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Ενότητα 6: A Novel Pedagogical Evaluation Model for Educational Digital Storytelling Environments

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Τμήμα Πολιτισμικής Τεχνολογίας και Επικοινωνίας

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

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A Novel Pedagogical Evaluation Model for Educational Digital Storytelling Environments

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Outline…

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2. **DS Evaluation Models Background**
3. **DS Pedagogical Evaluation Star**
4. **Pedagogical Evaluation of Toontastic**
5. **Discussion**
6. **Future Plans**

1. DS Background

Story telling:

- **The power of stories and myths is so great and ubiquitous in all societies and all times that they continue to shape our psyche and behavior.**
- **Education through storytelling has been used throughout history for teaching and learning.**
- **When the information is put into an interesting story people tend to pay much more attention for what is told .**
- **In conceiving and constructing their stories, students become more cognizant of the contexts and backgrounds that shape their perspectives .**

(Chinen, 1989; Abrahamson, 1998; Bruner, 1996; Benmayor, 2008)

1. DS Background

Digital storytelling:

- ✓ **is the modern expression of the ancient art of storytelling.**
- ✓ **derives its strength from the harmony between image, music, narration and voice.**
- ✓ **is a great channel to apply constructivist theories in practice.**
- ✓ **is an epistemic modality.**

(Lowenthal , 2008; Papadimitriou, 2003)

1. DS Background

Digital storytelling (DS):

- **allows students to have active participation and not just be passive consumers in a society steeped in digital products.**
- **strengthens the bonds between children and students and their teachers in class .**
- **helps students acquire several technological skills.**
- **helps the integration of disabled students or students with learning difficulties.**

(Ohler, 1996; Di Blas, 2009, 2010;)

2. DS Evaluation Models Background

- Schafer (2004) has proposed an evaluation model consisting of the following twelve dimensions: Concreteness, involvement, coherence, continuity, structure, cognitive effort, virtuality, spatiality, control, interactivity, collaboration and immersion.
- Spierling (2002) presented a four hierarchical level architecture. On each level the architecture consists of an engine and a corresponding model.
- Mateas (2000) presented a character-based evaluation approach in extension of Aristotle's model of drama.
- Murray (1998) introduces three categories for the analysis of digital story applications: immersion, agency and transformation.

2. DS Evaluation Models Background

- **Pedagogical aspects that emerged from modern social and constructivist views (Piaget, 1952, Bruner, 1960, Vygotsky, 1978, Jonassen, 1999) of learning for designing/evaluating EDSE are not fully addressed.**

- **Pedagogical dimensions in EDSE are also much less frequently studied than technical ones.**

In this direction…

✓ **The contribution of this paper is, the formation of a model consisting of appropriate pedagogical criteria-dimensions that could be used for pedagogically analyzing and evaluating EDSE.**

3. DS Pedagogical Evaluation Star

- **It consists of the following 16 pedagogical dimensions:**

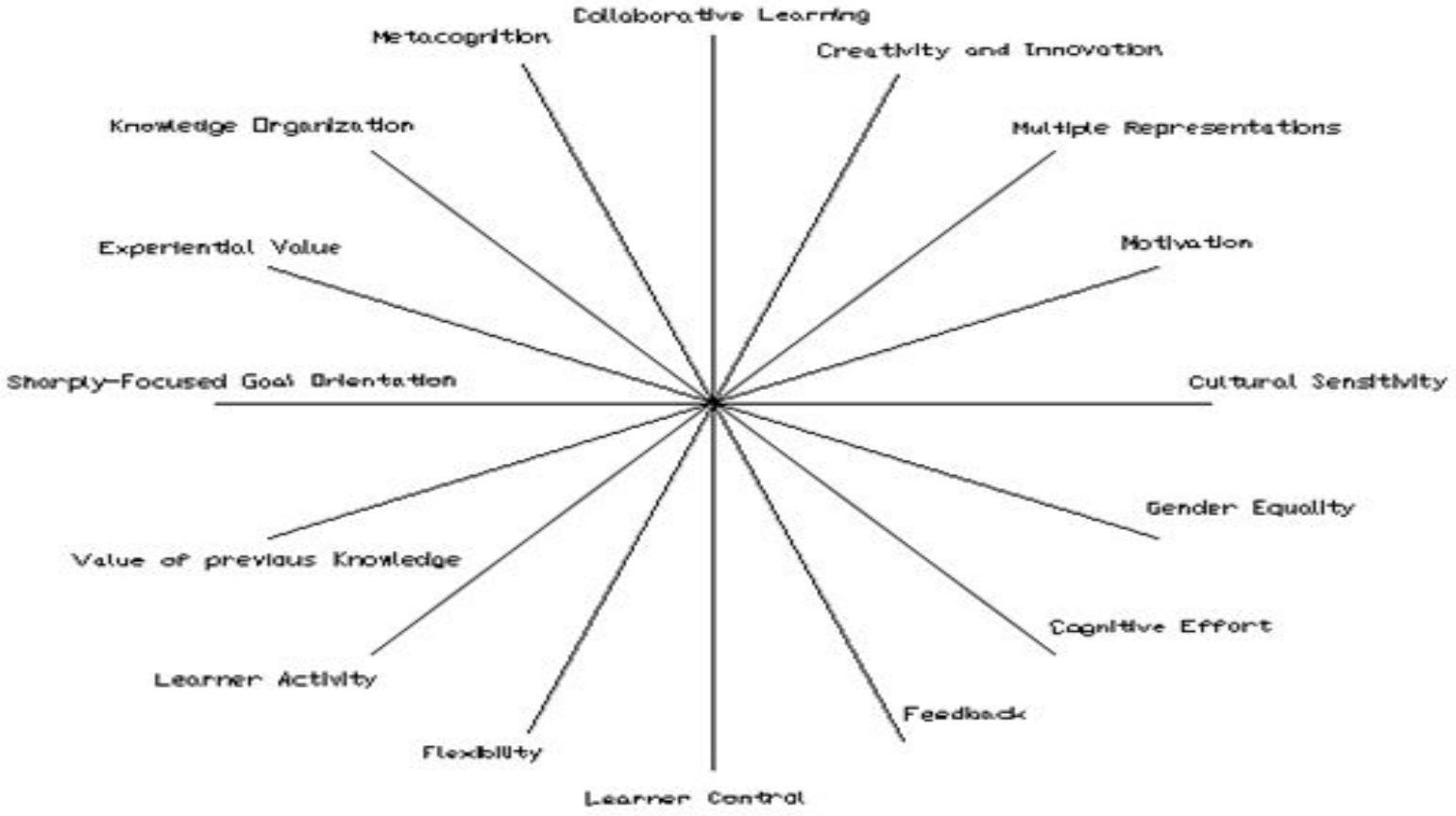
-collaborative learning -creativity & innovation -multiple representations -motivation -cultural sensitivity -gender equality -cognitive effort -feedback	-learner control -flexibility -learner activity -valuation of previous knowledge -sharply-focused goal orientation -experiential value -knowledge organization -metacognition

3. DS Pedagogical Evaluation Star

✓ Each dimension is represented as the radius of a star.

✓ The length of each peak of the star is proportional to the pedagogical features of each digital story in a four-level LIKERT scale (very high, high, medium, low.

3. DS Pedagogical Evaluation Star



The Pedagogical Evaluation Model

3.1 DS Pedagogical Evaluation Star – Collaborative Learning

- Collaborative learning refers to instructional methods in which learners work together in pairs or small groups to accomplish shared goals.

- Classroom roles change: both teachers and students take on more complex roles and responsibilities.

- DS is an educational tool that can encourage collaborative learning since many children can be involved in the creation of a digital story (e.g. Toontastic, Scratch).

(Slavin, 1992; MacGregor, 1990; Russel, 2010)

3.2 DS Pedagogical Evaluation Star – Creativity and Innovation

- Plethora of definitions about creativity and innovation.

- In brief, creativity and innovation refers to the phenomenon whereby a person creates something new (a product, a solution, a work of art etc.) that has some kind of value.

- DS can be the ideal channel to promote creativity and innovation. Students can be given tools to create digital stories from scratch, thus freeing their imagination (e.g. Storytelling Alice).

(Kelleher, 2006)

3.3 DS Pedagogical Evaluation Star – Multiple Representations

- A common justification for using more than one external representation in teaching and learning is that it is more likely to capture a learner's interest.
- Multiple and linked representations provide the learners with opportunities to observe how variations on the one system affect the other systems. In this way learners can acquire a more deep and cohesive view about the learning concepts in question.
- The use of multiple representation systems can encourage learners to develop multiple perspectives of the concepts in question at the same time enhancing their knowledge about these concepts.
- As far as DS is concerned, a lot of external representations can be used such as text, voice, pictures, graphs, diagrams, tables, videos etc. so as to reinforce the messages designed to be conceived by the learners.

(Ainsworth, 1998; Cox, 1995; Kordaki, 2005; Kordaki, Miatidis and Kapsampelis, 2008; Kordaki 2009)

3.4 DS Pedagogical Evaluation Star – Motivation

- Motivation is a key factor for achieving educational goals.
- There are two main types of motivation: intrinsic and extrinsic.
- Intrinsic motivation is defined as the doing of an activity for its inherent satisfactions, while extrinsic motivation refers to doing an activity to attain some separable outcome.
- DS gives another dimension to learning, making students striving for learning because the material is interesting in itself .
- Some EDSE may provide external rewards (e.g. grades, publishing the best digital story in the school's blog (e.g. VoiceThread; http://voicethread.com/) that can extrinsically motivate students

(Deci, Vallerand, Pelletier and Ryan, 1991 ; Ryan & Deci, 2000)

3.5 DS Pedagogical Evaluation Star – Cultural Sensitivity

- Cultural sensitivity is a very important pedagogical factor.
- Powel (1993) argues that few instructional design courses include cultural diversity in their design.
- A few EDSE allow an occasional minority role for an actor or perhaps include culturally direct albeit safe references in terms of music, location or other cultural aspects.
- Although EDSE may not be able to adapt to every cultural norm, they should be designed to be as culturally sensitive as possible.

(Elwyn, 1998)

3.6 DS Pedagogical Evaluation Star – Gender Equality

- International consensus on education priorities is very important to achieve gender justice in the educational sphere.
- EDSE should be designed in a way that promotes gender equality.
- For example, by providing appropriate tools (e.g. animated character libraries) for the students to construct stories with both male and female heroes in contradiction to the animated characters in existing EDSE which are mainly male.

(Subrahmanian, 2005)

3.7 DS Pedagogical Evaluation Star – Cognitive Effort

- The cognitive effort required for the students to get acquainted with and use a computer based tutoring system is a key factor for its pedagogical success.
- The environment should be as simple and understandable as possible.
- There are some EDSE that need low cognitive effort such as Façade, while other have high cognitive load for the students, like Toontastic.

(Arroyo, Meheranian, Woolf 2010; Mateas, 2003; Russel, 2010)

3.8 DS Pedagogical Evaluation Star – Feedback

- The necessity of feedback in a computer system is emphasized by psychologists, pedagogists, and usability engineers.
- There are two basic types of feedback, namely: intrinsic and extrinsic.
- In EDSE there can be intrinsic feedback from the environment during the exploration of a digital story while extrinsic feedback can be provided during its building.
- In EDSE, feedback can be provided during the story construction, warning students when they are not following the instruction given or when they have forgotten a part of the construction of the digital story (e.g. music, climax or faulty programming in environments like Storytelling Alice).

(Norman, 1998 ; Kelleher, 2006)

3.9 DS Pedagogical Evaluation Star – Learner Control

- The four fundamental categories of learner control in an educational environment are: pace control, sequence control, content control and advisory control.

- Learner control in EDSE refers to all the aforementioned learner control options that allow learners to make decisions about:

  - the time spent in each story that is constructed.
  - the order in which they construct the story material.
  - the content of each story.
  - the access to learning support such as helps, examples or pedagogical intelligent agents.

(Milheim & Martin, 1991, Clark & Mayer, 2002, Kraiger & Jerden, 2007)

3.10 DS Pedagogical Evaluation Star – Flexibility

- Flexible learning takes into account learners individual preferences and background.
- The more adaptable an environment is, the easier it is to fit the student's individual needs.
- Personalization of an EDSE depends on its objectives.
- The software should look over the shoulders of the interface users to help them.
- Digital storytelling environments using artificial intelligence, pretests and other techniques is a good way to achieve flexibility.

(Leflore, 2000)

3.11 DS Pedagogical Evaluation Star – Learner Activity

- The learners' independent activity can be increased when the teacher changes his role from a traditional didactic one to that of a facilitator.
- The social and constructivist views in education which is supported by the views of Piaget, Bruner and Lev Vygotsky holds that teachers should be facilitators.
- The teacher should help students to manage their skills and talents by helping them to "tell a story that is strengthened rather than weakened by the media they use and leverage their imagination and creativity"
- There is an increasing number of EDSE (e.g. Toontastic, Storytelling Alice) that enhance learners' activity, letting them construct their own stories, while teachers stay in the background, having a facilitative role.

(Reeves, 1994; Ohler, 2008)

3.12 DS Pedagogical Evaluation Star – Value of Previous Knowledge

- "As learners interact with their environment, they link information learned through experience to previous knowledge, and so construct new understandings and knowledge".

- The importance of previous material and the cumulative nature of knowledge have to become clear to the learner.

- EDSE that are designed to teach specific concepts should provide learners with opportunities to review the central concepts of previous studies as well as their intuitive knowledge about the present concepts that are crucial for understanding these concepts.

(Krause, Bochner and Duchesne , 2009; Nokelainen, 2006)

3.13 DS Pedagogical Evaluation Star – Sharply-Focused Goal Orientation

- Goals range from sharply-focused ones (e.g. learn how to drive a car) to unfocused ones (e.g. learn to appreciate classical music).
- According to constructivist learning theory, the goals should be clearly defined, but they have to originate, as much as possible, with the learners themselves.
- Goal orientation was also further divided into two distinct constructs: proving and avoidance
- The design of EDSE is desirable to promote both proving and avoidance goal orientation.

(Wilson & Myers, 2000 , 2000; VandeWalle, 2001)

3.14 DS Pedagogical Evaluation Star – Experiential Value

- Experiential learning is considered as a change in an individual that results from reflection on direct experiences.

- In experiential education, the student becomes more actively involved in the learning process than in traditional, 'didactic' education.

- DS is an intuitively experiential learning process, however the extent of experiential validity of an EDSE depends a lot on the degree of immersion provided by the software.

(Itin, 1999)

3.15 DS Pedagogical Evaluation Star – Knowledge Organization

Knowledge Organization:

- is a domain concerned with the structuring of what is known.
- in the field of computer based education can be used to effectively facilitate learning, usually in the form of concept maps.
- can help teachers to assess children's conceptual development and understanding, identify misconceptions, and facilitate learning by building new knowledge on old knowledge.

✓ Concept maps and story grammars can be an effective approach for developing learner-centered storytelling tools which can help students develop and apply the knowledge about storytelling

(Smiraglia, 2005; Birbilli, 2006 ; Chen-Chung Liu, 2011)

3.16 DS Pedagogical Evaluation Star – Metacognition

- Metacognition is defined as knowing about knowing.
- Offering metacognitive support in a computer-based environment can increase students' learning effectiveness.
- Metacognition during learning in a computer-based learning environment can motivate students to learn from challenging tasks.
- A good visual design in the e-learning environment can reduce the cognitive load on students and make their learning of metacognitive skills more effective
- Creating superior digital stories lies more in meta-cognition than in manipulation.

(Metcalfe, & Shimamura, 1994; Artino, 2009; Azervedo, 2005; Kirsh, 2005)

4. Pedagogical Evaluation of Toontastic

- **Toontastic is a collaborative digital animation creator**
- **A constructive tool designed to help children capture and share their stories.**
- **Ages : 8-12**
- **Aim: to provide children with opportunities to outline their internal representations and convert them to external.**

4. Pedagogical Evaluation of Toontastic

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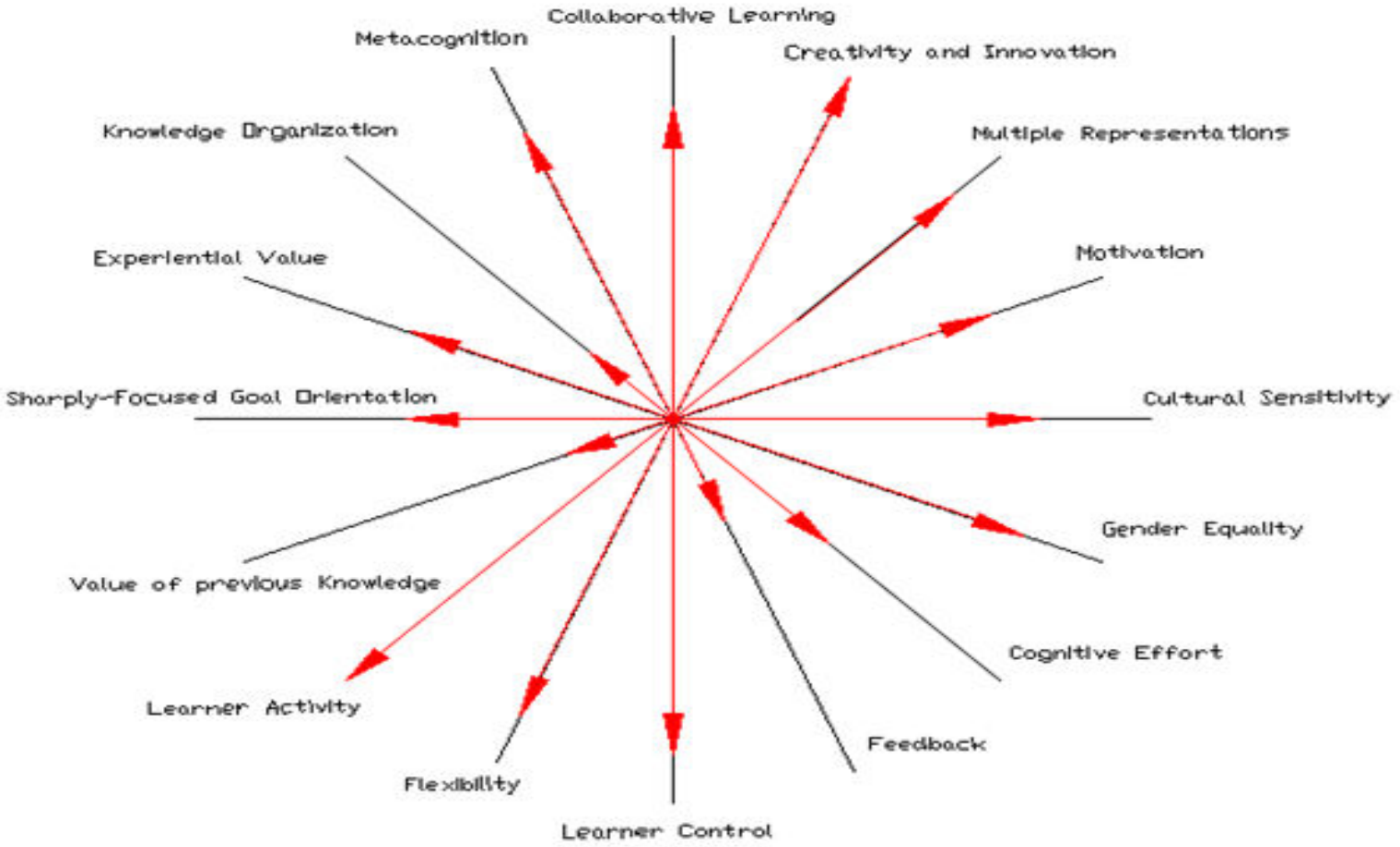

Pedagogical Evaluation Star for software Tooontastic.

3. Evaluation of Toontastic

Dimensions	value
• Creativity and Innovation	very high
• Multiple Representations, • Cultural Sensitivity, Gender Equality • Learner Control, Flexibility, • Metacognition	high
• Cognitive Effort, Experiential Value, • Sharply- Focused Goal Orientation	medium
• Feedback, Value of previous Knowledge, Knowledge Organization	low

4. Discussion

- **The diagrammatic pedagogical analysis of digital storytelling environments :**
- **allows the user to identify, at first glance the pedagogical strengths and weaknesses of the DSE.**
- **can become a useful tool for software developers.**
- **makes possible the pedagogical categorization of DSE using the "DS Pedagogical Evaluation Star".**

4. Discussion

- **Digital storytelling software designers have the opportunity to benchmark, compare and finally choose from successful examples.**

- **Digital storytelling pedagogical evaluation helps teachers to choose the appropriate EDSE which are in line with their pedagogical goals.**

5. Future Plans

- **The analysis of existent EDSE using the proposed "DS Pedagogical Evaluation Star".**
- **The development of general pedagogical guidelines for the development of applications**
- **The construction of a novel EDSE taking into consideration the aforementioned analysis in combination with the sixteen dimensions of this evaluation "Star"**

Thanks for your attention!

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Any questions?