GAME:IT Advanced Learning Objectives, Standards & Skills

We take great pride in the fact that GAME:IT Advanced is not simply a terrific computer programming course that introduces the student to software game development with Unity, but a lot more. We not only focus on programming skills, but also on each discipline related to STEM (science, technology, engineering and math).

Using game design and development as the teaching vehicle, GAME:IT Advanced exposes your students to a wide range of concepts and technical skills in six separate areas that will greatly help them succeed in the future.

GAME:IT Advanced's learning objectives were designed to align very closely with ISTE's NETS for students and 21st Century Skills Technology Core Standards.

GAME:IT Advanced exposes your students to a wide range of concepts and technical skills in six separate areas that will greatly help them succeed in the future.

1. Programming skills related to software development and computer programming with Unity

2. 3D modeling skills with Blender
3. Creative, innovative & critical thinking
4. Communication and collaboration as an individual and part of a team

5. Using appropriate and accessible digital tools for research and learning
6. Using engineering, physics & mathematical concepts critical to game development

1. Programming Skills

    1. Demonstrate an understanding of the core principles of programming with C#, a powerful object- oriented programming language.

    2. Utilize Unity to develop software applications.

    3. Analyze the basic structure of a C# application and be able to debug, compile, and run an application.

    4. Create, name, and assign values to variables.

    5. Create custom methods that can return values and take parameters.

    6. Utilize common built-in objects and references types.

    7. Utilize common programming statements to implement flow control, looping, and exception handling.

    8. Create, initialize, and use collections.

    9. Design and create custom classes and use the object-oriented techniques of inheritance, abstraction, polymorphism, and encapsulation.

2. 3D Modeling Skills

    1. Demonstrate significant understanding of 3D modeling tools, such as Blender.

    2. Understand 3D modeling and graphic design concepts.

    3. Understand UV and texture mapping and how they function in graphic design.

    4. Learn how to create and animate 3D objects to be used in software design projects.

3. Creative, Innovative & Critical Thinking

1. Demonstrate ability to enhance existing game program.
2. Create, design & program original working game features.
3. Explain how separated game logic fits together to form a cohesive game application.
4. Troubleshoot existing applications and game programs to fix bugs and ensure performance.
5. Perform self-evaluations of projects against the required established directives.
6. Follow technical and increasingly complex programming instructions in order and detail.

4. Communication & Collaboration

1. Conduct in-class presentations including demonstration of original game concepts.
2. Collaborate with classmates in problem solving and debugging program errors.
3. Use technical writing skills to explain game design concepts, document programming logic, document development processes.

5. Using Digital Research Tools

1. Use appropriate websites, wiki's, and blogs to engage other users of Visual C# Express and Unity for research, ideas and help.
2. Use websites to explore concepts learned and to reference C# Syntax.

6. Engineering, Physics & Math

1. Apply mathematical calculations and formulas to programming logic, creating custom behavior and functionality in an application and a game.
2. Perform physics calculations on objects within a game.
3. Recognize software engineering design principles by working within and enhancing a complex fully functional game.
4. Reverse engineer existing game functionality in order to understand game design
5. Apply knowledge of math & physics to evaluate behavior in an existing game in order to enhance core logic.

Compare to ISTE NETS for Students

http://www.iste.org/standards/nets-for-students/nets-student-standards-2007.aspx

1. Creativity & Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:

1. apply existing knowledge to generate new ideas, products, or processes.
2. create original works as a means of personal or group expression.
3. use models and simulations to explore complex systems and issues.
4. identify trends and forecast possibilities.

2. Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students:

1. interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.

2. communicate information and ideas effectively to multiple audiences using a variety of media and formats.

3. develop cultural understanding and global awareness by engaging with learners of other cultures.

4. contribute to project teams to produce original works or solve problems.

3. Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students:

1. plan strategies to guide inquiry.

2. locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.

3. evaluate and select information sources and digital tools based on the appropriateness to specific tasks.

4. process data and report results.

4. Critical Thinking, Problem Solving, and Decision Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students:

1. identify and define authentic problems and significant questions for investigation.

2. plan and manage activities to develop a solution or complete a project.

3. collect and analyze data to identify solutions and/or make informed decisions.

4. use multiple processes and diverse perspectives to explore alternative solutions.

5. Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students:

1. advocate and practice safe, legal, and responsible use of information and technology.

2. exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity.

3. demonstrate personal responsibility for lifelong learning.

4. exhibit leadership for digital citizenship.

6. Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students:

1. understand and use technology systems.

2. select and use applications effectively and productively.

3. troubleshoot systems and applications.

4. transfer current knowledge to learning of new technologies.

Compare to 21st Learning and Innovation Skills

Creativity and Innovation

Think Creatively

- · •Use a wide range of idea creation techniques (such as brainstorming)
- · •Create new and worthwhile ideas (both incremental and radical concepts)
- · •Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts

Work Creatively with Others

- · •Develop, implement and communicate new ideas to others effectively
- · •Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work
- · •Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas
- · •View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical

  process of small successes and frequent mistakes

Implement Innovations

· Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur

Critical Thinking and Problem Solving

Reason Effectively

· Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation Use Systems Thinking

· Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems Make Judgments and Decisions

- · •Effectively analyze and evaluate evidence, arguments, claims and beliefs
- · •Analyze and evaluate major alternative points of view
- · •Synthesize and make connections between information and arguments
- · •Interpret information and draw conclusions based on the best analysis
- · •Reflect critically on learning experiences and processes Solve Problems
- · •Solve different kinds of non-familiar problems in both conventional and innovative ways
- · •Identify and ask significant questions that clarify various points of view and lead to better solutions

Communication and Collaboration

Communicate Clearly

- · •Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts

- · •Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions
- · •Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)
- · •Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact
- · •Communicate effectively in diverse environments (including multi-lingual)

Collaborate with Others

- · •Demonstrate ability to work effectively and respectfully with diverse teams
- · •Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal
- · •Assume shared responsibility for collaborative work, and value the individual contributions made by each team member