elearningpapers

From cheating to teaching: a path for conversion of illegal gambling machines

Juarez Bento da Silva
Southern University of Santa Catarina, Araranguá, SC, Brazil

Gustavo Ribeiro Alves
Polytechnic Institute of Porto – School of Engineering, Porto, Portugal

João Bosco da Mota Alves
Remote Experimentation Lab of Federal University of Santa Catarina Florianópolis, SC, Brazil

Summary

Video poker machines, a former symbol of fraud and gambling in Brazil, are now being converted into computer-based educational tools for Brazilian public primary schools and also for governmental and non-governmental institutions dealing with communities of poverty and social exclusion, in an attempt to reduce poverty risks (decrease money spent on gambling) and promote social inclusion (increase access and motivation to education). Thousands of illegal gambling machines are seized by federal authorities, in Brazil, every year, and usually destroyed at the end of the criminal apprehension process.

This paper describes a project developed by the University of Southern Santa Catarina, Brazil, responsible for the conversion process of gambling machines, and the social inclusion opportunities derived from it. All project members worked on a volunteer basis, seeking to promote social inclusion of Brazilian young boys and girls, namely through digital inclusion. So far, the project has been able to convert over 200 gambling machines and install them in over 40 public primary schools, thus directly benefiting more than 12,000 schoolchildren.

The initial motivation behind this project was technology based, however the different options arising from the conversion process of the gambling machines have also motivated a rather innovative and unique experience in allowing schoolchildren and young people with special (educational) needs to access to computer-based pedagogical applications.

The availability of these converted machines also helps to place Information and Communication Technologies (ICT) in the very daily educational environment of these children and youngsters, thus serving social and cultural inclusion aspects, by establishing a dialogue with the community and their technological expectations, and also directly contributing to their digital literacy.

Keywords: social inclusion, innovation, pedagogy, computer-based educational tools, gambling machines, recycling, open source sofware

1 Introduction

The Computer Recycling Project has been running at the University of Southern Santa Catarina (UNISUL) since 2001, being able to donate so far approximately 300 educational machines (with some 200 converted from gambling machines) to public primary schools and other

institutions devoted to young-people community assistance. These educational machines were originally built from motherboards and other parts extracted from old computers and then equipped with fun educational software games adjusted and configured according to the profile of the receiving institution and the needs of the users served. This sort of activity can be classified as computer recycling for community purposes, as indicated by Seaman (2005). In countries like the United States, there is even specific legislation for enforcing computer recycling, as indicated by the New York State Education Department (2009). Following a more peculiar source, the work team involved in the Computer Recycling Project has been able to receive gambling machines seized by Brazilian federal authorities, in the state of Southern Santa Catarina, from 2007 onwards. The conversion of gambling machines into educational machines was an innovative and alternative process to the simple destroying procedure, as illustrated in figure 1, which refers to the final destiny of 4018 gambling machines, taking place at the city of Rio de Janeiro, Brazil, on December 28th, 2009.

Figure 1: *Gambling machines being destroyed (28/12/2009).*

The social and innovative character of the work developed by the project team was able to attract the attention of the Brazilian media, as documented in http://www.youtube.com/watch?v=l27AkkzokFk, this way rewarding the trust posed by the Brazilian federal authorities on UNISUL's project.

Figure 2 presents some images taken on the use of the converted gambling machines in public primary schools. An important aspect is that, during the conversion process, the original operating system and gambling applications are swapped by open software, namely an operating system distributed through a public license, open-source general applications, and specific educational applications developed with open-source tools. No doubt, the best complement to a recycled computer is free, open-source software, as besides the immediate economic gains, important social values and postures like cooperation, teamwork, working in communities and in favour of communities, are also transmitted to the end users, curious enough to ask about how were these machines built, the software developed, etc., and in same cases bold enough to even suggest improvements! Using open software also allows for specific cooperation with some schools' elements wishing to help to improve the educational materials installed, namely by incorporating fun games addressing the local culture and heritage (e.g. native Indian communities).

Figure 2: *Converted gambling machines being used at primary schools.*

2 Opportunities raised by the conversion of gambling machines

The availability of a large number of seized gambling machines provides a number of options that range from the direct conversion till the simple reuse of parts and components. So far, the project has been able to follow the following four options:

1. Reuse the full machine, replacing the gambling application by an operating system and open-source applications such as a text editor, an electronic spreadsheet, a drawing application, and a web browser. This option requires adding a mouse and a keyboard, acquired by UNISUL.
2. Reuse the full machine, replacing the gambling application by an operating system and specific educational fun games and applications. This option allows reusing the original gambling machine keypad.
3. Reuse the full machine, replacing the gambling application by special-purpose educational applications. The original gambling machine keypad is adapted to serve people with special (educational) needs.
4. Dismantling the full machine and reusing parts and components to upgrade conventional desktop computers in use at the university or other educational institutions associated with the project.

2.1 "Conventional" machines

We use the expression "conventional machines" to coin those resulting from option 1, i.e. those intended to serve as a conventional desktop computer with general-purpose applications (e.g. text editor, etc.). These machines have been mainly deployed and used at school libraries. The main motivations behind this option are: (i) optimise cost savings, i.e. no time spent on disassembling or assembling parts, just add a new keyboard and a mouse, plus re-decorate the machine case; (ii) and facilitate the access to a person using a wheelchair (there is no need for a table and a chair, as the computer is in stand-alone machine case) – see right image on figure 3.

Figure 3: *Examples of machines in use at some educational institutions.*

Figure 4 presents the desktop view (detail of the operating system) and two application windows referring to a text editor and an electronic spreadsheet.

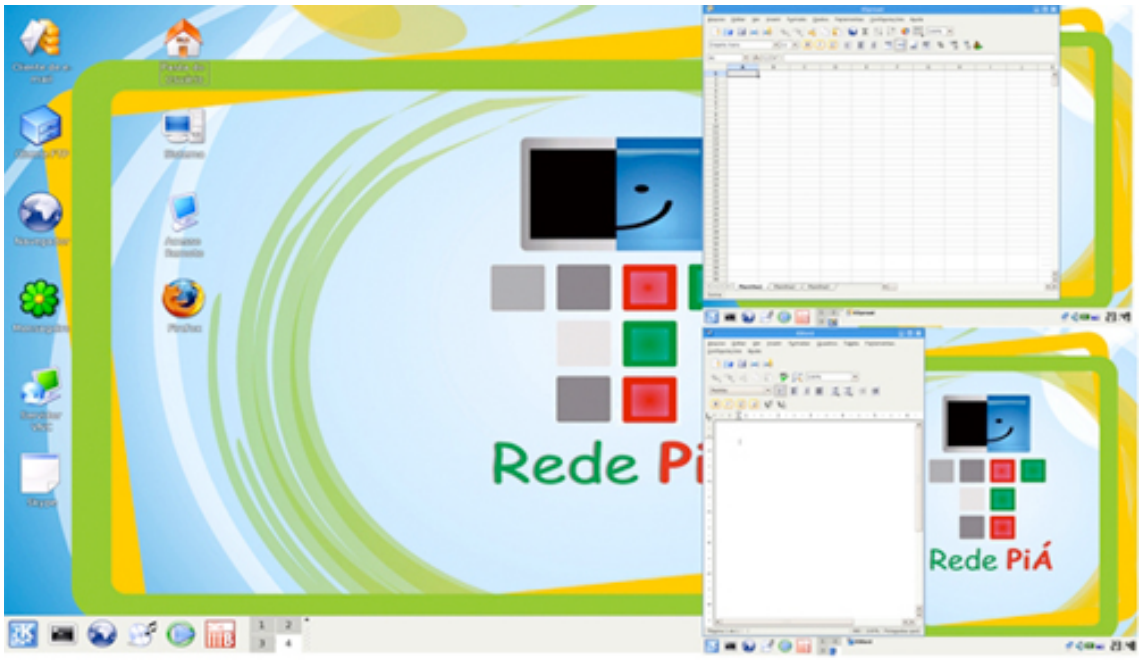

Figure 4: *Operating system and some general-purpose applications.*

2.2 Machines with special educational fun games

The computers with special educational fun games installed are also mounted on the original stand-alone cases of the gambling machines. The original keyboard is maintained and only a mouse is added, besides redecorating the machine case. These machines are mainly deployed at school halls and corridors and used during class break periods for recreation activities. The installed applications focus on the subjects being taught in normal classes, and other related

themes, which are presented in an attractive, game-based form to engage students (e.g. quizzes). These machines are sometimes also equipped with applications for raising awareness of society-related problems like: traffic safety, personal care and hygiene, recycling, domestic violence and child abuse, drugs prevention, etc. Figure 5 illustrates a converted machine with an application explaining how should domestic garbage be sorted to facilitate the recycling process. Figure 6 presents the desktop screen of a machine equipped with educational games, selectable through the buttons of the original machine keypad (see detail of right image in figure 5).

Figure 5: *Converted machine equipped with educational fun games.*

Figure 6: *Selection of educational games.*

2.3 "Special" machines for people with special (educational) needs

The World Health Organization (WHO) estimates in 10% the percentage of the world population that presents some sort of disability or special needs. In Brazil, the 2000 census carried out by the Brazilian Geographic and Statistics Institute (IBGE) included, for the first time, specific questions about disabilities and special needs. The results obtained were surprising to many Brazilians. Approximately 14.5% of the Brazilian population has some sort of disability or special needs, which corresponds to 24.5 million Brazilian individuals. This number is divided into: 48.1% with blindness or visual impediment; 22.9% with movement impairments; 16.7% with deaf/hard-of-hearing problems; 8.3% with mental-related disabilities; and 4.1% with physical disabilities. According to the census, there is also a direct and reciprocal connection between poverty and disability. This suggests that poverty contributes to the increase of disabled and people with special needs, which, on their turn, find no or difficult access to health care, education, and, notably, job positions. This situation contributes to social exclusion and a to continuous poverty condition. According to the United Nations (UN), 82% of the disabled people live under the poverty line, while 400 million disable people live in precarious conditions in developing countries.

In an attempt to serve these persons, the project developed a "Learning Platform for People with Special Educational Needs" comprehending a physical and a software module. The physical module corresponds to a converted gambling machine, while the software module corresponds to special educational applications targeting very specific pedagogical contents. The user interface was developed according to requirements addressing psychological aspects and cognitive reasoning, so as to stimulate the learning process. For instance, the screen contents are sometimes matched against the colours used in the machine buttons in order to facilitate the selection process.

This was one of the most rewarding options in converting the gambling machines, as it allowed us to develop a low-cost solution for fighting the social exclusion of a significant part of the Brazilian population, which deserves the right to a proper and dignifying education. The additional time spent on developing specific applications and interfaces is surely to be compensated by the educational gains provided by this platform. Very simple educational applications like "Teaching the colours" and "Puzzle" were developed for this special purpose. Regarding the physical interface, figure 7 presents some details of the keypad assembly plus a case application, in an educational institution for students with cerebral palsy and Down's syndrome. Psychomotor difficulties, e.g. the situation depicted in figure 7a, were specifically addressed by the use of resistant and spaced key buttons. This very simple keypad (with colours and/or numbers – usually from 1 to 10 – on the key buttons) is built reusing components disassembled from the gambling machines.

Figure 7: *Converted machine for special educational purposes.*

The following lines describe an example on the use of these converted gambling machines, in this special educational context. On a certain educational institution, there was a student with cerebral palsy that was also deaf. When using one the applications we have developed, in this case a quiz showing 10 domestic animals, where each animal is presented in the screen using a multimedia approach, i.e. the sound usually emitted by a particular animal is played on the machine loudspeakers, just before presenting its image on the screen. The student then has to identify the animal, using the key buttons from 1 to 10. It happened that, in the particular case of this student, she was able to correctly identify the chicken, by pressing the right key button, even before the actual image was displayed on the screen. Realizing the possibility of an erroneous diagnostic in relation to the student hearing capabilities, the pedagogical and psychological experts collaborating with our project decided to conduct some further research. They were able to understand that due to the fact the student family raised chickens on the backyard, she was able to relate the sound played on the machine loudspeakers with that emitted by the animals she was used to see on her house. The cerebral palsy was, however, impairing this young girl from actually articulating any words.

Figure 8 depicts the “puzzle” application where students typically use the mouse for solving it. The application has different skill levels so as to account for users with different levels of special needs or to promote educational progression. In the illustrated example, the “puzzle” may have four, eight, or sixteen piece. The student can only progress to the following level after successfully completing the current level. This requirement was actually identified after deploying an initial set of machines on a number of institutions and collecting some feedback from both teachers and students, i.e. the final users.

Figure 8: *Examples of pedagogical applications.*

Figure 9 depicts an application targeting children with special educational needs. It is a simple conceptual map with situations and subjects related to the student daily life. The goal is to allow the student to develop mental schemes by connecting the figures related to a certain situation or subject, using connecting words, so as to obtain a logical and correct sequence. The student, from the completed conceptual map, can thus extract meaningful knowledge. The strategy to select situations and subjects related to the environment where these students live has proved to be efficient, as students typically show motivation and a desire for obtaining the correct sequence. The obtained results have been particularly encouraging, regarding the use of this type of application.

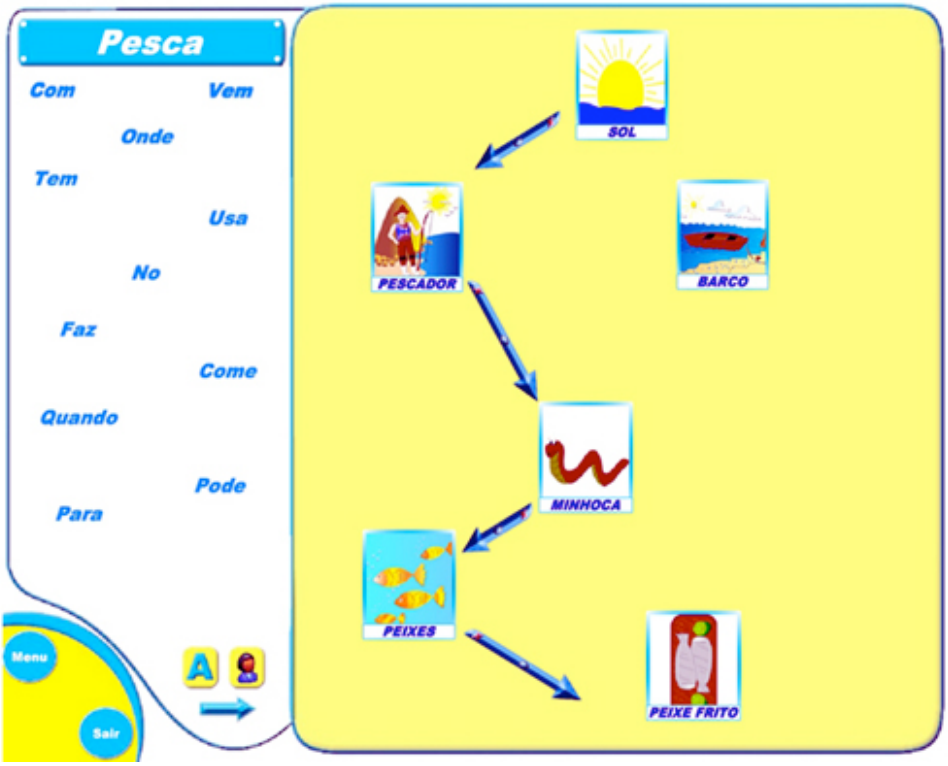

Figure 9: *Another example of a pedagogical application, developed for a converted gambling machine.*

2.4 Recycling parts and components extracted from the gambling machines.

Periodically, several bank and educational institutions update their computer resources and donate their old machines, usually quite outdated, both in hardware and software terms. In many cases, these old machines can be quickly updated for a specific, narrowed, application. Recycling these old computer machines, donated to the Computer Recycling Project, addresses two important goals: 1) environmental, by diminishing the number of objects thrown to garbage, particularly of the electrical and electronic appliances type; and 2) sustainable development, by serving several institutions with the recycled machines, where their use can still prove beneficial. In this last situation, the served institutions do not have the financial means to acquire new machines or a sufficient number to cover all their needs.

Also, our project has received a significant number of partially functioning gambling machines, and thus it had to figure out an end for them. Reusing parts and components for updating donated old computers emerged as an obvious option, as the gambling machines are, surprisingly enough, usually built with more recent technology, and, in some cases, with the latest technology. Through this technology update and use of open-source software, we allow new technologies to reach a broader number of schoolchildren, in an attempt to reduce digital illiteracy. So far, this option enabled us to place circa 100 computers, built from donated old machines and parts and components disassembled from gambling machines. Figures 10 and 11 depict some of these computers in use at primary public schools, juvenile detention centres, and adult training centres.

Figure 10: *Recycled computers in use at a public primary school.*

Figure 11: *Recycled computers and some pedagogical applications developed, in use at other places with young children.*

3 Conclusions and final considerations

The initial motivation behind this project was technology based (i.e. recycling computers), however the different options arising from the conversion process of the gambling machines have also motivated a rather innovative and unique experience in allowing schoolchildren and young people with special (educational) needs to access to computer-based pedagogical applications. The availability of these converted machines also helps to place Information and Communication Technologies (ICT) in the very daily educational environment of these children and youngsters, thus serving social and cultural inclusion aspects, by establishing a dialogue with the community and their technological expectations, and also directly contributing to their digital literacy. The project actions and the embraced volunteer work thus range from computer recycling to promoting digital literacy.

Regarding the project continuity and its horizons, it is known that technology evolves every year, so the flow of outdated machines is expected to last for the long term, as enterprises and public bodies, have a policy for continuously updating their computer resources. This guarantees, at least, a continuous flow of computers, which can later be denoted to schools and other educational institutions, after passing the updating process, and used for very specific pedagogical applications, which do not require new computers, thus contributing to cost savings.

Finally, we maintain this project because we believe the technical motivations, and most of all its social relevance and impact, have enabled an all number of educational institutions, and especially the young children served by them, to have access to products and services that otherwise would not had so. In our belief, the best compliment to this project would be seeing it replicated in other countries where illegal gambling machines are shoulder-to-shoulder with poverty and social exclusion.

References

Alcantud F. & Ferrer A. M. (1999). As tecnologias de ajuda: ajudas técnicas para estudantes com necessidades especiais físicas e sensoriais. Valência. Editora: Rivas y López. Universitat de València.

Candido S. (2009). Máquinas caça-níqueis apreendidas em operações policiais são destruídas no Centro". retrieved January 10, 2010 from http://oglobo.globo.com/rio/mat/2009/12/29/maquinas-caca-niqueis-apreendidas-em-operacoes-policiais-sao-destruidas-no-centro-915391260.asp

Castells M. (2000). A sociedade em rede. A era da informação: economia, sociedade e cultura. São Paulo: Editora Paz e Terra S.A.

Freire P. (1975). Pedagogia do Oprimido. 3ª ed. Rio de Janeiro. Editora Paz e Terra: Rio de Janeiro.

Hazard D. , Alves T. & Rezende A. L. (2007). Inclusão digital e social de pessoas com deficiência. Organização das Nações Unidas para a Educação, a Ciência e a Cultura (UNESCO).

New York State Education Department (2009). Computer Recycling for Education and Technology Enhancement: General Program Information. Available at http://www.emsc.nysed.gov/ssae/AltEd/create/create-programinfo.html. Accessed March 15th, 2010.

Pierre L. (2004). As tecnologias da Inteligência- O futuro do pensamento na era da informática. São Paulo: Editora 34.

Negroponte N. (1995). A vida digital. São Paulo: Editora Companhia das Letras.

Resnick M. (2002). Rethinking Learning in the Digital Age. In The Global Information Technology Report: Readiness for the Networked World. Kirkman. Oxford University Press.

Santarosa L. & Moori A. (1996). Ambientes de Aprendizagem Computacionais como "Prótese" para o Desenvolvimento de Jovens Portadores de Paralisia Cerebral". Revista Integração, Ministério de Educação e Cultura do Brasil, 7(17), pp 33-40.

Seaman, G. 2005. Free Computers. Available at http://www.opencollector.org/freecomputers.html. Accessed March 15th, 2010.

Silva, J. B. (2007). A Utilização da experimentação remota como suporte para ambientes colaborativos de aprendizagem. Tese de doutorado. Programa de Pós-Graduação em Engenharia e Gestão do Conhecimento da Unviersidade Federal de Santa Catarina. Florianópolis.

Silva, J,B. (2007). Projeto de Reciclagem de Microcomputadores, retrieved July 24, 2009 from www.rexlab.unisul.br/redepia.

Stainback S. & Stainback W. (1999). Inclusão – Um guia para educadores. Porto Alegre: Editora Artmed.

Vigotsky L. S. (1987). Pensamento e Linguagem. São Paulo: Editora Martins Fontes.

Authors

Juarez Bento da Silva
Professor/Pesquisador
Southern University of Santa Catarina, Araranguá, SC, Brazil
juarez.silva@unisul.br

Gustavo Ribeiro Alves
Polytechnic Institute of Porto – School of Engineering, Porto, Portugal

João Bosco da Mota Alves
Remote Experimentation Lab of Federal University of Santa Catarina Florianópolis, SC, Brazil

Copyrights

Edition and production

Name of the publication: eLearning Papers
ISSN: 1887-1542
Publisher: elearningeuropa.info
Edited by: P.A.U. Education, S.L.
Postal address: C/ Muntaner 262, 3º, 08021 Barcelona, Spain
Telephone: +34 933 670 400
Email: editorial@elearningeuropa.info
Internet: www.elearningpapers.eu