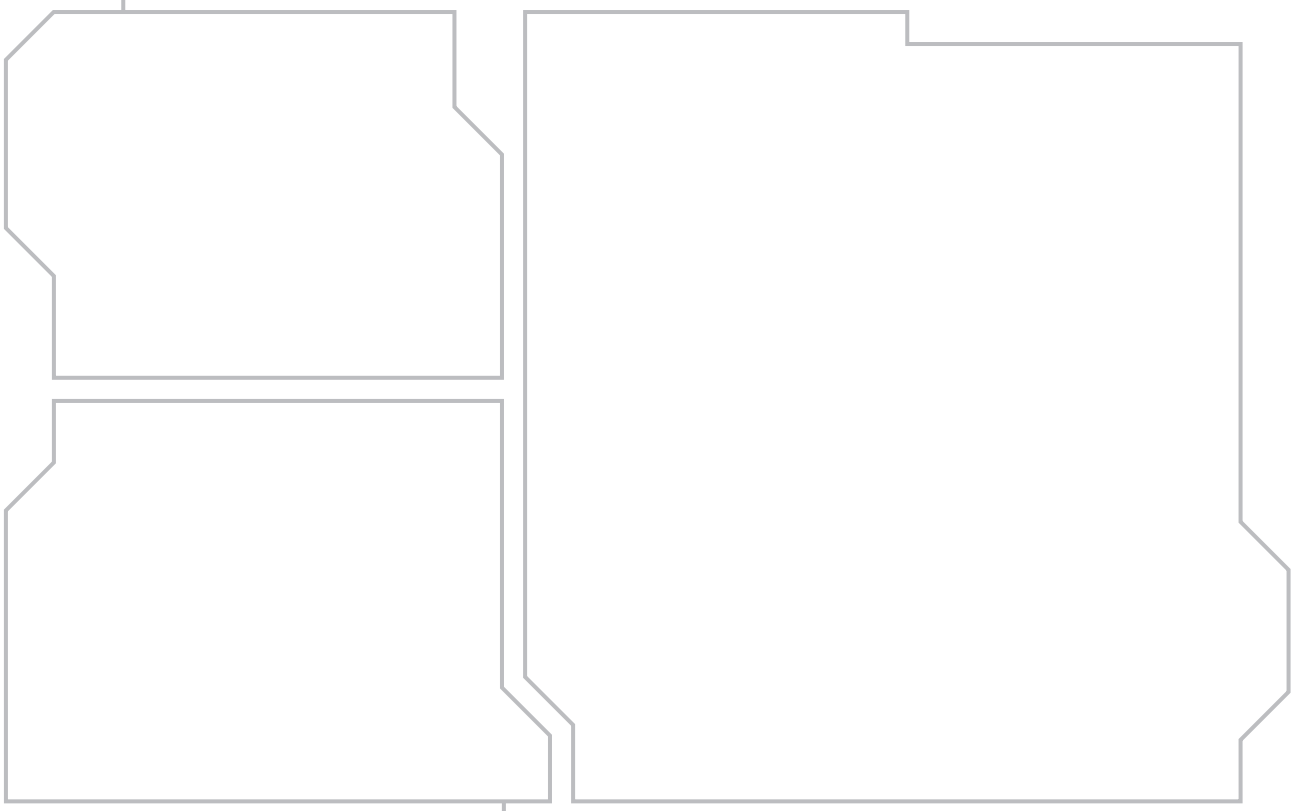
Skill Standards for Electronic Game Content Production

A specialty standard based on the IT-Digital Media skill standards developed by the National Skill Standards Board.

Lake Washington Technical College


DreamStreet Racers
M.P.H.
RPM x100
GTO
GTO
GTO

Skill Standards for Electronic Game Content Production



Lake Washington Technical College

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This document is the result of the collaborative work of industry, education, labor and government. The successful completion of the Skill Standards for Electronic Game Content Production, would not have been possible had it not been for the countless hours of dedicated support of the project. Recognition goes to the skill standards Project Lead, Terryll Bailey of the Allison Group. Ms. Bailey, a skill standards expert, conducted local focus groups, analyzed, cross referenced and synthesized data, developed and implemented surveys, led brainstorming and discussion/dialogue sessions with the Working Group, and wrote the final research report.

Invaluable to the success of this undertaking was the management of the project, provided by Frank Agnello through Lake Washington Technical College (LWTC). His knowledge of the game industry, his vision and dedication to the industry and its stakeholders provided the momentum the project required to press forward to completion.

This project owes a debt of gratitude to the generous contribution of Electronic Game Content Production companies located throughout Washington State and to individual game industry professionals, as well as the team at Lake Washington Technical College and at Mesmer Animation Labs and Anthony Rossano, Peerless Leader. Mike Potter, LWTC Dean for Information Technology, Business & Allied Health, has been instrumental in forging the initial alliance with Mesmer that led to this innovative private-public project. President Mike Metke and Executive Vice President Shirley Metcalf were steadfast in their essential support. LWTC Multimedia Design and Production department instructor John Gabriel, who heads the Animation and Game Design program, played a major role on The Working Group and in curriculum development, authoring with colleague Jason McCoy the Game Pre-production courseware. A special acknowledgement is extended to LWTC VP-Institutional Advancement, Ray Nadolny and his staff. He has been tireless in his support of this initiative and its promising future. Public Information Officer, Regine Adams earns personal praise for her contributions.

Three distinct groups of industry professionals participated in the project: The Working Group, regional game companies and the focus groups.

The Working Group included (alphabetically): Jay Balakrishna, Independent, now with Radical Entertainment; David Choi, Senior Animator, Atari Humongous; Marina Fish, Creative Director, Game House: John Gabriel, LWTC; James Gwertzman, President, Escape Factory; Suzanne Kaufman, Senior Animator, Sucker Punch Productions; Paul Lewis, President, Outcast Ltd.; and Matt Ontiveros; Technical Art Director, Amaze Entertainment/Adrenium.

The regional game companies and their top-level executive participants in the project include:
Adrenium, Phil Trumbo, Creative Director
Amaze Entertainment, Dan Elenbaas, President and CEO
Atari Humongous, Andy Hieke, Sr. VP & GM
Atari Humongous, Jim Bradrick, Director of Animation
Cranky Pants-THQ, Dave Bollesen, GM
Escape Factory, James Gwertzman, President
Game House, Garr Godfrey, President

Griptonite, David Mann, COO and CFO
Microsoft, Mike Egan, VP External Affairs

The following individuals participated as subject matter experts in the Focus Groups:

Gene Blakefield, Microsoft Sports-ArtSource, Character Animator
Alex Galkin, Independent Contractor, Modeler, Exhibit Design Specialist
Seth Gibson, Adrenium, Technical Artist
David Hunt, Adrenium, Lead Animator
Michael Ingrassia, DigitalWorldFX, Animator, Visual Effects Artist
Colin Kawakami, Independent Contractor, Animator
Rob Maki, Spirit Studios, President, Animator
Charla Pereira, Sharp Pixel/Macrosystems, Co-owner, Animator
Matt Rapelje, Zombie Games, Character Animator
Lawrence Ruelos, KnowWonder, Animator, Concept Artist
Jesse Skellington, Troy MacFarland, Inc., Motion Capture Technician
Chad Smith, Independent Contractor, Animator

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State Board of Community and Technical Colleges, Sally Zeiger-Hanson
Washington Software Alliance, Lew McMurran, Director, Public & Government Affairs
King County Workforce Development Council, Kris Stadelman, Executive Director

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Mary Margaret Walker merits particular appreciation for providing access to her unprecedented database of game industry professionals to assist the skill standards verification phase.

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Overview

INTRODUCTION AND PERSPECTIVES

Skill standards are an outcome of concerns expressed by key industries with respect to their ability to remain competitive in global markets if the U.S. cannot provide sufficient quantities of qualified, skilled workers. These key industries, in conjunction with federal and state governments, are providing funding to develop voluntary skill standards for those industries with a critical need for trained workers. The standards identify what people must know and be able to do to qualify for beginning and middle level jobs. This information, generated through strong collaboration between industry and educators, provides a sound starting point for the development of training programs that prepare people for employment and career advancement and meet the country's need for knowledgeable, highly skilled workers. Industry-based skill standards can help ensure that more people, particularly those who have been under served by our education system, are prepared for high-wage jobs requiring workers with a range of technical knowledge and skills. This project proposes the development of regional industry-based skill standards applicable to electronic game content production within the game industry. These standards will be implemented in an integrated articulation model among the partners of this consortium of schools and colleges.

To that end, this project is part of a larger effort, which has three distinct outcomes:

Develop skill standards.
Develop and pilot industry-identified curriculum modules.
Develop a model for sustainability of collaboration among industry companies.

Concurrent with the development of the skill standards, and under the direction of a Working Group of hands-on animators and creative directors, five courseware modules have been developed and published, entitled "Teaching Gamecraft: The Theory, Planning, Art, Production and Design of Video Games". the five chapters are Philosophy and Taxonomy of Games, Game Preproduction, 3DS Max for Games, Maya for Games, and Level Design with Unreal Tournament. This courseware is being field-tested in Lake Washington Technical College's Animation and Game Design classes with monitoring by industry partners who have created internships with Lake Washington Technical College, such as Atari Humongous.

Also concurrent with the development of the skill standards has been an effort toward sustainability in the form of a new Washington Training and Education Coordinating Board (WTECB) designation as a formal industry SKILLS Panel consisting of top executives from nine regional game companies and a grant extension to convene and facilitate the group. The acronym, SKILLS, stands for Securing Key Industry Leadership for Learning Skills. The Panel has identified incumbent worker training as a priority. Specifically, immediately addressing an unmet need for an entry-level curriculum preparing technical artists for the game industry. Courseware will be designed and tested again through the real-world leadership and collaboration with industry partners. The SKILLS Panel is now reviewing one, three and five year organizational work plans and will have a clear path to achieve self-sufficiency within six months through a combination of member fees, sponsorship, underwriting and grants.

Executive Summary

Sales of video game hardware, software and gear reached a record $9.4 billion last year. Electronic games continue to generate annual domestic revenue exceeding the approximately $10 billion in first-run movie box office receipts. A pivotal industry development is the advent and rapid growth of online games. It propels the synergies with Web branding and cross-media campaigns and that fuels the convergence of the game and entertainment industries. The industry is relatively new, and still maturing. Increased visibility continues to draw negative response from citizen groups and legislators seeking to restrict game industry sales and even content. Regardless of the substance of opposition for the moment, the economic heft of the game industry suggests these challenges can be turned aside, as they have been to date, particularly in the courts.

The extensive application of 3D visualization tools for manufacturing is serious business and being taken very seriously. The defense establishment has been using 3D computer visualization systems to design, simulate and train for decades. The health and medical fields rely on applied 3D for pharmaceutical scientific visualization and molecular modeling, robotic and spinal surgery, and gait analysis for prosthetics and rehabilitation therapy to name a few. Forensic animation, also called accident-reconstruction, is transforming the legal field. And the largest potential use encompasses 3D-for-Web and mobile devices. This industry is growing, and requires a highly skilled workforce in order to take advantage of continued growth opportunities.

To help respond to the gap between the demand for workers with knowledge and skills in Electronic Game Content Production, and the availability of workers with those skills, Mesmer Animation Labs in Seattle approached Lake Washington Technical College to determine if 3D art and animation programs in community and technical colleges in Washington State could include a stronger emphasis on the needs of industry. Investigation determined that skill standards for Electronic Game Content Production would enable colleges to review their curricula and identify gaps in instruction. However, it was determined that these specialty standards for the game industry did not exist.

In 2002, The State Board for Community and Technical Colleges granted funds to Lake Washington Technical College to:

Develop skill standards.
Develop and pilot industry-identified curriculum modules.
Develop a model for sustainability of collaboration among industry companies.

Working with Mike Potter, (Dean of Information Technology, Business and Allied Health) and Frank Agnello (Project Director), Lake Washington Technical College would take the lead in the project, and skill standards would be developed and disseminated to all community and technical colleges in the State.

Lake Washington Technical College contacted Terryll Bailey of the Allison Group to design and conduct the research and manage the skill standards project. Through her efforts, this project has developed a set of specialty skill standards that focus on Electronic Game Content Production.

This project was conducted in accordance with SBCTC (State Board for Community and Technical Colleges) and NSSB (National Skill Standards Board) guidelines for developing skill standards. For additional information and updates, contact Lake Washington Technical College, Instructional Services Department or the State Board for Community and Technical Colleges in Olympia, Washington.

Trends in the Game Industry

Contributed by Frank Agnello, Project Director

"...If you still think of Pac-Man and Donkey Kong..."

The video game boom may sound strange if you still think of Pac-Man, Galaga and Donkey Kong. But video games have undergone as radical a transformation as the film industry did when sound was added to movies.

As the games get more dazzling and carry production costs ranging from $1 to $8 million, ...increasingly specialized skills are needed. General computer science programs...don't give students the cross-section of skills they need, says Ken Lobb of Microsoft Xbox. That's because colleges have had a hard time seeing games as "serious," says Trip Hawkins, who founded Electronic Arts.

The biggest independent game maker, EA, now brings in more than $2 billion in revenue a year and has been added to the Standard & Poor's 500 index. Activision hauled in nearly $900 million, while THQ, the next biggest brought in $459 million.

About $1.9 billion worth of PC games will be sold this year ('02), according to DFC Intelligence, a San Diego-based market research and consulting firm. But video game system software will far surpass that at $3.7 billion.

The current video game hit, 'Grand Theft Auto: Vice City,' sold more than 1.4 million copies at an average $48 apiece in its first three days. That $70 million windfall easily puts it in the ranks of blockbuster movie.

Matt Krantz, USA Today, 12/3/02

CONTINUED GROWTH

The game software development industry continues to grow at a 5-10% annual rate, against the backdrop of less-than-robust economic conditions, and presents a positive workforce education development opportunity. Partnering with the private sector and game companies to align post-secondary education programs with industry needs has begun and must accelerate. This project is a coherent beginning. Washington, with its vital regional game industry cluster, becomes the first state to create a specialty skill standard defining Information Technology (IT)-Digital Media Skill Standards for Electronic Game Content Production. As an outgrowth of the project, industry partners have identified incumbent worker retraining as an immediate priority and committed to ongoing workforce education development.

Electronic games continue to generate annual domestic revenue exceeding the approximately $10 billion in first-run movie box office receipts. This is completely consistent with the predominant trend or convergence of the game industry with the broader entertainment industry, expressly due to game successes.

Both movies and games are pillars of the entertainment industry that includes popular music, TV, and the Web. Game content is increasingly derivative of, and driven by, other media. George Lucas film and game properties illustrate the point. LucasArts Games licenses from LucasFilm the characters and intellectual property encompassed in a specific movie and produces game titles. Similarly, Amaze Entertainment, Kirkland, WA, the nation's largest independent game developer, found success last year developing games based on two of the year's biggest movies: "Harry Potter and the Sorcerer's Stone" and "The Lord of the Rings: The Two Towers." (Steve Ernst, Puget Sound Business Journal 2/7-13/03)

Follow the Money

Video games have morphed from being primitive toys for geeks and kids into a major form of entertainment. Sales of video game hardware, software and gear jumped 42% to a record $9.4 billion last year, says NPD Group. That's more than the $8.4 billion in movie tickets sold each year, says PricewaterhouseCoopers.

Sony, a major music label and movie producer, got nearly 60% of its profits last year from sales of hardware and software for its latest-generation console, the PlayStation2.

When reporting its fiscal third-quarter results, Barnes & Noble said GameStop, the video game retailer of which it owns 60%, contributed as much to profit as its banner bookstores. Without video games, Barnes & Noble would have reported a loss.

(Krantz, USA Today)

Concentration of producing and distributing entities is becoming pronounced, although smaller game developers still serve niche audiences and the 'independent garage band hit' is still possible. Blizzard and Bioware are examples of firms staying with their niche markets and "Eternal Darkness," from Silicon Knights, was cited as an unexpected hit, from an unknown studio. Nintendo eventually acquired the company. The challenge for small developers and studios creating new titles is supporting multiple game formats. There are three consoles to consider: PlayStation, Xbox and Game Cube and many opt only for Sony PS2. This is also true of major developers, who produce lucrative sports titles exclusively for PS2, like giant EA Sports. PC games and online gaming rely on personal computer hardware systems with dictates the audience demographics of 18-35 years old, as well as most games for younger children.

In that respect, Amaze Entertainment has adopted a most versatile current stance, building on its legacy as KnowWonder, founded by Dan Elenbaas in 1996 to develop software on PC for children. "There really isn't another studio in the world that can do what we do. With one contact, publishers can get a great PC game, a great Game Boy game and a great console game—nobody that I know of offers that." In addition to its niche working with Hollywood studios, the company has positioned itself as a creative force in the development of family-friendly games. "We are very happy to make games that we can play with our kids. You won't ever see a game rated M (Mature) come out of Amaze," Elenbaas says. (Ernst, Puget Sound Business Journal)

The other pivotal industry development is the advent and rapid growth of online games. It propels the synergies with Web branding and cross-media campaigns, and that fuels the convergence of the game and entertainment industries.

Online Game Play Is THE 900-Pound 'Elephant'

In a futuristic version of the blind men and the elephant fable, game industry behemoths 'feel' quite differently about the immediate importance of Online. At a local spring '03 industry trends forum, top marketing executives from Nintendo and Microsoft said, respectively, 'much later' and 'immediate' when asked about the impact of Online Game Play. Industry-monolith Sony PlayStation dominates with 50 million+ sold worldwide since 10/2002, compared to 10 million Microsoft Xbox and 7 million Nintendo Game Cube. From the late '80s to 92 Nintendo controlled 90% of the market, demanding exclusivity from developers. Content still rules and content-creators currently produce far more and better titles for the Sony PS2 console. PS3 is due in 2005.

Enter the 900-pound elephant: Microsoft Xbox Live, an online service that signed up 350,000 in three months after launch, reaching 500,000 by 3/03. Microsoft would not disclose how much it spends on Xbox Live but said last year it will spend $2 billion through 2007 on Xbox and Xbox Live.

Sony quickly released an outboard Online adapter for PS2, selling 1 million. The new PS3 features built-in online capabilities. Sony has been reaping returns from Online gaming for years with content. The Everquest online site attained a $10 million-per-month revenue rate two years ago.

Some say it's the future of distribution. The Online Game Players Website zone.com is receiving 15 million hits-per-day.

Author's notes from March 2003 event

INCREASED VISIBILITY, SOME NEGATIVE

Increased visibility continues to draw negative response from citizen groups and legislators seeking to restrict game industry sales and even content. Regardless of the substance of opposition for the moment, the economic heft of the game industry suggests these challenges can be turned

aside, as they have been to date, particularly in the courts. Look to the feature film and television industries and the Web for similar examples of economic potency effectively overriding regulation. Efforts to fine retail clerks for selling game titles depicting violence toward law enforcement and prostitutes is directed at Grand Theft Auto 3, the industry's sales and creative beacon. It generated $600 million in revenue. It will be emulated. At the same time, this specific Washington law is being challenged on Constitutional grounds and Missouri's appeals court nullified a St. Louis ordinance that was never enforced because of perceived legal vulnerability.

"Court Strikes Down St. Louis Video Game Law"

A federal appeals court Tuesday (6/3/03) struck down as unconstitutional a St. Louis County law limiting children's access to violent video games. The ordinance, passed in 2000, requires children to have parental consent to buy violent or sexually explicit video games or play similar arcade games.

The ordinance was never implemented pending the outcome of a legal challenge brought by a video game industry group....The 8th U.S. Circuit Court of Appeals said the ordinance violates the First Amendment.

"Whether we believe the advent of violent video games adds anything of value to society is irrelevant. Guided by the First Amendment, we are obliged to recognize that 'they are as much entitled to the protection of free speech as the best of literature,'" Judge Morris S. Arnold wrote.

St. Louis modeled its ordinance after one in Indianapolis that was invalidated by a federal appeals court in Chicago. Spokesmen for the Washington attorney general could not be reached for comment on effects the ruling might have on a recently adopted Washington law that fines retail clerks that sell, to those under 18, M rated games that depict violence against law enforcement officers. An industry and civil liberties coalition has already begun legal steps to nullify the new law.

The Associated Press 6/4/03 and Author's notes.

MEDIATED IMPACT EXTENDS TO EDUCATION

I believe the mediated impact of electronic games will increase perceptibly for a sustained period and then accelerate further as succeeding generations of 'gamers' predominate. Games are a unique form of media, due to the interactivity or 'game play' achieved through 'level design.' This is universally true. It trumps content every time. New game technology delivers to the interactive players' system image and sound quality, 3D photo-realism, online multiple player environments, equaling movies and TV. Persuasive arguments are made for the monumental shift in learning and society that is coming. The following presentations were made at the Spring Futures Forum 2002.

The extensive application of 3D visualization tools for manufacturing is serious business and being taken very, very seriously. The defense establishment has been using 3D computer visualization systems to design, simulate and train for decades. Aptitude and performance is an essential indicator for recruits who will operate advanced technology military systems.

Online Worlds and Higher Education, J.C. Herz, Joystick Nation

In terms of the speed and volume of learning—the rate at which information is assimilated into knowledge and then synthesized into new forms—the networked ecosystem of online gaming is vastly more dimensional than the 19th century paradigm of classroom instruction.

In a role-playing game, a player's progress is represented not by geographical movement (as in many console adventure games where the object is to get from A to B, defeating enemies along the way), but in the development of his character. The player earns experience points by overcoming in-game challenges. The better the player becomes, the more daunting the challenges.

Thus, the player scales a well-constructed learning curve over several months or years as he builds his level-one character into, for example, a highly skilled, fully equipped level-50 'Everquest' powerhouse.

One's character is a reflection of every action a player has taken in the virtual environment—a sort of existential self-portrait. Not surprisingly, players are emotionally invested in the statistical profiles of these characters, far more so than they would be in a simple tally (or grade point average).

This sense of actualized knowledge is the most powerful convention that higher education can borrow from persistent multiplayer online worlds, because, after all, life for a 21st century undergraduate is a persistent multiplayer online world.

Games, Simulation, & Military Education by Michael Macedonia

More recently, two key factors have raised the visibility and importance of game technology and content to the Department of Defense (DoD) community. First, simulation technology—that is, the creation of virtual experiences—is now a major strategic capability for the U.S. military. The U.S. has incorporated war gaming and simulation into the curriculum of every war college....Second, computer modeling and simulation are considered essential to 'military transformation'—the remaking of the armed forces for the new realities of the 21st century.

The U.S. military is exploiting commercial entertainment technology and simulation to revolutionize education and training dramatically. DoD is leveraging the capabilities of commercial products by Sony and Microsoft to take advantage of the huge investment these companies pour into R&D. Microsoft, for example, spent over $2 billion on development of the Xbox alone, far surpassing the U.S. Army's entire science and technology budget of $1.6 billion.

...The Army and DoD have partnered with the USC to form the Institute for Creative Technologies, which will focus primarily on development of both the technology and the art to create virtual experiences. Their goal is to revolutionize how the military trains and rehearses for upcoming missions. Military leaders expect nothing less than a quantum leap in helping the army to prepare for the world, soldier, weaponry and mission of the future.

PRODUCTION TRENDS

Consolidation will continue with full, original titles relatively rare, although enormously important to Nintendo's revenue stream. It is estimated that 70% of new titles are sequels and driven by the 'Hollywoodization' of the game industry.

Again influenced by Hollywood feature film production values, game art asset design and creation appears to dominate game play. Electronic Arts and Sony have been recruiting film industry creative talent to produce their "A titles."

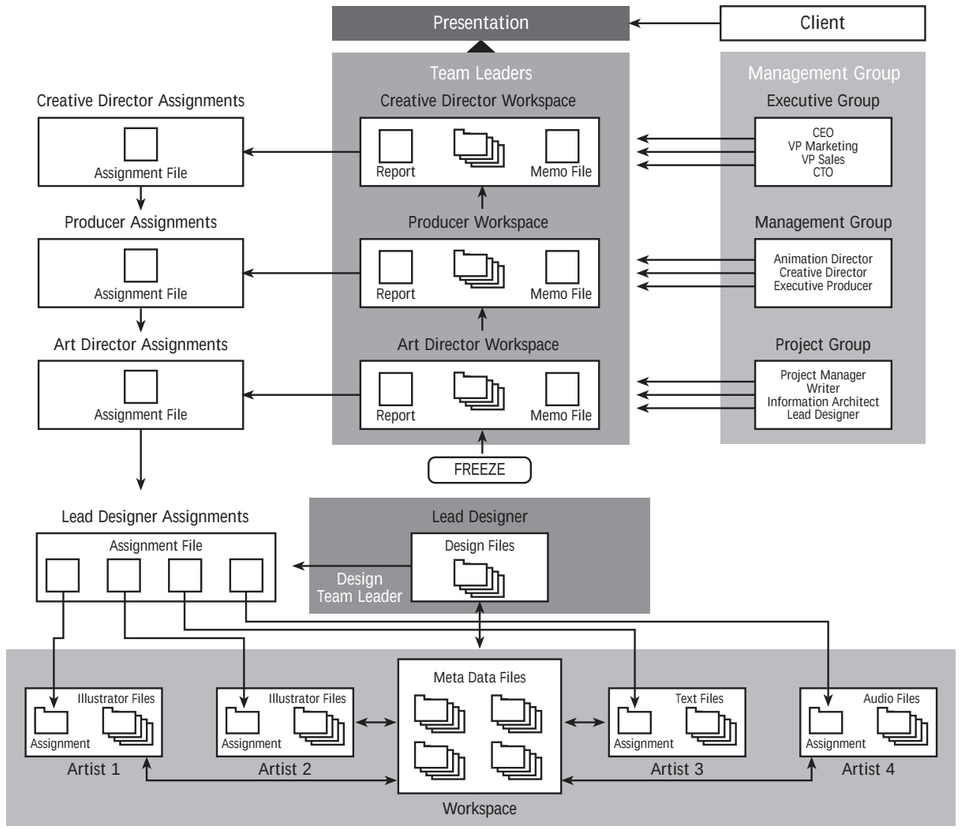
As Alias Maya is adopted by leading studios and aspiring leaders, this will bring about a rapid increase in the use of MEL scripting vis-à-vis producing the same result as achieved by programmers and the game engine. This is momentous.

CONCLUSIONS

The game software development industry represents a highly visible vanguard in the rapidly evolving world of applied communication technology. In the hands of educated, resourceful, and talented workers, the technological and creative tools continue to elevate the bar of what is delivered to the screen. The impact of 3D is destined to spread far beyond the areas presently served. The game industry has already been joined by potentially even greater users of visualization technology. The health and medical fields rely on applied 3D for pharmaceutical scientific visualization and molecular modeling, robotic and spinal surgery, and gait analysis for prosthetics and rehabilitation therapy to name a few. Forensic animation, also called accident-reconstruction, is transforming the legal field. And the largest potential use encompasses 3D-for-Web and mobile devices. There are 124 million wireless phones worldwide. Nintendo sold one million Game Bay Advance portable consoles in a week and Sony announced its own competing product. Web-delivered 3D content for your wireless phone and PDA may well be the next 'big thing.'

IT-Digital Media Content Production

Contributed by Frank Agnello, Project Director



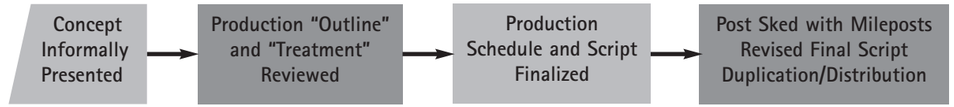
Graphic created by Frank Agnello, project director and designer David Gentry for a Canadian contract client.

From Idea to Completed Digital Media Production

Contributed by Frank Agnello, Project Director

Pre Production	Production	Post-Production
Planning Accessing resources • People and skills • Existing media elements New elements to be created • Video (location and/or studio) • Computer generated images • Audio (narration) Develop production pipeline (distribute to all)	Begin only with agreed to script and storyboard or equivalent Produce and/or obtain all required elements: • Video • CGI • Audio Honor pipeline and completion time frame	Edit video, audio Add video EFX Composite CGI Enhance and mix final audio Secure client approval Duplicate, distribute

TASK TIMELINE



* Please note: The production Outline and Script Treatment are essential and are drafted by studio production team as an outgrowth of the first informal session where the concept is presented. Of course, this step will be customized for each project. Production and Post Schedules are also devised by the studio team and shared with all, as a method of tracking progress toward completion.

An Orienteering Guide: Career Path and Electronic Game Content Production

THE TERRAIN

- The Career Path is a three tier structure. We address the first two.
- Content-creation and Technical Art comprise the largest categories.
- Technical Artists are more in demand at entry-level than animators.
- Real world collaborative project portfolio pieces essential to employment.

CAREER PATH HIERARCHY

Engineering/Programming

- Brings to the screen the creative concept in its specific final form
- Integrates computer hardware, operating system, original software
- Top of the hierarchy, requires advanced education, experience
- Communication and team building skills essential for managers
- Art skills uncommon however extremely valuable

Technical Art

- Essential bridge between content creation and engineering
- Does not require programming, rather scripting and related skills
- Experience places one on coveted Technical Director track
- Communication and teamwork skills essential for managers
- Hands-on art skills for entry level much less demanding

Content Creation (2D/3D)

- Art Lead has experience to direct 2D/3D team from storyboards
- Tends toward specialist: modeler, animator, compositor, etc.
- Positions all along the Production Pipeline with some upward mobility
- Communication and teamwork skills essential for career progression
- Concept artist easier entry point. Few entry level animation jobs

A National Context

A NATIONAL CONTEXT FOR SKILL STANDARDS

The National Skill Standards Board was established by Congress in 1994 to encourage the creation and adoption of a national system of voluntary skill standards that would enhance the ability of the United States to compete effectively in a global economy. At the national level, voluntary skill standards projects have been developed by four sectors in full partnership with education, labor and community-based organizations: Manufacturing, Sales and Service, Information Communication Technology and Hospitality and Tourism. The intent is to have voluntary skill standards that are flexible, portable and continuously updated and improved.

WHAT ARE SKILL STANDARDS?

Skill standards are performance specifications that identify the knowledge, skills and abilities an individual needs to succeed in the workplace. They are critical to improving workforce skills, raising living standards and improving the competitiveness of the U.S. economy. To be effective, skill standards must reflect the consensus of Electronic Game Content Production professionals.

Skill standards provide measurable benchmarks of skill and performance achievement. They answer two critical questions: What do workers need to know and be able to do to succeed in today's workplace? And, how do we know when workers are performing well? Without this fundamental information, employers do not know whom to hire or where to focus their limited training dollars; employees and new entrants to the workforce do not know what they need to do to improve their performance; and educators do not know how to prepare students for the challenge of the workplace.

Voluntary, industry based skill standards should be:

Responsive to changing work organizations, technologies and market structure.
Benchmarked to world-class levels of industry performance and free from gender, racial or other forms of bias.
Tied to measurable, competency-based outcomes that can be readily assessed.
Inclusive of basic reading, writing and critical thinking skills.
Useful for qualifying new hires and continuously upgrading employees' skills.
Applicable to a wide variety of education and training providers, both work and school-based.
Based on a relatively simple structure to make the system user-friendly.
A cooperative effort among all stakeholders.
Developed independently of any single training/education provider or type of education/training provider.

National Alliance of Business

WHY ARE SKILL STANDARDS IMPORTANT?

In today's workplaces, the only constant is change. Jobs that once were relatively simple now require high performance work processes and enhanced skills. Because skill standards reflect changing workplace realities, they become a tool which can be used by applicants and employees to access greater career opportunities.

National recognition of skill standards in career fields provides a common basis for certifying achievement against those standards, thereby allowing for the portability of skills across geographic areas, companies and careers.

Updating skills and knowledge is now a lifelong endeavor, causing many employers and employees to spend more effort, time and money on education and training. Skill standards provide benchmarks for making education and training decisions, shaping curricula, and directing funds toward highest value education and training investments.

THE BENEFITS AND USES OF SKILL STANDARDS

Skill standards benefit all the stakeholders — business, labor, educators, government and the community. The success of a skill standards development project and its usefulness to the community is dependent on the full participation and commitment of all stakeholders. These benefits can be used as a benchmark for evaluating the effectiveness of collaborative efforts.

How Skill Standards Benefit Employers

Employers can use skill standards to establish personnel qualification requirements. Interviews, performance reviews, and productivity can be evaluated and assessed to a higher degree of accuracy and efficacy. Employers are also able to identify core competencies, workers' abilities to demonstrate competencies and to match competencies to critical work functions and key activities to significantly improve efficiencies and productivity. Performance based skill standards also provide a vehicle for varying degrees of job certain and the ability to structure competency based pay scales. In addition, employers use skill standards to:

- Align personnel qualification requirements with nationally adopted certificates of competence.
- Modify employee training.
- Simplify measurement of employee training effectiveness.
- Assess employee skill levels based on industry standards.
- Match employee skills to the work needed.
- More easily document employee skills, training needs, and performance criteria.
- Improve consumer satisfaction and confidence through better developed evaluation skills of customer contact personnel.
- Improve employee satisfaction and morale by clarifying expectations.
- Improve quality, productivity, time to market and competitiveness.
- Achieve their business goals.
- Partner with education and labor in developing school-to-work initiatives.

How Skill Standards Benefit Educators

Educators can identify core competencies and assessments based on the skill standards and implement them in their curriculums. Students can then be required to demonstrate competency throughout their coursework. Academia and industry can build a cohesive relationship through a like-minded expectation of student competencies and work readiness. This enhances an instructor's ability to teach information consistent with industry's entry level expectations and needs. In addition, educators use skill standards to:

- Partner with business and labor in developing school-to-work initiatives.
- Provide effective, targeted instruction.
- Develop benchmarks for certificates of competence earned by students.
- Communicate what companies expect of employees.
- Develop new and evaluate existing curriculum and programs based on industry needs.
- Develop assessments to evaluate skills, knowledge and abilities in classrooms and internships.
- Develop a common language on workforce preparation with business and labor.
- Improve relationships with local businesses, labor unions, other educators and agencies.
- Provide students with relevant career education and counseling.

How Skill Standards Benefit Labor Unions

Labor unions can use skill standards to gain support for company-sponsored worker training programs and to identify career paths for workers within companies and industries. Unions can provide this information to union members and develop strategies to improve career mobility and stability. In addition, labor unions can use skill standards to:

- Improve member value to company.
- Provide a greater worker voice in the company.
- Link skill standards to increased training and upward career mobility for union members.
- Assist employers to match employee skills to the work needed.
- Develop skills-based training and certification initiatives that complement union apprenticeship programs.
- Communicate effectively with employers about worker training and retraining needs.
- Cooperate with education and industry developing school-to-work initiatives.

How Skill Standards Benefit Students and Workers

Skill standards assist students in making career choices by providing industry expectations for success in the workplace. In addition, standards-based curriculum and assessments provide students with credentials that certify work-readiness. Work-ready students can anticipate being hired at higher rates of pay and can experience faster advancement in their chosen fields. Workers can accurately assess their skills against those required for career advancement and plan effectively for their career pathways. They can determine the skills and abilities needed for advancement or transfer within industries, and determine the continuous learning and training they need to upgrade their skills. In addition, students and workers can use skill standards to:

- Achieve clarity regarding what they are expected to learn and how to prepare for work.
- Enter and reenter the workforce with better control of their choices of high skilled and high paying jobs.

- Accurately assess business expectations of the skills needed for positions and careers of their choice.
- Improve mobility and portability of their credentials.
- Obtain certification of competence of the skills they gain through experience, school, training or self-study.
- Enhance their performance and achievement by self evaluation against known standards.
- Be active contributors to the activities that make their organizations successful.

How Skill Standards Benefit Government

Government can provide information that will ensure a better skill match between workers and employers and initiate education reform to better educate future members of the workforce. Skill standards better enable agencies to provide options for career and job mobility and link learning to the needs of the workplace. In addition, government can use skill standards to:

- Assist in the development of a highly skilled, high-quality and competitive workforce and industry base.
- Evaluate the effectiveness of publicly funded education and training.
- Increase opportunities for under-represented populations by making public the information that defines the skills required for success and by facilitating the national adoption of those definitions and their use.
- Support the creation of high performance organizations where they improve living standards for all members of the population.
- Facilitate collaboration between educators and industry.
- Communicate the need and basis for education reform to business, education, labor and the community at large both on local and national levels.

Skill Standards: A Continuous Development Process

It is anticipated that the skill standards generated in this project will be used by its education partners to develop or modify curriculum at the high school and community college level. By providing the necessary input from industry, this skill standards document is a first step in curriculum development. The goal is that it serves the manufacturing industry in particular and is received as an example of what can be done across industries.

In order to keep current with a rapidly changing workplace, standards need to be reevaluated and updated on a regular basis, with full partner participation at each step. New technological developments impact the ways that workers organize and apply their skills, including time management and interpersonal relationships. Increased technological complexity may simplify some of the job tasks but make others more intricate. Today's Electronic Game Content Production workers are asked to acquire a broader range of decision making and customer service skills as well as keeping current with emerging technologies. Ongoing changes like these must be reflected in curriculum in order to meet the needs of industry, where expectations for workers are evolving.

A MODEL OF CONTINUOUS IMPROVEMENT FOR ECONOMIC DEVELOPMENT

Step 1: Skill Standards Identification

- Compile and research existing standards in related jobs and careers
- Conduct focus groups to identify critical work functions and key activities, define key activity performance indicators, and identify technical knowledge, foundation skills and personal qualities.
- Conduct a survey of current workers to determine level of SCANS skills required for the job.
- Develop work-related scenarios to place the skill standards in the context of the work environment.
- Validate the data gathered from the focus group.
- Disseminate skill standards information to involved parties from industry, education and labor for their review and editing.

Step 2: Assessment

- Industry and education collaborate to develop assessments that reflect competent performance as defined by the skill standards.
- A person generates and collects evidence of his or her ability to perform at the levels determined by the skill standards.
- A student, trainee, apprentice, prospective worker or worker seeking additional training is assessed to determine present skill level through direct and indirect evidence.
- Direct evidence includes products and items produced by the person who is assessed.
- Indirect evidence includes supporting information.
- Assessment results meet the criteria of validity, currency, authenticity and sufficiency.
- Demonstration of validity is a tangible item or record of action.

- Demonstration of authenticity shows that the item or specific piece of a team-effort is produced by the individual being assessed.
- Demonstration of sufficiency provides enough evidence to match key tasks and performance criteria of the skill standards.

Step 3: Curriculum Development

- Identify necessary competencies based on the skill standards information and assessments.
- Develop program outcomes for specific academic and training programs, including Tech Prep, 2-year and apprenticeship programs.
- Perform gap analysis to determine changes or additions to be made to curriculum.
- Revise existing curriculum to better meet the current and future needs of the industry.
- Develop new curriculum and establish new programs based on these competencies.

Step 4: Articulation

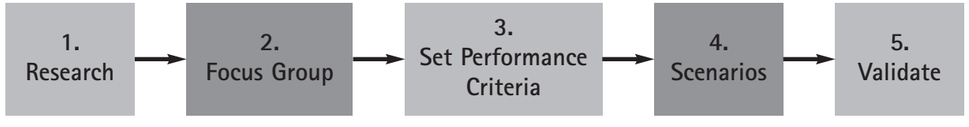
- Develop models to support the articulation of program outcomes and competencies between academic and training systems.
- Establish articulation agreements between existing programs to ensure portability of skills
- Connect competencies and Certificates of Competence with benchmark documentation to build national portability systems.

A CONTINUOUS UPDATING PROCESS

A continuous exercise by all partners of revising and verifying skill standards on a regular basis is necessary. Updating of curriculum and current training methods to meet workplace standards is required for success in national economic development.

Individual workers must have access to clearly stated competency goals and direct access to skill development assistance. With cooperative effort on local and national levels, we can begin to resolve the workforce issues that face us today.

Building Skill Standards: The Process



Pyramid of Competencies

The Pyramid of Competencies is a depiction of skill standards in three broad skill categories.

TIER I

Tier I represents the broadest level of competencies, and is the set of employability (SCANS) skills, knowledge, abilities, and personal qualities required of all workers to be successful in today's workplace. These are the universal skills that are needed to apply technical knowledge and tools effectively.

TIER II

Tier II represents technical skills, knowledge, and abilities common to all jobs within a concentration across all industries or industry sectors. For workers who provide field support, a knowledge of and ability to operate equipment would be applicable across many sectors.

TIER III

Tier III represents industry-specific technical skills, knowledge, and abilities that are unique to individual jobs or clusters and are the most prone to rapid change. For example, many workers need to upgrade their skills based on sudden market shifts.

Electronic Game Content Production Skill Standards Project

ELECTRONIC GAME CONTENT PRODUCTION SKILL STANDARDS PROJECT GOALS AND GUIDING PRINCIPLES

Goals

- Identify voluntary skill standards for Electronic Game Content Production. The standards will serve as benchmarks for entry into Electronic Game Content Production careers at the technician level.
- Disseminate the results and support their use by educators, businesses, unions, students, workers, and government agencies.

Guiding Principles for Development of Skill Standards

- Experienced workers are the experts in their career fields and are best able to identify the work performed and the skills, knowledge, and abilities required to be successful.
- Business, labor and education must work as partners to ensure the link between the work expectations and the curriculum.
- The standards must be consistent with existing civil rights laws and practices.
- Standards must be flexible and portable, and should be updated continuously.
- Skill standards describe the major functions and key activities, as well as the performance indicators, technical knowledge and skills, and employability skills and personal attributes needed to succeed in the workplace.
- Integrated skill standards define work duties and the skills required to perform them in the context of work settings.

The experience of the partners involved in this project holds that the success of any skill standards project is critically linked to the full participation and commitment of all partners.

Development of Skill Standards: Preface

Contributed by Frank Agnello, Project Director

The new Skill Standards for Electronic Game Content Production for entry-level workers relies on occupational/technical knowledge and skills that invoke hands-on craft traditions requiring some context to be understood, particularly with reference to "animation" and, most specifically "character animation." There is terminology and legacy to explain.

"Animate" means "breath life into", and traditional animators use pencil and paper to create the illusion of life as a 'flip book' of individual frames, or cells, revealed at a rate that the viewer's eye 'smoothes out' into continuous motion. The essence of traditional cell animation and Hollywood movies resides in the legacy left by the landmark Disney Feature Animation studio. By the 1930's Walt had charted a course well beyond the "Steamboat Willie" short produced after Walt created 'Mortimer Mouse' in 1928 with cartoonist Ub Iwerks doing virtually all the drawing and Lillian Disney advised husband Walt to name it "Mickey." "Snow White and the Seven Dwarfs," released in 1934 set the standard for "animation" with the typical apprenticeship of seven years before one could call oneself a Disney "character animator."

So it is that terms like "character animation" take on special meaning and become a point of potential confusion in identifying the domain of work and its requisite occupational/technical knowledge and skills for today's contemporary game industry workers performing tasks referred to as "animation." First, in all major game studios "character animation" is now done with 3D computer content-creation tools, relying on computer generated wire frame objects with textured surfaces, rather than hand-drawn cartoons. Further complicating discussion is the historic pattern, particularly in the film community, of using the word "animation" to encompass all of the creative production functions, such as modeling (creating the wire frame geometry for environments, objects and characters), as well as animating special effects.

Finally, it is important for the reader to understand that this project addresses only one concentration for the complete career pathway of the game industry: Electronic Game Content Production. Further research is required to identify all of the concentrations. These may include Computer Programming, Production Management, Sound, Art Direction and Writing.

Programming, sound, writing, production management, etc. are essential realms deserving particularized study, and the skill standards in this study focused exclusively on creative art asset production for games and performing the related technical art tasks. For example, it is fundamental to recognize that the programming department in all studios serves as a gating mechanism on the art asset creation workers. The bar is always being raised for both groups with programmers striving to utilize all the evolving capabilities of hardware and software to deliver the game experience to the player's screen and artists doing the same thing in their domain.

Development of Skill Standards: Research Methodology

PRELIMINARY RESEARCH

Voluntary skill standards were developed using specific research-based processes. This project followed the process required by the Washington State Board for Community and Technical Colleges (SBCTC) as prescribed in Skill Standards Guidebook I, RoseAnn Stevenson, Washington State Board for Community and Technical Colleges, 1996 and the process developed by the National Skill Standards Board (NSSB). In particular, the protocols used for the ICT (Information Communications Technology) skill standards were adopted.

The Industry Working Group was formed in the fall of 2002, in response to the desire of industry to address the ever-widening shortfall in skilled workers in Electronic Game Content Production. It was comprised of industry and education representatives. Funds were granted this project by the State Board for Community and Technical Colleges to conduct a skill standards study. Funds were awarded to Lake Washington Technical College for project management, and the committee began development of standards for Electronic Game Content Production.

An initial draft of critical work functions and key activities and occupational technical knowledge and skills was created by the Industry Working Group, based on existing certification standards, curriculum standards, research, skill standards and skills analyses. The skill standards were originally created by the National Workforce Center for Emerging Technologies, and updated by the National Skill Standards Board in 2003. This existing research was reviewed and analyzed by the Industry Working Group and collated into a draft, which was presented to a panel of subject matter experts in three focus groups.

FOCUS GROUPS

In all three focus groups, a structured process was used to guide the review panel through the development of the critical work functions and key activities. In each focus group, the process included the following elements:

- Panelists were facilitated by a professional skill standards focus group leader.
- Panelists received an orientation to skill standards. Examples were provided.
- Panelists from diverse areas of the game industry arrived at consensus regarding the components of the skill standards.

The purpose of Focus Group #1 was to:

- Clarify the organization and structure of the critical work functions and key activities.
- Fill in gaps in critical work functions and key activities.
- Confirm the accuracy of the critical work functions and key activities.

Panelists reviewed the draft critical work functions and key activities developed by the Industry Working Group and compiled by the skill standards expert. Gaps and inconsistencies noted by the review panel were addressed.

They were encouraged to edit the draft aggressively to avoid "rubber stamping.

After a thorough orientation to skill standards, panelists were asked to brainstorm critical work functions for Electronic Game Content Production. After composing their own critical work functions, they were then provided with the draft critical work functions identified by the Working Group and through research. Panelists were asked to compare the critical work functions from the Working Group with those they brainstormed as a group, and to consider the following criteria:

- Is the function a broad responsibility?
- Does it take a significant amount of time to achieve?
- Are there groupings of Key Activities associated with it?

Participants were asked to review the key activities for each critical work function. The criteria used for this purpose were:

- Does the activity describe what you have to do to achieve this function?
- Is it a major area of task responsibility?
- Is it concrete and specific?
- Does it have relatively equal importance to the other Key Activities?
- Does each Key Activity require distinct, definable skills?

The purpose of Focus Group #2 was to:

- Finalize the critical work functions and key activities.
- Identify performance indicators for each key activity.

Once the critical work functions and key activities were finalized, performance indicators were developed for each key activity. Panelists were asked how they know when a task is performed well, and what elements need to be in place so they would be ensured that this key activity is performed competently?" The following criteria were provided regarding performance indicators:

Performance Indicators should...

- Describe competent performance.
- Be directly observable, concrete and measurable.
- Capture the essential aspects of performance.
- Be as precise and explicit as possible but still apply across the industry cluster.
- Reflect what the individual can control.

Panelists brainstormed performance indicators, and then arrived at consensus with respect to the final list. The group was assisted in putting the content into appropriate language format.

The purpose of Focus Group #3 was to:

- Finalize the performance indicators for key activities.
- Identify the occupational technical knowledge and skills required to perform the work at the levels described by the performance indicators.
- Complete a survey to level the academic and employability knowledge and skills.
- Identify the most important academic and employability knowledge and skills for each critical work function.

For the purposes of verifying occupational technical knowledge and skills, panelists were divided into three working groups, each with a particular focus: Art, Design and Technical. The preliminary draft list of occupational technical knowledge and skills developed in the research phase was distributed to all three working groups. Panelists were encouraged to edit the draft aggressively to avoid "rubber stamping."

Panelists in Focus Group #3 also completed a SCANS leveling survey and identified which of the 37 SCANS skills were most important to each critical work function.

SURVEYS

A survey to level SCANS skills and personal qualities for Electronic Game Content Production careers was conducted. SCANS (Secretary's Commission on Achieving Necessary Skills) are foundation abilities required of workers in all occupations at varying levels specific to their jobs. Surveys were distributed to and results from the survey were compiled. These results are found on pages 25 and 26.

A survey to verify the critical work functions and key activities developed by the focus groups was conducted. Results of this survey are found on page 27.

SENIOR EXPERT REVIEW

The results of the focus group including critical work functions, key activities and performance indicators were reviewed by industry experts. Their feedback is summarized on page 19.

Definition of Terms

Each chart in the following skill standards templates contains the following components:

Concentrations

An occupation cluster is a specialty within an occupation. The occupation cluster for this study is Electronic Game Development. This study covered one concentration in Electronic Game Development: Electronic Game Content Production.

Critical Work Functions

Critical work functions represent the general areas of responsibility for the front line worker in Electronic Game Content Production. The functions tell us what must be done to achieve the key purpose of an occupation cluster.

Key Activities

Key activities are the tasks related to the functional area of the career cluster and performed by workers in a given occupation. They are made up of work activities which are measurable and observable, and which result in a decision, product or service.

Performance Indicators

Performance indicators are specific behavioral evidence of a worker's achievement of skills, knowledge and tasks. The question answered is: "How do we know when this key activity is performed well?" Performance indicators provide the standard of performance required to produce the necessary outcomes of key activities.

Technical Skills, Knowledge, Abilities and Tools

Technical skills, knowledge and abilities are those areas of expertise which workers must have in order to perform a given occupational task with excellence. A collection of skills, knowledge, abilities and tools make up competencies.

Skills refer to proficiency in an applied activity. This activity could be physical, mental or interpersonal in nature.

Knowledge is a particular set of information.

Abilities are broad human characteristics that result from natural talent, training, or experience.

Tools are materials, equipment and implements a worker must be able to use competently to meet the requirements of the job.

Academic and Employability Knowledge and Skills

Employability skills are basic knowledge, and personal skills and abilities that are needed to build more advanced competencies. They are competencies required by all workers in order to obtain meaningful work and participate in the modern workforce. They are described more fully on page 24 and charted on pages 25 to 26.

Survey Results

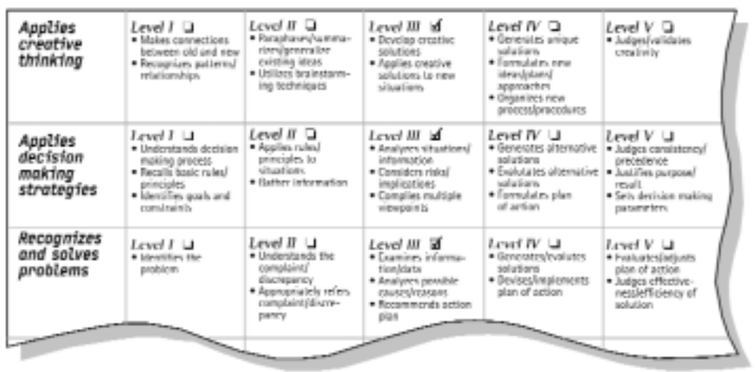
ACADEMIC AND EMPLOYABILITY KNOWLEDGE AND SKILLS: SCANS SURVEY

During the data-gathering process of this project, employability skills for Electronic Game Content Production careers were identified. Employability or workplace skills are basic academic and foundation skills needed to build more advanced competencies. The foundation skills are based on broad workplace categories, known as SCANS (Secretary's Commission on Achieving Necessary Skills, U.S. Department of Labor). This federal report issued in 1991 identifies 37 foundation and workplace competencies required for work readiness.

SCANS is comprised of a three-part foundation of skills and personal qualities and five workplace competencies needed for successful job performance in today's workforce: Professionals currently working in the field were asked to identify the level of difficulty or complexity for each of the 37 SCAN skills which is most required for successful workplace performance in each cluster. The information in the charts on the following pages was compiled by taking a weighted average of the responses across the cluster. This summary information provides a general view of the key workplace skills deemed relevant and necessary for the front line worker in Electronic Game Content Production as well as providing the foundation for the employability skills within the skill standards.

Basic skills	*Personal qualities*	*Thinking skills*	*Workplace competencies*
Reading	Responsibility	Creative Thinking	Utilizing Resources
Writing	Self-worth	Decision Making	Interpersonal Skills
Arithmetic	Sociability	Problem Solving	Utilizing Information
Mathematics	Self-management	Visualization	Using Systems
Listening	Integrity / Honesty	Knows / Learns	Using Technology
Speaking			

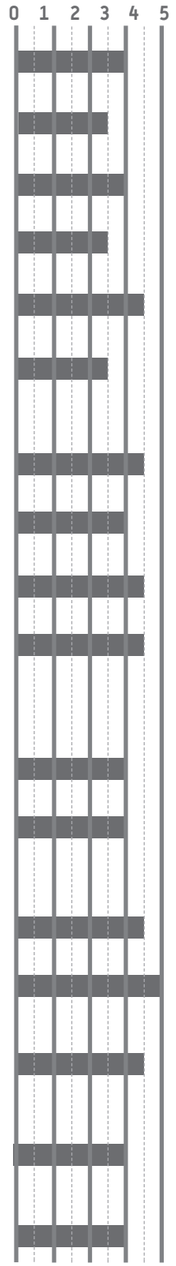
The ADVANCE™ Workplace Standards Skill Inventory from Advance Educational Spectrums, Inc. was used to capture industry views on foundation skills for Electronic Game Content Production workers. Industry professionals ranked the SCANS skill levels required for Electronic Game Content Production. The information in the chart on the following pages was created by taking the average of the profiles across the clusters. This summary information provides a general view of the key foundation skills deemed relevant and necessary for the front line Electronic Game Content Production worker.

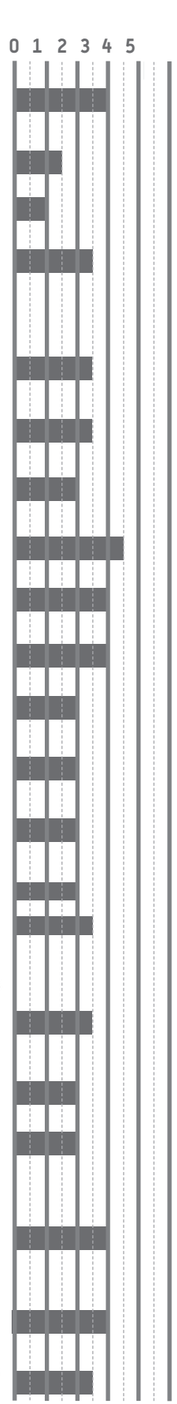


	Level I	Level II	Level III	Level IV	Level V
Applies creative thinking	• Makes connections between old and new • Recognizes patterns/ relationships	• Paraphrases/summarizes/generalizes existing ideas • Utilizes brainstorming techniques	• Develop creative solutions • Applies creative solutions to new situations	• Generates unique solutions • Formulates new ideas/plans/ approaches • Organizes new process/procedures	• Judges/validates creativity
Applies decision making strategies	• Understands decision making process • Recalls basic rules/ principles • Identifies goals and constraints	• Applies rules/ principles to situations • Gathers information	• Analyzes situations/ information • Considers risks/ implications • Considers multiple viewpoints	• Generates alternative solutions • Evaluates alternative solutions • Formulates plan of action	• Judges consistency/ precedence • Justifies purpose/ result • Sets decision making parameters
Recognizes and solves problems	• Identifies the problem	• Understands the complaint/ discrepancy • Appropriately refers complaint/discrepancy	• Examines information/data • Analyzes possible causes/reasons • Recommends action plan	• Generates/evaluates solutions • Devises/implements plan of action	• Evaluates/adjusts plan of action • Judges effectiveness/efficiency of solution

SCANS Survey Results

FOUNDATION SKILLS & PERSONAL QUALITIES	CRITICAL COMPETENCIES
Basic Skills	
Demonstrates Effective Reading Strategies	Identifies relevant details, facts, specifications, follows set of instructions, and qualifies information.
Demonstrates Effective Writing Strategies	Records information accurately, writes simple documents and summarizes/paraphrases information.
Applies Arithmetic Processes	Performs basic computations and measurements, converts numerical data and predicts arithmetic results.
Applies Mathematics Processes	Utilizes mathematical formulas and processes, Summarizes and translates mathematical data.
Demonstrates Effective Listening Skills	Listens attentively and interprets, clarifies and influences communication.
Demonstrates Effective Speaking Skills	Communicates appropriate verbal/non-verbal messages, actively participates in discussion and presents complex ideas and information.
Thinking Skills	
Applies Creative Thinking/Generates Ideas	Demonstrates creative thinking process while problem solving, and applies creative solutions to new situations.
Applies Decision Making Strategies	Understands decision making process, analyzes situation/information and considers risks/implications.
Recognizes and Solves Problems	Identifies the problem, examines data, analyzes possible causes/reasons, recommends action plan.
Demonstrates Visualization	Translates blueprints, drawings, diagrams; applies appropriate principles to situation and utilizes previous training/experience to predict outcomes; visually analyzes the relationship between parts & whole and process & procedure; creates comprehensive model and mentally pictures familiar activities and outcomes.
Knows How to Learn	Interprets and applies new knowledge and experience, interprets symbols and diagrams and investigates new learning techniques.
Applies Reasoning Skills	Applies and analyzes rules/principles, uses logic to draw conclusions and examines information for relevance and accuracy.
Personal Qualities	
Demonstrates Responsibility	Follows procedures and pays attention to details, follows up on assigned tasks, works with minimal supervision and demonstrates initiative.
Demonstrates Belief in Self Worth	Maintains a positive self image, responds assertively, defends own viewpoints, and accepts constructive criticism and responsibility for own behavior.
Demonstrates Sociability in Groups	Responds appropriately, takes active interest in and willingly helps others, modifies behavior to environment and shows understanding and empathy for others.
Demonstrates Self-Management	Maintains self control, accepts constructive criticism, sets well defined/realistic goals and demonstrates commitment to self improvement.
Demonstrates Integrity/Honesty	Demonstrates honesty and trustworthiness, accepts responsibility for own behavior and recommends ethical course of action.





Management of Time and Resources	
Manages Time	Starts on time, efficiently manages time, prioritizes daily tasks, and monitors/adjusts task sequence.
Manages Money	N/A
Manages Materials/Facilities	Maintains job-specific supplies and equipment and uses materials in a safe and efficient manner.
Manages Human Resources	Recognizes job tasks and distributes work assignments.
Management and Use of Information	
Acquires/Evaluates Information	Selects/obtains data/information relevant to the task, identifies the need for data and predicts outcomes.
Organizes/Maintains Information	Selects appropriate categories for information, interprets information and applies processes to new information.
Interprets/Communicates Information	Provides accurate information; interprets information and prepares basic summaries and reports.
Uses Computers to Process Information	Understands computer operation, utilizes integrated/multiple software and networks, locates and retrieves stored information, manipulates information, integrates multiple platforms, and modifies information.
Interpersonal Skills	
Participates as Team Member	Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment.
Teaches Others	Models proper performance/attitudes, conducts task specific training and coaches others to apply related concepts
Serves Customers	Responds to internal/external customer needs and demonstrates sensitivity to customer concerns.
Exhibits Leadership	Adheres to standards, demonstrates commitment to excellence and leads by example.
Negotiates Agreements	Understands negotiations process, identifies conflicts and demonstrates composure.
Works with Diversity	Respects the rights of others and demonstrates awareness of diversity.
Understanding and Management of Systems	
Understands System	Understands the organization system/hierarchy, follows procedures and responds to system demand.
Monitors/Corrects System Performance	Adjusts system operation, monitors system performance and trouble shoots system malfunction/failure.
Improves/Designs Systems	Identifies needed systemic improvements and suggests system modifications/improvements.
Use of Technology	
Selects Appropriate Technology	Knows available technology, understands the requirements of the task and technological results, analyzes the task/technology relationship and proposes simple technological solutions.
Applies Technology to Task	Understands technology applications, manipulates technology for desired results and analyzes technology output.
Maintains/Troubleshoots Technology	Follows specified maintenance, identifies and corrects malfunctions, and troubleshoots failures.

Verification Survey Results

To comply with the skill standards process, this project required that the electronic game content production functions and tasks identified during the focus groups be verified by a statistically significant number of game content development professionals. A survey instrument was developed asking respondents to rate the level of importance for performing each work function and key activity.

Level of Importance

0 = not important
1 = somewhat important
2 = important
3 = very important
4 = critical

Thirty five (35) valid surveys were returned. Following is a summary of ratings for the Electronic Game Content and Production concentration area:

Importance Rating	Number of Key Activities	Number of Critical Work Functions
Not Important	0	
Somewhat Important	3	
Important	21	
Very Important	13	6
Critical	0	1
Total	37	7

As the table indicates, six critical work functions were rated as very important, and one (Create Models) was rated as critical.

All key activities except for three were rated as important or very important, and those three were rated as somewhat important. The three rated as somewhat important are:

D4 Create digital matte paintings
E4 Create animation for FMV (Full Motion Video)
F6 Create effects for FMV (Full Motion Video)

It is suggested that additional research be conducted with subject matter experts to further review these three key activities, and that additional verification surveys be conducted in the future to confirm their level of importance.


DEPARTMENT OF CORRECTIONS

Skill Standards for Electronic Game Content Production

TYPICAL DESCRIPTION OF WORK FOR ELECTRONIC GAME CONTENT PRODUCTION

Individuals who work in the area of Electronic Game Content Production are at the heart of the work in the Electronic Game Development industry. They work on a team with other professionals that usually includes an Art Director, Lead Animator and a group of modelers and other artists. As a member of the team, they help craft a high quality game experience for the game player. The work includes creating art assets including concept art, user interface, models, textures, character rigging and animation, special effects, and lighting.

For example, an individual might generate designs for mythical and photorealistic terrains, followed by modeling the landscape and environment. Or, they might do image processing. Or, an individual might conceptualize, build and create texture maps for realistic military and civilian vehicles, and implement vehicles, including physics models and damage models into a specific game engine. Related to character animation and motion capture, an individual would use his/her strong understanding of human locomotion, timing, weight and balance, to bring memorable characters to life.

In order to accomplish this, those who work in game content production must be able to handle both technical and artistic challenges during game development. They must also be familiar with a wide variety of content creation application software and their relationships to game engines. In addition, they need strong traditional drawing, painting and/or sculpture skills and graphic design core competencies. For character work, they need to have a deep understanding of realistic human anatomy. Overlying all this, is a profound knowledge, appreciation and comprehension of the game experience.

SAMPLE JOB TITLES

Level Designer
2D Animator
3D Character Animator
Texture Artist
Modeler
2D Production Artist
Scripter
Tool Builder
Rigger
Shader

Scenarios

ROUTINE SCENARIO: CREATE ENVIRONMENT SECTION

The artist receives several pieces of concept art and is briefed by the art lead on setting, style, file size and deadline. The artist then researches and collects/creates further concept assets (such as photographs or relevant art work) as necessary to complete a personal understanding of the environment, and a path to its completion.

The artist then creates the environment geometry, checking quality against specifications periodically, both alone and with co-worker/art lead feedback. When the artist has completed the geometry, s/he checks his/her work with the art-lead and backs up all related files before beginning UV mapping/texturing.

The artist then creates UV maps, shaders and textures for the previous geometry, quality checking as before. When finished, the artist submits the assets to the art lead, invites critical discussion from his co-workers, and makes revisions as required.

Finally, the artist creates any special case effects, animations or scripts as determined by the art lead/design document, checking the environment after each element is completed. When finished, the artist submits the file to the art lead for approval, makes revisions as necessary, and then backs up all related files.

Critical Work Functions and Key Activities Involved in Scenario

A. Develop Concept Art Assets
- A.5 Collect Concept Assets

C. Create Models
- C.2 Create game geometry for level environments

D. Create Textures
- D.3 Create Texture sheets for level environments
- D.4 Create digital matte paintings
- D.5 Set up materials and shaders

G. Create Lighting
- G.1 Create environmental lighting
- G.2 Create and apply light maps
- G.3 Create Vertex lighting
- G.4 Create dynamic lighting

F. Create Special Effects
- F.1 Create texture animation
- F.2 Create cycled keyframed mechanical motions
- F.3 Create sprite animation
- F.4 Create particle animation

CRISIS SCENARIO: COMPLETED ENVIRONMENT PRODUCES UNKNOWN ERROR AFTER ENGINE/TOOL UPGRADE

The lead programmer rolls out an upgrade to the engine that should not break any current assets. In spite of assurances to the contrary, some previously created environments fail to export to the development platform with the new tools, producing only an unknown and undocumented error. The authors of individual broken assets are dispatched to diagnose and fix their respective asset files.

To determine what is causing the unknown error, the artist begins by eliminating file nodes systematically by node type.

First, all of the shaders are replaced by a single shader known to function. That file still produces the initial unknown error, proving the shaders are not the cause. The artist backs up the file then deletes half of the scene's geometry nodes. That file exports properly to the development platform, so the artist identifies that the error was caused by a geometry node in the group he just deleted. He returns to file's most recent backup and deletes the inverse selection.

By iteratively reducing the geometry nodes in the scene, the artist identifies the node which produces the unknown error and replaces it with a functioning backup, or recreates the geometry to function.

Critical Work Functions and Key Activities Involved in Scenario:

C. Create Models
- C.1 Create object or character game geometry
- C.2 Create game geometry for level environments
- C.3 Create game geometry for secondary game objects
- C.4 Create placeholder geometry
- C.5 Create LODs (Level of Detail) of game objects or characters
- C.6 Create tools and technical character art

D. Create Textures
- D.1 Create UV maps
- D.2 Create texture sheets for game objects or characters
- D.3 Create texture sheets for level environments
- D.4 Create digital matte paintings
- D.5 Set up materials and shaders

F. Create Special Effects
- F.1 Create texture animation
- F.2 Create cycled keyframed mechanical motions
- F.3 Create sprite animation
- F.4 Create particle animation

G. Create Lighting
- G.1 Create environmental lighting
- G.2 Create and apply light maps
- G.3 Create Vertex lighting
- G.4 Create dynamic lighting

LONG TERM SCENARIO: TOOL DEVELOPMENT

The project reaches a major milestone and assets are being gathered and scrutinized by the project leads and publishing staff with a focus on overall game narrative. Environments which share common assets are re-designed with new variables that will force unique versions of all assets on an environment by environment basis. There are only a few months left in the development cycle, so a solution which allows for environment variants needs to be developed quickly.

The artist suggests a tool which is run on existing environments to create unique localized versions of an environment file and all of its ancillary file nodes including shaders and external textures. This allows for a basic version control of the initial file and the ability to create versions localized to new design specifications without affecting the initial file.

After the tool's design is established, its feasibility is discussed with programming staff, and it is implemented quickly.

Critical Work Functions and Key Activities Involved in Scenario:

C. Create Models
- C.6 Create tools and technical character art

E. Create Character Rigging and Animation
- E.8 Create tools and technical character art

F. Create Special Effects
- F.7 Create tools and technical character art

Summary of Critical Work Functions and Key Activities

A. Develop Concept Art Assets
- A.1 Develop preliminary drawings of primary objects or characters
- A.2 Develop preliminary drawings of level environments
- A.3 Develop preliminary drawings of secondary objects or characters
- A.4 Develop Storyboards
- A.5 Collect concept assets

B. Create User Interface
- B.1 Design game interface hierarchy
- B.2 Create art assets for game interface

C. Create Models
- C.1 Create object or character game geometry
- C.2 Create game geometry for level environments
- C.3 Create game geometry for secondary game objects
- C.4 Create placeholder geometry
- C.5 Create LODs (Level of Detail) of game objects or characters
- C.6 Create tools and technical character art

D. Create Textures
- D.1 Create UV maps
- D.2 Create texture sheets for game objects or characters
- D.3 Create texture sheets for level environments
- D.4 Create digital matte paintings
- D.5 Set up materials and shaders

E. Create Character Rigging and Animation
- E.1 Create and implement a character rig for the game engine
- E.2 Create and implement a rig for mechanical animation
- E.3 Adjust and edit skin weights
- E.4 Create animation for FMV (Full Motion Video)
- E.5 Create cycled keyframed motion for characters
- E.6 Perform Motion Capture post production
- E.7 Create Animation for 'real time' cinematics (cut scenes)
- E.8 Create tools and technical character art

F. Create Special Effects
- F.1 Create texture animation
- F.2 Create cycled keyframed mechanical motions
- F.3 Create sprite animation
- F.4 Create particle animation
- F.5 Create effects for 'real time' cinematics (cut scenes)
- F.6 Create effects for FMV (Full Motion Video)
- F.7 Create tools and technical character art

G. Create Lighting
- G.1 Create environmental lighting
- G.2 Create and apply light maps
- G.3 Create Vertex lighting
- G.4 Create dynamic lighting

Skill Standards: Performance Indicators and Academic and Employability Knowledge and Skills

Electronic Game Content Production Critical Work Function: A. Develop Concept Art Assets

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
A1 **Develop preliminary drawings of primary objects or characters.**	Consistent style that conforms with style of game is developed. Appropriate scale of character as related to environment is adhered to. Appropriate color palette, for style of the game in accordance with style guide, is developed. Multiple stylistic variations, all consistent with style guide, are developed. Model sheets (multiple sides and views) are created. Level of detail is appropriate in accordance with style guide. Drawings are completed in timely manner to meet timeline requirements. Effective and timely communication is consistently maintained with other team members. Flexibility is maintained and change orders are incorporated into drawings. The function of objects or characters is illustrated in the preliminary drawing. Personality of character is captured in drawing.	Selects/obtains data/information relevant to the task, identifies the need for data and predicts outcomes. Demonstrates creative thinking process while problem solving, develops creative solutions and applies creative solutions to new situations. Understands decision making process, analyzes situation/information and considers risks/implications. Draws upon experiences and prior knowledge, interprets and applies new knowledge and experience, interprets symbols, diagrams and schematics and investigates new learning techniques. Listens attentively and interprets, clarifies and influences communication. Maintains job-specific supplies and equipment and uses materials in a safe and efficient manner. Starts on time, efficiently manages time, prioritizes daily tasks, and monitors/adjusts task sequence. Understands negotiations process, identifies conflicts and demonstrates composure. Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. Identifies the problem, examines data, analyzes possible causes/reasons, recommends action plan. Identifies relevant details, facts, specifications, follows set of instructions, and qualifies information. Applies and analyzes rules/principles to process, uses logic to draw conclusions and examines information for relevance and accuracy.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
A2 **Develop preliminary drawings of level environments**	Consistent style that conforms with style of game is developed. Appropriate scale of environment objects as related to characters is adhered to. Appropriate color palette, for style of the game in accordance with style guide, is developed. Multiple stylistic variations, all consistent with style guide, are developed. Multiple views of environments are provided. Level of detail is appropriate in accordance with style guide. Drawings are completed in timely manner to meet timeline requirements. Effective and timely communication is consistently maintained with other team members. Flexibility is maintained and change orders are incorporated into drawings. Multiple lighting variations, all consistent with style guide, are developed.	Follows procedures and pays attention to details, follows up on assigned tasks, works with minimal supervision and demonstrates initiative. Maintains self control, accepts constructive criticism, sets well defined/realistic goals and demonstrates commitment to self improvement. Responds to internal/external customer needs and demonstrates sensitivity to customer concerns. Understands the organization system/hierarchy, follows procedures and responds to system demand. Translates blueprints, drawings, diagrams; applies appropriate principles to situation and utilizes previous training/experience to predict outcomes; visually analyzes the relationship between parts & whole and process & procedure; creates comprehensive model and mentally pictures familiar activities and outcomes. Records information accurately, writes simple documents and summarizes/paraphrases information.
A3 **Develop preliminary drawings of secondary objects or characters**	Consistent style that conforms with style of game is developed. Appropriate scale of secondary characters or objects as related to environment is adhered to. Appropriate color palette, for style of the game in accordance with style guide, is developed. Multiple stylistic variations, all consistent with style guide, are developed. Model sheets (multiple sides and views) are created. Level of detail is appropriate in accordance with style guide. Drawings are completed in timely manner to meet timeline requirements. Effective and timely communication is consistently maintained with other team members. Flexibility is maintained and change orders are incorporated into drawings. The function of object or characters is illustrated in the preliminary drawing. Personality of character is captured in drawing	

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
A4 **Develop Storyboards**	Storyboard clearly illustrates key events over the passage of time. Proper format is used In accordance with production guide. Camera angles and movement are clearly illustrated. Strong storytelling through composition is reflected in the shots. Appropriate industry-recognized terminology is used. Sense of motion and scale is reflected on storyboard. The pacing, action and storytelling is communicated in the storyboard. Storyboards are completed in timely manner to meet project deadlines. Storyboard contains proper detail for the shot in accordance with supervisor instructions or company protocols.	
A5 **Collect concept assets**	Concept assets are well researched and well documented in accordance with copyright laws. A well structured library of assets, including thumbnails or other cataloguing techniques and effective navigation, is created. Logical naming conventions are used. Appropriate quantity and quality of assets to meet requirements of project are collected. Only appropriate and relevant assets are placed into the database. Library is kept up to date. Collected assets are made available in accordance with company policies.	

Electronic Game Content Production Critical Work Function: B. Create User Interface

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
B1 **Design game interface hierarchy**	Effective and logical navigation is included in User Interface (UI). Flow of entire interface hierarchy is accurately and thoroughly mapped. Game design specifications are met in game interface hierarchy. The game interface hierarchy is functional. The entire game is controllable through the interface. The interface works in conjunction with play of the game. Proper testing is performed to ensure that asset performs to specification.	Demonstrates creative thinking process while problem solving, develops creative solutions and applies creative solutions to new situations. Understands decision making process, analyzes situation/information and considers risks/implications. Identifies needed systemic improvements and suggests system modifications/improvements. Provides accurate information; interprets information and prepares basic summaries and reports. Listens attentively and interprets, clarifies and influences communication. Adjusts system operation, monitors system performance and troubleshoots system malfunction/failure. Understands negotiations process, identifies conflicts and demonstrates composure. Selects appropriate categories for information, interprets information and applies processes to new information. Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. Identifies the problem, examines data, analyzes possible causes/reasons, recommends action plan. Follows procedures and pays attention to details, follows up on assigned tasks, works with minimal supervision and demonstrates initiative. Maintains self control, accepts constructive criticism, sets well defined/realistic goals and demonstrates commitment to self improvement. Responds to internal/external customer needs and demonstrates sensitivity to customer concerns. Communicates appropriate verbal/non-verbal messages, actively participates in discussion and present complex ideas and information. Understands the organization system/hierarchy, follows procedures and responds to system demand. Understands computer operation, utilizes integrated/multiple software and networks, locates and retrieves stored information, manipulates information, integrates multiple platforms, and modifies information. Translates blueprints, drawings, diagrams; applies appropriate principles to situation and utilizes previous training/experience to predict outcomes; visually analyzes the relationship between parts & whole and process & procedure; creates comprehensive model and mentally pictures familiar activities and outcomes.
B2 **Create art assets for game interface**	Text and icons are readable and spelled correctly. Critical information is displayed. Files are appropriately compressed in accordance with project specifications. Style of game is represented in game interface. Proper testing is performed to ensure that asset performs to specification.	

Electronic Game Content Production Critical Work Function C. Create Models

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
C1 **Create geometric game objects or characters**	No N-side polygons are contained in the geometry, no inside polygons and no hidden faces are created, and there are no isolated vertices, no coplanar faces. Geometry works within the budgeted poly count. Naming conventions follow company and/or team protocols. Polygonal normals have consistent and correct direction. Characters are grouped correctly in a clear hierarchy. Models' scales conform to design specifications. Character models are created for effective deformation, effective UV mapping and are oriented and positioned correctly for export. Characters have correct pivot points and function in accordance to design specifications. Asset performs in accordance with specification inside the game. Clean and efficient modeling techniques are used. Proper testing is performed to ensure that asset performs to specification.	Understands the requirements of the task and technological results and analyzes task/technology relationship. Performs basic computations and measurements, converts numerical data and predicts arithmetic results. Demonstrates creative thinking process while problem solving, develops creative solutions and applies creative solutions to new situations. Understands decision making process, analyzes situation/information and considers risks/implications. Follows specified maintenance, identifies and corrects malfunctions, and troubleshoots failures. Starts on time, efficiently manages time, prioritizes daily tasks, and monitors/adjusts task sequence. Utilizes mathematical formulas and processes, Summarizes and translates mathematical data. Understands negotiations process, identifies conflicts and demonstrates composure. Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. Identifies the problem, examines data, analyzes possible causes/reasons, recommends action plan. Understands the requirements of the task and technological results and analyzes task/technology relationship. Maintains a positive self image, responds assertively, defends own viewpoints, accepts constructive criticism and responsibility for own behavior and understands own impact on others. Responds to internal/external customer needs and demonstrates sensitivity to customer concerns.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
C2 **Create geometric game level environments**	Objects are grouped correctly in a clear hierarchy. Models' scales conform to design specifications. Environment models are created for effective UV mapping. Objects are oriented and positioned correctly for export. Objects have correct pivot points and function in accordance to design specifications. Asset performs in accordance with specification inside the game. Clean and efficient modeling techniques are used. Geometry is functional and geometry functions within the physics engine where applicable. Proper testing is performed to ensure that asset performs to specification.	Responds appropriately to others, takes active interest in and willingly helps others, modifies behavior to environment and shows understanding and empathy for others. Understands the organization system/hierarchy, follows procedures and responds to system demand. Understands computer operation, utilizes integrated/multiple software and networks, locates and retrieves stored information, manipulates information, integrates multiple platforms, and modifies information. Translates blueprints, drawings, diagrams; applies appropriate principles to situation and utilizes previous training/experience to predict outcomes; visually analyzes the relationship between parts & whole and process & procedure; creates comprehensive model and mentally pictures familiar activities and outcomes.
C3 **Create geometric secondary game objects**	Objects are grouped correctly in a clear hierarchy. Models' scales conform to design specifications. Models are created for effective UV mapping. Objects are oriented and positioned correctly for export. Objects have correct pivot points and function in accordance to design specifications. Asset performs in accordance with specification inside the game. Clean and efficient modeling techniques are used. Geometry is functional and geometry functions within the physics engine where applicable. Proper testing is performed to ensure that asset performs to specification.	

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
C4 **Create placeholder geometry**	Primatives are used to scale. Placeholder geometry is produced in a timely manner. Placeholder geometry correctly indicates whether a character is game playable or static. Placeholder geometry accurately conveys a sense of the final product. Placeholder geometry is grouped correctly in a clear hierarchy. Placeholder geometry scales conform to design specifications. Placeholder geometry is oriented and positioned correctly for export. Placeholder geometry has correct pivot points and function in accordance to design specifications. Asset performs in accordance with specification inside the game. Proper testing is performed to ensure that asset performs to specification.	
C5 **Create LODs (Level of Detail) of game objects or characters**	LODs look very similar to original model at appropriate distance. LODs are grouped correctly in a clear hierarchy. LODs scales conform to design specifications. Character models are created for effective deformation. LODs are created for effective UV mapping. LODs are oriented and positioned correctly for export. LODs have correct pivot points and function in accordance to design specifications. Asset performs in accordance with specification inside the game. Clean and efficient modeling techniques are used. LODs fit within budgeted geometry. Proper testing is performed to ensure that asset performs to specification.	
C6 **Create tools and technical character art**	Tools and technical processes are performed to established specification/design. Tools and technical processes are properly documented both internally and in external documents. Technical character asset integrity is maintained throughout the project. Effective communication is consistently maintained with technical director or art director. Assets are kept in accordance with established formats and naming conventions. Requisite batch processes are developed and are overseen to completion. Proper testing is performed to ensure that asset performs to specification.	

Electronic Game Content Production Critical Work Function: D. Create Textures

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
D1 **Create UV maps**	Minimum texture distortion is created. Detailed areas are given appropriate resolution. Seam placement is correct. UV's are mapped so they do not overlap. Indexed palettes are applied as appropriate. Proper testing is performed to ensure that asset performs to specification.	Understands the requirements of the task and technological results and analyzes task/technology relationship. Demonstrates creative thinking process while problem solving, develops creative solutions and applies creative solutions to new situations. Draws upon experiences and prior knowledge, interprets and applies new knowledge and experience, interprets symbols, diagrams and schematics and investigates new learning techniques. Adheres to standards, demonstrates commitment to excellence and leads by example. Maintains job-specific supplies and equipment and uses materials in a safe and efficient manner. Starts on time, efficiently manages time, prioritizes daily tasks, and monitors/adjusts task sequence. Understands negotiations process, identifies conflicts and demonstrates composure. Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. Identifies the problem, examines data, analyzes possible causes/reasons, recommends action plan. Maintains self control, accepts constructive criticism, sets well defined/realistic goals and demonstrates commitment to self improvement. Responds to internal/external customer needs and demonstrates sensitivity to customer concerns. Understands the organization system/hierarchy, follows procedures and responds to system demand. Understands computer operation, utilizes integrated/multiple software and networks, locates and retrieves stored information, manipulates information, integrates multiple platforms, and modifies information. Translates blueprints, drawings, diagrams; applies appropriate principles to situation and utilizes previous training/experience to predict outcomes; visually analyzes the relationship between parts & whole and process & procedure; creates comprehensive model and mentally pictures familiar activities and outcomes.
D2 **Create texture sheets for game objects or characters**	Texture memory budget is fitted in accordance with design specifications. There is optimal use of texture space. Style is developed in accordance with design specifications. There is maximum detail using minimum resolution. Appropriate file size and proper directory naming conventions and file types are used. Indexed palettes are applied as appropriate. Proper testing is performed to ensure that asset performs to specification.	
D3 **Create texture sheets for level environments**	Tiling is without visible repetitive pattern. Textures are reusable and are easily manipulated for multiple uses. Proper resolution for scale of environment and player POV (point of view) is used. LOD (MIP map) have differing draw distances. Indexed palettes are correctly applied as appropriate. Appropriate file size and proper directory naming conventions and file types are used. Proper testing is performed to ensure that asset performs to specification.	

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
D4 **Create digital matte paintings**	Digital matte painting tiles or wraps in background seamlessly. Environmental design specifications are reflected. The game world contains an appropriate sense of scale and depth to the game world. Minimum texture distortion is created. Appropriate resolution is given to matte painting. Appropriate file size and proper directory naming conventions and file types are used. Indexed palettes are properly applied as appropriate. Seam placement is inconspicuous. Proper testing is performed to ensure that asset performs to specification.	
D5 **Set up materials and shaders**	Appropriate shaders (specular, bump, normal, incandescent) and materials are used to achieve the look of required surface characteristics. Materials and shaders are set up in a timely manner. Matching or ancillary textures are created to properly fulfill custom material attributes from UV map/texture sheet. Appropriate file size and proper directory naming conventions and file types are used. Indexed palettes are properly applied as appropriate. Proper testing is performed to ensure that asset performs to specification.	

Electronic Game Content Production Critical Work Function: E. Create Character Rigging and Animation

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
E1 **Create and implement a character rig for the game engine**	Skeleton fits within the bone budget. Orientation and limits on skeleton are appropriate. Proper joint placement is created. Hierarchy and naming conventions are properly used. Skeleton performs in accordance with character specification. Appropriate controls are set up in accordance with specifications. Proper testing is performed to ensure that asset performs to specification.	Understands the requirements of the task and technological results and analyzes task/technology relationship. Performs basic computations and measurements, converts numerical data and predicts arithmetic results. Demonstrates creative thinking process while problem solving, develops creative solutions and applies creative solutions to new situations. Understands decision making process, analyzes situation/information and considers risks/implications. Demonstrates honesty and trustworthiness, accepts responsibility for own behavior and recommends ethical course of action.
E2 **Create and implement a rig for mechanical animation**	Hierarchy is correctly grouped and named. Pivots are placed in appropriate places. Appropriate controls are set up in accordance with specifications. Proper testing is performed to ensure that asset performs to specification.	Starts on time, efficiently manages time, prioritizes daily tasks, and monitors/adjusts task sequence. Maintains job-specific supplies and equipment and uses materials in a safe and efficient manner. Utilizes mathematical formulas and processes, Summarizes and translates mathematical data. Understands negotiations process, identifies conflicts and demonstrates composure.
E3 **Adjust and edit skin weights**	Skin deforms properly. Vertex morphing is properly set up where applicable. Skin weights are completed in a timely manner. Effective and timely communication is maintained among all appropriate parties. Skin weight conforms to specifications. Proper testing is performed to ensure that asset performs to specification.	Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. Identifies the problem, examines data, analyzes possible causes/reasons, recommends action plan. Applies and analyzes rules/principles to process, uses logic to draw conclusions and examines information for relevance and accuracy. Responds to internal/external customer needs and demonstrates sensitivity to customer concerns. Understands the organization system/hierarchy, follows procedures and responds to system demand. Understands computer operation, utilizes integrated/multiple software and networks, locates and retrieves stored information, manipulates information, integrates multiple platforms, and modifies information.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
E4 **Create animation for FMV (Full Motion Video)**	Character animation is done in accordance with game specifications. Animation has appropriate weight and timing to reflect the character in accordance with design document and storyboard. Appropriate camera placement and animation are used to meet with design document and storyboard. Composition and staging correctly convey the shot or scene to achieve narrative's goals. Appropriate rig or model is created and used for FMV sequence. Effective communication is maintained with in-game animators to maintain consistency in animation styles. Proper testing is performed to ensure that asset performs to specification.	
E5 **Create cycled keyframed motion for characters**	Frame rate is set correctly in accordance with game/company specifications. Animations are properly looped. Animation curves and keyframes are used efficiently. Speed and length are appropriate in accordance with supervisor's instruction. Cycled keyframed motion is completed properly and in a timely manner. Proper testing is performed to ensure that asset performs to specification.	
E6 **Perform Motion Capture post production**	Proper optimization of keyframes (data) is performed. Animation plays properly within the game engine. Naming conventions are consistent and logical. Motion Capture post production is completed in a timely manner. Proper testing is performed to ensure that asset performs to specification.	

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
E7 **Create Animation for Real time cinematics (cut scenes)**	Character animation is properly created in accordance with game specifications. Animation has appropriate weight and timing to reflect the character in accordance with design document and storyboard. Appropriate camera placement and animation are used to meet with design document and storyboard. Composition and staging correctly convey the shot or scene to achieve narrative's goals. Real time animation cycles are sequenced appropriately in game engine. Effective communication is maintained with in-game animators to maintain consistency in animation styles Proper testing is performed to ensure that asset performs to specification.	
E8 **Create tools and technical character art**	Tools and technical processes are correctly performed to established specification/design. Tools and technical processes are properly documented both internally and in external documents. Technical character asset integrity is maintained throughout the project. Effective and timely communication is consistently maintained with technical director or art director. Assets are kept in accordance with established formats and naming conventions. Requisite batch processes are developed and are overseen to completion. Proper testing is performed to ensure that asset performs to specification.	

Electronic Game Content Production Critical Work Function: F. Create Special Effects

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
F1 **Create texture animation**	Looping is fluid. Texture animation correctly conveys real-world effects that work within the game engine. Appropriate file size and proper directory naming conventions and file types are used. Texture animation works correctly in accordance with the design document. Texture animation is consistent with style of game as per design document. Texture animation correctly fits within surrounding environments/character. Proper testing is performed to ensure that asset performs to specification. Convey real world and/or convincing effects working within game engine.	Understands the requirements of the task and technological results and analyzes task/technology relationship. Performs basic computations and measurements, converts numerical data and predicts arithmetic results. Demonstrates creative thinking process while problem solving, develops creative solutions and applies creative solutions to new situations. Starts on time, efficiently manages time, prioritizes daily tasks, and monitors/adjusts task sequence. Maintains job-specific supplies and equipment and uses materials in a safe and efficient manner. Utilizes mathematical formulas and processes, Summarizes and translates mathematical data. Understands negotiations process, identifies conflicts and demonstrates composure. Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. Identifies the problem, examines data, analyzes possible causes/reasons, recommends action plan.
F2 **Create cycled keyframed mechanical motions**	Cycled keyframed mechanical motions are created in logical manner in order to convey reality. Looping is fluid. Blending is correct to enable going from one function to the next. Appropriate file size and proper directory naming conventions and file types are used. Cycled keyframed mechanical motions work correctly within the design document. Cycled keyframed mechanical motions are consistent with style of game as per design document. Cycled keyframed mechanical motions correctly fit within surrounding environments/character. Proper testing is performed to ensure that asset performs to specification.	

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
F3 **Create sprite animation**	Alpha channels are properly used and work correctly within context of game. Sprite animation properly conveys a sense of reality and depth. Looping is fluid. Sprit animation is created taking into account the gaming engine and specific game situations where the sprite would be used. Keyframes are kept as efficient as possible without loosing overall effect. Appropriate file size and proper directory naming conventions and file types are used. Sprite animation works correctly within the design document. Sprite animation is consistent with style of game as per design document. Sprite animation correctly fits within surrounding environments/character. Proper testing is performed to ensure that asset performs to specification.	Identifies relevant details, facts, specifications, follows set of instructions, and qualifies information. Follows procedures and pays attention to details, follows up on assigned tasks, works with minimal supervision and demonstrates initiative. Understands the requirements of the task and technological results and analyzes task/technology relationship. Maintains self control, accepts constructive criticism, sets well defined/realistic goals and demonstrates commitment to self improvement. Responds to internal/external customer needs and demonstrates sensitivity to customer concerns. Understands the organization system/hierarchy, follows procedures and responds to system demand. Understands computer operation, utilizes integrated/multiple software and networks, locates and retrieves stored information, manipulates information, integrates multiple platforms, and modifies information. Translates blueprints, drawings, diagrams; applies appropriate principles to situation and utilizes previous training/experience to predict outcomes; visually analyzes the relationship between parts & whole and process & procedure; creates comprehensive model and mentally pictures familiar activities and outcomes. Records information accurately, writes simple documents and summarizes/paraphrases information.
F4 **Create particle animation**	Particle animation correctly conveys real-world effects that work within the game engine. Looping is proper when necessary. Keyframes are kept as efficient as possible without loosing overall effect. Particle count stays within polygon budget and particle effect has correct positioning and orientation. Appropriate file size and proper directory naming conventions and file types are used. Particle animation works correctly within the design document. Particle animation is consistent with style of game as per design document. Particle animation correctly fits within surrounding environments/character. Proper testing is performed to ensure that asset performs to specification.	

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
F5 **Create effects Animation for Real time cinematics (cut scenes)**	Particle effects, geometry effects and dynamic effects are consistent with game art style. Particle effects, geometry effects and dynamic effects properly fit within the budgets as set by technical director or supervisor. Particle effects, geometry effects and dynamic effects are implemented correctly in accordance with technical director or supervisor. All objects are grouped and named correctly. Appropriate research and development tasks are performed as mandated by technical director. Appropriate file size and proper directory naming conventions and file types are used. Effects animation for Real time cinematics work correctly within the design document. Effects animation for Real time cinematics is consistent with style of game as per design document. Effects animation for Real time cinematics correctly fit within surrounding environments/character. Proper testing is performed to ensure that asset performs to specification.	
F6 **Create Animation for FMV (Full Motion Video)**	Particle effects, geometry effects and dynamic effects are consistent with game art style. Particle effects, geometry effects and dynamic effects fit within the budgets as set by technical director or supervisor. Particle effects, geometry effects and dynamic effects are implemented correctly in accordance with technical director or supervisor. All objects are grouped and named correctly. Appropriate research and development tasks are performed as mandated by technical director. Appropriate file size and proper directory naming conventions and file types are used. Animation for FMV works correctly within the design document. Animation for FMV is consistent with style of game as per design document. Animation for FMV correctly fits within surrounding environments/character. Proper testing is performed to ensure that asset performs to specification.	

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
F7 **Create tools and technical effects art**	Tools and technical processes are correctly performed to established specification/design. Tools and technical processes are properly documented both internally and in external documents. Technical character asset integrity is maintained throughout the project. Effective and timely communication is consistently maintained with technical director or art director. Assets are kept in accordance with established formats and naming conventions. Requisite batch processes are developed and are overseen to completion. Proper testing is performed to ensure that asset performs to specification. Appropriate research and development tasks are performed as mandated by technical director. Relevant knowledge base is maintained and made accessible. Appropriate file size and proper directory naming conventions and file types are used. Tools and technical effects work correctly within the design document. Tools and technical effects are consistent with style of game as per design document. Tools and technical effects correctly fit within surrounding environments/character. Proper testing is performed to ensure that asset performs to specification.	

Electronic Game Content Production Critical Work Function: G. Create Lighting

KEY ACTIVITY	Performance Indicators How do we know when the tasks performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
G1 **Create environmental lighting**	Lighting corresponds to design document specification regarding time of day, weather, and scene. Light attributes are correctly adjusted to complement existing environment. Lights are placed efficiently to achieve max effect with minimum number of lights. Light types are used appropriately to achieve desire effect (i.e. point, spot). Lights are named, grouped and organized as per game development protocol. Proper testing is performed to ensure that asset performs to specification.	Knows available technology, understands the requirements of the task and technological results, analyzes the task/technology relationship and proposes simple technological solutions. Performs basic computations and measurements, converts numerical data and predicts arithmetic results. Demonstrates creative thinking process while problem solving, develops creative solutions and applies creative solutions to new situations. Maintains job-specific supplies and equipment and uses materials in a safe and efficient manner. Starts on time, efficiently manages time, prioritizes daily tasks, and monitors/adjusts task sequence. Utilizes mathematical formulas and processes, Summarizes and translates mathematical data. Identifies the problem, examines data, analyzes possible causes/reasons, recommends action plan. Follows procedures and pays attention to details, follows up on assigned tasks, works with minimal supervision and demonstrates initiative. Understands the requirements of the task and technological results and analyzes task/technology relationship. Maintains self control, accepts constructive criticism, sets well defined/realistic goals and demonstrates commitment to self improvement.
G2 **Create and apply light maps**	Lighting corresponds to design document specification regarding time of day, weather, and scene. Light attributes are correctly adjusted to complement existing environment. Lights are placed efficiently to achieve max effect with minimum number of lights. Light types are used appropriately to achieve desire effect (i.e. point, spot). Lights are named, grouped and organized as per game development protocol. Light maps are properly smoothed in image processing software as necessary. Light maps fit within the allotted memory budget. Proper testing is performed to ensure that asset performs to specification.	

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Academic and Employability Knowledge and Skills SCANS and Academic Knowledge and Skills
G3 Create Vertex lighting	Lighting corresponds to design document specification regarding time of day, weather, and scene. Light attributes are correctly adjusted to complement existing environment. Lights are placed efficiently to achieve max effect with minimum number of lights. Light types are used appropriately to achieve desire effect (i.e. point, spot). Lights are named, grouped and organized as per game development protocol. Proper testing is performed to ensure that asset performs to specification.	Understands computer operation, utilizes integrated/multiple software and networks, locates and retrieves stored information, manipulates information, integrates multiple platforms, and modifies information. Translates blueprints, drawings, diagrams; applies appropriate principles to situation and utilizes previous training/experience to predict outcomes; visually analyzes the relationship between parts & whole and process & procedure; creates comprehensive model and mentally pictures familiar activities and outcomes.
G4 Create dynamic lighting	Lighting corresponds to design document specification regarding time of day, weather, and scene. Light attributes are correctly adjusted to complement existing environment. Lights are placed efficiently to achieve max effect with minimum number of lights. Light types are used appropriately to achieve desire effect (i.e. point, spot). Lights are named, grouped and organized as per game development protocol. Light's animation corresponds to its source exactly at all points in its animation. Dynamic light attributes are properly utilized to achieve appropriate effect over time. Proper testing is performed to ensure that asset performs to specification.	

Skill Standards: Occupational Technical Knowledge and Skills

Category 1: Creation

1. Knowledge of animating atmospheres and environments.
2. Knowledge of animating light and shadow.
3. Knowledge of animating movement.
4. Knowledge of animating with multiple modifiers.
5. Knowledge of animation techniques.
6. Knowledge of camera placement.
7. Knowledge of character animation techniques.
8. Knowledge of character rigging.
9. Knowledge of cloning.
10. Knowledge of composite process and techniques.
11. Knowledge of compression techniques.
12. Knowledge of digital special effects.
13. Knowledge of drawing.
14. Knowledge of facial animation.
15. Knowledge of framing and composition layout.
16. Knowledge of graphics formats (GIF, JPEG, PNG, TIFF, BMP).
17. Knowledge of hierarchies and deformations.
18. Knowledge of human and animal anatomy.
19. Knowledge of inverse/forward kinematics.
20. Knowledge of keyframes.
21. Knowledge of launch and roll-back processes.
22. Knowledge of lighting and shading concepts and techniques.
23. Knowledge of modeling concepts and techniques.
24. Knowledge of motion capture concept and process.
25. Knowledge of motion graphics.
26. Knowledge of motion tracking.
27. Knowledge of multimedia design elements, principles and testing procedures.
28. Knowledge of painting, both traditional and digital.
29. Knowledge of particle animation.
30. Knowledge of pivot points.
31. Knowledge of rendering techniques (lighting and application of texture).
32. Knowledge of resolution.
33. Knowledge of sketching and drawing.
34. Knowledge of skins weights.
35. Knowledge of sprite animation.
36. Knowledge of stagecraft and camera movement.
37. Knowledge of still image manipulation.
38. Knowledge of texture sheets.
39. Knowledge of typography.
40. Knowledge of user interface design.
41. Skill in creating 3D shapes and textures on paper and by using technology.
42. Skill in producing and developing multimedia applications.
43. Skill in producing and developing multimedia presentations.
44. Skill in producing simulations on paper and using technology.
45. Skill in storyboarding.

Category 2: Computer Concepts

1. Knowledge of application development languages (C, C++, Java, Delphi, etc.).
2. Knowledge of bandwidth limitations.
3. Knowledge of basic programming concepts and the inter-relation between visual & technical design (multimedia design).
4. Knowledge of basic technical design (back-end functionality).
5. Knowledge of basic technical scripting.
6. Knowledge of coding/programming and debugging.
7. Knowledge of computer platform performance and limitations.
8. Knowledge of connectivity: modems, DSL, T1, broadband.
9. Knowledge of databases and database development languages (SQL, Access, Oracle, SQL Server, etc.).
10. Knowledge of FTP (File Transfer Protocol).
11. Knowledge of graphic formats (GIF, JPEG, PNG, TIFF, BMP).
12. Knowledge of hardware specifications, trends and capabilities.
13. Knowledge of media limitations issues and considerations.
14. Knowledge of naming conventions.
15. Knowledge of operating systems and file management.
16. Knowledge of programming concepts.
17. Knowledge of scripting.
18. Knowledge of storage medium and access.
19. Knowledge of technical design (back-end functionality).
20. Knowledge of technical information design.
21. Knowledge of technical scripting.
22. Knowledge of user interface design.
23. Knowledge of version and revision control practices.
24. Knowledge of Web development languages (JavaScript, ASP, Cold Fusion, XML, XSL, RPC, .Net, etc).

Category 3: Hardware

1. Knowledge of computer operating systems and platform specific.
2. Knowledge of computer peripherals (input/output devices, scanners, printers, tablets, mice).
3. Knowledge of computer platform performance and limitations.
4. Knowledge of multimedia hardware.
5. Knowledge of simulation hardware.
6. Knowledge of streaming server technology.
7. Knowledge of systems technology capabilities and constraints.
8. Knowledge of technological constraints of development and delivery platforms.

Category 4: Software

1. Knowledge of 2D software packages.
2. Knowledge of 3D software packages (Alias Maya, 3D Studio Max, Softimage|XSI, Lightwave).
3. Knowledge of AVID and Final Cut Pro.
4. Knowledge of browsers.
5. Knowledge of capabilities and limitations of simulation software.
6. Knowledge of communication software (Outlook, Instant Messenger, IRCQ, WIKI).
7. Knowledge of FTP (File Transfer Protocol).
8. Knowledge of graphic, animation, audio and video development tools and multimedia software.
9. Knowledge of graphics formats (GIF, JPEG, PNG, TIFF, BMP).
10. Knowledge of graphics packages and other software design tools.
11. Knowledge of image and photo editing software (i.e. Illustrator, Photoshop).
12. Knowledge of multimedia software (i.e. Combustion, Premiere, After Effects, Flash, Shockwave, Director).

13. Knowledge of multimedia system capabilities.
14. Knowledge of multimedia tools, techniques and procedures (e.g. authoring, media editing, software design, integration software).

Category 5: Game Engine

1. Knowledge of a variety of methods for game creation.
2. Knowledge of game engine budgets and standards.
3. Knowledge of game engine types and limitations.
4. Knowledge of game engine workings (i.e. how assets are used, how assets are budgeted).
5. Knowledge of game platforms.
6. Knowledge of games and terminology history.
7. Knowledge of the impact of technical limitations and resources on game design.
8. Knowledge of multimedia hardware specifications.

Category 6: Project Management

1. Knowledge of asset management (i.e. setting up project folders).
2. Knowledge of command line.
3. Knowledge of design alternatives.
4. Knowledge of design elements and principles and interface requirements.
5. Knowledge of digital asset management.
6. Knowledge of game mechanics.
7. Knowledge of game technology and budget.
8. Knowledge of iterative nature of development work.
9. Knowledge of look-and-feel concepts and implementation.
10. Knowledge of media design.
11. Knowledge of media indexing.
12. Knowledge of media limitations issues and considerations.
13. Knowledge of production processes.
14. Knowledge of programming and development process.
15. Knowledge of related disciplines to facilitate communication.
16. Knowledge of sign-off procedures and skill in managing them.
17. Knowledge of specification and implementation procedures.
18. Knowledge of the impact of technical limitations and resources on game design.
19. Skill in communicating design concepts to clients and technical team members.
20. Skill in evaluating visual impact and technical limitations in context of multiple platforms and system configurations.
21. Skill in selecting media type or combination of media types to communicate the content area.
22. Skill in teaching others technical skills.

Category 7: Tools

1. Knowledge of 3D graphics tools.
2. Knowledge of animating cameras.
3. Knowledge of biped.
4. Knowledge of CD and DVD burners.
5. Knowledge of concept design tools and procedures.
6. Knowledge of database software tools.
7. Knowledge of digital cameras (still and video).
8. Knowledge of dubbing machines.
9. Knowledge of geometry.
10. Knowledge of graphics tablets.
11. Knowledge of hardware and software color specifications and palette color manipulation tools.

12. Knowledge of media format conversion principles and tools.
13. Knowledge of media players.
14. Knowledge of printers.
15. Knowledge of scanners.
16. Knowledge of speakers, surround-sound, and microphones.
17. Knowledge of storage devices including CD and DVD burners.
18. Knowledge of storyboarding techniques, tools, and interface design principles.
19. Knowledge of VTR operation.

Category 8: Art and Design Concepts

1. Knowledge of anatomy.
2. Knowledge of animation principles (i.e. Silhouettes, Timing, Exaggeration, Weight, Posture).
3. Knowledge of architectural history and styles.
4. Knowledge of art history.
5. Knowledge of basic audio concepts.
6. Knowledge of basic design elements and implementation.
7. Knowledge of basic film and video production techniques.
8. Knowledge of basic video concepts.
9. Knowledge of color theory and composition and the cultural and contextual uses of color.
10. Knowledge of composition, balance and perspective.
11. Knowledge of costume design.
12. Knowledge of cultural, social and ethical issues and considerations.
13. Knowledge of design elements and principles.
14. Knowledge of environment design.
15. Knowledge of film and broadcast genre.
16. Knowledge of framing and composition.
17. Knowledge of geometry.
18. Knowledge of good design, interface and human factors principles and implementation.
19. Knowledge of human and animal anatomy.
20. Knowledge of immersive, holistic experience design.
21. Knowledge of interface design.
22. Knowledge of lighting and shading.
23. Knowledge of music ability to influence.
24. Knowledge of principles of color and the cultural and contextual uses of color.
25. Knowledge of sculpture.
26. Knowledge of storyboarding.
27. Knowledge of styles of animation.
28. Knowledge of styles of art.
29. Knowledge of texture sheets.
30. Knowledge of the inter-relation between technical and visual design.
31. Knowledge of theory of emotion, movement and expression.
32. Knowledge of typography.
33. Knowledge of video formats.
34. Knowledge of visual impact and effectiveness.

Category 9: Quality Control and Testing

1. Knowledge of concept testing.
2. Knowledge of company testing procedures.
3. Knowledge of game testing techniques.
4. Knowledge of how to operate game event system
5. Knowledge of methods of qualitative study including observational testing.

6. Knowledge of multimedia testing techniques.
7. Knowledge of quality assurance concepts and procedures.
8. Knowledge of simulation and testing procedures for placeholder objects, models and prototypes.
9. Knowledge of techniques for assessing acceptance testing for efficiency and effectiveness.
10. Knowledge of testing and problem solving techniques.
11. Knowledge of testing and quality assurance criteria and processes.
12. Knowledge of testing methods, tools, procedures.
13. Skill in identifying and resolving conflicting functional requirements.

Category 10: Industry Concepts and Practices

1. Knowledge of copyright laws.
2. Knowledge of development and delivery platforms.
3. Knowledge of gaming.
4. Knowledge of graphic, animation, audio and video industries.
5. Knowledge of industry standards and trends.
6. Knowledge of interactive experience/player to player interaction.
7. Knowledge of interactive trends and concepts.
8. Knowledge of mass media law, copyright laws and licenses and usage pricing.
9. Knowledge of multimedia hardware trends.
10. Knowledge of prototyping standards.
11. Knowledge of sources for resources (i.e. Websites providing 3D 'tips and tricks').
12. Knowledge of styles of animation.
13. Knowledge of standards and formats for video, image, and files.
14. Knowledge of trend styles (i.e. genres, anime, Pokemon).
15. Knowledge of understanding fun.

Integration

ASSESSMENT AND CERTIFICATION: A VITAL CONNECTION

Skill standards, while useful on their own, are just one part of a much larger equation. Skill standards establish the standard of competent performance, but they do not tell a person whether he or she has succeeded in meeting that standard.

For this reason, developing skill standards does not end with their publication. Coalitions of industry in Washington State is also working to develop voluntary assessments and certifications which will make it possible for students, workers and any person to determine their strengths and weaknesses based on the standards and to earn certification that they can perform work competently as established by the skill standards.

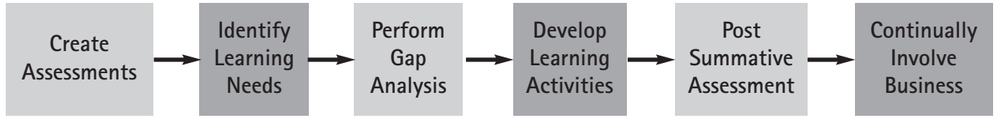
In today's fast-moving technological economy, the necessity for assessments and certification is crucial. The demand for both technical and employability skills is escalating as work becomes more complex. The workforce is more mobile, with workers moving freely between jobs and industries, requiring that workers are able to communicate their qualifications to potential employers. As technology changes, workers must keep up with technological change through continuous learning and worker retraining, and need to be able to prove they have kept pace. All of these mean more training and education for individuals and the ability to show evidence that this training translates to performance on the job.

Voluntary assessments and certifications based on skill standards will help us address all those needs because of the guiding principles upon which skill standards development are based, and because of the stakeholders whose needs skill standards are designed to meet: employers, educators, workers, students, and government.

Please Note: To ensure the used of standards and their related assessments and certifications do not contradict U.S. employment law, employers will need to conduct an internal validation of the standards before using the skill standards to make hiring and promotion decisions. The purpose of this validation is to ensure that the knowledge, skills and performance described by the standards are needed for competent performance in an employer's organization. The need to validate the standards internally is a key requirement of U.S. employment law, which seeks to protect individuals from discrimination in hiring and promotion.

The first step toward a state-wide system of assessments and certifications is the development of assessments which measure an individual's ability to perform work competently as defined by the skill standards. Once these assessments are developed, curriculum can be assessed to determine that all necessary topics and practicums sufficiently cover the items in the assessment. Once any gaps are identified, learning activities and content adjustments can be made, and post/summative assessments can be administered. Finally, it is critical that industry is involved every step of the way, and that standards are continuously reviewed and updated. The diagram below provides a summary of this process.

Integrating Skill Standards



Assessment Strategies

Upon completion of the development of skill standards, performance assessment can be created to assess to the criteria identified. Sample assessments and standards may be distributed to instructors and curriculum developers who will be educated on the skill standards elements.

Assessments based on the skill standards may include pre-and post-evaluations of the student to measure skill progression and also track the success rate of obtaining certification, where applicable.

Within a skill standards or competency-based system, assessment is the generation and collection of evidence of performance which can be matched to specified explicit standards which reflect expectations of performance in the workplace. There are two main forms of evidence:

- Evidence of actual performance;
- Evidence of underpinning knowledge, skills and abilities.

The types of evidence may vary and will include:

- Direct evidence (products and items produced by the performer);
- Indirect evidence (supporting evidence and information about the performer).

Evidence can be collected in a wide variety of educational or business settings. To a large extent, this will be determined by the range of opportunities which are available for demonstration. Often it is difficult to actually perform the task in the authentic work setting. In this case, evidence generated during an educational course or an in-house training session can be collected by individuals and added to their overall portfolios.

By requesting that the student or trainee produce tangible results in the form of take-away products (videos, tapes, paper and electronic products), the participant will have created real evidence which can be shown to human resource personnel, hiring managers, supervisors or assessors. When assessing these products, the trained assessor will seek:

- Validity
- Currency
- Authenticity
- Sufficiency

Therefore, when designing skill standards based assessment for an educational course or training session, the assessment process and results will meet four criteria:

Validity: The assessment instrument/process clearly relates to the relevant standards.

Currency: The assessment instrument/process calls for a demonstration of the current standards in the industry.

Authenticity: The assessment results are produced by the individual being assessed; it is their own work. Team activities will be useful to demonstrate the skills and abilities to work effectively with others, not necessarily the total end results. The individual can, if possible, identify his or her part of the team project to demonstrate evidence of their own results.

Sufficiency: Enough evidence is collected to match the key task and the performance criteria included in the skill standards.

When designing / revising the curriculum for Electronic Game Content Production, students will be assisted in generating high-quality evidence of performance or of underpinning skills, knowledge and abilities which will help them to be successfully assessed as fully competent.

Adapted from Skill Standards Volume 2: Assessment, 1999, Washington State Board for Community and Technical Colleges, and Designing Competency-Based Training, Shirley Fletcher, 1991, Pfiffer & Company, p 86-88.

Assessment Design:

Type of Authentic Assessment	Description of Authentic Assessment Strategies
Project	Hands-on demonstration of knowledge, skills and attitudes that reveals a student's ability to plan, organize and create a product or an event. Documentation of process of development from initial steps to final presentation.
Portfolio	Collection of pieces of evidence of a student's knowledge, skills and attitudes. Showcase of best work, work in progress. Record of student's progress over time. Content selection by student in collaboration with the teacher. Centerpiece for parent conferences.
On-Demand Demonstrations	Hands-on performance by a student, which illustrates levels of knowledge, skills and attitudes. Typically involve a "real life" problem or situation to solve. Focus on the application of knowledge and skills learned in one situation as it connects to a new and different one.
Case Studies	Analysis of events and individuals in light of established criteria. Synthesis of evidence to support generalizations based on individual cases.
Paper/Pencil Tests	Multiple-choice, essay, true-false questions that rely on extended responses to further clarify a student's understanding of the knowledge being assessed. Graphic representations that reveal a student's understanding of connections among ideas.
Structured Observation	Observation of events, groups and individuals that focuses on the salient traits of the skill or attitude being observed.
Scenarios	A problematic or challenging situation presented in the context of a career-technical context area. Required study to analyze or evaluate a situation. Apply relevant knowledge or skills. Prepare and justify a reasonable solution.
Critical Incident	An interview where the assessee is asked to describe past experiences which demonstrate a skill standard.

From: Center for Occupational Research and Development, November 1996 and Skill Standards Volume 2: Assessment, 1999, Washington State Board for Community and Technical Colleges.

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Monster.Com: www.jobsearch.monster.com

O*NET (Occupational Information Network): http://online.onetcenter.org

BBC Training and Development, 3D Animation Careers: www.bbc.co.uk/

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Aquent provided in-kind contribution of professional design and layout services by Cynthia Fliege and other support to the project.

AQUENT is a global professional service firm that delivers Creative and IT solutions through consulting, outsourcing and staffing.

Aquent's Entertainment Software Services group, based in Seattle, has a specialized mission: to help game companies find the best individuals for their teams, and to help candidates find exciting gaming opportunities. For more information visit: www.Aquent.com/gaming.

Kevin Myers is one of the many talented individuals represented by Aquent. Kevin has nearly twenty years of experience in film, television and live events production. He leverages this experience in his role as a Game Producer and Game Designer.

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