Inclusive Design in Assisted Instruction

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Much instruction starts with abstract representations for which learners have insufficient foundation [1]. The British Standard, BS 7000-6:2005 Guide to Managing Inclusive Design, provides a comprehensive framework that can help all private enterprises, public sector and not-for-profit organizations, build a consistent approach to inclusive design into organizational culture as well as processes [2]. While courses, technology, and student services are typically designed for the narrow range of characteristics of the average student, the practice of universal design in education (UDE) considers people with a broad range of characteristics in the design of all educational products and environments [3]. This paper has been designed to provide an overview about the curriculum paradigm consisting in the fusion of the technology and the classroom instruction in economic higher education.
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Introduction

In our knowledge society where time to learn is fast and competence domains are widened and in rapid evolution, the economic higher education is forced to move towards the e-class model, characterized by an intensive use of personal computers and social functions founded on web.

This research is based on the idea that assisted instruction is a social application of the global information system, and it focuses on designing interactive educational standards referring to teaching, learning, assessing and self testing as methodological procedure. Such a manner can be understood as a default result of the developing of the hardware standards, which generated software standards, and, as a matter of fact, computer literacy standards.

1. The cognitive, conceptual and technological infrastructure for an educational organization

In our world of a continuous change, one of the most prevailing behaviours is that of convergence [4]. People converge into new local, global and virtual communities; concepts converge to form completely new concepts; technology converges to create new technologies and products; the personal computer become tool, tutor, tutee and finally the context for education. In this new environment, professional skills converge to create new professions.

The basis for this approach is the fact that technology is no more a hardware item but a system of knowledge. As a result, knowledge management can be studied from two perspectives:

- Knowledge can be viewed as “Object”; in this case, researchers as practitioners are building knowledge systems;
- Knowledge can be viewed as “Process”; in this case, researchers as practitioners are involved in education [5].

These two perspectives are reflected by two types of organizations: the educational organization and the learning organization. Both of them use *the workplace learning paradigm*, integrate content and technology in the same infrastructure and develop the cognitive infrastructure to interact with an information-centred global economy.

The concept of globalization was generated in a world which became a smaller place because of the term *information technology*. Technological knowledge is chaining increasingly rapidly. In addition, further training, in-service training, continuing education and similar concepts are emerging. The edu-

cational scene has undergone remarkable change as we approach *the learning society*; notions are shaped by the paradigms we hold. In these sense "paradigm" means the "working model" of what we do, why and how we exist as intellect [6].
The difference between the learning society and the individual learning is the same as the difference between theory and practice. For effective learning to occur, it is necessary for an educational organization to have followed an appropriate prior path of learning in the relevant domain.
An educational organization is an organization based on a technological infrastructure developed through the process of internal R&D in a specific domain of knowledge.
A first step in understanding the organizational transformation is to recognise the nature of the organizational learning, in terms of collective cognition where individuals constantly make sense of the environment and negotiate each other's learning experiences [7].
An important distinction made by several researchers into organizational learning has been that learning occurs at more than one level. The first one, which has been termed adaptive or single-loop learning, relates to the ability to adjust to new operating conditions. The second one has been termed generative or double-loop learning and it involves being able to reassess the underlying assumptions behind a situation. The third one has been termed triple-loop learning and is based on the ability and awareness necessary in order to learn how to learn [8].
A simple illustrative example can be taken from the technology: single-loop implies component competence, double-loop means configuration competence, while triple-loop reflects architectural competence. The process depends on the resource based view of the firm and generates *knowledge translation*, which can be defined as translating the meaning of a sentence in one language, with its specific cultural, technological and intellectual context, to a second language in a new context. This approach explains, at the same time, the *information gap*, the concept developed as a limitation in communication between organizations and between individuals.
Describing the process of metamorphosis of the educational organization, based on Bloom's Taxonomy, adapted for organizational learning, single-loop learning implies the ability to recognize, assimilate and apply knowledge from outside the organization; double-loop means the ability for analysis and synthesis of knowledge, while triple-loop reflects the ability for *knowledge evaluation*.

2. Knowledge translation

Knowledge production is more than a deterministic link between a conceptual map and technological infrastructure. Debating the meaning of profession and professional behaviour has a long and contested history in relation to education.
In our society, the driving force is knowledge and the axial principle is computer-assisted theoretical knowledge universalized by the global information system.
In our educational age, the key in development is not discovery of new knowledge but the use and process of existing knowledge.
In developing their chosen forms of knowledge, pure and applied scientists often isolate their subject matter from its natural context. Education is one of the understandable area in which this over-simplified approach has had scientifically unanticipated consequences in the twenty one century. It may well define a "stage 1" view of the scientific method.
A more general systems-oriented approach was needed. The "stage 2" form of the scientific method takes the "default" system properties of the phenomena into account by investigating it in its context.
If the term "science" is to be applied across a wider range of studies in education, then each of these areas of study needs to be re-construed, both in terms of how scientific knowledge in this area is recognised and defined, and in terms of how its particular forms of scientific method are made manifest and can be viewed one in relation to the other.
These re-construal of the nature of the scien-

tific effort are requiring and producing methodologies that go far beyond stage 2, to an over-arching framework for a new “stage 3” view [9]. We call this “explicit learning” by inclusive design in assisted instruction.
In knowledge age, science represents the main manner for environment research and, at the same time, technology became default application of this research; o priority in order to optimize these activities is the research in educational area.
Such kind of evolution could be explained because of permanently re-organizing of the research processes and systematically update and upgrade of the technological applications.
Hardware and software applications are simultaneously objects and tools for scientific research.
This approach generated the context for using the dichotomy object language – meta language, a characteristic of the programming languages, in sequence to develop scientific language.
Fig. 1 presents a conceptual description of the scientific research as a technological application in higher economic education [10].

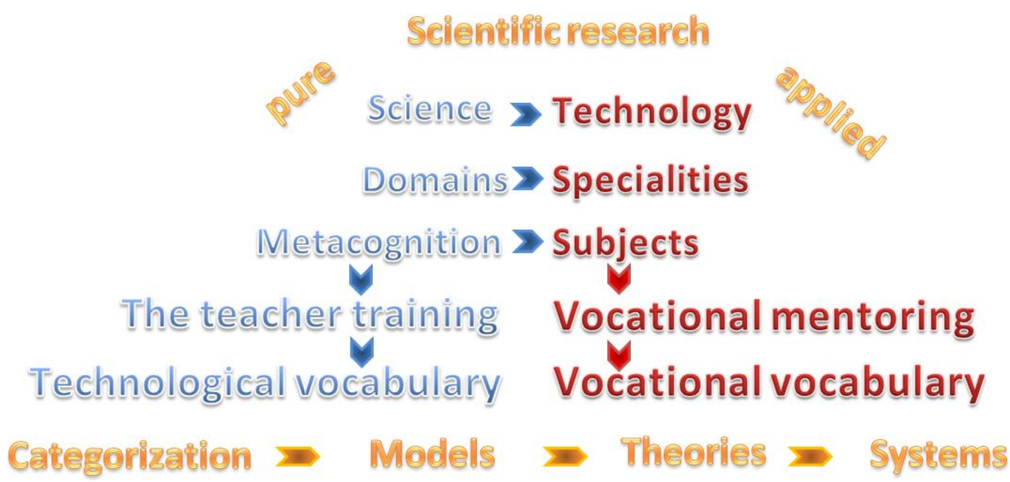

Fig.1. A paradigm for scientific research in education

Basis for a new educational model results from the earlier theoretical and practical researches in didactics assisted design [4]; theory and practice interact in the educational space, and the learning system becomes the engine of the learning society.

3. Knowledge cube

Considering pedagogy to be the activities that assist understanding, and teaching to be scaffolding learning activities and mediation of learning experience, technology could be used in activities for developing learning objects, or as tools, in order to contribute to the completion of tasks. Tasks are undertaken in order to achieve a result or outcome. This new model is two-sided and requires shared effort and conscientiousness on the part of learners and teachers.
Categorization, as a central topic in cognitive psychology, in linguistics, and in philosophy, it is decisive exactly in learning. Concepts categorization enables the student to classify (or to recognize the classification of) objects or concepts that belong to a group. This characteristic accelerates the thinking process, favours the instant selective perception and facilitates generalization and learning. This is *the pyramid of concepts* and represents the basis for knowledge, comprehension and application. Categorization, together with processing and analogical reasoning, has a special role in the inference of non-explicit (tacit) knowledge that the learner can conclude from what he has seen or heard.
Conceptual categories are higher order concepts, and they express the specific role of concepts in their contexts, and in *concepts mapping* they are visual elements relevant to analysis, synthesis and evaluation. These entities have a special role in processing explicit knowledge that the learner can receive

in a pedagogical dialog.

Scaffolding in assisted instruction consists in developing and using dedicated applications in order to match tacit knowledge to explicit knowledge in the zone of proximal development. This approach invokes *active learning design* and ensures *student-centred learning* (see Fig. 2).

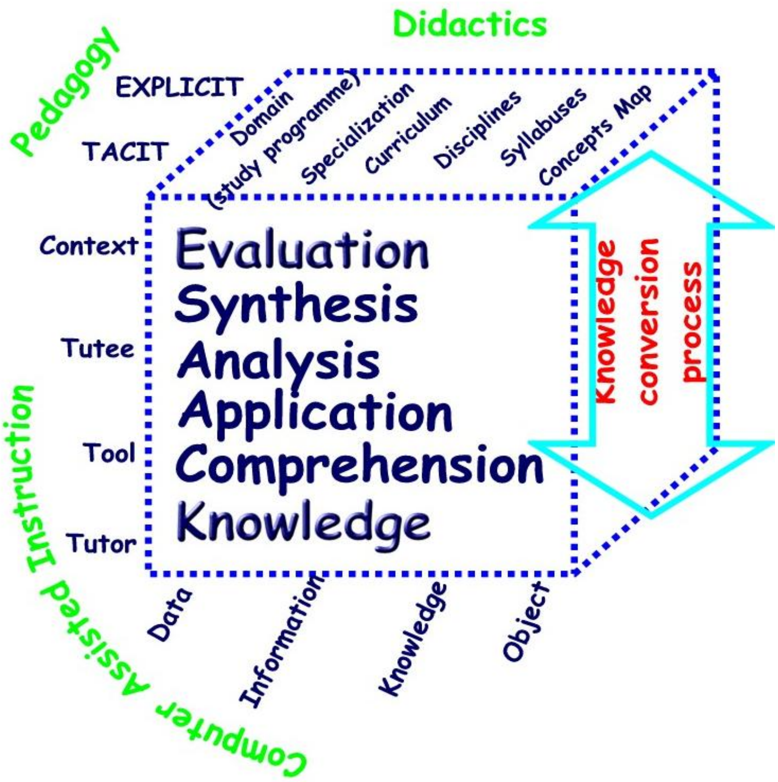

Fig.2. Knowledge cube in assisted instruction

When the personal computer is used to instruct in traditional mode a subject matter area, it becomes a tutor. In assisted instruction, the teachers educated using the principle of computer literacy, become competent users; they develop, adapt, and optimize their applications, based on their experiences, observations and interactions. They can reduce the routine, when it is required, by recording it in procedures, or they can stimulate the routine, in the other cases [11, pp. 50-55].

(1) In a traditional approach, the term computer-assisted instruction is used to describe the tutor mode; with advanced users, the content, gradually refined (data, information, knowledge and objects) is based on a glossary, permanently improved: as a pyramid of concepts for knowledge, comprehension and application, and as *a concepts map* for analysis, synthesis and evaluation.

(2) In the tool mode, the computer solves a practical function in getting a job done. It may become a paintbrush, a typewriter or an electronic spreadsheet. The widespread acceptance of tool applications such as database management caused schools to rethink the meaning of computer literacy. At this level, we optimize the convert process in the dichotomy tacit-explicit knowledge.

(3) When computers are tutee, the roles are reversed: the student becomes the tutor. The student teaches the computer. In this behaviour, learning about computer is seen as a discipline unique unto itself: it is the beginning for training the trainers. There is a dedicated discipline in this programme: *Computer Assisted Instruction*, as it reflects the reference mode to the computer: *tool*, *tutor* and *tutee*.

(4) When a personal computer becomes a

context, it integrates all forms of education (formal, no formal and informal) in a single one. The context reflects student desktop, teacher desktop or workplace office. The student desktop could be placed at home, in the classroom or in the office. This metaphorical construct leads to the *workplace learning* concept; for an institution it could signify *organizational learning*. An educational institution is the first type for an enterprise which intends to develop into a learning organization.

4. Pedagogical content knowledge

Technology has changed the cultural context of our world, and every process around us relies, to some extent, upon technology. Using computer as cerebral extension, connecting computers and sharing resources, Information and Communication Technology have changed, and continue to change the learning process developed into the conventional classrooms.

This domain of knowledge consists of an understanding of how to represent specific subject matter topic and issues in ways that are appropriate to the diverse abilities and interests of learners.

Figure 3 presents an example in order to reflect a structured access interface for a particular application (to edit a letter) using a program focused on text processing.

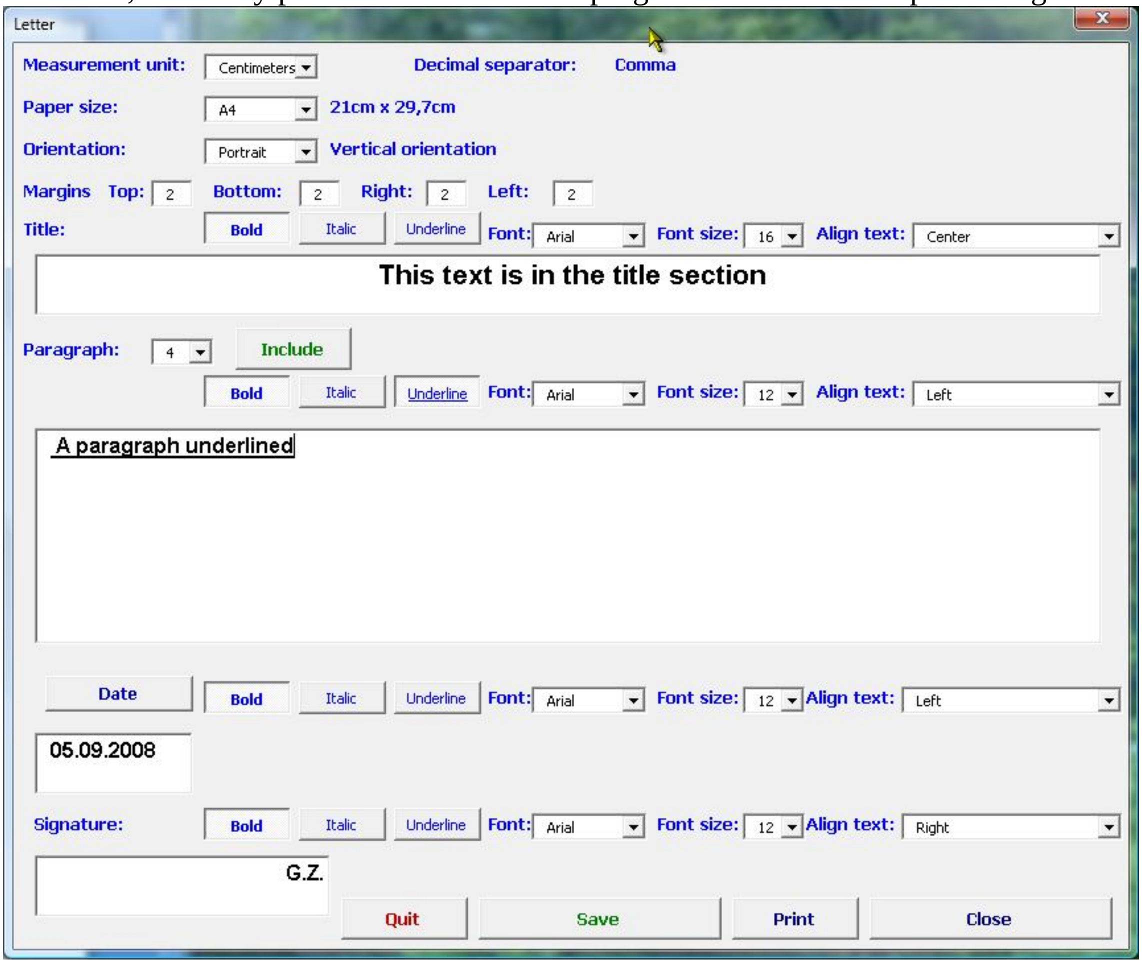

Fig.3. Pedagogical content knowledge application

This example contains four sections, just in case the letter is going to be a printed one; the first section includes the properties of the paper; the other sections refer the final object (the letter) which consists of three parts: title, content (one or more paragraphs) and, finally, date and signature. Each of the last three sections has assigned the main attributes of the text. The application consists of three types of objects for interaction: text box, command button and combo boxes.

Conclusions

Personal computers include two types of activities for log on (identification and certification) with the intention of transmitting commands. At the same time, there is a built-in system authorization, so as to accept commands. There are three levels of generic users' accounts: guest, standard user and administrator, which reflect three levels of competence, in order to maintain a functioning operating system.

Inclusive design in assisted instruction reflects a method for training users in a technological background, where there is a default interface, based on a programming environment which can generate easy access interfaces.

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