

Recommendations for Further Research

During the process of aggregating and analyzing the results of this study, a number of areas for future research became apparent.

Expansion of the Study

The research study itself can be expanded to include for-profit institutions in the US that offer undergraduate game degree programs. Data collected can then be analyzed against the public and not-for-profit institution data collected in this study for the purpose of providing a more robust data set. Additionally, the definition of a game program can be expanded to include institutions offering specializations and concentrations in both countries, which would also provide a richer set of data for comparison.

Additional Analysis of Research Data

Since the works of both modern and post-modern theorists are used heavily in creating the foundation for this research study, comparing the results against these theorists could enhance or validate their work. For example, one could explore how the influencing factors and processes line up with the four categories of learning (assessment-centered, knowledge-centered, learner-centered, and community-centered) proposed by Brownsford, Brown, and Cocking, 1999, and referred to in previous chapters.

Additional research can be conducted to determine if there is any significant difference between the influencing factors and philosophies considered at various institutions using demographics beyond the aggregate grouping of UK and US institutions. A multivariate analysis of variance should be used to compare the survey questions against the demographic information of institutions, including the types of programs offered. For example, institutions that consider program assessment during the curriculum planning process may indicate a higher degree of external influence factors. In addition to assessment, research could be conducted to determine how philosophies

and influencing factors considered during the curriculum planning process affect student outcomes.

Research Involving Other Fields of Study

The survey instrument used in this study could undergo reliability and validity checking by testing a wider number of participants and be made into a reusable instrument for educational researchers. Since this instrument is specific to game degree programs, this would require research to first determine which elements of the survey are specific to game degree programs and which are considered across different disciplines.

Further Research to Explain Study Results

In the results of the motivation for creating the game degree programs, it is apparent that there is a difference between the UK and the US. The reasons for this difference are unclear. One additional area of research, then, is to explore why are there different motivators for creating programs in these two countries.

During this study, it became apparent that gender, ethnicity, socio-economic status, and age of students were not explicitly considered during the building of the curriculum. All of the interview participants were male and were, in most cases, the driving force behind the development of the program. Though one participant noted that he did not care what a student's gender or ethnicity is, it is important to note that without explicitly considering the backgrounds of students and what each student brings to the table, a hidden curriculum can be formed. In the case of each institution, for example, the committees and the leader of these committees were predominantly white males. These individuals are then creating a program for predominantly white males. The learners that

have been attracted into these programs are also, according to the data, white males. It seems, therefore, that curriculum planners' inherent biases may be creating programs in which predominantly white males will be successful. A follow-up study in this area, to determine if a hidden curriculum has been developed (even unknowingly to the planners), could shed further light on this subject.

Alumni feedback will also be important in the future, as more students graduate from these programs. Additional areas that can be researched in the future include the placement of students as well as feedback from industry on the skills of these alumni.

It is reported in the data that enrollment and funding are following these newly created game degree programs. Since there are only a few institutions offering these programs, particularly in the US, it could be the case that enrollment is high due to the supply and demand economics of the situation. Additional research might follow trends in this area, particularly looking for a saturation point in enrollment as more universities develop game degree programs.

Also uncovered in this study is the fact that women enrolled in the game degree programs may not drop out as frequently as men. Along with gender, research into other characteristics of students who fail to complete the program might provide value in both developing the program and recruiting students who will be successful in the program.

Research has been previously performed on the skills that are required and desired by game development companies. These companies, however, were more traditional companies and the results of this research do not reflect the types of skills that might be most useful for those students who want to pursue a career in the indie game

development field. Since these skills are embedded in three of the four institutions that participated in the follow-up interviews, conducting research in this area might provide empirical data for both existing and new programs.

Assessment of game degree programs is another vast area that has yet to be formally explored. It is also a highly relevant area, since many institutions realize its importance, yet have not invested the time and resources to produce adequate measures to assess their program.

There was some concern noted by one participant that some academics believe that game degree programs take away students from traditional computer science programs, thus resulting in a drop in enrollment for these programs. Though he did not believe this to be the case, and other participants echoed that, empirical data on this would be helpful in determining if this is really the case.

If motivation spurs the curriculum planning process, and the curriculum planning process at all of the institutions from which data was collected ended up with a game degree program, what factors heavily influence institutions' decisions to be motivated to start the curriculum planning process, but then not produce a game degree program? Answering this question could shed light on the "tipping" factors that can either halt or significantly delay the curriculum planning process for these programs.

Reflections on the Researcher's Experience

In this section, the researcher reflects on the experiences with this research study. It includes a discussion on the researcher's biases, preconceived ideas, and values. This section also includes possible unintended effects the researcher may have had on this

study. It concludes with a reflective analysis of how this study has changed the researcher's thinking.

Biases, Preconceived Ideas, and Values

The researcher has a strong technical background and has taught game design and development in a post-secondary classroom. She has also been involved in laying the groundwork for the implementation of a cross-disciplinary game degree program at her institution. This has involved an extensive amount of background research on potential program content. This has undoubtedly created biases about the creation of game degree programs. As much as possible, care has been taken to ensure that each conclusion drawn in this study has been formally mapped back to the information from either the quantitative or qualitative study.

Effects of the Researcher on the Study

The researcher was responsible for all aspects of both the quantitative and qualitative studies. She created the survey instrument and the semi-structured interview questions, recruited all participants, parsed and analyzed all of the data, and interpreted all of the findings. Due to the inherent nature of this process, the researcher may have introduced her biases into the research study. Though care has been taken to keep the research study and its findings wholly reliant on the collection of the data, the process of collecting the data and including certain participants may be influenced by the researcher's previous knowledge and biases. It is important that readers consider these biases when reading the findings, since the researcher's biases may have had unintended effects on the results of this study.

Changes in Thinking as a Result of the Study

The researcher has been involved with various stages of the curriculum planning process for different fields. Prior to the start of this study, the researcher was in the early stages of participating in a collaborative game degree program. Through this, the researcher began to understand many of the administrative, political, and historical issues as well as how the individual beliefs of planners can be potential sources of problems with interdisciplinary collaboration. As she progressed through the process of planning the curriculum, followed by the process of collecting and analyzing the data, it has become clear to her that many of the deliberations and the processes of gaining approval throughout the university could have been handled much more efficiently and effectively.

The lengthy process of creating a meaningful literature review gave the researcher an opportunity to get to know the existing issues regarding new game degree programs. The lengthy process of conducting a mixed methods study, a quantitative study followed by a qualitative study, gave the researcher an opportunity to see the value of both forms of research. After conducting the quantitative portion of the study, the researcher felt confident in the direction that the findings of the research were headed. The researcher found the qualitative data so rich and informative that it served not only as informing about the quantitative data, but gave the findings a different focus.

This study has also had a tremendous affect in building the confidence of the researcher in conducting educational research studies. After a lengthy process of studying quantitative analysis methods, which took place prior to this study, the researcher was able to start to interpret statistical data and understand its meaning. When it came to

developing the quantitative survey instrument, the researcher was able to quickly choose the statistical analysis methods.

Concluding Statement

The future success of game degree programs is dependent upon curriculum planners making informed decisions about program content. The current programs are still in their infancy stage, particularly compared to the much more established academic fields in the related areas of computer science and art.

After conducting this study, it is clear that the curriculum planning process of game degree programs in the UK and the US are more alike than they are different. With few exceptions, the planners consider the same internal and external factors.

Creation and implementation of game degree programs is currently partly systematic, but includes a considerable degree of variation and randomness in issues and influences being considered. These issues often derive from the goals and resources that are put forth by the institution or originating department. Even with these differences, following a more systematic development framework has the possibility to make a real improvement to the quality of degrees being developed. It can also serve as a solid resource for managing the curriculum planning process more smoothly and efficiently.

Prior to this study, such a framework did not exist, largely due to the young age of the discipline. Based on the careful collection and analysis of data, this work provides such a framework. It is hoped that this work can contribute to an improvement in the quality of game degree programs developed in the future.

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APPENDIX A

GAME DEGREE PROGRAM CURRICULUM

DEVELOPMENT SURVEY

Game Degree Program Curriculum Survey

If your institution has multiple game programs in which you have been involved in planning the curriculum, please complete the survey for one program of your choice. If the planning for multiple programs occurred simultaneously, please note this in your response to Question 3.

For additional program(s), please consider repeating this survey.

Due to the differences in taxonomy between the UK and the US and the need for consistency in both surveys, the US taxonomy is used throughout the survey.

The term "program" in this survey is used to refer to the degree programme or course of study in the UK terminology.

The term "faculty" is used to refer to "academic staff members" in the UK terminology.

Note that the US spelling of words is also maintained in the survey for consistency.

Demographics

1. What is the name of your institution?

2. What is your position at the institution?

3. Were you involved in planning the curriculum for a game degree program at your institution?

   Yes _____
   No _____

   If responding Yes: What is the name of your institution's game degree program that you planned or assisted in planning and for which this survey is being completed? (If your institution offers more than one program, choose one.)

   Program: _____

   a. Is this program a stand-alone program ("major") or a specialization in an existing program?

      _____ Stand-alone (Major)
      _____ Specialization in existing program: _____

   b. Briefly, what were your contributions to the planning process?

c. If you were involved in planning more than one game program concurrently, please identify the other program(s) here.

4. Approximately how many years has the game degree program been offered? _____

5. Approximately how many students are currently in the game degree program? _____

6. Approximately how many students have graduated from the game degree program since its inception?

   _____

7. Approximately how many individuals were involved in the planning of the curriculum?

   _____

8. If more than one department was involved in planning the curriculum, which other departments were involved?

9. Approximately how long did the incubation period for the game degree program take (from inception of the idea to the first official offering of the program)?

   _____

10. As part of this research, I will be conducting follow-up case studies in the UK and the US at several institutions. Would you be willing to participate in a follow-up interview at your institution? If so, please provide your name and email. If you prefer, you may instead send me an email at mmcgill@bradley.edu.

    Name: _____

    Email: _____

Curriculum Planning Process

1. What were the primary motivations for creating the game degree program at your institution?

2. What curriculum frameworks, if any, were considered during the planning process (select all that apply):

_____ International Game Developers Association

_____ British Computer Society

_____ ACM/IEEE Computing Curricula

_____ Game Degree Programs at other institutions

_____ International Art Education Standards

_____ Skillset

_____ National Art Education Standards

_____ Other:

3. Using the following scale, please indicate the degree to which you agree with the statements listed below with respect to the curriculum planning process for the game degree program in which you were involved.

During the curriculum planning process:	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
There was extensive deliberation.					
Program assessment was considered to be of high importance.					
An analysis of needs was conducted.					
Program objectives were formulated.					
Program goals were formulated.					
Criteria for selecting program content was formulated and applied.					
Considerable time was spent on establishing the sequence of the program content					
Student projects that reflected current industry practices were considered.					
Decisions were made to respond to the anticipated interests of the learners.					
The curriculum content was weighed against the time available for students to complete the program.					
The individual beliefs, values, and visions of the planners were considered.					
A psychology of learning was considered.					
The planners had extensive experience in curriculum development.					

During the curriculum planning process:	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Student learning experiences were selected.					
Student learning experiences were organized.					
The planners considered creating a program that was flexible in nature.					
Goals and objectives were given quantifiable measures to determine effectiveness of the program.					
The planners sought input from organizations outside the institution.					
The planners sought input from other departments within the institution.					
There were sometimes tense deliberations.					
The entire scope of the curriculum (including resources and materials) was considered.					
The planners were experienced with teaching game development.					
Balance and pace of program for sustaining student interest and effort were considered.					
Integration and linking of content from within and across the program were considered.					
Shared standards for assessing outcomes across the curriculum were considered.					

4. Were any additional processes involved in planning the curriculum? If yes, please explain:

5. Using the following scale, please indicate to what degree each external factor listed below influenced the final curriculum for the game degree program that you were involved in planning.

	No Influence	Little Influence	Moderate Influence	Significant Influence
National Initiatives				
Institutional Initiatives				
External Program Assessment Measures				
External Proficiency Exams (eg. National or Industry proficiency exams for students)				
Current/Future Needs of Industry				
External Certification or Standards				
Industry Advisory Board				
Industry Professionals				
Professional organizations				
Societal norms				
Community norms				
Political Issues outside of the institution				
Globalization Issues				
Other (please specify):				

6. Using the following scale, please indicate to what degree each internal factor listed below influenced the final curriculum for the game degree program that you were involved in planning.

	No Influence	Little Influence	Moderate Influence	Significant Influence
Experience of the curriculum planners				
Political Issues within the Institution				
Time for students to complete the program requirements				
Department Initiatives				
Life experiences of the planners				
Economic outcomes of the program				
Ability to recruit and retain students				
Timing of the curriculum changes				
Personal preferences of planners				
Emotional reactions of planners				
Moral issues				
Social issues				
Internal Program Assessment Measures				
Other (please specify):				

7. Using the following scale, please indicate to what degree each resource factor listed below influenced the final curriculum for the game degree program that you were involved in planning.

	No Influence	Little Influence	Moderate Influence	Significant Influence
Lab Facilities				
Classroom Facilities				
Faculty Availability				
Faculty experience teaching game development				
Technology/Equipment				
Funding for program				
Administration of program				
Other (please specify):				

8. Using the following scale, please indicate to what degree each learner factor listed below influenced the final curriculum for the game degree program that you were involved in planning.

	No Influence	Little Influence	Moderate Influence	Significant Influence
Relevance of program content to students				
Ethnicity of students				
Gender of students				
Age of the students				
Attitudes of students				
Socio-economic status of students				
Student feedback				
Alumni feedback				
Level of knowledge of incoming students				
Learning needs of students				

9. Were there any additional factors considered during the curriculum planning process that affected your final program? If yes, please explain.

Thank you for taking the time to complete this survey.

APPENDIX B

SEMI-STRUCTURED QUESTIONS

FOR FOLLOW-UP INTERVIEWS

Semi-structured Interview Questions for Follow-up Interviews

1. Describe the game degree programs that are offered at your institution.
2. Describe how your institution adopts new programs.
3. Describe your role in the curriculum planning process of the game degree program(s).
4. In your opinion, why did your institution or department(s) seek to create a game degree program?
5. Approximately how long did the process take between the initial ideas of creating a program to its actual offering to students?
6. In your own words, describe the process for planning the game degree program curriculum at your institution.
7. Who was involved in the curriculum planning process?
    a. What roles did each of the planners have in the process?
    b. What did each of the planners contribute to the process?
    c. Since game degree programs are relatively new to post-secondary institutions, who provided the content area expertise in game development? What experiences did he or she (or they) have in game development?
8. During the curriculum planning process, were there any references to curriculum frameworks?

a. If not, the International Game Developers Association's Curriculum Framework and the Skillset's Accreditation documents both provide frameworks that might be used in curriculum development. Were any frameworks like this used?

b. In your opinion, how much influence did the(se) framework(s) have on the final curriculum?

9. An influencing factor in curriculum planning can be anything that influences your program. These can be factors that are internal to your department or institution or external.

    a. In your opinion, what were some of the influencing factors that you considered when you planned your curriculum?

    b. Of these, what factors had the most influence on your curriculum?

10. Deliberation between individuals involved in the curriculum planning process can play a large role in curriculum development. Often the deliberation process can be very tense as planners bring their individual experiences, beliefs, and values into the process.

    a. To what extent do you believe deliberation was part of the process?

    b. Provide one or two examples of the types of deliberations that took place.

11. Was assessment of the game degree program discussed during the curriculum planning process?

    a. If so, to what extent?

b. What type of assessment measures have been put into place?

12. What obstacles were encountered during the curriculum planning process?

    a. How were these obstacles handled?

    b. Did these obstacles influence the final program?

13. How has the program affected the sponsoring department(s)?

14. Since the program(s) was (were) implemented at your institution, what types of problems or concerns, if any, have arisen?

APPENDIX C

GAME DEGREE PROGRAM DATA

FROM THE UNITED KINGDOM

Post-Secondary UK Institution	Program Name	Degree(s)
University for the Creative Arts	Computer Game Arts	BA
	Computer Game Arts & Animation	BA
University of Abertay Dundee	Computer Game Applications Development	BS
	Game Design & Production Management	BA
Aberystwyth University	Computer Graphics, Vision & Games Degree	BS
Anglia Ruskin University	Computer Games Development	BS
	Computer Gaming and Animation Technology	BS
	Computer Games and Visual Effects	BA
Birmingham City University	Animation for Game Design	BA
Bournemouth University	Software Development for Animation, Games, and Effects	BS
	Games Technology	BS
Brunel University	Computer Science (Digital Media and Games)	BS
	Game Design and Creative Writing	BA
	Games Design and Drama	BA
	Games Design and English	BA
	Games Design and Film and Television Studies	BA
	Game Design and Music	BA
	Game Design and Sonic Arts	BA
Buckinghamshire New University	Digital Games Design	BS
	Games Development	BS
City University	Computer Science with Games Technology	BS
Coventry University	Games Technology	BS
De Montfort University	Game Art Design	BA
	Electronic Games Technology	BS
	Computer Games Programming	BS
Glasgow Caledonian University	Computer Games (Design)	BS
Glyndwr University	Design: Digital Art for Computer Games	BA
	Computer Game Development	BS

Post-Secondary UK Institution	Program Name	Degree(s)
Heriot-Watt University	Computer Science (Games Programming)	BS
Kingtson University	Computer Science (Games Programming)	BS
	Games Technology	BS
Leeds Metropolitan University	Games Design	BS
Liverpool John Moores University	Computer Games Technology	BS
London Metropolitan University	Computer Games	BS
	Game Studies	BA, BEng
	Game Studies and Media Arts	BA, BEng
London South Bank University	Game Cultures	BA
Manchester Metropolitan University	Computer Games Technology	BS
Middlesex University	Computing, Graphics and Games Degree	BS
Norwich University College of the Arts	Games Art and Design	BA
Nottingham Trent University	Computer Science (Games Technology)	BS
Sheffield Hallam University	Games and Interactive Media Technologies	BS
	Games Design	BA
	Games Software Development	BS
Southampton Solent University	Computer Games Development	BS
	Sound for Film, Television, and Games	BS
	Computer & Video Games	BA
Staffordshire University	Game Artificial Intelligence	BS, BEng
	Computer Games Design	BS, BEng
	Computer Games Design and Programming	BS, BEng
	Multiplayer Online Games Programming	BS, BEng
	Portable Game Programming	BS, BEng
	Games Concepts Design	BS, BEng
	Computer Games Audio Design	BS, BEng
	Arcade Game and Simulator Development	BS, BEng

Post-Secondary UK Institution	Program Name	Degree(s)
Swansea Metropolitan University	Computer Games Development	BS
	Creative Computer Games Design	BA
Thames Valley University	Games Development (Games Art, Games Design)	BA
University of Bedfordshire	Computer Games Development	BS
University of Bolton	Games Art	BA
	Computer Games Software Development	BS
	Games Design	BS
University of Bradford	Interactive Systems and Video Games Design	BS
	Design for Computer Games	BA, BEng
University of Brighton	Computer Science (Games)	BS
University Campus Suffolk	Computer Games Design	BA
University of Central Lancashire	Computer Games Development	BS
	Computer Games Enterprise	BA, BS
	Games Design	BA
	Multimedia Games Development	BS
University of Derby	Computer Games Programming	BS
	Computer Games Modeling and Animation	BA
University of East London	Computer Games Design (Story Development)	BS
	Computer Games Technologies	BA
University of Essex	Computer Games	BA
University of Glamorgan	Games Art & Animation	BA
	Computer Games Development	BS
University of Greenwich	Computing with Games Development	BS
	Games and Entertainment Systems Software Engineering	BS, BA
	Games and Multimedia Technology	BS
	Games Technology	BS
University of Hertfordshire	3D Games Art	BA
	Games and Graphics Hardware	BS

Post-Secondary UK Institution	Program Name	Degree(s)
University of Huddersfield	Interactive Toy and Game Design	BA
	Computer Games Design	BA
	Computer Games Programming	BS
University of Hull	Computer Science with Games Development	BS
University of Lincoln	Computer Games Production	BS
	Games Computing	BS
University of Newcastle-upon-Tyne	Computing Science (Games and Virtual Environments)	BS
University of Northumbria at Newcastle	Computer Games Design and Production	BS
	Computer Games Software Engineering	BS
University of Plymouth	Computing and Games Development	BS
University of Portsmouth	Computer Games Enterprise	BS
	Computer Games Technology	BS
University of Salford	Computer and Video Games	BS
University of Sunderland	Multimedia Games	BS
University of Sussex	Games and Multimedia Environments	BS
University of Teesside	Computer Games Animation	BA
	Computer Games Art	BA
	Computer Games Design	BA
	Computer Games Programming	BS
	Music and Computer Games Design	BA
	Games Graphics Programming	BS
University of Ulster	Computer Games Development	BEng
	Computing (Game Development)	BS
	Multimedia Computer Games	BS
University of Wales Institute, Cardiff	Mobile, Web & Game Design	BA, BS
University of Wales, Newport	Computer Games Design	BA
	Games Development and Artificial Intelligence	BS

Post-Secondary UK Institution	Program Name	Degree(s)
University of the West of England, Bristol	Games Technology	BS
	Games Technology Programming	BS
University of the West of Scotland	Computer Games Development	BS
	Computer Games Technology	BS
University of Westminster	Computer Games Development	BS
University of Wolverhampton	Computer Science (Games Development)	BS
	Computer Games Design	BA
University of Worcester	Computer Games & Multimedia Development	BS

APPENDIX D

GAME DEGREE PROGRAM DATA

FROM THE UNITED STATES

4-year Public or Not-for-profit US Postsecondary Institution	*Program Name*	*Degree(s)*
Bloomfield College	Game Development	BA
Champlain College	Game Art & Animation	BS
	Game Design	BS
Columbia College	Game Design	BA
Dakota University	Computer Game Design	BS
DePaul University	Game Development	BS
Ferris State University	Digital Animation and Game Design	BAS
George Mason University	Computer Game Design	BFA
Ithaca College	Game Design and Immersive Media	BFA
Rensselear Polytechnic Institute	Games and Simulation Arts and Sciences	BS
Rochester Institute of Technology	Game Design & Development	BS
Rogers State University	Game Development	BS
Savanah College of Art & Design	Interactive Design and Game Development	BA, BFA
Shawnee State University	Digital Simulation & Gaming Engineering Technology	BS
	Gaming and Simulation Development Arts	BFA
Southern New Hampshire University	Game Design and Development	BS
Southern Polytechnic State University	Computer Game Design and Development	BS
University of California – Santa Cruz	Computer Science: Computer Game Design	BS

4-year Public or Not-for-profit US Postsecondary Institution	*Program Name*	*Degree(s)*
University of Colorado – Colorado Springs	Game Design and Development	BI
University of Denver	Animation and Game Development	BA, BS
University of Southern California	Computer Science (Games)	BS
Worcester Polytech Institute	Interactive Media and Game Development	BS

APPENDIX E

THEMES GENERATED FROM OPEN-ENDED QUESTIONS IN THE SURVEY

Theme	Code	Comment
Faculty	Faculty Expertise	In-house Expertise.
Faculty	Faculty Interest	also a strong interest in serious games, games design and programming and research in games with the staff in faculty of computing.
Faculty	Research Opportunities	Compliments research
Industry	Industry Growth	We recognised that story-based games were increasing in prevalence & popularity and that games designers need to understand about narrative and story and how they relate to gameplay
Industry	Industry Growth	Industry Demand.
Industry	Industry Growth	Graduate students with appropriate programming skills to work within our local and wider games industry
Industry	Industry Growth	Also the number of graduates finding work in the games industry from traditional design degrees.
Industry	Industry Growth	Approached by UK games industry to develop the programme
Industry	Industry Growth	Redesign was done to need for specialization rather than generalization with degree, in accord with industry requirements
Industry	Industry Needs	My conclusion that videogames are making an important contribution to contemporary culture. That the games industry must be more innovative if game designers had some training in critical theory.
Student	Student Interest	Awareness that there was an interest from students (current and potential);
Student	Student Interest	We are a very regional university, most of our students come from the immediate surroundings. We identified that there was interest in a course of this type in our catchment area.
University	Compliment External Business Activities	external business activities
University	Enrollment Growth	Student recruitment
University	Interdisciplinary Program	Improve portfolio of "inter-disciplinary" programmes.
University	Interdisciplinary Program	To support, enhance and encourage collaboration with our other programmes.
University	Market Gap	Gap in the market
University	Market Gap	Also now the only game related course in our region of the country.
University	Market Gap	To fill an existing gap in the market.

University	Market Gap	Recognised the need for a specialist games course focusing on A.I. rather than just Graphics
University	Market Gap	We felt that there was a market for games degrees.
University	Market Gap	Indication that a degree route for the games industry should be created from the Department of Trade and Industry and TIGA
University	New Program Offering	To include a software-centric programme concentrating on games development as part of our suite of computing provision

Theme	**Code**	**Comment**
Faculty	Faculty Interest	significant interest in this field by me and other faculty members
Faculty	Faculty Interest	faculty interest
Faculty	Research Opportunities	A perception that games offered interesting potential for research. UCSC is located very close to Silicon Valley and a major concentration of companies in the games industry. It seemed like there could be synergy between the university and these companies.
Industry	Industry Growth	a growing industry
Student	Enterprise Opportunities For Students	Teaching students how to be indie game developers with small startup companies (a different employment path),
Student	Student Interest	significant interest demonstrated by potential students
Student	Student Interest	student interest
Student	StudentI nterest	Take advantage of campus faculty expertise to offer an innovative and attractive degree program
Student	Student Interest	Talking to incoming Freshmen before the degree program was launched, we realized that many of them were choosing computer science due to an interest in creating computer games. That is, the primary motivation to study computer science was games.
Student	Student Interest	Lots of student interest
Student	Student Interest	Student interest
University	Enrollment Growth	(enrollment growth)
University	Enrollment Growth	1) Address drop in computer science majors
University	Enrollment Growth	Rapidly declining CS enrollments after the dotcom bust, which threatened the growth trajectory of the department.
University	Leverage Existing Curriculum	the thought that we could leverage much of our existing curriculum.
University	New Program Offering	Career offering for new media students

University	Preempt Other Department	The _____ Department at ____ also had an interest in games. Since Computer Science was a more natural home for the program, the CS department was given first shot. We didn't want to miss the opportunity.

APPENDIX F

THEMES AND CODES FROM

FOLLOW-UP INTERVIEWS

Meta Category	Codes	Categories	Themes
As	ProgrammeReview	Evaluation	Assessment
As	ObserveStudentLearning	Program	Assessment
As	ProgrammeAssessment	Program	Assessment
DD	Deliberation	Deliberation	Deliberation and Decision-Making
DD	CurriculumPlanners	Planners	Deliberation and Decision-Making
EF	ExternalReview	Assessment	Government
EF	ExternalReviewer	Assessment	Government
EF	FundingIssues	Funding	Government
EF	GovernmentConstraint	Policies	Government
EF	AdvisoryBoard	Advisory Board	Industry
EF	IndustryProgrammeReview	Assessment	Industry
EF	Conferences	Currency	Industry
EF	Currency	Currency	Industry
EF	ArtVsCSIndustry	Industry Needs	Industry
EF	CulturalInfluences	Industry Needs	Industry
EF	IndustryNeedsIndie	Industry Needs	Industry
EF	IndustryNeedsTraditional	Industry Needs	Industry
EF	IndustryRelationships	Industry Relationships	Industry
EF	EmploymentOpportunities	Job Opportunities	Industry
EF	SkillsForEmployers	Job Opportunities	Industry
EF	TransferableSkills	Job Opportunities	Industry
EF	LittleLocalGameIndustry	Local	Industry
EF	LittleLocalITIndustry	Local	Industry
EF	PortfolioDevelopment	Portfolios	Industry
EF	ResearchTools	Tools	Industry
EF	ResearchOtherUniversities	Programs	Other Universities
EF	RelationshipsWithOtherUniversities	Relationships	Other Universities
EF	CulturalImportanceOfGames	Games In Society	Society
EF	ViolenceInGames	Violence In Games	Society
EF	ABETAccreditation	Accreditation	Trade Associations
EF	GameDegreeAccreditation	Accreditation	Trade Associations
EF	SkillsetAccreditation	Accreditation	Trade Associations
EF	SkillsetAssessment	Assessment	Trade Associations
EF	CurriculumFrameworkIssues	Frameworks	Trade Associations
EF	IGDA	Frameworks	Trade Associations
EF	TIGA	Trade	Trade Associations

Meta Category	Codes	Categories	Themes
EF	TradeAssociations	Trade Associations	Trade Associations
Ev	StudentsFailGameProgramEvolution	Curriculum Content	Evolution
Ev	CurriculumEvolution	Curriculum Content	Evolution
Ev	InterdiscIssuesEvolution	Interdisciplinary Issues	Evolution
Ev	PaidProjectWorkForFaculty	Faculty and Program Currency	Evolution
St	LackOfDesignPrograms	Misperceptions	Students
Ev	LabResourcesEvolution	Facilities	Evolution
IF	LabResourcesAPriori	Learning Environment	Facilities
IF	TechnologyCurrencyIssues	Technology	Facilities
IF	StudentsWhoPlayGamesExcessively	Beliefs	Faculty
IF	AcademicFaculty	Credentials	Faculty
IF	ArtFacultyResource	Credentials	Faculty
IF	LackOfAcademicExperience	Credentials	Faculty
IF	NewFacultyFromIndustry	Credentials	Faculty
IF	ProgrammingFacultyResources	Credentials	Faculty
IF	FacultyCredit	Credit	Faculty
IF	FacultyGameDevExperience	Game Development Experience	Faculty
IF	FacultyInterest	Interests	Faculty
IF	OpportunitiesForArtsFaculty	Opportunities	Faculty
IF	FacultyResources	Resources	Faculty
IF	ViolenceInGames	Constraints	Institution
IF	ExistingCourses	Efficiencies	Institution
IF	LimitedNewCourses	Efficiencies	Institution
IF	UseExistingResources	Efficiencies	Institution
IF	FundingIssues	Funding	Institution
IF	InstitutionHistory	History	Institution
IF	PolytechnicOrigins	History	Institution
IF	CreativeNewCurricula	Initiatives	Institution
IF	InstitutionalPressures	Initiatives	Institution
IF	SeniorManagement	Initiatives	Institution
IF	InternalArtsReviewer	Internal Assessment	Institution
IF	AdministrativeConstraint	Policies	Institution
IF	CurriculumPlanningProcess	Policies	Institution
IF	StudentAssessment	Policies	Institution
IF	TimeToCreateProgram	Policies	Institution

Meta Category	Codes	Categories	Themes
IF	UniversityIssues	Policies	Institution
IF	UniversityRegulations	Policies	Institution
IF	CollegeCredit	Politics	Institution
IF	ResistanceToProgram	Politics	Institution
IF	UniversityCommunityInfluenceOnProgramme	Politics	Institution
IF	UniversityPolitics	Politics	Institution
IF	AdministrativeSupport	Support	Institution
IF	StudioCourseSchedulingConstraints	Constraints	Interdisciplinary Collaboration
IF	StudioCourseSizeConstraints	Constraints	Interdisciplinary Collaboration
IF	InderdiscIssuesApriori	Issues	Interdisciplinary Collaboration
IF	InterdisciplinaryCollaboration	Scope	Interdisciplinary Collaboration
IF	StudentAbilities	Abilities	Learners
IF	StudentsFailGameProgramAPriori	Abilities	Learners
IF	StudentDemographicsAffectOnCurriculum	Demographics	Learners
IF	ProspectiveStudentsGender	Gender	Learners
IF	ProspectiveStudentInterestAPriori	Interests	Learners
IF	StudentInterestsAPriori	Interests	Learners
IF	StudentsLackOfKnowledgeOfGameDev	Knowledge	Learners
IF	StudentSatisfactionAPriori	Satisfaction	Learners
IF	ProspectiveStudentSkills	Skills	Learners
IF	TransferStudents	Transfer	Learners
IF	TeachingVsResearch	Constraints	Originating Department
IF	Efficiencies	Efficiencies	Originating Department
IF	ProgrammeEfficiency	Efficiencies	Originating Department
IF	DepartmentHistory	History	Originating Department
IF	OriginatingDepartment	History	Originating Department
IF	PlagiarismIssues	History	Originating Department
IF	ProgrammeOrigins	History	Originating Department
IF	CSDepartmentTeachingMethods	Teaching Methods	Originating Department
IF	DrivenByOnePrimaryFaculty	Driver	Planners
IF	ExperienceOfCurriculumPlanner	Experience	Planners
IF	CurriculumContentScope	Content Selection	Time and Space
IF	TimeToCompleteProgram	Time to Complete Program	Time and Space
Im	FacultySatisfaction	Characteristics	Faculty
Im	FacultySelfIdentification	Characteristics	Faculty
Im	GamesResearch	Research	Faculty
Im	EnrollmentNumbers	Enrollment	Institution, Department, Program

Meta Category	Codes	Categories	Themes
Im	EntryRequirements	Entry Requirements	Institution, Department, Program
Im	PassionVsGoodGrades	Entry Requirements	Institution, Department, Program
Im	ProgrammeRecruitingHistory	Recruitment	Institution, Department, Program
Im	StudentApplications	Recruitment	Institution, Department, Program
Im	ProgrammeReputation	Reputation	Institution, Department, Program
Im	StudentRetention	Retention	Institution, Department, Program
Mo	MotivationToCreateProgram	Enrollments	Motivation
Mo	KeepingUpWithOtherUniversities	Game Degree Programs at Other Universities	Motivation
Mo	IndustryGrowth	Industry Growth	Motivation
Mo	MarketResearch	Market Research	Motivation
PC	CourseAssessment	Students	Assessment
PC	CapstoneCourse	Students	Assessment
PC	BuildCamaradarie	Camaradarie	Dispositions
PC	SocialNetworkingAmongStudents	Networking	Dispositions
PC	GenderRelevanceInAssignments	Culturally Relevant	Instruction
PC	CourseRelevanceToStudents	Culturally Relevant	Instruction
PC	AvoidPrescriptiveTeaching	Descriptive	Instruction
PC	ArtVsCSCurriculum	Interdisciplinary	Instruction
PC	InterdisciplinaryInstruction	Interdisciplinary	Instruction
PC	CoursesWithComputingStudents	Interdisciplinary	Instruction
PC	CoursesWithMMStudents	Interdisciplinary	Instruction
PC	CoursesWithoutOtherStudents	Interdisciplinary	Instruction
PC	ProblemBasedLearningProjects	Methods	Instruction
PC	StudentSelfEfficacy	Methods	Instruction
PC	CourseContent	Methods	Instruction
PC	QuickPaceOfLearning	Pace	Instruction
PC	VocationalLeanings	Practicum	Instruction
PC	UnderlyingPrinciples	Theory	Instruction
PC	Animation	Art	Knowledge
PC	Arts	Art	Knowledge
PC	Modeling	Art	Knowledge
PC	BusinessCourses	Business	Knowledge
PC	CommercialAwareness	Business	Knowledge
PC	CopyrightLaws	Business	Knowledge

Meta Category	Codes	Categories	Themes
PC	Entrepeneurship	Business	Knowledge
PC	ComputerScienceLeanings	Computer Science	Knowledge
PC	DigitalMedia	Digital Media	Knowledge
PC	DiversityInGames	Diversity in Games	Knowledge
PC	GenderInGameDesign	Diversity in Games	Knowledge
PC	Ethics	Ethics	Knowledge
PC	Film	Film and Video	Knowledge
PC	Video	Film and Video	Knowledge
PC	GameDesign	Game Design	Knowledge
PC	GameGenres	Game Genres	Knowledge
PC	GameHistory	Game History	Knowledge
PC	Graphics	Graphics	Knowledge
PC	LightingRendering	Graphics	Knowledge
PC	IndieDevelopment	Independent Game Development	Knowledge
PC	Mathematics	Mathematics	Knowledge
PC	MotionCapture	Motion Capture	Knowledge
PC	InteractiveNarrative	Narrative	Knowledge
PC	Physics	Physics	Knowledge
PC	Producer	Production	Knowledge
PC	ProjectManagement	Production	Knowledge
PC	Programming	Programming	Knowledge
PC	SeriousGames	Serious Games	Knowledge
PC	Sound	Sound	Knowledge
PC	VirtualReality	Virtual Reality	Knowledge
PC	ElectivesForGameDegree	Electives	Program Requirements
PC	OfferChoices	Electives	Program Requirements
PC	ElectivesReplacement	Electives	Program Requirements
PC	GameOrientedGenEds	General Education Requirements	Program Requirements
PC	SandwichYear	Internships	Program Requirements
PC	Internships	Internships	Program Requirements
PC	NonTechnicalSkills	Technical and Non-technical Balance	Program Requirements
PC	ProgramAdministration	Administration	Program Structure
PC	ProgrammeName	Administration	Program Structure
PC	ChallengingProgram	Difficulty Level	Program Structure
PC	Gender	Diversity	Program Structure
PC	CommonMeetingSpace	Facilities	Program Structure
PC	ProgrammeGoal	Goals	Program Structure

Meta Category	Codes	Categories	Themes
PC	FoundationalSkills	Learning Outcomes	Program Structure
PC	LearningOutcomes	Learning Outcomes	Program Structure
PC	BroadSkills	Learning Outcomes	Program Structure
PC	ProgramNiche	Niche	Program Structure
PC	FinalYearExperiences	Sequencing	Program Structure
PC	FirstYearExperiences	Sequencing	Program Structure
PC	SecondYearExperiences	Sequencing	Program Structure
PC	Sequencing	Sequencing	Program Structure
PC	CSStudentsLearningArt	Technical and Non-technical Balance	Program Structure
PC	TechnicalLeanings	Technical and Non-technical Balance	Program Structure
PC	LaptopSpecificationsForStudents	Student Laptops	Program Requirements
PC	ConsoleDevelopment (Platforms)	Consoles	Technology Skills
PC	PCBased	PC	Technology Skills
PC	MobilePhones	Mobile Devices	Technology Skills
PC	PlatformSelection	Consoles	Technology Skills
PC	PlayStation3	Consoles	Technology Skills
PC	Xbox	Consoles	Technology Skills
PC	3DStudioMax	Digital Art Software	Technology Skills
PC	Blender	Digital Art Software	Technology Skills
PC	Flash	Game Development Software	Technology Skills
IF	FreeTools	Accessibility to Software	Learners
PC	GameMaker	Game Development Software	Technology Skills
PC	Maya	Digital Art Software	Technology Skills
PC	OrangeBox	Game Development Software	Technology Skills
PC	PhotoShop	Digital Art Software	Technology Skills
PC	Unreal	Game Development Software	Technology Skills
PC	VisualStudioNet	Game Development Software	Technology Skills

Meta Category	Codes	Categories	Themes
PC	XNA	Game Development Software	Technology Skills
St	StudentInterviewSkills	Abilities	Current
St	StudentAttrition	Attrition	Current
St	Aspergers	Characteristics	Current
St	FirstYearStudentUndefinedSpecialization	Characteristics	Current
St	Geeks	Characteristics	Current
St	LikeGames	Characteristics	Current
St	LikeTechnology	Characteristics	Current
St	PassionForLearningAboutGameDev	Characteristics	Current
St	Pragmatic	Characteristics	Current
St	ProactiveStudent	Characteristics	Current
St	StudentAbilityToThinkOutsideTheBox	Characteristics	Current
St	StudentIdentification	Characteristics	Current
St	StudentInterests	Characteristics	Current
St	StudentSatisfaction	Characteristics	Current
St	StudentsFailGameProgram	Characteristics	Current
St	StudentsNotReceptiveArtClasses	Characteristics	Current
St	StudentsNotReceptiveWomensStudies	Characteristics	Current
St	StudentsSelfAssessment	Characteristics	Current
St	StudentsUnclearAboutWhereToSpecialize	Characteristics	Current
St	SuccessfulStudentTraits	Characteristics	Current
St	UnevenSocialSkills	Characteristics	Current
St	Age	Demographics	Current
St	BeyondLocalRecruitment	Demographics	Current
St	Ethnicity	Demographics	Current
St	InternationalRecruitment	Demographics	Current
St	LocalRecruitment	Demographics	Current
St	StudentEthnicity	Demographics	Current
St	StudentMaleFemaleRatio	Demographics	Current
St	StudentsAge	Demographics	Current
St	StudentFeedback	Feedback	Current
St	CanablizingFromCS	Interests	Current
St	StudentMisperceptionsGameDevelopment	Misperceptions	Current
St	StudentMisperceptionsOfTechRequirements	Misperceptions	Current
St	StudentMisperceptionsOfWorkload	Misperceptions	Current
St	StudentsLeavingProgram	Misperceptions	Current
St	StudentFacultyRapport	Rapport With Faculty	Current
St	AntagonisticRelationshipsWithNonGameDevProfs	Rapport With Faculty	Current
St	StudentExclusion	Rapport With Faculty	Current
St	AlumniFeedback	Feedback	Matriculated

Meta Category	Codes	Categories	Themes
St	AlumniJobsInIndustry	Placement in Industry	Matriculated
St	CautionProspectiveStudents	Advisement	Prospective
St	ProspectiveStudentInterest	Interests	Prospective
St	FirstYearStudentPreparedness	Knowledge	Prospective
St	ProspectiveStudentSkills	Skills	Prospective