An assessment tool for online language learning computer games

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Abstract

The evolution of technology and the strong belief that computer games promote learning contributed to the increase of educational computer games available online in the field of teaching and learning a foreign language. Therefore, the design and implementation of an evaluation model of them leads to the development of an online tool for assessing educational software with a playful character which is necessary in order to facilitate teachers and autonomous players/students in their choices.

1. Introduction

The first evaluation models of educational computer games focused on their technological quality and resulted in the distinction between software that worked well and software that has a lot of malfunctions [1]. These models aimed to investigate the usability of user interfaces and not the achievement of specific educational goals.

However, the evolution of technology contributed to improve both the quality of educational software and his spread. This new status requires the development of assessment tools to monitor the effectiveness of educational software in accordance with specific educational objectives and their suitability to meet the needs of students and enhance their knowledge.

In this paper, we present an online assessment tool that evaluate about 50 online educational games based on the learner's autonomy, student's self-assessment and feedback, student's motivation for learning and transparency, while it states which language skills players/students can develop through each online educational computer game.

2. Methodology

The proposed assessment tool is based on a theoretical evaluation model which is structured around five notions: the student's autonomy, self-assessment and feedback, student's motivation for learning, consistency of educational objectives when these are clearly stated by the manufacturer and language skills, and finally credibility [2]. Each of these notions is described in detail in fifty criteria. Based on this model we evaluated one hundred games for learning/teaching a foreign language (English and French). The examined games are divided after a cluster analysis, based on their score (out of 50), in three groups. Our online assessment tool classifies each one of these educational games by the basic notions mentioned above and language skills developed by the player/student.

3. Theoretical Framework

3.1. Student's autonomy

The notion of student's autonomy, introduced to the Language Didactics with the advent of the communicative and student-centered approaches, whose principles were adopted by the Council of Europe in the framework 4 Living languages (1971-1981), and since then is one of fundamental principles of the Council of Europe.

Holec [5] argues that autonomy is a learnable skill and specifically "to develop the capacity of the student to learn» (apprendre à apprendre) [6]. It is the student's ability to assume responsibility for decisions relating to all phases of learning process.

As far as student's autonomy who seeks to learn a foreign language, Porcher states that: "the process of learning a foreign language (like any language), which is a personal matter, the involvement of the subject is fundamental [...]. To manage a student to become a foreign language speaker has the ultimate responsibility, using the best possible advantage provided by teacher and the various teaching tools» [7].

In order to ensure the greatest degree of autonomy that a player / student can achieve through an educational computer game, our theoretical model rating eight criteria that must be taken into account:
- definition of educational objectives,
- definition of content,
- definition of learning module,
- definition of language learning level,
- definition of student's audience,
- clearly defined instructions,
- easy access to game instructions in each level of it,

▪ referral to other sources.

3.2. Self-assessment and feedback

Two major factors of student's autonomy are self-assessment and feedback. According to Cuq & Gruca [8] self-assessment is "a progressive and continuous assessment that requires student's responsibility and promotes his autonomy."

Self-control and self-assessment of language learning activities provides information that lead to changes in objectives, strategies and allocation of student's effort. In order to assess the quality of the methods used, students should be able to control the outcome of their actions in order to see what goals have really achieved [9].

As for the feedback Garris, Ahlers, and Driskell [10] argue that it is an important criterion of boosting performance and learning motivation as well as a significant factor in the decision-behavior-outcome cycle.

Personal decisions and behavior are determined by the comparison made between feedback and goals. If the feedback indicates that the student/player easily reaches the goal, the game is very easy and the learning motivation decreases. According to Malone [13a] and Lepper [14a], performance feedback provides an ongoing challenge and helps to maintain motivation when it is : a) clear, b) often c) constructive and d) encouraging.

Therefore criteria describing the notions of self-assessment and feedback focused on the existence of a system that allows player/student to evaluate his learning in order to improve it and enhance it. It should also be given the opportunity to identify and understand his weaknesses in order to intensify his efforts to develop skills according to his personal language needs.

In this viewpoint, we describe eleven criteria, mainly focus on the importance of score indication, to inform the player/student for his performance. Also, a scoring scale and an appearance table with the highest scores it is proposed, as a very important element for enhancing motivation.

Specifically, the eleven criteria relating to the self-feedback are the following:

1. score indication in each level,
2. changing scale of score,
3. final score indication,
4. final score indication in a percentage scale,
5. highest scores table,
6. final score storage,
7. total number of players, already played the game,
8. points subtraction for each wrong answer,
9. points subtraction when the player asks for additional support,
10. appearance of correct answer / solution when the player answers incorrectly,
11. feedback for right and wrong answers.

3.3. Learning motivation

The criteria that refer to the motivation formulated on the basis of Csikszentmihalyi [12], Malone [13a], Malone et Lepper [11] and Keller [14b] who argue that learning motivation depends on the importance given by the student in a proposed learning activity and the clarity of its objectives and targets. Moreover, the above theories emphasizes the importance of curiosity caused by the proposed learning activity and the challenge that player/student feels during its progress. These elements involve the player/student's active participation and his desire to accomplish the task, even the completion was harder than expected.

According to our proposed evaluation model we distinguish sixteen criteria that aim to increase learning motivation in an educational computer game environment. Parameters such as time and speed are taken into account. These criteria are the following:

1. clearly defined ultimate goal of the game,
2. clearly defined rules of the game,
3. graded levels of difficulty,
4. restriction of levels changing,
5. limitation of time to reply,
6. variation of game's speed,
7. simultaneously competition against computer or other players,
8. visual reward,
9. acoustic reward,
10. reward for accessing the next level,
11. visual correction,
12. acoustic correction,
13. solid support,
14. changing support,
15. satisfactory graphics' quality,
16. good sound quality.

3.4. Consistency of pedagogical goals and content

The proposed model also suggests evaluation criteria that control the degree of consistency between educational objectives and game content. The definition of educational objectives and content are a set of parameters to be taken into account when designing a computer educational game because it significantly affects the outcome of teaching /learning a foreign language. In particular, we check whether in the software there are activities that promote the following abilities:

1. lexical ability,
2. grammar ability,
3. Semantic ability,
4. phonological ability,

5. orthographic ability,
6. orthoepic ability,
7. sociolinguistic competence,
8. pragmatic competence,
9. sociocultural competence.

3.4. Credibility

The final six criteria included in our model are designed to control the degree of transparency of the use of educational computer game.

The evaluation of an online computer game in terms of transparency is essential, as for all the information on the Internet. Nowadays there are too many websites operate without oversight or editorial control over them. Therefore, there are no valid criteria universally accepted for the posted information consequently can be easily changed, stolen, or falsified [15], Flanagin & Metzger [16]).

As definition of transparency we refer to the passage [17]: "Responsibility for the provision of information means that the information should be transparent so that it can be determined if the use is appropriate under one set of rules."

Based on Kapoun's [18] evaluation criteria such as: a) accuracy, b) authority, c) objectivity, d) timeliness and e) security, we propose the following:

1. website that hosts the game belongs to an institution/organization public or private, who states its purpose and its legal status,
2. manufacturer of the game is stated,
3. name of manufacturer,
4. contact details of the manufacturer or his website (phone or email),
5. creation date of the game is shown,
6. last date of game's content renewal is shown.

4. Development

A basic principle for the design of our online assessment tool was the creation of a model that could host a limited number of criteria consisting of different notions as mentioned above. This demand led us towards research into certain basic parameters:

▪ the development of the appropriate user interface,
▪ the design of a database able to support a vast number of concurrent users,

Creating a online assessment tool requires integrating individual criteria as well as providing various navigational mechanisms, such as a table of contents and an index. Similarly, creating statistical components must be taken into consideration.

4.1. User Interface and Database

For planning and development of the proposed tool, a modern CMS was chosen.

Among the platforms of this type, the most promising are Joomla and Drupal. These are very popular worldwide systems, because such software:

▪ are "open source" and therefore free,
▪ have advanced and versatile options, and
▪ provides a working environment and management extremely flexible, adaptable and easy to use.

As already mentioned, Joomla and Drupal are widely adopted modular content management systems (CMS: Content Management System, CMS), developed using the PHP programming language. Joomla and other modern CMS, are intended to allow the system administrator to:

▪ organize content,
▪ adapt the presentation / publication,
▪ automate management tasks, and
▪ manage the accounts of users of the site.

For the realization of this online assessment tool, the Joomla platform was chosen because the number of modules currently available allows a variety of experiments much larger than that of Drupal.

None of the above platforms integrate components for the statistical representation and management of large set of data, making them less friendly for users.
The variety of games examined and the criteria used, are supported by a database (MySQL) capable of allowing multiple users' requests. In accordance with the user's needs and our specific requirements, a conceptual model for the database has been developed. This database consists of a data security layer for the protection of the stored content, a data management layer [19, 20] as well as the storage and retrieval system [21].

A dynamic delivery user interface provides access to students (learners), teaching staff (instructors) and the system administrator. Instructors are provided with a user-friendly interface to search the examined games. Using pre-defined templates, they can add their own newly discovered and examined online educational computer games for language learning and teaching.

5. Conclusion

In an era of "digital globalization" the increasing use of open technological platforms, such as CMC, VLS, LCMS, Blogs, Wikis, social networking sites, and online gaming and simulation environments, affect the entire adulthood of young learners.
This early digital adulthood of learners, whom Prensky [22] already calls "digital natives" requires, in the field of learning a foreign language, language

learning tools not only suitable to their needs but capable to assist them to construct personal technology-enhanced language learning experiences. The right use of these tools from learners' side becomes a crucial issue for language teachers who must guide them through the process of language acquisition.

In the above context, in this paper we initially propose a theoretical model and secondly an assessment tool for online educational computer games for language learning and teaching.

6. References

[1] Rhéaume J., 1994. 'L'évaluation des multimédias pédagogiques : de l'évaluation des systèmes à l'évaluation des actions'. In *Educatechnologie*, Vol.1, N°3.

[2] Krystalli P., 2011. *An evaluation model for educational on-line computer games for foreign language teaching and learning*. PHD thesis available online: http://invenio.lib.auth.gr/record/128661?ln=el

[3] Tricot A., Plégat-Soutjis F., Camps J.-F., Amiel A., Lutz G., Morcillo A., 2003. 'Utilité, utilisabilité, acceptabilité: interpréter les relations entre trois dimensions de l'évaluation des EIAH'. In C. Desmoulins, P. Marquet & D. Bouhineau (Eds). *Environnements informatiques pour l'apprentissage humain*. Paris : ATIEF / INRP. 391-402.

[4] Barendregt W., 2006. *Evaluating fun and usability in computer games with children*. PHD thesis available online: http://alexandria.tue.nl/extra2/200513731.pdf

[5] Holec H., 1979. *Autonomie et apprentissage des langues étrangères*. Hatier, Paris.

[6] Holec H., 1981. 'Autonomie de l'apprenant et l'apprentissage des langues'. In *Langues Vivantes* (1971-1981). Conseil de l'Europe, Strasbourg.

[7] Porcher L., 2004. *L'enseignement des langues étrangères*. Paris, Hachette.

[8] Cuq J-P. & I. Gruca, 2005. *Cours de didactique du francais langue étrnagère et seconde*. PUG, Grenoble.

[9] Zimmerman S., Bonner S., Kovach R., 2000. *Des apprenants autonomes*. De Boeck. Paris.

[10] Garris R., Ahlers R., Driskell J, 2002. 'Games, Motivation, and Learning: A Research and Practice Model'. In *Simulation and Gaming* (2002), 33. 441 467.

[11] Lepper, M.R. & Malone, T.W., 1987. 'Intrinsic motivation and instructional effectiveness in computer-based education'. In R.E. Snow and M. J. Farr (Eds.), 1987. *Aptitude, Learning and Instruction III: Conative and Affective Process Analyses*. Hillsdale, N.J.: Erlbaum,

[12] Csikszentmihalyi M., 2008. *Flow-The Psychology of Optimal Experience*. Harper Perennial Modern Classics, New York.

[13a] Malone, T. W., 1980a. *What makes things fun to learn? A study of intrinsically motivating computer games*. Palo Alto, CA: Xerox.

[13b] Malone, T. W., 1980b. 'What makes things fun to learn? Heuristics for designing instructional computer games'. In *Proceedings of the 3rd ACM SIGSMALL symposium*, Palo Alto, California. 162 – 169.

[14a] Keller, J. M., 1987. 'Strategies for stimulating the motivation to learn'. In *Performance & Instruction*, 26 (8). 1–7.

[14b] Keller M. J., 2010. 'Five fundamental requirements for motivation and volition' In *Technology-Assisted Distributed Learning Environments*. In Inter-Ação, Goiânia, Vol. 35, No 2. 305-321. http://www.revistas.ufg.br/index.php/interacao/download nl

[15] Metzger M., Hall E., 2005. 'Understanding How Internet Users Make Sense of Credibility: A Review of the State of Our Knowledge and Recommendations for Theory, Policy, and Practice'. In *Internet Credibility & the User: Skills*, available online: http://projects.ischool.washington.edu/credibility/ Metzger-skills.pdf

[16] Flanagin, A. J., & Metzger, M. J. (2000). 'Perceptions of Internet information credibility'. In *Journalism and Mass Communication Quarterly*, 77, 515-540. Διαθέσιμο: http://www.comm.ucsb.edu/publications/flanagin/Flanagin -Metzger-2000-JMCQ.pdf.

[17] Weitzner D.J, Abelson H, Berners-Lee T., Feigenbaum J., Hendler J., Jay Sussman G., 2008. 'Information accountability'. In *Communications of the ACM*, June 2008, Vol. 51, No. 6. 83-87. Available online: http://dig.csail.mit.edu/2008/06/info-accountability-cacm-weitzner.pdf.

[18] Kapoun, Jim. "Teaching Undergrads WEB Evaluation: A Guide for Library Instruction." *C&RL News* (July/August 1998). 522-523. Available online: http://olinuris.library.cornell.edu/ref/research/webeval.html

[19] Elmasri, Ramez, and Navathe, Shamkant B., *Fundamentals of Database Systems*, 3rd edition, Massachusetts: Addison-Wesley, Reading, 2000.

[20] Date, Chris J. *An Introduction to Database Systems*. 6th edition, Massachusetts: Addison-Wesley Publishing Company, 1995.

[21] Connolly, Thomas M., and Begg, Carolyn E. , Database Systems, A Practical Approach to Design, Implementation and Management, 4th edition, Massachusetts: Addison Wesley, 2005.

[22] Prensky M. (2001). ''Digital natives, digital immigrants'. *On the Horizon*, MCB University Press, Vol. 9 No. 5, October 2001.