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Development of Two Educational Web Games: Chemical Sudoku and Nanotechnology Puzzle

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Abstract – This paper describes the experiences in the development of two interactive educational games on the Web in the chemistry and nanotechnology domains in Brazil. The goal is to use the information and communication technologies to bring the students a fun way to learn scientific concepts. With the availability and dissemination of games to schools throughout the country could see was interesting results in terms of use of methodologies for Web development and user interaction computer to guide the production and improvement of educational games.

One of the greatest challenges in the development of new educational assets is to make them attractive to users with a high degree of perception and to provide adequate retention of concepts, within the context in which they were developed. According to Connate (2002), games are being integrated into few people education, as a new paradigm of innovation on teaching [1].

In this context, the use of web-based interactive games that incorporates educational content into their plots, has shown as a viable solution to the challenge of making educational methods more attractive to the eyes of users. The development of two games, presented below, resulted from a partnership between a software company and an institution of research, development and knowledge diffusion: the Multidisciplinary Center for Ceramic Materials Development (CMDMC, in its acronym in Portuguese). The main results were: (i) a great increase on CMDMC's website visitation (ii) press releases about this initiative and (iii) development of educational guidelines for new games.

"Suuji wa dokushin ni kagiru" or "the digits must remain single" is the full name of Sudoku, a traditional Japanese game that became a hit among puzzle hobbyists around the world. The only rule is simple, just insert the elements in rows and columns without any recurrence, but this requires a significant reasoning. An adaptation of this ancient oriental game was proposed in the Journal of Chemical Education [2], which uses the original idea, but the elements are not numerical digits, but chemical symbols. However this first adjustment was made for the game on paper and then, as a improvement, developed for the web. Thus Chemical Sudoku was developed, which aims to stimulate logical thinking and present concepts of the periodic table in a fun and interactive way.

Aiming to approximate the community to the nanotechnology world, Puzzle of Nanotechnology game was developed, which challenges players to join parts in the shortest time possible, forming scientific microscopic images. Among the great variety of puzzles, the Jigsaw Puzzle was chosen to be implemented. The interaction with the microscopic images and explanatory captions takes makes the player familiar with nanotechnology concepts only presented in books or other traditional educational materials. An important requirement served by this on-line puzzle is the possibility to control time and number of points, allowing a asynchronous competition with other players.

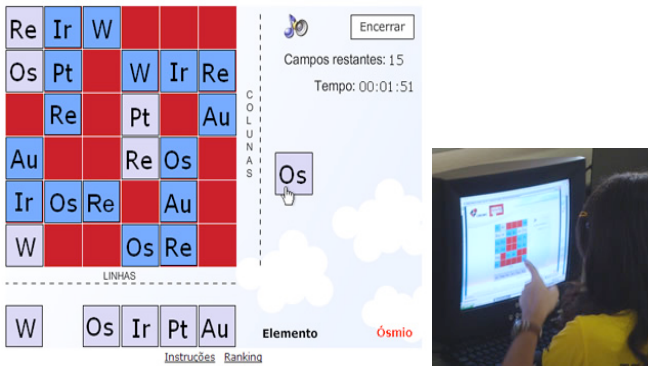

Figure 1: Chemical Sudoku and an interaction with a student

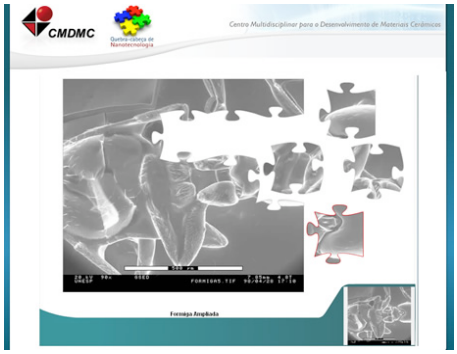

Figure 2: Nanotechnology Puzzle

References

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[2] Saecker, Mary. Chemistry Sudoku Puzzle, Journal of Chemical Education, vol. 83, number 4, April, 2006