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Research Article

Learning with the Games: a Competitive Environment based on Knowledge

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Abstract

Today, vocational training has become a major necessity for the development of contemporary societies. In this situation, computer-based learning environments based on serious games (SGS) offer the opportunity for learners to express and test the importance of their ideas in their daily lives. A competitive environment with a constructive dimension of knowledge brings learners together around a learning circuit controlled by a methodology that provides the tools, resources, challenges and scenarios appropriate to each learner. The purpose of this paper is to dissect the meaning of competitiveness in gaming-based learning environments. In order to build a holistic knowledge, two dimensions will be considered that promote the development of knowledge, the conceptual dimension of the game (scenarios) and the technical dimension that accentuates the competitive spirit in the game.

Keywords: Competitive Learning Environment, Serious Games (SGS), Technical and Conceptual aspect of the games.

Introduction

In the 21st century, the engineering of learning environments brings together several new praxies: new teaching tools, new teaching methods, new interaction techniques and new methods of evaluation, Niemi et al (2014). Faced with these challenges, a series of E-educational methods emerges. According to Graul et al (2017) gamification is a powerful tool for capturing people's attention and engaging

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them in a target activity. The gamification offers learners a space for interaction with themselves and their pairs. Such an environment is based on a process of application of game design theories that adapts to everyday situations, Simpson and Jenkins (2015). This can influence their behaviors and their competitive minds to produce innovative ideas over other friendly methods that promote unidirectional knowledge transfer, De Freitas and Liarokapis (2011). The learning method based on serious games is a very competitive approach motivating learners-players to engage in a game where everyone is limited by boundaries that respect the pedagogical approach. This paper is devoted to the analysis of the different points of view on competitive learning based on the games. The notion of the competitiveness during the learning will be discussed.

Competitive Learning Environments

Faced with the development of information technologies, the learner (with his new privileges in terms of access to reliable information and his obligations in terms of sharing and exploiting his resources) becomes interested in generating innovative and practical ideas. This situation represents the basis of an environment of learning enlivened by its creative acts involved in scientific or academic events. Learning spaces supported by SGS implies for the learner a systematic connection to computer applications via tablets and mobile smartphones. These applications are based on educational scenarios that ensure interactive, diversified and progressive learning. The competitiveness is a concept strongly linked to the field of business. Competitiveness is the key success factor for direct competitors. In the field of education and training, competitiveness represents a factor similar to the field of business, but with particularities in terms of the stakeholders involved in the competitive learning process, namely (the learner, the co - learner, the teacher, the co-teacher, the administrators, etc.), and in terms of the very short product life cycle which is based on the knowledge created and to be developed by their peers. Furthermore, according to the studies of Nonaka and Takeuchi (1996), learning spaces are usually open and unrestricted by walls or boundaries; the evolving nature of knowledge opens the horizon of competitiveness. The competitiveness is defined as a space not limited by time or place, characterized by diversity, complexity and dynamism. In the field of education and training, there is no direct competitor; everyone contributes to the development of knowledge.

A competitive learning circuit brings together all learners involved in the learning situation. Several learning circuits can be built at the same time, with common goals. This can create an overlap around a situation; competitiveness can lead to cooperation between learners to enrich the targeted knowledge. In this regard, using both competition and cooperation can enhance learning opportunities for learners pursuing a professional career, Attle and Baker (2007). SGS are a unique educational opportunity to maximize learning and professional development for learners (Bellotti et al (2013) and to prepare them to cooperate by structuring learning activities that force them to do so. The conceptual features of a game are the game elements that must be explored in detail in order to exploit the expected benefits of the game environments. According to Cagiltay et al (2015), a serious competitive game motivates learners to gradually improve. Conceptual features of the game are based on controls based on educational or training objectives Csikszentmihalyi (1990). Learner's behaviours and perceptions are taken into consideration. According to Malone and Lepper (1987), competitiveness reaches a higher level when several factors are included such as uncertainty, challenge, feedback and fantasy. Introducing the dimension of uncertainty in the design of a game motivates and surprises the learner in terms of competitive scenarios and decisions adopted by him. Nobody can predict the game path in terms of goals to achieve, or the effects of others on the path of the game. On the other hand, instantaneity and feedback are important

features that affect the progress in the game. According to Malone (1981), it is through feedback that players are able to get valuable insight on their effectiveness; the immediate feedback increments the degree of competitiveness among learners. The competing learner can adjust their judgments through the information returned following the decisions that have been taken. In addition, feedback that informs the learner of their performance or failure may create a challenge for learners that should be closely related to player skills, Csikszentmihalyi (1975). The conception of a game that respects the constraints of the competition should take into consideration the skill levels of the players. Constructing a game with a high level of skill at the required thresholds will cause difficulties in the manipulation of the game. In this context, a permanent pre-test that controls the stock of skills generated during and before the game portion, can measure the skills required to carry out a mission. At the same time, the fantasy of a game is an important element in game design. An attractive educational game can encourage the learner to engage in a competitive learning circuit Iuppa and Borst (2007). Excessive competitive activities may negatively affect the learning process, such as increased rates of anxiety, reduced responsibility, and engagement of the learner in a competitive learning process, Kohn (1992). Nevertheless, the competition is geared towards the achievement of one's objectives despite there can be a price to pay for his opponents, Hong and Sullivan (2009). The Games can be classified in three wide categories: self-opponent, computer opponent and team competition, Vanderruysse et al (2013).

Architecture of Competitive SGS

In order to attract the attention of the player carrier of ideas to engage in a process of continuous learning, a serious game must include two dimensions, the serious dimension and the playful dimension, Sawyer (2007). The serious dimension represents the finality of a competitive circuit, namely: information and problem-solving skills, self-regulation, networked cooperation, i.e. developing creative thinking skills and critical thinking. In parallel, the playful dimension includes all the dimensions of the entertainment such as the image, the graphic design, aesthetics and animations. The serious dimension is subject to a pedagogical approach well adapted to the need for training. The aspect of competitiveness must be in line with the proposed pedagogical approach. Users of SGS that train in a virtual environment (VE) will be subject to a moderately experiential learning model: A model adapted to learners accustomed to active experimentation. Experimental learning models adopted by De Freitas and Neumann (2009) suggest that game design is based on four dimensions, namely:

a. *Profiling the learner:* A serious game takes into consideration the targeted skill at the end of the training, skills related to personal, relational, emotional and cognitive factors.
b. *Selecting pedagogies used:* The educational method followed during the game includes activities, practical exercises and scenarios that stimulate the player to invent and be creative during the game.
c. *Used representation:* Game representation is strongly linked with player engagement in a game. The usage rate of the game is calculated through indices such as the level of fidelity, interactivity and the immersion level of a game.
d. *Context learning:* A game that considers the specificity of competing entities, their adopted competitive strategies, the planned alternatives and their resources used, stimulate the learner to challenge himself and inspire himself during the game.

The design of a serious game involves learners in a complicated mission of exploration, experimentation, cooperation and competition, Micallef and Arachchilage (2017). This is a consequence of the diverse origins and components of games: from text to graphic, video and virtual reality, software applications namely artificial intelligence, and science horizon

from psychology to marketing, Rieber (2005). According to Westera et al (2008), this explains at least partly why this new discipline lacks an internal coherence and structure which in turn causes an apparent lack of rigor in the methodology used and the paradigm to emerge. The complexity inherent in such games requires great efforts for their development. Building a serious game is not an isolated mission. To share the pedagogical and educational dimension in the game requires a strong sense that participants must achieve a certain goal that necessarily corresponds to the learning objectives pursued, Kirkley et al (2007). One of the higher education key challenges might be to motivate learners to use the simulations as approximation of the real word to engage in deep study despite the complexity, Krassmann et al (2015). The development of SGS in higher education has proved to be complex, time-consuming and expensive, Dickey (2005). According to Westera et al (2008), learners should be constantly challenged in order to develop their cognitive representations by creating relevant knowledge. In this context, one of the main challenges for researchers has been to increase our understanding of the impact of game design on learning. We cite studies by Dickey (2005) that offer various game design strategies that engage players in attractive learning environments such as storytelling, point of view, and role-playing. According to the work of Westera et al (2008), an educational process does not require a complexity in itself; it requires a controlled complexity to promote effective learning. Complexity in an educational game is measured through players involved in games, such as in the case of multiplayer games that govern the behavior of participants (agents) which can give rise to very complex situations, Thavikulwat et al (2016). This complexity must be controlled in order to avoid unpredictability and uncertainty during the training or learning process by respecting the required learning objectives. The complexity of a game emerges at the stage of advancement in the process of training or learning. Events represented by solo or interactive entities are displayed and others are hidden. In order to overcome the challenge of rendering the complexity of the world and respect the necessary consistency to the educational objectives, many behavioural rules needed to be set. These rules appear as scenarios which are the frame of the underlying dynamics of the game that define the flux of information, situations and possible achievements. According to Westera et al (2008), a serious educational game dedicated to learners includes four basic characteristics.

SGS expose learners to a complex learning environment: A challenging environment that puts the learner in a situation of permanent experimentation. The game-based environment puts the learner in a professional learning environment by including objects, feelings, obstacles, tools, actions and reactions from others that will be available to the learner. The game scenario works in conjunction with the constraints of the gaming environment. For example: the development of the business model of the company generates the different necessary environments such as: Market Forces, Macro-Economic Trend, and Industry Forces along with their praxis and their required practitioners. The SGS-based environment involves individual or group users via the Internet in knowledge development activities. The user is tested through incremental scenarios. Behind each action, we will find a methodology that controls and ensures the progress of the learner during the game. A methodology that controls the conflict situations encountered (eg: the frequency of conflict events delivered during the game, i.e. the simultaneous conflicts), the flow of information contextualized gradually and constantly (eg: statistics on the financial situation of the company compared to its direct competitors), problem-solving tools adapted to the situation encountered (for example: tools related to the process of financing such bank loans, alliances with other companies in the sector), all these ensure scientifically reliable results in terms of the quality of training offered. The construction of a competitive game involves both conceptual and technical

dimensions. Game engineering represents the conceptual dimension. The engineering is the soul of pedagogy. Scenarios powered by activities integrate the pedagogy. The activities are the practical part of a game including exercises, video sessions, conflict situations, and group tasks via the Internet. In this context, intensity and frequency of actions in the game measure the degree of competitiveness. At the most, competitiveness is strongly linked to the speed of events and challenges encountered during the game. The technical dimension involves building the designed game architecture. All development tools take into account the competitiveness in terms of frequency of changes in situation (location), from a simple learning situation to a complex situation. At most, role-building tools are developed in direct relationship to the competitive dimension of the game. The roles are entrusted to the learner depending on the objectives of the game, and to the decisions made by the learner and his/her peers. In the same context, the informational component represented by e-mail must be part of this competitive theory. Instant and personalized emails will be sent to learners: E-mails that take into consideration the progress in the game, the trajectory and the way of managing things (objects, attributes).

Conclusion

These days, professional learning has become a recurring need in the government's plans around the world. In practice-based learning, learners do more than listen. In this context, SGS offer learners the opportunity to experience the effectiveness of their ideas. Competitive game characteristics include its velocity in terms of game events, its high volume of data generated during the game and its variety in terms of the situation of challenge and change of state available in the game. The game-based learning environments are controlled and guided by a methodology. All participants must respect the pedagogical constraints of the game, in order to ensure that educational objectives are achieved. At the same time, the fun aspect is present in a competitive game. The activities, mental decompression areas, video sessions and other activities that participate in the mental refreshment process are on display. In order to deepen the competitive dimension of games, a competency-based game model will be implemented in subsequent research studies.

References

1. Attle, S and Baker, B. (2007). 'Cooperative learning in a competitive environment: Classroom applications, ' *International Journal of Teaching & Learning in Higher Education*, 19(1).
2. Bellotti, F., Kapralos, B., Lee, K.., Moreno-Ger, P. and Berta, R. (2013). 'Assessment in and of serious games: an overview,' *Advances in Human-Computer Interaction*, 1.
3. Cagiltay, NE., Ozcelik, E. and Ozcelik, NS. (2015). 'The effect of competition on learning in games,' *Computers & Education*, 87, 35-41.
4. Csikszentmihalyi, M. (1975). 'Play and intrinsic rewards, ' *Journal of humanistic psychology.*
5. Csikszentmihalyi, M. (1990). 'The domain of creativity'. De Freitas, S and Liarokapis, F. (2011). 'Serious games: a new paradigm for education ,' *In Serious games and edutainment applications,* 9-23. Springer, London.
6. De Freitas, S and Neumann, T. (2009). 'The use of 'exploratory learning'for supporting immersive learning in virtual environments,' *Computers & Education*, 52(2), 343-352.
7. Dickey, MD. (2005). 'Engaging by design: How engagement strategies in popular computer and video games can inform instructional design,' *Educational Technology, Research and Development*, 53(2), 67-83.
8. Graul, C., Wachowicz, J., Bielski, R., Kufel, K. and Żółtowski, M. (2017). 'Enterprise Gamification-Learning as a Side Effect of Competition,' 9637-9642.
9. Hong, HY and Sullivan, FR. (2009). 'Towards an idea-centered, principle-based design approach to support learning as knowledge creation,' *Educational*

Technology Research and Development, 57(5), 613.
10. Iuppa, N and Borst, T. (2007). 'Story and simulations story and simulations: Tales from the trenches'.
11. Kirkley, J., Kirkley, S. and Heneghan, J. (2007). 'Building bridges between serious game design and instructional design,' *the design and use of simulation computer games in education*, 2, 74.
12. Krassmann, AL., Paschoal, LN., Falcade, A. and Medina, RD. (2015). 'Evaluation of Game-Based Learning Approaches through Digital Serious Games in Computer Science Higher Education: A Systematic Mapping,' *In Computer Games and Digital Entertainment (SBGames) IEEE*, 14th Brazilian Symposium on (pp. 43-51).
13. Kohn, A. (1992). 'No contest: The case against competition, ' *Houghton Mifflin Harcourt*.
14. Micallef, N and Arachchilage, NAG. (2017). 'Involving Users in the Design of a Serious Game for Security Questions Education, ' *arXiv preprint arXiv*:*1710.03888*.
15. Malone, TW and Lepper, MR. (1987). 'Making learning fun: A taxonomy of intrinsic motivations for learning. Aptitude, ' *learning and instruction*, 3.
16. Malone, TW. (1981). 'Toward a theory of intrinsically motivating instruction,' *Cognitive science*, 5(4), 333-369.
17. Nonaka, I and Takeuchi, H. (1996). 'The knowledge-creating company: How Japanese companies create the dynamics of innovation, ' *Long range planning*, 4(29), 592.
18. Niemi, H., Harju, V., Vivitsou, M., Viitanen, K., Multisilta, J. and Kuokkanen, A. (2014). 'Digital storytelling for 21st-century skills in virtual learning environments, ' *Creative Education*.
19. Rieber, LP. (2005). 'Multimedia learning in games, simulations, and microworlds,' I*n The Cambridge Handbook of Multimedia Learning (Mayer, R.E. ed.)*, 549-567. Cambridge University Press, Cambridge, UK.
20. Simpson, P and Jenkins, P. (2015). 'Gamification and Human Resources: an overview,' *Brighton: Brighton Business School*.
21. Sawyer, B. (2007). 'Serious games: Broadening games impact beyond entertainment, ' *In Computer Graphics Forum*, (Vol. 26, No. 3, pp. xviii-xviii), Oxford, UK: Blackwell Publishing Ltd.
22. Thavikulwat, P., Chang, J. and Yu, BWT. (2016). 'Can Action Complexity be used to Measure the Effectiveness of an Educational Game?' Proceedings in Developments in Business Simulation and Experiential Learning: of the Annual ABSEL conference, (Vol. 43, No. 1).
23. Vandercruysse, S., Vandewaetere, M., Cornillie, F. and Clarebout, G. (2013). 'Competition and students' perceptions in a game-based language learning environment, ' E*ducational Technology Research and Development*, 61(6), 927-950.
24. Westera, W., Nadolski, RJ., Hummel, HG. and Wopereis, IG. (2008). 'Serious games for higher education: a framework for reducing design complexity, ' *Journal of Computer Assisted Learning*, 24(5), 420-432.