Edunetmatics – education assisted by a world telematic net

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Abstract: Traditional education is developed by building up connections between specific ideas and related skills through repeated practice and positive reinforcement. All that has no sense in virtual learning environments because the new information and communication technologies, NICT, have induced a new space concept in society and a new dimension space for the culture. Thus the traditional learning environment must be changed and its meaning translated to a virtual learning environment. This new learning space must be constructed over an innovative educational paradigm, which is determined by a new concept, named edunetmatics (education assisted by telematic net). The edunetmatic process has a dynamics inspired on an uncertainty principle. The outcome is a learning cybernetic cave. Some evaluation has been done over the Chilean national educational net, Enlaces. A Virtualisation of Experiments on Science and Technology Project is being developed and implemented on the national educational net, according to the Chilean Educational Reform.

Keywords: Virtual learning environment, edunetmatics, collective intelligence, educational navigation, educational network

1. INTRODUCTION

The Internet, the computer world net, is one of the inventions having the most impact in the past century. As with many new inventions, it has been integrated into daily affairs. It has been also used in education, but as an invention which has not been created specifically for education, it has been

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applied without doing a thorough study to obtain a natural projection above all the real dimensions.

This work is the result of research to understand the meaning of the Internet and to derive a projection of how education could be achieved. This same path has been followed with the educational robotics (Saldaño, 1989) obtaining an educational model which has been applied on one side to the pupil knowledge construction (Vega, 1991) and on the other hand to scientific research. Thus, significant results have been obtained.

Naturally, there are big differences between these research studies, because for the Internet application, it was found that the generated subayacent space was far more complex, overcoming in a broad way the system, communication, information treatment, space globalization and time contraction models. From what has been already stated about this new hyperspace which has been created by the Internet, a good projection on education has been derived.

The first aspect considered was education as a dialogue process and the possible types of educational communication, as relation, friendship, and communion (common – union), over telematic (telecommunication and informatics) nets (Reyes & Sandaño, 1995), and then an edunetmatic (education assisted by telematic net) process conceptualization has been developed (Reyes & Saldaño, 1994). Then participation levels or educational telematic net participation (Reyes, Saldaño, Mendez, & Garay, 1995; Reyes, Saldaño, Garay, & Mendez, 1997) were recorded, and finally procedural dynamic principles on edunetmatics were developed (Reyes & Saldaño, 1998a; 1998b). Innovative and educational underlying foundational paradigm components will be treated in this work.

2. CONCEPTUAL FRAMEWORK

2.1 Edunetmatic foundational space

The new learning space must be constructed over an innovative educational paradigm, named edunetmatics which is determined by a new space concept, that is:

- i) an inner space described by a topology, semiotics and valuation.

Topology means the space conformed by all the computers interconnected among them. Semiotics is the integration result of the oral, musical, text, hypertext, image, hyperimage and animation meanings. And valuation is interpreted as the valuation result of the all semiotic meanings.

This is very important because it will handle impulse and orientation to the navigation dynamics in the Internet hyperspace.

ii) an outer space composed by subjects, messages, communication means and reach

Subjects. They can interact as one-by-one (1-1), one-by-n (1-n), n-by-one (n-1) and n-by-n (n-n). So, they can be monopole or multipole, that is, not only one is emitting, but many of them can be emitting at the same time too. Then each subject, when it is emitting, is the center of the net. The net is multicentered. The subject may be collective and have life. Over the Internet the subject has life only when it is emitting. Otherwise it is latent, if it is plugged-in. Thus it is possible to say that there is a collective intelligence. This intelligence is independent of subjects belonging to the collective, but always dependent of one of them. It changes with the time but it is stable for the virtual space. The collective intelligence emerges from the direction and the action of subjects but it is absorbed by the reflection. Another characteristic of the subject is the educability, that is, to uninform and to exclude. Uninform has two meanings: to create criteria for the change and the permanency and to determine axiological and operative filter systems. Exclude includes managing codes and meanings in a critical, active and creative way.

Message. It is the integration result of oral, musical, text, hypertext, image, hyperimage and animation codes.

Communication means. These are defined by:

1. technological convergence: the integration of phone, radio, TV, computer, e-mail, chat, newsgroups and websites.(Dominique, 1999)
2. structure: as a cobweb.
3. space contiguity: in any place. time contiguity: in any time.
4. interactivity: 1-1, 1-n, n-1 and n-n. To any person, from any person.
5. navigation on World Wide Web net.

Reach. It is all the earth. A global village or globality.

2.2 Edunetmatic process

A new learning process is to be determined over the edunetmatic space just defined.

- Final or initial objective?

The traditional educational objectives are determined by the final goal of the process: “the student must be able to ...”. In the edunetmatic learning process, only the initial conditions are known, such as in the seed situation, from which a plant is produced, because it is not possible to know the netway process. A statement begins as “student is going to be able to ...”.

- Categorical or integral thinking?

The development work for the traditional thinking is done under a structured disciplinary frame. The thinking development network is constructed by an integral interdisciplinary knowledge.

- Competitive or cooperative methodology?

The present educational methodology is based on an individual paradigm (competitive) instead of community paradigm (cooperative), where students authentically grow up.

- Context or educational process?

Consider an uncertainty principle, the product of the context by the process is finite. This is an analogy to the Heisenberg physical principle. In other words, “the road is made by walking ...”. A. Machado. So, in the traditional educational process if the process is more important than the context, the learning is unmeaningful. Inversely, if the context is more important than the process, the educational product is insignificant. In the edunetmatic process the result of navigating (walking) in a network-like way (road) is self-constructed knowledge.

- Actual or virtual learning purpose?

The traditional learning purpose emphasizes to have a transcendental life, to be someone in the world. A virtual learning in any netway point is achieved when one is able to cease to exist and then exist again.

2.3 Edunetmatic dynamics

The following are some characteristics of edunetmatic dynamics:

1. It is determined by the classic systemic notion (in, process, out and feedback)
2. It is impulsed and oriented by the semiotic and the valuation
3. It is organized by a self reference logics (like the evolution of a seed)
4. It is defined by the continuous motion of its kinematic center
5. It is supported by
 - the synergy - total energy is greater than the energy of the parts.
 - the recursivity - the final point is the initial point of the next step.

- the fractality - the structure of the total motion is similar to the motion structure of any part.

3. EDUNETMATIC PARADIGM

This paradigm will be derived, taking into account the integration result (14) of the telematic net framework in the context of the Chilean Educational Reform, defined by the Chilean Ministry of Education (1996), and the Chickering and Gamson (1991) seven principles as guides of a quality education.

From the conceptual framework and from its main features an educational paradigm is possible to draw out.

1. The Internet hyperspace is a cobweb kind of structure and multi-centred. A semiotic comprehension is the basis for doing a good valuation. The best valuation will give a good impulse and a clear motivation to obtain a good navigation dynamics in the Internet hyperspace. Internet work is for any space, in any time, in any place and by any person.
2. Subject educability is obtained by uninformed and excluded process. Each subject must learn to share the knowledge, try to be a valid collector and be able to contrast other knowledge with his self-knowledge. The net knowledge (collective intelligence) is neither static nor trivial. Furthermore it is linked to a place and to a person who creates it. It is global. It is shared with anyone. It is universal with respect to belonging, language and location aspects. Each Internet user participates in a collective intelligence. The better the Internet work the better the navigation on the World Wide Web. Collective intelligence emerges from each action and direction subject. A collective intelligence must manage many unpredicted and unpredictable events.
3. Communications messages depend on the component codes and on the integration methods used for them. The better the technological convergence of communication means, the better the quality of messages will be.
4. The life and social holistic thinking are privileged over the bias of professional thinking. Entropic and distributed learning let persons grow up intellectually, affectively and socially. The learning purpose may be convergent or changeable, induced or emergent, deterministic or entropic.
5. In edunetmatics only initial learning objectives are known. An operative learning objective is to be able to construct new knowledge

and to develop critical, creative and metacognitive thinking and emotions (Reyes, Montes & Saldano, 1999).

6. The dynamical process is characterized by a one way motion - from the objective to the subjective, from the competitive to the cooperative, from the categorized to the integrated and from the actual to the virtual. The dynamical process is based on the self construction of integral transdisciplinary knowledge and on a community paradigm. The dynamical process results will be achieved as a self constructed knowledge through a navigation in a network-like way.
7. Finally it is necessary to consider the teacher role as an motivator, a guide, an animator and a facilitator (IGAF).

This educational paradigm must be picture-framed on the Chilean Educational Reform. The main features proposed are: a pedagogical activity centered on students, a cooperative work, a project methodology, problem solving and transversal objectives, and content about personal growth and self-formation, thinking development, ethical formation and personal environment (Chilean Ministry of Education, 1996).

Chickering and Gamson's (1991) seven principles serve as guides of a quality education. These seven principles have been applied many times and in different contexts. Moreover they define a picture-frame in which actors, learning activities and methods, and systems approach are integrated.

4. EDUNETMATIC PROJECT

Some evaluation has been done over the Chilean national net, Enlaces. But what has been done has not had a basic substantive framework which would let one obtain solid comparative results. The set of ideas can be exemplified by a project about the collection and information exchange about typical national dishes of five Latin American countries.

1. Project contextualization must be done to determine each one of the participants, individualizing them, organizing the communication system and defining in detail the compromises.
2. An interactive website must be designed and uploaded to the net. Integration, interaction, database definition, link and hyperlink, and assistance variables must be defined in an operative manner.
3. Topology and semiotic of codes and component meanings must be defined according to the project contents. The technological convergence of communication means level must be decided.
4. Dynamic space must be allocated with typical dishes list of each participating country along with the local ingredients for each dish and

recipes for cooking each one. This is done so that groups from the other countries can cook them and interchange information about them.

5. Relations among the typical dishes, ecology, customs, costs, and impact from each country must be collected.
6. Student participation patterns must be set up to evaluate the results.

5. CONCLUSIONS

The net of connections of our planet minds, assisted by a computer net, is as a sum of intellects and emotions which have generated a cybernetic cave (Luker, 1999). Those primitive men who live there, now have a collective intelligence and “in net emotions” (Reyes, Montes & Saldaño, 1999). All that is a product of a virtualisation dynamics of their cognitive and affection potentialities through a navigation across a world telematic net. These issues and principles must be considered when designing the networked schools of the future for all citizens.

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Antonio Saldaño is a professor at Universidad Metropolitana de Ciencias de la Educación. His formal education includes: Teacher of Mathematics and Physics, Universidad Católica de Chile, 1969; Diplôme d'Etudes Approfondies en Physique Mathématique, Université Pierre et Marie Curie. Paris, 1976; and Docteur en Physique-Mathématique. Université Pierre et Marie Curie, Paris, 1997. His areas of research are educational informatics, educational robotics, education assisted by telematic net - edunetmatics, artificial intelligence in education, and educational technology. He has served as visiting professor in more than 20 national and international universities. He is currently co-ordinator of a Master in Educational Informatics at UMCE. He is the winner of the Pioneer in Educational Informatics award, Chile Siglo XXI.

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