SQUEAK, AN INVISIBLE LABORATORY FOR TEACHERS AS LEARNERS

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In this paper, we highlight the empowerment of fresh developers challenged to create their own virtual laboratories of learning in the Squeak's World. We suggested to a large group of teachers, from all school levels in Portugal, the use of Squeak, as a multimedia system, an interface development environment, or simply as a programming language, in order to create new virtual worlds or simulated environments. They were challenged to exploit such a tool, knowing that school and schooling are fine, assuming that we aim to make it better, even if we do not always know what that means.
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1. CURRENT CONTEXT OF THE ICT IN PORTUGAL

The last PISA report (GAVE, 2007) about scientific competences of the Portuguese students, published by the GAVE[1], denotes that the students with worse academic results are also that carry the bigger difficulties in the utilization of the information technologies. The governmental initiatives to provide better IT access to all of the students are based in that observation. A recent initiative named Schools, Teachers and Laptops (STL), started in late 2006, give the entire schools upper the primary level a technological kit with fourteen laptops for students use and ten for teachers plus a multimedia projector and a wireless access point. In the Technological Plan for Education, published last year, all of the teachers and the students of the tenth grade (k16) also could acquire, in financially worthwhile conditions, a laptop with mobile Broadband Internet access.

However, the plans for ICT integration in the curricular activities, continue suffering big limitations, due the difficulty that schools have in the implementation process of new activities or due their own paradigms of space and culture.

So often, the computers are installed in laboratories and the ICT activities are referred as computer software lessons. Computers are becoming the subject of study and not instrumental factors of learning.

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[1] GAVE – Bureau of Educational Assessment of the Ministry of Education - a free translation of
"Gabinete de Avaliação Educacional do Ministério da Educação"

1.1 The ICT adoption barriers

Our experience in monitoring the school's ICT integration process is shown a great difficulty for the adoption in adopting strategies to use new technologies.

The recent initiative of the ministry of education seams to be insufficient to change the situation and is clear for us the inability to attract teachers to adopt ICT in teaching. Year after year, the Portuguese teachers had training in technology areas, but the assessment structures and the career progression mechanisms does not sufficiently value the professional training in the areas that are not specific to the teaching specialization.

Moreover, the technocentric perspectives which Papert refutes are commonly taken. We commonly verify that the ICT activities are only the ones proposed by ICT curriculum teachers and often the other teachers assumes they do not have the sufficient knowledge or skills to use ICT in their teaching activities.

In our opinion, this image of insecurity and low self-esteem could be overcome with more eclectic policies for the integration of technologies, accompanied by his real importance in educational terms.

1.2 Change resistance

The main resistance to change the paradigm relay in a poor reflection on what technologies may result in improving the academic exploitation of students and the difficulties that we still observe in the sharing of knowledge, resources and strategies of their use. Nor can we ignore that education in Portugal has experienced in recent years, a large uncertainty in terms of guidelines. The reforms and counter-reforms have succeeded at a so high rhythm that we had 12 different ministers in the past twenty years.

The resistance is a chronic feature of our society and the direct relationship to success of students with the teacher's performance, lead teachers to ignore the more constructivist methodologies in favor of more traditional in that they feel safer. Associated the uncertainty factor we referred to the constant agitation in Portuguese education, the defense of less entrepreneurs is the easiest attitude to adopt. When the most entrepreneur teachers do not get the expected success, they become easy targets of the most skeptical and conservative and the education system also do not protect them.

1.3 Reprinting the analog model

Despite all those responsible for education recognize that new technologies require new methodologies, the inability of innovation and the lack of research leads, almost invariably, the transposition of analog models for the use of ICT. That attitude is feeding certain disinterest on the students who are harassed by the novelty of the games consoles, the interactive features of mobile devices and the funny activities offered by many online sites.

While teachers are adopting static electronic presentations, for example, or are using the e-learning platforms, primarily as repositories of teaching notebooks (Valente and Moreira 2007), students are succumbing the offers from Real Life (Osório 2007) which is conducting them in the immersion and performance roles

that the school does not encourage or tolerate. They became winners, clever and creative outside the school.

The reward of success denied by the school is easily obtained in the online services available on 3G mobile phones or in the cybercenters in front of schools.

In a pseudo-attitude of innovation and commitment to change the paradigm, the school has systematically ignored, for decades, research evidence from the most noticeable educational researchers on the field of technology integration in education. Seymour Papert, for example, has been insatiable on alerting the dangers of technocentrism teaching; Alan Kay proposes creative and innovative approaches for children to learn with computers (Dynabook), since last century sixties. Nicholas Negroponte has partially jumped to the reality of a dream world where each child can have their own computer and Allison Druin (Druin and Inkpen 2001) using a paraphrase of the Papertian idea of invisibleness of computers, suggests that they need to be "seamlessly infused into the school's environment, activities and culture", while Kirschner, Sweller and Clark (Kirschner, Sweller et al. 2006) agree on the lack of minimal guidance learning with ICT. Yet the school continues to show arrogance on the more creative proposals that it offers.

1.4 Computers as curriculum contents

Our consultancy activity in the area of ICT enabled us to note, for example, a very strong tendency to focus the learning on the physical resources, schools are often promoting activities that relate more to equipment that the strategies for their use. Learning Moodle or doing PowerPoint are very common expressions in the projects for ICT integration.

It is not unusual to find up exploration activities focused on the technical characteristics of the computers or other technical resources. The main rules for the use of equipment and ICT spaces are sometimes genuine obstacles to their use, ignoring its advantage in valuing learning. In some cases the aim seems to be preserving of computers at any cost as we are preserving a rare book by not flapping it.

It is a frequent concern of Heads of schools to put the computers they have in laboratories, in which they are then subject to regulations that excludes its natural and spontaneous use.

In a recent initiative of the team CRIE, schools received a set of laptops, a multimedia projector and a wireless access point, that could permits any teacher to have sufficient resources to use ICT in any discipline. However, in many cases, schools have fixed these computers in a room/laboratory, demonstrating the inability to reach the findings that Alison Druin (Druin and Inkpen 2001) attaches to the success of the integration of technologies. The importance of having certain equipment is more valued than the concern related to their real enjoyment.

The conception and construction of virtual laboratories for learning are developed within a framework of pro-active attitudes towards the use of information and communication technologies in education. Such a framework is opposed to the idea, inspired by the more troublesome metaphors, despite believing that we are in the vanguard of the technology, that computer rooms in schools ought to be built. Unfortunately, the computers in such rooms, sooner or later, will become the central object of study, leading students to run away from the school computer to the world of "mobile phone's computers" and console games. This is a tendency where the

student's "Real Life" paradigm (Osório 2007), will elude the "Second Life" of the school.

2. THE SQUEAK SYSTEM

The Squeak is a system to programming on objects oriented language, developed in SmallTalk, which combines the capabilities of the language invented by Alan Kay, developed at Apple and tested in Disney, with the ease of an environment based on the visual metaphor of drag and drop.

Perfectly suited to inexperienced users, Squeak begins to make sense to us, with the contributions of various communities of users encouraged by Kay through the Squeakland portal and the interest drawn by the initiative OLPC (One Laptop per Child).

Squeak is the implementation of a proposal on how we can use computers to interact with the information, to create our own knowledge, emphasizing the importance of the principles that Alan Kay advocates from the Dynabook ideas.

In a article published by www.squeakland.org, Alan Kay says, in an interview granted to "The Book and the Computer", that his idea about the Dynabook refers to a laptop, interactive, as accessible as a book ("a portable interactive personal computer, as accessible as a book") and that this device could connect to a network and provide its users text, viewing of images, video and audio. This device, considered for many to be the first draft of the personal computer and laptop, still just a dream.

While a multimedia system, by letting kids programming their own projects, the Squeak Etoys developed by Kay's team at ViewPoints Research Institute, opens a world of possibilities for exploration and experimentation in all areas of knowledge, exceptionally visible in the simulation and representation of models, as state Allen-Conn & Kim Rose (Allen-Conn and Rose 2003) in the book Powerful Ideas in the Classroom.

However, our difficulty to abandon the traditional models and interfaces often prevents us to see beyond the blank world screen of Squeak.

3. THE *SQUEAKLANDIA* PROJECT/COMMUNITY

Squeaklandia is the first community of Squeak users in Portugal, emerged from an academic project at the University of Minho and our concern on teacher's trends use of closed software.

We've found in Squeak some of the characteristics that, in our point of view, may help to combat the apology of use the closed educational resources where the interaction is only possible on "using" the content and its (de)construction is impossible. We value some of the aspects suitable to the Web 2.0; the capability of the end user to reconfigure the interface and the educational power given from projects built in Squeak.

Some of our thoughts on this evidence led us to propose the use of Squeak, as a multimedia system, interface development environment, or programming language to create and to design virtual learning laboratories.

Intended to enable its use by a larger number of teachers and students we have translated the English version of Squeak to Portuguese.

Consequently, we also developed a virtual community (web site plus Moodle instance) of virtual laboratories developers where the software is available for download and where we want to provide some examples of projects made with Squeak.

In the summer of 2007, in collaboration with some Schools and Teacher Training Centers we provided a Squeak Free Course to the community.

3.1 Squeak Online Course

The enthusiasm shown by teachers programming their first "toys" in Squeak led us to build a learning space in our Web site. In the first course online we present the system and teach some principles on programming with Squeak, mainly by working with movement. This is a self-supported training course mounted in Moodle using video lessons, tutorials and discussion forums.

Late December 2007, we began to accept registrations for the first course on Squeak, fully online. The contents are the most basic characteristics of the system: learn how to create and save a project in Squeak; learn to get objects in motion and control them with a virtual joystick; learn how to use simple conditional events.

In a week 280 candidates signed up to join.

The course is organized into modules that are supported by diverse information documents, such as manuals for download in PDF format, resources sequence in HTML format created in the e-learning platform and videos explaining the necessary procedures for doing small projects.

The modules are designed to allow self-learning and respect for a gradual increase in difficulty. Support is given to students through discussion forums, and a system of pre-scheduled online chat. The contents are presented one every two weeks and at the end of the course the trainees should upload a project on which implemented the learning they have done.

At this moment, the projects, available in a database's internal platform, are appreciated by the teacher of the course, and are being accessible to all other participants in a try to promote the sharing of ideas and resources. Likewise we created a system to collect suggestions for new projects which we expect to be a birthplace of Squeak projects.

3.2 Teachers as learners

Since the community is completely open, it is not possible to accurately characterize their members, but in the course start we asked the participants to answer a short questionnaire that allows us to have a clearer idea of who is interested in Squeak.

At the time we wrote this text, only 133 participants had responded to the questionnaire, so is on these data that we are working.

Thus, we can see that the majority of participants are female (52%) and that the most expressive age group is 46 to 50 years, as follows: 4% is under 30 years old, 17% have between 31 and 35 years old, 22% are between 36 and 40 years old, 19% are between 41 and 45 years old, 23% are between 46 and 51 years and 17% are over 51.

5% of the participants are teaching in higher education Schools or are not teachers.

In spite a minority of teachers of pre-school (1%) and primary schools (9%), there are teachers belonging all groups of the Portuguese education system with special emphasis on the teachers of ICT (17%) which are the largest group.

3.3 Reasons given for signing up

One of the questions we asked the participants mentions the reasons for signing up. Although we haven't done a proper statistical treatment, we noted that 25% refer reasons related to the desire of learn, 17% say that signed up by curiosity, 21% are looking up for new things, 23% signed because they are concerned to provide their students new opportunities for learning and 11% signed because they like technology.

Perhaps we can see here a concern with the quality of professional performance and discover some very important proactive attitudes to reach the success of new approaches in education, but the short time the experience is running don't give us the basis we need to go further in our assessment.

In the tasks of this first course it is implied the need to design and build a virtual laboratory, even incipient or embryonic, allowing learn how to programming without even using the terms and concepts associated with traditional programming. In an earlier Workshop on Squeak held a few months ago, the organization's head observed that the word "programming", stated at the activity title, was discouraging for candidates seeking information before subscribing.

4. DISCUSSION

In the course online, the participants were taken to explore the potential of Squeak related to the movement and its control through scripting. The aim was not to proper explore practical applications but to highlight the ease of programming, associated with the learning potential of Squeak.

Students of this course was required to submit a draft project at the end of the course to show their learning without, however, any prior guidance on the objectives of the project nor of its content.

4.1 The first Squeak projects

As the projects were being transferred to the platform we found they do not vary so much from the general application suggested in the course contents, but there are some attempts to use creativity which give us high expectations on the impact of the course.

Thus, some projects are combining the movement of rotation with the linear displacement of objects of everyday life, verifiable for example when cycling, in the movements of joggling in circus, in the handling of the elements of the solar system and so on. Other projects, try to represent the movement of animals in nature such as birds, fish and domestic mammals and motorized transport vehicles, such as boats and aircraft.

The use of a kind of joystick to control movement had also already submitted, applied to most common examples as car rings or to discover the pathways in fiction labyrinths or the animal's tracks in nature. Another proposal led to the representation of elements of child tales: The Turtle and the Hare.

Some projects promote the interaction with objects using the mouse we can group in the category of "knowledge testing" learned in other environments, such as the wheel of food and the separation of domestic waste.

We have projects in which the user interaction is reduced to acting in a start/stop button or to the exploitation of curriculum contents. One of such projects simulates a voyage of Brazil discovery and another shows the movement of the sails of a windmill, for example.

In all projects, participants tried to simulate curriculum content issues, using Squeak as an invisible laboratory. While learning at their pace, independently, trying new activities and discovering the basics of programming with Squeak these teachers highlighted many of the valued thoughts in education.

We found that those participants who take longer than most to seize the features, capabilities and the appropriate way to use the software, express some rejection attitudes of the Squeak. Firstly they start comparing the final "products" they get with the others of other systems that they already use, like powerpoints or flash clips, ignoring the features that make the new tool an added value education.

As they grow up in the acquisition of knowledge and understanding the way Squeak language works, some participants are beginning to ask questions related to situations not yet tested, using a hypothetico-deductive language: *if I use the x characteristic could get the y effect?*

5. CONCLUSIONS

Even though we are at an early stage of our study, we started to have indicators pointing to a performance of learners which is oriented to research and experimentation and believe that Squeak is the key in this (re)direction of learning.

In general, these teachers as learners are expressing behaviors common to that we have found in students of other levels, posting in forums and asking questions for which answers had already in the support documents. The greatest difficulty to learn how to use a new system as is the Squeak seems to be directly lied to how the documents available function and the learner's ability to exploit them, understand them and deconstruct them. Often, the help requested by the responsible course was to small problems of resource use, such as the upgrade of plugins in common Web browsers or the location of the downloaded files.

Initially, as they had not experienced enough, participants showed a tendency to replicate the projects they were presented as examples, but later started trying more complex and interesting simulations. We detected this feature in the work of participants that had several projects, and in these cases, the first projects have always been less creative and denotes less personal investment than the subsequent ones.

6 . REFERENCES

Allen-Conn, B. J. and K. Rose (2003). <u>Powerful Ideas in the Classroom</u>. Glendale, Viewpoints Research Institute, Inc.

Druin, A. and K. Inkpen (2001). "When are Personal Technologies for children?" <u>Personal and Ubiquitous Computing</u> **5**(3).

Kirschner, P. A., J. Sweller, et al. (2006). "Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching." <u>Educational Psychologist</u> **41**(2): 75–86.

Osório, A. J. (2007). Real Life. L. Valente. Braga.

Pinto-Ferreira, C., A. Serrão, et al. (2007). PISA 2006 – Competências Científicas dos Alunos Portugueses. Lisboa, GAVE - Gabinete de Avaliação Educacional.

Valente, L. and P. Moreira (2007). <u>Moodle: moda, mania ou inovação na formação? – Testemunhos do Centro de Competência da Universidade do Minho</u>. Challenges 2007, Braga, Centro de Competência da Universidade do Minho.