

T-Learning and Interactive Television Edutainment: the Portuguese Case Study

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Abstract

This paper presents a case study of Portugal's specific developments in the use of interactive television as a learning resource. The paper depicts the Digital Interactive Television evolution in Portugal since 2001 and discusses the T-Learning and iTV Edutainment implementation experiences developed in the country since that period. An exemplary project is used to discuss the shape of learning activities provided through Television. Consequences of this process are also presented and discussed, namely from the learner's point of view.

Keywords

Interactive television, usability, learning applications, t-learning

Introduction

Interactive Television (iTV) is a technology still in its infancy, troubled by dilemmas about its "true nature" and questions concerning its commercial viability. Television is not an interactive medium. The type of relationship that television encourages with people that use it is a passive one. Television carries the same message and content irrespectively of who is watching it. This is how we have become used to look at television. Interactive and enhanced television challenge's this status of the media, convoking user interaction and participation, while at the same time claiming for new modes of production, following the convergence between web and Tv and the need for more personalised and engaging applications.

Like other new media, iTV can be defined according to its potential to provide new services, namely educational ones [Livingstone, 2002]. The degree to which each new media can be observed as a product and an instrument of social change, varies with the level of autonomy, participation or interactivity it provides the user, but is definitely preceded by the access to the medium and the consequent appropriation of the technology by different users [Preston, 2001].

Being an innovation still in an early stage of social diffusion [Rogers, 1995], there is very few data pointing to the fact that iTV can effectively be used as a learning tool and resource. Portugal was one of the first countries in the world to commercially deploy an iTV service and such a fact facilitated the development of projects aimed at testing that hypothesis.

Like all media, iTV is historically grounded [Urichio, 2003]. Though, in the use of iTV as a learning resource we will find a mixture of representational forms from the linear TV model and interactive or communication proprieties similar to those we find in other information and communication technologies (ICT). The evaluation of interactive television as a medium with specific learning potential is the goal of our study. To conduct this analysis, we think it is important not only to collect data from empirical studies but also to observe user behavior under market conditions. In the following sections we look at both this areas and discuss iTV potential to provide a rich and compelling educational experience.

The Portuguese Interactive Television Market

Interactive television was officially born in Portugal on June the 7th 2001, when TV Cabo launched its high-end interactive television service, the world's first interactive cable TV service to include the digital video recording (DVR) functionality delivered via a set-top receiver, powered by the Microsoft TV Advanced platform.

By January 2003, TV Cabo announced that the high-end interactive service was available to 8.000 subscribers, a number that would correspond to about 24.000 unique users. Also, the company unveiled its intention to launch new iTV services and products, namely a low-end version of the current iTV service.

Two months later, in March 2003, the establishment and operation of the DTT platform suffered a serious setback when the Minister for the Economy revoked the license granted to the PDTP operator after the National Authority for telecommunications delivered a favorable opinion regarding the revocation of the license [Anacom, 2003]. This happened after the consortium had twice delayed the launching of the operation, claiming technical difficulties related with the chosen platform – the Multimedia Home Platform.



Figures 1 & 2: TV Cabo Walled Garden Home Page for low end and high-end platforms

Seeing its position in the market strengthened, TV Cabo officially launched, in June 2003, its

low-end interactive TV service based on DVB-HTML, for both DTH and Cable subscribers. This happened two years after delivering to the market its high-end interactive service as a direct result of the few adherences obtained with the original service. The launch of this new service also marked a strategic change in terms of service distribution. While with the original service subscribers had to pay an up-front fee for the box, the new digital low-end set-top box is offered to all subscribers of DTH or premium channels. The result, an immediate critical mass of about 80.000 set-top boxes with interactive features installed in family homes. Since the Power Box has no return path embedded, the mobile phone works as the return channel for the low-end set-top-box: the subscribers are able to interact through SMS, but also using Wap and Java applications.

In summary, the Portuguese iTV market in 2003 is reduced to a single major player, TV Cabo, still with no competition from other pay-TV operators. By launching a low-end interactive television service whose major value is the delivery of pay-per-view services, TV Cabo recognizes that its high-end offer was not suitable for the market and that in this, like in similar technology driven markets [Simmons, 2000], technology infrastructure and perceived difficulty of using the system are not the only barriers to user adoption. Cost versus value and technical quality of the service, were the main obstacles for this first iTV trial-out in Portugal.

Television and Learning

Past Experiences on the Use of Television for Learning Purposes

Before the digital and interactive television rollout, Television was already used for distance education in schools. In Portugal, the usage of television for educational purposes was first implemented by "Telescola", or "Curso Unificado Telescola" (CUT), later called "Ciclo Preparatório TV" (CPTV) and currently designated as "Ensino Básico Mediatizado" (EBM). "Telescola" was launched in the 60s to allow children from rural areas, high-density suburban areas or over-crowded schools, to successfully finish basic school [Costa, 2003]. "Telescola" can be defined as a distance learning system complemented by an on-site tutor. The students would watch the lessons broadcasted by RTP (public broadcaster) and after the class

fill out questionnaires to test their knowledge. This process allowed schools with lack of teachers or without qualified ones, to provide their students with some form of teaching.

"Telescola" is about to be extinguished in Portugal, a decision that has been questioned by several educational specialists who claim that this project has been one of the few successful tele-mediated learning solutions in the world [Trindade, 2003]. Still, the "Telescola" model presents several challenges: for instance, the learning process is not really interactive, since the students watches the explanations but has no opportunity to ask questions or to speak with the teachers.

Interestingly, to interact with television is something as almost as old as Television it self: not long before the "Telescola" project began in Portugal, in the United States one early children's programme pushed the boundaries of the often passive relationship between the broadcaster and the viewer - *Winky Dink and You*. The popular CBS children's' program - which originally ran from October 1953 until April 1957 - introduced what can be defined as the first analogue form of interactivity: children equipped with a special Winky Dink kit could "help" the programs' hero in such adventures as to cross a river or to find his way out a labyrinth. To do so, a child had several clear plastic sheets to place over the TV screen, and with a crayon he just would have to draw a bridge for Winky Dink to cross [Hartman, 2002].

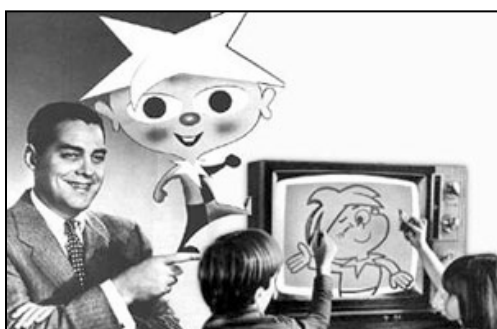


Figure 3: "Winky Dink and You" – One of the earliers experiments in edutainment

The Concept of T-Learning

The expression "t-learning" describes the convergence between iTV and e-learning, the latter understood as the use of Computational technology to support training and educational activities [diSessa, 2000]. A number of factors

point to the fact that television can be used with advantages on an educational setting: television is a largely available medium; most individuals are very accustomed to it; people usually trust what they receive through the television set and the quality of the content assures a richer experience for the user. Television can perfectly cope with generating very rich contents and high levels of motivation for the user, essential elements for any training experience [Lytras, 2002]. On the other hand, traditional linear television broadcast does not provide any feedback nor does it allow the user to interact with the contents.

iTV applications give the user the possibility to interact at different levels with the content being broadcast [Chorianopoulos, & Spinellis, 2002]. Whether that interaction deals with the "see more" possibility alone, as in the case of enhancements, or it provides personalisation tools, the fact remains that the potential exists for organisations to use iTV as a learning tool.

iTV Edutainment State of the Art in Portugal

T-Learning and Interactive Television Edutainment are still in its infancy in Portugal. Until the end of 2003, no formal T-Learning projects were launched by TV Cabo or any other pay-TV operator in Portugal. However, there are several cases of interactive televisions programs or applications offered through TV Cabo's Smart Box that fit the category of iTV Edutainment - the mix of entertainment content and other information to create a learning context -, enabling its users to know more about a given subject or to play along with the program, learning something along that process.

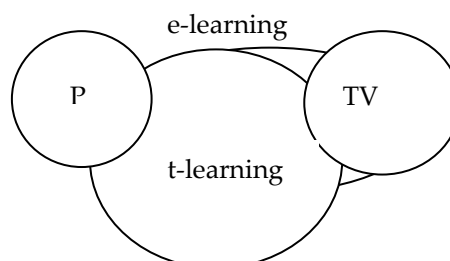


Figure 4: T-learning: a convergence between the PC and Television

One of the very first Portuguese programs to offer an Enhanced TV application was the children's' program "*Batatoon*", in April 2001. Broadcasted by one of the leading commercial

television stations in Portugal - TVI-, the "Interactive Batatoon" allowed children to know more about the program's characters, to play several games, to get information about movies, another entertainment event for children, and to play several games and activities. Children could also communicate with other kids in the debate forum functionality and could even sing along the most popular "Batatoon" songs in the jukebox feature.

The children's television channel Panda also decided to offer its viewers, in partnership with TV Cabo, an interactive television application. The "Barra Panda" offered the following contents and functionalities: educational games such as "Computer game" and "Jogo da Memória", electronic postcards to send to friends, a jukebox to wear the channel's most popular songs, an area to add personal contacts, information about the channel's programming and a forum to debate with other viewers. The Disney Channel also offered a very complete interactive television application for its viewers, which enabled them to add points as they navigated in the application in order to obtain Disney merchandising.

Other Smart Box applications are worth mentioning, both of them adapted from existing web sites: *Ciberdúvidas* – an educational site for people who have doubts regarding the Portuguese language, and *Fra.pt* – a news site for university and college students. Also worth mentioning as iTV Edutainment application is "Portugal dos Pequenitos", with information about a Coimbra's small leisure park about the Portuguese History and popular architecture aimed at children and their families.



Figure 5: User interface for the edutainment program "Batatoon"

Implementation and Testing of a T-Learning Application

The VEMiTV project was a research project aimed at establishing a model for the testing and measurement of specific interactive television applications when used on an educational setting. This project's ultimate goal was to establish the potential of interactive television as an educational tool. Cognitive impacts and HCI issues were the main topics involved in the project. The main working hypothesis of the project was that "The use of iTV on an educational setting can improve students' levels of motivation and cognitive retention". This hypothesis tried to lay the ground for a research program that could help in clearly establishing the potential for the use of t-learning.

The project promoted the use of iTV as a synchronous and asynchronous tool for ODL activities. In the context of the project, the expression "T-learning" refers to the intersection (Fig.4) of the uses of television with the uses of the computer to produce an e-learning experience.

Under the VEMiTV project there were two main areas of scrutiny – interface usability and user cognitive responses. Tests on both items was conducted on several stages of the experiment and all items have as a basis the same sample of individuals, the same iTV applications and the same educational environment – first grade schools. The hypothesis was tested for the use of iTV as an informal medium complementary to the children regular classes.

In VEMiTV, Usability evaluation was divided into two steps. When the first prototype for the interface and application was finished, a heuristic evaluation of the interface was conducted (Nielsen, 1994). This evaluation comprehended design, layout and functional elements of the application. The objective was to simplify the interface to the minimum requirements of the sample test groups while keeping its ability to convey the involved educational contents. A second evaluation on the interface's usability was conducted during live tests through the use of an adapted version of *QUIS* questionnaires (Chin, et al, 1988). The main objective of this evaluation was to establish a level of satisfaction with the interface and to define a set of rules for the

personalisation of the tool. Apart from the questionnaires, three other methods for usability and cognitive evaluation were used at this stage (Dumas & Redish, 1999): definition of a focus group based on a sample of students and teachers, logging of actual use and live observation during application use.

Usability inspections were conducted simultaneously and following the same experimental design as cognitive evaluation. A group of 55 representative children aged between 9 and 10 taking first degree in elementary school was divided into two groups – a test group (O1) and a control group (O2). The experiment ran for 4 weeks (June 2003) and comprehended math's and history contents. During the testing period O1 group use the iTV application as its learning tool and group O2 had no access to iTV. Previous test to evaluate current state of achievement for each children and each class were done using the BAPAE methodology (Cegoc, 1996). This proof covered the following areas: 1) verbal; 2) spatio-perceptual; 3) Numeric; 4) Shapes; 5) spatial orientation. The same tests were passed to all children immediately after having used iTV.

The iTV application developed for the experiment - "PANDA" - was based on the Microsoft TV platform and used the Metallic3036N STB. All the application coding was done using jelly script and an ITS system was attached to the application in order to allow for adaptive modelling of the application to children progression. This basic personalisation feature used data provided by the user that was stored in the STB hard disk. The application interface was totally based on animation (figure 10), both for economic reasons and pedagogical reasons – animation contents are closer to children educational imaginary and emotional learning behaviour (Reilly et al, 2001). "Panda" worked as a linear animation service for approximately half of the time and in specific areas interaction was prompted through the use of animated characters who worked as tutor agents for certain areas of knowledge (figure 10 shows character for the history subject). When the agent was active, the children could record parts of the information being broadcast into a personal "vault of knowledge" to access it later, could enter a chat area and interact with other kids, or it could pass to the test environment. In this area games were available that would test

the children acquisition of information until that moment and control the information that she could receive later according to those results. These features were the ones associated with the passive reception of information – text, sound and graphics. On the other hand, the application provided non-linear functionalities for the children that were not directly associated with the didactic content but created as a mean to generate a sense of belonging to a community. These functionalities were accessed through the main area of the application – the children would minimize the linear broadcast and enter "the school". In this area she could manage her vault, enter a messaging tool or create a personal agenda that would link her activities to characters and points in the linear story.

Learning functionalities were kept to a minimum – only history and math's contents were used – because the main objective was to prove the ability of the application to work as a complement and not a substitute to actual classes. In this sense, all the functionalities associated with the "building a community" activity were reinforced. Future developments of the application include the implementation of a video-conferencing service associated with the chat area and a monitoring application that gathers psycho graphic info while the children plays all the different games within the application.

The results of the study¹ proved the application cognitive efficiency (83% impact) but testing on a larger sample must be conducted to confirm these results. Usability inspection results showed clear positive rates (3.8 in a scale of 5). Information flow and interaction with the tutor (Application flexibility and user guidance) were the areas that deserved the more negative remarks from the children, while graphics and interaction with characters that depicted content (compatibility, learning and perception) were the most appreciated areas.

1 Complete description of the study and reports available
<http://www.ulusofona.pt/investigacao/pocti>

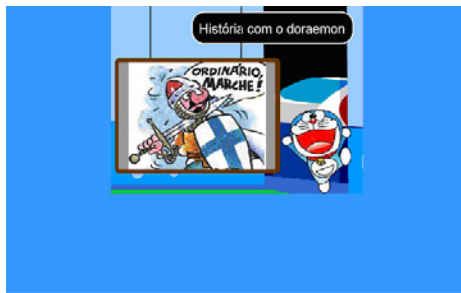


Figure 10: T-learning application interface

In general children enjoyed learning with the program (group 01) but demand for less individual and more community based learning was expressed. Children satisfaction rates were high (97.25 points in a scale of 100) and served as a clear demonstration of the technology ability to work, at least, as an informal and complementary learning medium. This was a controlled study experiment but all efforts were made to take the experiment as close as possible to actual learning settings. Though, all testing was conducted inside children's school environment and all used material came from a real source (Panda TV Channel).

Conclusions

When discussing iTV we can observe a permanent "conflict" between user needs and technology push. This fact is present all along the Portuguese case scenario that we have presented. The initial push for high-end services was not fully supported in technological terms, but clearly, user perceived value of that service was also a major drawback.

Users distinctively value those applications that are somehow linked with the linear broadcast but allow for some level of participation. On the other hand, all applications that promote community based services or personalised interaction with content, are highly valued.

The potential for T-Learning as been proved, at least as an informal learning resource. Further studies must be conducted on usability and

cognitive issues, but the development of a Universal Multimedia experience adapted to the learner's context and needs, is clearly the most valuable development path for t-learning.

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