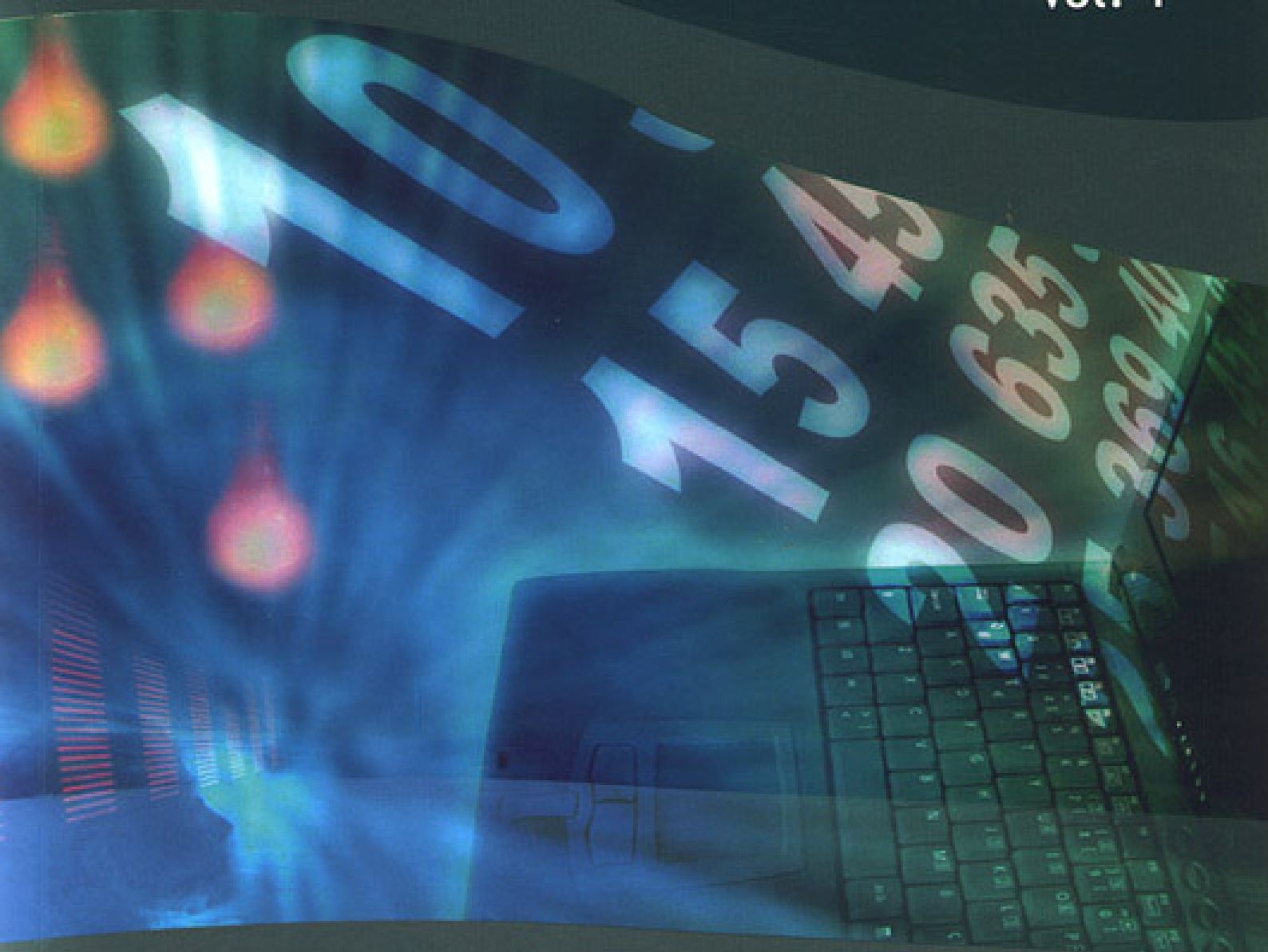


# Research, Reflections and Innovations in Integrating ICT in Education

Vol. 1



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# Multidisciplinary ICT based learning in practice

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Innovation is a search process of solutions to new situations and problems. New solutions arise from the discovery of the relations among knowledge references and multidisciplinary experiences.

Teaching children to feel how each knowledge or curricular area meets the others finding knowledge as a whole, is the first step for a practice and experience of multidisciplinary relationship learning. Thus, primary school comes also as a living laboratory of research to held new knowledge based upon curricular contents for which ICT displays powerful tools for such a creative environment while helping to improve the relationship of teacher and pupils in the classroom.

This paper presents the guide lines, activities structure and procedures of how ICT based knowledge contents according its multidisciplinary interaction have been integrated within the curricular areas learning practice and how an e-learning environment, besides school time, helps a following monitorized living learning process.

**Keywords** ICT; multidisciplinary; keyword

## 1. General remarks

Knowledge is not to know lots of things. Knowledge is not just to have lots of information. Lesser is to learn things independently and disconnected or without any relationship as within. This has been traditional learning (Fig. 1).

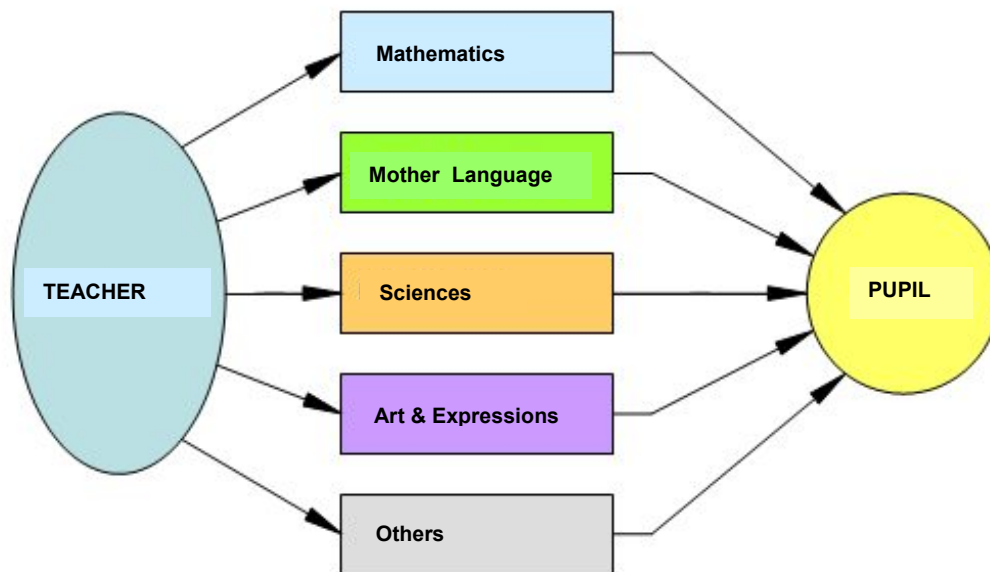


Fig. 1 Tradicional learning model

Knowledge is truly to achieve solutions for new situations, specially if adverse.

Skills to achieve solutions depends on how knowledge and experiences can be related. More important then to acquire information and knowledge, is to know how to relate them, even knowledge matters that seems to have not any kind of relationship

Teaching children to feel how each knowledge unitor curricular area meets the others finding knowledge as a whole, is the first step for a practice and experience of multidisciplinary relationship learning.

Primary school must be also a living laboratory of research to held new knowledge based upon curricular contents. ICT displays powerful tools for such a creative environment while helping to improve the relationship of teacher and pupils.

## 2. The ICT based learning frame

Teachers are intended to use computers in school within the learning process and knowledge acquirement. As a result of the civilization development, but specially by the recent and updated ICT expansion, the learning process ways and methods are changing, although a feasible learning model ICT based, has not yet been achieved or always remains in discussion.

Improvement of learning matters has to reflect the new ways and methods within ICT era but the achievement of the logical essence of ICT and its use must also be integrated. The evolution process from traditional methods to the ICT era must consider, analyze, discuss and compare several and different learning realities and systems that the general globalization processes are making closer.

The unavoidable change of learning ways and methods according to ICT development becomes effortless, easier, faster and an attractive way of learning for pupils while opening new worlds for teaching.

Our research and expertise run along more than 20 years in the development of an ICT based learning model within primary schools, as an innovative way of learning through active actions about living knowledge

### 2.1. An ICT based learning model

The new learning model named as Educação XXI<sup>®</sup> is an integration process of knowledge areas and ICT (Fig. 2). It is based on planned learning content guides for teachers that mixes and relates knowledge areas guiding them to the presentation of knowledge as a dynamic whole. At the same time matching sketch and template files are intalled in pupils computers over which they develop concerning ICT based activities.

Pupils can, thus, to live the search of the relationship among knowledge areas using ICT as a powerful tool for such a creative environment for knowledge building through research and ICT based projects concerning curricular matters - mathematics, history, natural sciences, music, geography and expressions.

The result is a new discovery of knowledge matters and its integrated way as knowledge itself and last but not least, an applied, directed and oriented way for ICT learning while helping to improve the relationship of teacher and pupils.

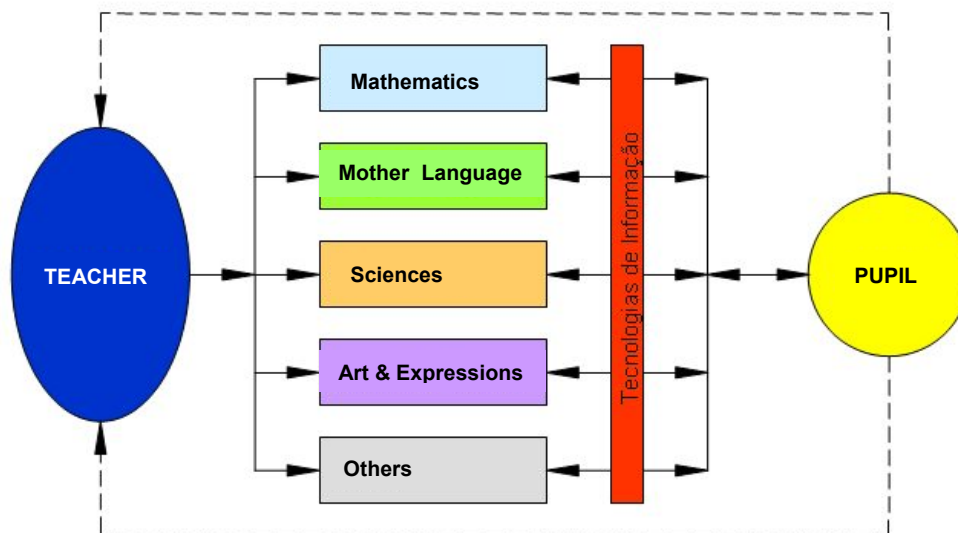


Fig. 2 ICT based learning model

### 2.2. Pedagogical issues

ICT education models developed in the last few years has a strong educational background in the constructivist theories, quite popular in education sciences. According Educação XXI model, the pupil is encouraged to pursue through the session under active, constructed and progressive behaviour based on a search for knowledge in which pupils' autonomy and interest are cornerstones. Furthermore, the question is, by nature, multidisciplinary and provides knowledge integration.

Sessions contemplate the development of projects, that pupils run as active agents, under survey and guidance of the teacher. Sessions are thus to make available an active learning environment under an interdisciplinary perspective pushing an enthusiastic oriented research about knowledge subjects. Nevertheless, the real goal of these actions is wider, although not immediate, because the main purpose is to develop changing adapting skills for new and diverse situations, while getting accurate inhabits for finding solutions.

### 3. The model in practice

Educação XXI® includes sets of learning contents guides for teachers and templates and software applications for pupils in order to run active learning actions through the living and development of projects pushing pupils to achieve the relationship among knowledge under a living practice.

Content guides are structured as thematic modules, for each quarter-year according knowledge units within official curricula contents. Each module is designed for each year level and that runs through 1 + 1 hours weekly laboratory sessions. It concerns to a curricular base-theme through which under an interdisciplinary environment, the teacher advises the research about its relationship to other knowledge themes is encouraged through an active action in order pupils can get result records. The teacher continuously monitorizes pupils' work developments directly or through its computer over pupils' computers (Fig. 3). On the other hand these research process of building knowledge has to become a record as a project development and conclusion under a time frame - a project where pupils reveal and learn to take care as their own creation.

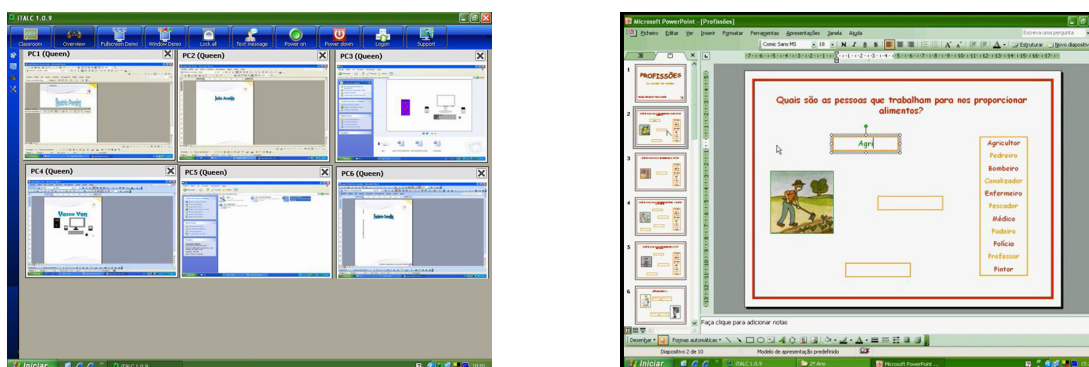


Fig. 3 Teacher follows pupil's screens or remotely remarks on each pupil screen

### 4. The e-learning environment besides classroom

Within this project an e-learning platform for all the community of pupils involved has been developed under the support of Ministry of Education program and is now available in [www.educacaoxxi.com](http://www.educacaoxxi.com), as a further learning monitorized tool besides classroom time frame.

Since this system is to be used by pupils aged between 5 and 10, it is important to notice that the requirements of such a system are quite different from those built to an adult audience. A number of requirements and features are held to such a system:

- The system must be able to adapt its behaviour, according to the student's learning process, thus providing an one-to-one tutoring, although not restricting the pupil's flexibility of search;
- The contents provided by the system should be attractive and diverse, and based on a multimedia environment;
- A number of mechanisms should be provided to support navigation within the environment, minimizing the risk of disorientation;
- Evaluation mechanisms need to be provided in order to assess the student's knowledge acquirement;
- A tutor (teachers and/or parents) should be able to monitor the behaviour of pupils within the system, being supplied the maximum information available;
- The system should provide authoring tools through a friendly interface or a back-office to allow educators to enrich the system with new knowledge, with minimum effort.

The architecture of the developed e-learning system is depicted in Fig. 4, where it is clear that the system is made up of three main modules: the knowledge base, the reasoning module and the interface component. The knowledge base encapsulates the data kept by the whole system, which can be sub-divided into two main modules: the *knowledge repository* and the *students' profile*. The system contemplates three distinct interfaces, one for each role a user can take within the system, namely the *student*, the *tutor* and the *author*.

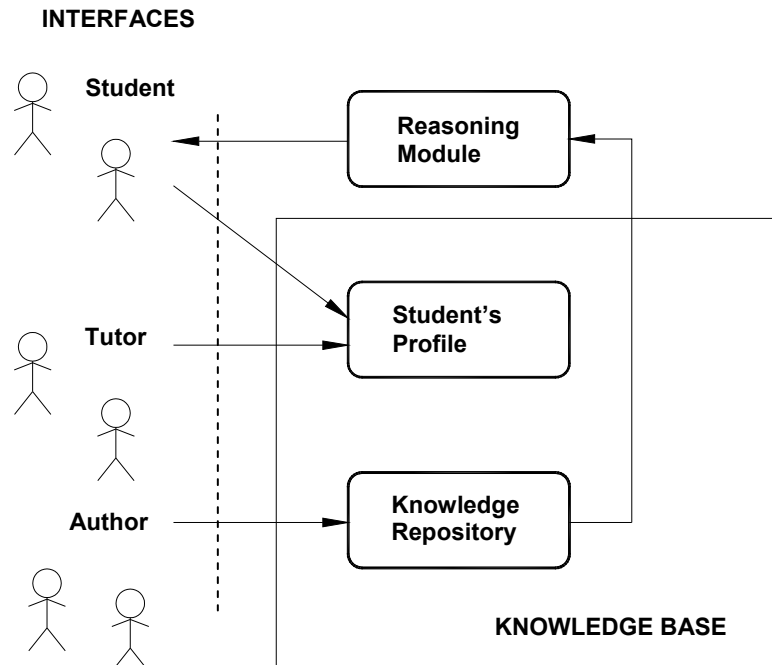


Fig. 4 The system's main component

The interactive multimedia environment for the pupil (*student* interface) comes as in Fig. 5. The *author* component of an e-learning system to this target – primary school pupils – the development of contents must be based on image processing technology, animation and movies requiring computer science skills that an interface with such features is not common yet. So, for the update, increase and improvements of contents for the presented platform a back-office programming environment according teachers issues and requests is now starting.

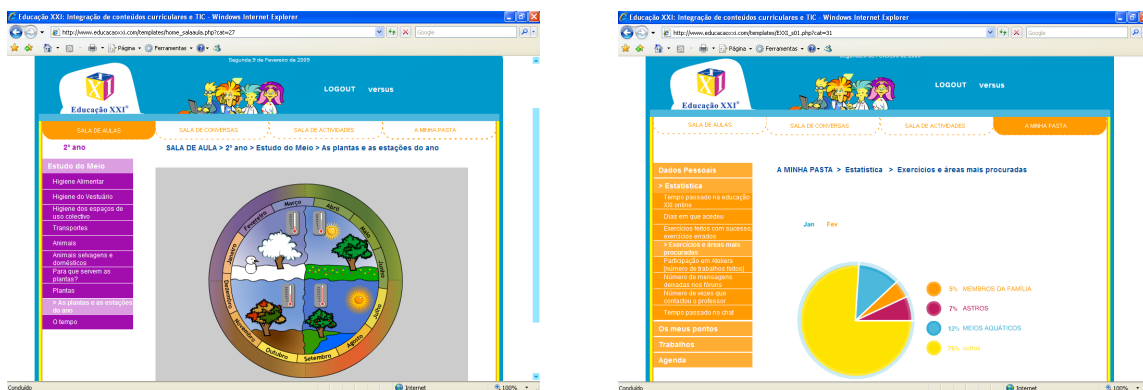


Fig. 5 The interactive multimedia environment within the e-learning platform for K-6

## 5. Conclusions

Although not under a formal way, the learning success of pupils involving a currently average of 10.000 pupils along the last 20 years is such a clear register as it is also an active improvement of teaching and learning under such an unprecedented pleasant environment for teachers.

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