



Take me



universidade de aveiro
theoria poiesis praxis

DigiMedia
digital media and interaction
research centre

Measurement of the User eXperience. Educational games Unlove and Carmen Sandiego

Maria Helena da Silva Reis | hsreis@ua.pt ■ Ana Margarida Pisco Almeida | marga@ua.pt
DeCA/DigiMedia | UA, Aveiro, Portugal

BACKGROUND

Incorporating games in the educational context seems to have a positive impact on the motivation, learning, behavior and attention of students. By associating a playful component, enriched by visual and auditory tools, recognized for having a great influence on cognition [1], the student learns the topics addressed by the game more easily [2]. Thus, when articulated with more traditional methodologies, the educational games seem to boost communication and produce excellent results in learning [3].

METHODS

Participants
_Observational study (11 jun. 2019 - 26 mar. 2020)
_School Centro de Estudos de Fátima (Fátima, PT)
_50 participants
_Participation rate 97,06%

Data collection and analysis
_User Experience Questionnaire
_Descriptive statistical analysis

In this study, User eXperience is one of the dimensions appreciated in the game's evaluation (beyond motivation and learning) (Fig. 1). After several classroom game sessions, Vocational Education students completed, for each game, the 26 items of Martin Schrepp's User Experience Questionnaire (UEQ). The Carmen Sandiego and Unlove games (Fig. 2) were measured according to the UEQ scales 'Attractiveness', 'Perspicuity', 'Efficiency', 'Dependability', 'Stimulation' and 'Novelty' [5]. These six UEQ scales define a theoretical scale structure in Pragmatic Quality (goal-directed) and Hedonic Quality (not goal-directed). The first brings together aspects related to the task and its quality; the second relates to the concept of usability in a holistic view, since it allows to perceive the interaction between people and resources. Concepts like pleasure, emotions, attraction are included in the hedonic quality scale (Table 1).

Table 1 - Scale UEQ

Pragmatic Quality	Hedonic Quality												
<table border="1"> <tr> <td>Attractiveness</td> <td>allows to draw an overall impression of the game: whether users like the features or not. Items: annoying /enjoyable, good /bad, unlikable /pleasing, unpleasant /pleasant, attractive /unattractive, friendly / unfriendly.</td> </tr> <tr> <td>Perspicuity</td> <td>whether it is easy to understand how to use the game or to become familiar with it. Items: not understandable /understandable, easy to learn /difficult to learn, complicated /easy, clear /confusing.</td> </tr> <tr> <td>Efficiency</td> <td>whether it is possible to use the game more quickly and more efficiently; whether the user interface is organized. Items: fast /slow, inefficient /efficient, impractical /practical, organized /cluttered.</td> </tr> </table>	Attractiveness	allows to draw an overall impression of the game: whether users like the features or not. Items: annoying /enjoyable, good /bad, unlikable /pleasing, unpleasant /pleasant, attractive /unattractive, friendly / unfriendly.	Perspicuity	whether it is easy to understand how to use the game or to become familiar with it. Items: not understandable /understandable, easy to learn /difficult to learn, complicated /easy, clear /confusing.	Efficiency	whether it is possible to use the game more quickly and more efficiently; whether the user interface is organized. Items: fast /slow, inefficient /efficient, impractical /practical, organized /cluttered.	<table border="1"> <tr> <td>Dependability</td> <td>whether the user feels being in control of the interaction with the resource and if this interaction with the game is safe and somehow predictable. Items: unpredictable /predictable, obstructive /supportive, secure /not secure, meets expectations /does not meet expectations.</td> </tr> <tr> <td>Stimulation</td> <td>whether it's interesting and exciting to use the game; whether or not the user feels motivated to use the game again. Items: valuable /inferior, boring /exciting, not interesting/ interesting, motivating /demotivating</td> </tr> <tr> <td>Novelty</td> <td>whether the game design is innovative and creative; whether the feature draws attention. Items: creative /dull, inventive /conventional, usual /leading edge, conservative /innovative.</td> </tr> </table>	Dependability	whether the user feels being in control of the interaction with the resource and if this interaction with the game is safe and somehow predictable. Items: unpredictable /predictable, obstructive /supportive, secure /not secure, meets expectations /does not meet expectations.	Stimulation	whether it's interesting and exciting to use the game; whether or not the user feels motivated to use the game again. Items: valuable /inferior, boring /exciting, not interesting/ interesting, motivating /demotivating	Novelty	whether the game design is innovative and creative; whether the feature draws attention. Items: creative /dull, inventive /conventional, usual /leading edge, conservative /innovative.
Attractiveness	allows to draw an overall impression of the game: whether users like the features or not. Items: annoying /enjoyable, good /bad, unlikable /pleasing, unpleasant /pleasant, attractive /unattractive, friendly / unfriendly.												
Perspicuity	whether it is easy to understand how to use the game or to become familiar with it. Items: not understandable /understandable, easy to learn /difficult to learn, complicated /easy, clear /confusing.												
Efficiency	whether it is possible to use the game more quickly and more efficiently; whether the user interface is organized. Items: fast /slow, inefficient /efficient, impractical /practical, organized /cluttered.												
Dependability	whether the user feels being in control of the interaction with the resource and if this interaction with the game is safe and somehow predictable. Items: unpredictable /predictable, obstructive /supportive, secure /not secure, meets expectations /does not meet expectations.												
Stimulation	whether it's interesting and exciting to use the game; whether or not the user feels motivated to use the game again. Items: valuable /inferior, boring /exciting, not interesting/ interesting, motivating /demotivating												
Novelty	whether the game design is innovative and creative; whether the feature draws attention. Items: creative /dull, inventive /conventional, usual /leading edge, conservative /innovative.												

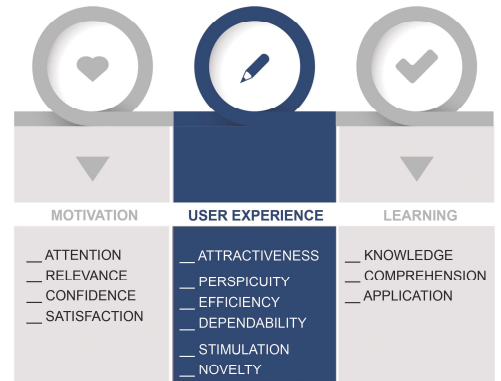


Figure 1 - Study Dimensions

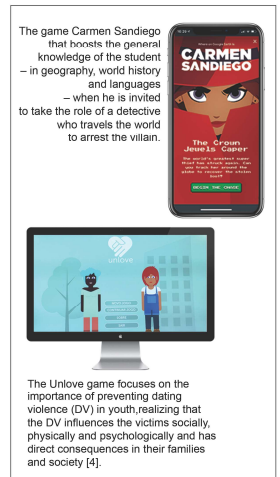


Figure 2 - Games Interface

RESULTS

The raw data used on 7-point Likert scale has been transformed so that the final data may range from -3 to +3. The error bars represent the 95% confidence interval for each arithmetic mean. A T-test with Alpha-Level of 0.5 was used and showed that game Carmen Sandiego and Unlove has no significant difference in the different scales (Attractiveness 0,1891; Perspicuity 0,1337; Efficiency 0,3441; Dependability 0,3787; Stimulation 0,0614 and Novelty 0,2394).

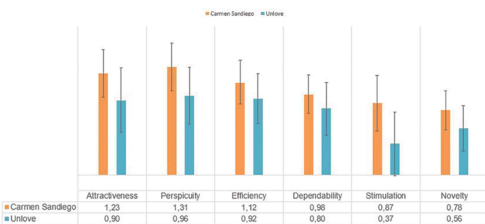


Figure 3 - Results for Carmen Sandiego and Unlove

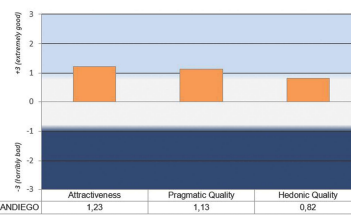


Figure 4 - Pragmatic Quality and Hedonic Quality for Carmen Sandiego



Figure 5 - Pragmatic Quality and Hedonic Quality for Unlove

CONCLUSIONS

Although the T-test presents no significant difference, the result shows that the participants had a slightly positive or neutral impression concerning the user experience of Carmen Sandiego and Unlove. The impression of the participants concerning the Carmen Sandiego user experience is much better than their impression on Unlove (Fig. 3). Being the Carmen Sandiego game a mature product, it's no surprise that its average value is above the neutral value (i.e. 0) of the 7 points as well as above the Unlove game rating. Their impression concerning the pragmatic quality (Perspicuity, Efficiency and Dependability) of the Carmen Sandiego (Fig. 4) and Unlove (Fig. 5) games is higher than the impression concerning the hedonic quality (Stimulation, Novelty). This is somehow natural, since participants are used to using serious games with more evolved graphics and major challenges. Another interesting result is that the Perspicuity scale showed the highest score which may have been influenced by used of the developed support materials for both games.

REFERENCES

- [1] M. Matias, V. Heemann, and N. Santos, "Aspectos cognitivos da interação humano-computador multimídia," in Workshop sobre Fatores Humanos em Sistemas Computacionais, 2000, vol. 3, pp. 22–32.
- [2] J. P. Gee, "Bons video games e boa aprendizagem," Perspectiva, vol. 27, no. 1, 2012.
- [3] P. S. Lisenbee and C. M. Ford, "Engaging Students in Traditional and Digital Storytelling to Make Connections Between Pedagogy and Children's Experiences," Early Child. Educ. J., vol. 46, no. 1, pp. 129–139, 2018.
- [4] A. M. P. Almeida, J. Lima, M. J. Pereira, and M. Silva, "UNLOVE: A Digital Game for Gender-Based Violence Prevention and Awareness," in Proceedings of the International Conference on Gender Research, 2018, pp. 342–350.
- [5] Laugwitz, B., Schrepp, M. & Held, T. (2008). Construction and evaluation of a user experience questionnaire. In: Holzinger, A. (Ed.): USAB 2008, LNCS 5298, pp. 63-76.