Erasmus+
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Structural Elements of Educational Games

QUESTLINE OVERVIEW

Structural Elements of Educational Games

Quest	Task
Game Objectives	Study
Learning Objectives	Study
Results & Outcomes	Study
Storyline Scenario (Narrative)	Study
Interaction	Study
Rules	Study
Freedom	Study
Challenges & Conflicts	Study
Resources	Study
Aesthetics	Study
Level	5
Challenge	Identify a digital educational game of your preference, deconstruct its key structural elements, and note your observations.
Boss Fight	Quiz-Based Game
Experience Points	350
Achievement	Knowledge Is Power

QUESTLINE DESCRIPTION

Highlights

- ✔ Game engineering involves multidisciplinary work and that makes it hard to design them; let alone blending educational concepts and transferring them into 3D Virtual Worlds.
- ✔ To mitigate this burden, Prensky provides an exhaustive list of elements that Digital Games-Based Learning instructional designers and educators should consider when preparing such interventions.
- ✔ On the grounds of his work, we present and elaborate the themes that should be considered when designing 3D gamified interventions.

GAME OBJECTIVES

Informational

- ✔ The game objectives determine the goals and the actions that players need to achieve and attain respectively, in order to progress within the game.
- ✔ Some common game objectives include collection of objects, puzzle solving, chasing/racing or even escaping.
- ✔ A useful practice in designing goals is not just having one end-goal, but a series of sub-goals that help guide the player.
- ✔ The completion of a game objective is typically communicated through audiovisual feedback (e.g., trophies, badges, points, sounds) or by unlocking access to new content.

LEARNING OBJECTIVES

Informational

- ✔ The learning objectives define the actual knowledge and the intellectual abilities that instructors want the students to acquire while playing the game.
- ✔ By making the goals easily observable enables students to better understand what should learn and facilitates the evaluation process from the teachers' end.
- ✔ The best way to design such goals is by applying action verbs during the formulation process (c.f. Bloom's taxonomy).
- ✔ A way to formulate learning goals is to structure the sentence the following way: "After playing [name of the game] you should be able to [description of the learning objective]".

RESULTS & OUTCOMES

Informational

- ✔ Both of the abovementioned design elements are contributing to one particular goal; the attainment of meaningful results and thorough (learning) outcomes.
- ✔ Regardless of the chosen method or approach to evaluate the effectiveness of the intervention (i.e., inside or outside the 3D Virtual World), educators and instructional designers should ensure that evidence is collected with regard to the knowledge and skills' gains that students have realised both after the completion of the learning activities (immediate evaluation) and over the course of time (retention evaluation).
- ✔ It is also important to ensure that, when hands-on activities are simulated within the virtual environment, students have acquired the necessary understanding to transfer the acquired skills in the real-world context (i.e., empirical evaluation).

STORYLINE SCENARIO (NARRATIVE)

Informational

- ✔ The storyline scenario describes what happens during the interaction time.
- ✔ There are many ways to communicate the game narrative (e.g., text, multimedia) but the end goal remains the same; it should present a story that involves substantial challenges and opportunities for the learners to unfold their existing or newly acquired knowledge.
- ✔ Likewise, the degree of importance varies and depends greatly on the game genre.
- ✔ For instance, a simulation or a puzzle game may require quick actions from the end-user with possible time constraints.
- ✔ On the other hand, an exploration game includes storyline elements and therefore, more time may be required to reach the end-game.

INTERACTION

Informational

- To facilitate interaction and promote active engagement, instructional designers should follow the principles of the available theoretical models such at the Multimedia Learning Theory or the INTERACT model.
- The following steps provide guidelines at glance:
  - **Establish the interactivity requirements**: determine the environment, define the activities, and the methods available to facilitate interaction.
  - **Design alternative solutions**: explore different ways to interpret and satisfy the interactivity requirements.
  - **Prototype design**: prototype the most promising idea and perform a preliminary evaluation with a small group of students.
  - **Prototype evaluation**: analyse the findings emerged from the previous step to assess the degree that the proposed requirements have been met.

RULES

Informational

- ✔ The game rules tell the players how to behave. Instructional designers have the authority to determine and interpret the game rules in accordance with the interactivity requirements and the wider scope of the game.
- ✔ The game rules should be bound to the central concept, instead of simply framing it, and should be explicitly reported upfront in a concrete and compact way.
- ✔ The enforcement of the game rules in the gameplay impacts players' motivation and satisfaction in addition to guiding and assisting them to finish the game.
- ✔ For this reason, special caution should be taken to not overwhelm the target audience with too many conflicts or choices.
- ✔ For instance, if the students should follow a specific path, hints should be displayed on the screen so that they can explore the map. Likewise, special operation modes may be integrated to determine students' progress and provide feedback.

FREEDOM

Informational

- ✔ In the Game-Based Learning context, freedom encompasses the following concepts:
  - (a) the freedom to choose to play the (educational) game
  - (b) the freedom within the (educational) game environment.
- ✔ Enabling learners to control their learning approach and the learning process, respectively, promotes motivation and facilitates knowledge acquisition/retention.
- ✔ However, this does not imply that students should be simply left on their own.
- ✔ Educators should encourage learners to consider the adoption of the educational game as part of their practicing routine whereas, the integration of well-defined game rules, provide the means to control the degree of freedom learners' have within the game.
- ✔ As a generic guideline, offering learner a moderate degree of freedom (either way) has been found to be fundamental toward autonomous learning.

CHALLENGES & CONFLICTS

Informational

- ✔ The game challenges define the effort that players have to put to achieve their personal goals whereas, the game conflicts, intensify the degree of the challenge.
- ✔ Even though the game conflicts do not necessarily constitute a learning factor, they remain one of the key-elements that motivate players to engage.
- ✔ The effort required to overcome the challenges can be either physical/kinesthetic (testing players' accuracy, reaction time, endurance) or cognitive/nonkinesthetic (testing players' decision-making, problem-solving skills, spatial reasoning).
- ✔ Physical/kinesthetic challenges are usually performative, as the player has to perform a sequence of known actions correctly in a specific time frame, whereas cognitive/nonkinesthetic challenges are exploratory, requiring the player to make decisions and predict their outcomes.

RESOURCES

Informational

- ✔ A resource is anything that can potentially help a player alter the state of the game.
- ✔ All games involve some sort of resource collection, as a means to develop the game economy (e.g., currency, tokens), or resource management, as a method to influence the gameplay experience (e.g., points, options).
- ✔ The nature (limited, renewable, exchangeable,) of the game resources is usually dependent on the game genre whereas, the complexity of acquiring and utilising them, is defined by the game rules.
- ✔ In either case, the decisions of the players influence the progress and eventually the outcome of the game.

AESTHETICS

Informational

- ✔ In the context of game design, aesthetics refer to the player experience.
- ✔ Players experience the aesthetics first and then immerse with the game flow (dynamics, mechanics).
- ✔ The design of the characters as well as that of the surrounding environment describe the emotional responses that the game developers aimed at evoking when the players interact with the game system.
- ✔ Game designers have classified the fundamental aesthetics types in accordance with the emotions they evoke as follows: (*i*) sensation, (*ii*) fantasy, (*iii*) narrative, (*iv*) challenge, (*v*) fellowship, (*vi*) discovery, (*vii*) expression, and (*viii*) submission.
- ✔ Depending on the theme of the educational game more than one aesthetics approach may be utilised.