
INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) AND DISTANCE LEARNING IN ACADEMIC EDUCATION

**Carmen Mihaela Olteanu, PhD Lecturer
Spiru Haret University, Bucharest,
Romania**

**Alina Preda, PhD Associate Professor
Babes-Bolyai University, Cluj-Napoca,
Romania**

***ABSTRACT:** This article is a theoretic-methodological approach of the educational and psychological premises of the efficient use of ICT in the distance learning in academic education. We bring arguments for the construction of the pedagogic module of the intelligent hypermedia tutorial system. The e-Learning platforms should have functions that manage the students' interaction, the design and editing of documents through teamwork, students' assistance by a human tutor, or their assistance by a computerized tutor. It is recommended that the computerized tutor be made with the help of a package of programmes called author system (Author tools). The computerized tutor is in fact a generic network, being made of lots of systems of intelligent tutors, based on the hypermedia technology. In distance learning, students must show more autonomy while managing one or more aspects of their learning activity; hence, the use of metacognitive strategies are necessary. The usefulness of the pedagogical objectives for the distance learner is underlined by the cognitive and metacognitive approaches.*

Key words: distance learning, cooperative learning, e Learning, metacognition, mediation pedagogy, constructivism, technology of instruction, hypermedia.

1. Introduction

Quality distance education and training is provided by the use of some computerized platforms (often called *e-Learning* platforms) that guide and support the learner during the training. For the production and delivery of the distance training courses mediated by the information and communication technologies, a series of *e-Learning* platforms, such as

WebCT, *VirtualU*, *LeraningSpace*, *Librarian*, *TopClass*, *Pleiad*, *Classleader* have been designed, developed and marketed, platforms which have some shortcomings. For example, some of them put the pedagogical preoccupations on the second place and the course materials of the hypertext type, their permissive structure and the way of reading this structure contradict certain pedagogical principles. In these circumstances, students can access different parts of the course without taking into account their skills or the sequence of the various parts of the course. The lack of personalized pedagogical support can make many students drop out. Numerous universities have found themselves in such a situation, including universities from the United States of America or the National Distance Education Centre from France, where the dropout rate announced between 1991 and 1999 was around 70% (Després, 2001).

To guide and support the distance learner, the *e-Learning* platforms must include functions that manage the group of learners' interaction, the design and editing of documents through teamwork, the students' assistance by a human tutor, and their assistance by a computerized tutor, the cooperative achievement of the computerized tutor using a software package called author tools etc. The computerized tutor (the artificial tutor) is actually a generic network, a lot of systems of intelligent tutors based on the hypermedia technology (Talhi and al., 2002).

The specialists in the field recommend that the system of hypermedia intelligent tutors (or the hypermedia intelligent tutoring system) should be, on the one hand, independent of the subject to be learned in order to satisfy a maximum number of specialties and, on the other hand, the independent of the material platform, taking into account the great diversity of the existing IT park. From the student's point of view the system should be interactive to prevent the distance learner's passivity, adaptable, and at the same time it should provide assistance to mitigate the two problems encountered in this type of learning, i.e. disorientation and cognitive overload (Talhi and al., 2005).

Pedagogical assistance or support requires the intervention of a human or artificial tutor that closely monitors the students throughout their training. The human or artificial intervention necessary to guide and support distance training is achievable by providing intelligent hypermedia tutorials with two working modes. In *the first mode*, when learning is synchronous, a human tutor supports the distance student. In *the second mode*, when learning is asynchronous, the student's support is made by an artificial tutor. The asynchronous mode allows training with no time limits or space restrictions, while the synchronous mode enables

a real-time open discussion. The following factors justify the inclusion of the two types of assistance in a hypermedia intelligent tutoring system.

2. Objective-based pedagogy and distance training

Objective-based pedagogy (PO) appeared in the United States at the beginning of the twentieth century, and in recent years it has seen great success in Europe and elsewhere. In terms of methodology, it proposes the decomposition, based on pedagogical/educational objectives, of a complex learning module into simple and essential elements in order to facilitate the teaching / learning and assessment.

The pedagogical objectives can be defined at several hierarchical levels. Starting from a global pedagogical objective or 'pedagogical goal', the number and names of these levels differ from one author to another. For example, some specialists use a three-level hierarchy: 'general pedagogical objectives' (GPO), 'specific pedagogical objectives' (SPO) and 'operational pedagogical objectives' (OPO) (Hameline, 1990).

The objective approach has the merit of focusing the education on student. It uses the resources of the learning theory to modify the students' behaviour and to help the students learn at their own pace, maximizing the process of knowledge acquiring. To meet the criterion of 'observable and measurable', the pedagogy through objectives orients the learning situation towards the result. It allows measuring the students' progress accurately, achieving thus an 'objective' assessment (Saint-Onge, 1992).

2.1. The usefulness of pedagogical objectives for distance learner

Some works addressing the authors writing distance learning courses propose to include explicit goals for the learning activities in the courses (Rowntree, 1994), seeing this not only as an excellent means of providing the author's educational intentions (Dessaint, 1995), but also as an opportunity to guide or orientate the student (Zubot, 1993).

Within a learning strategy, discussing the objectives and goals is a stage in the preparation phase of knowledge acquirement, stage that allows the learner to give a sense to what s/he is required (Tardiff, 1992). Communicating the objectives and goals can foster the distance learners' autonomy; it is important that they should be explicitly informed of all decisions and should be required to participate enabling their accurate position in the relation

to the overall objectives and also a formulation of their own sub-objectives. The accuracy of the objectives and goals positively influence the learner's emotional state and, at the same time, activates some important factors of motivation, such as the awareness of the usefulness of a task, the perception of the importance and the requirements of the task (Deschênes, 1991).

Some experimental studies state that the effect of the communication of the objectives in distance learning is important and meaningful. Others say that their presence is less important when the structure of the content and the presence of other indicators clearly establish the way to be followed.

However, communicating the specific objectives has some disadvantages. It might make the student limit to only what is indicated in the objective. It was found through an empirical manner that the students who were told the reading objective before a reading were more superficial, having a superficial understanding of the text. It seems that they selected from the text only the information that allowed them to meet the objective. This example, however, shows rather the limits of the behavioural objectives and not necessarily an adverse effect related to the communication of the objectives. In fact, students cannot be criticized for using the objectives as a guide, focusing their efforts on the objective, if it describes a real pedagogical intent. The issue becomes a problem if a superficial objective is used.

On the other hand, the presence of some behavioural objectives may require an approach in which the students may not manifest their autonomy, or the self-management of their own training. Although the success rate for the objectives defined in this way is good, this type of procedure limits the student in terms of training. Besides the disadvantages related to the student's autonomy restriction, this approach refers to knowledge associated with a firm content.

The evolution of the cognitive theories allowed going further in defining objectives based on the systematic analysis of the content or the tasks. The learning model evolved and the strict definition of the behavioural objectives was replaced by an approach based on skills or abilities. If the learning activities are designed for a specific objective, this objective will be expressed more according to a cognitive operation or process than according to a behavioural result.

The constructivist approach presents a fundamentally different conception of knowledge, knowledge being defined as a mental representation of a problematic situation. Knowledge is a construction resulting from both an individual's mental activity and his

experience (Deschênes et al., 1993). Some authors argue that in real life, the complex domains of knowledge are less structured: information is not linear or hierarchical and the same information can have different meanings according to the situation or context. To address these areas less structured, an individual must develop a 'cognitive flexibility', 'a supple process of assembling this knowledge which may enable the construction of a new representation specific to each situation' (Spiro and al., 1992).

Constructivism proposes three fundamental principles of training: 1) knowledge is constructed by the learner and is neither transmitted nor stored, 2) learning requires the engagement of an active learner who builds his/her representations through his/her interactions with the material or people, and 3) the context plays a decisive role in the learning process. Given the importance of the context and the authentic activities used for the student, activities that integrate cognitive, metacognitive, affective and psychomotor aspects are necessary, involving the promotion of the development of the learner's capacities or skills (Duffy and Jonassen, 1992).

2.2. Categories of objectives in distance education

The objectives that can be associated with learning activities proposed to distance learners are divided into five categories or domains: **cognitive, affective, motivational, metacognitive** and **psychomotor**.

The **cognitive objectives** are based on the knowledge of a conceptual field, on the information processes related directly to the content of the subject. Thus, the cognitive level can be distributed among several tasks: 1) *activating knowledge*, 2) *selection of important information*, 3) *organization*, 4) *integration*, 5) *transfer*, 6) *generalization or conceptualization*, 7) *review* and 8) *recovery of knowledge*. The printed text being, by far, the most used medium in distance education, these cognitive operations establish a parallel with the strategies used in active reading and in the learning process (Deschênes et al., 1993).

The metacognitive objectives take into consideration that metacognition includes two dimensions: *metaknowledge* (knowledge about knowledge) and *learning management strategies*. Although *metaknowledge* may seem natural for adult learners, its embodiment for a student is a complicated process (Noël, 1991). The use of the *metacognitive strategies of planning, control and assessment* is important for the educational success. In distance education, students must demonstrate greater autonomy in the management of one or more

aspects of their learning; hence, the necessity of the use of the metacognitive strategies. The autonomous students must know their own strategies in order to use them, to know what they do not know in order to search for the information needed, to plan, regulate and evaluate their own progress. Besides the inclusion of the learning activities based on metacognitive objectives, the use of the metacognitive strategies can be encouraged, allowing the student to control various aspects of training.

The affective objectives – make emotional intelligence work and are based on *cognitive* and *aesthetic emotions* and on *feelings* and *attitudes* that can change the learning environment through a new view of the conceptual field of the course (Griséand Trottier, 1997). As part of the professional training, they are translated into lots of socio-affective skills (personality traits, relational skills, professional commitment) that characterize this training. An examination of the distance academic or vocational educational literature shows that the affective objectives do not seem to be an important concern. However, their presence is widely recognized.

The motivational objectives are based on the idea that the learning activities may involve the intervention of motivation by using personal experiences and by appealing to the desire and willingness to act in order to achieve cognitive activity. Motivation is modelled by the learners' representations of the objectives, the tasks and their own abilities: the task aims to learning or assessment, it is useful to learning, but are they able to meet the pre-established challenges? (Tardif, 1992). For the author of the courses, maintaining the students' motivation is an important aspect in the development of all the learning activities or materials.

3. The usefulness of the hypermedia intelligent tutorial system

According to the above mentioned pedagogy based on objectives, to organize the learning material, the design of the pedagogical module of the hypermedia intelligent tutorial system uses a hierarchy of the pedagogical objectives on three levels: general pedagogical objectives (OPG), specific learning objectives (SLO) and operational pedagogical objectives (OPO) (Brusilowski, 2003).

This hierarchy allows three levels of abstraction for this module. The components of any intelligent tutorial system are: the parts of the system (that satisfy the general pedagogical objectives), the chapters (that meet the specific pedagogical objectives) and the hypermedia learning units (which relates to the operational objectives). The hypermedia learning units of

the pedagogical module are units made for students and the tutorial system organizes the training process around these parts (Talhi et al., 2006).

The hypermedia learning units presents the students with the theory they have to learn and the examples which give them the possibility to apply the theory. They also measure the degree of the students' achievement of the operational objectives. The management of the hypermedia learning units in the intelligent tutorial system is ensured by a database of knowledge founded on five sets of rules. These sets of rules ensure the following functions: the negotiation of the learning objectives; the estimation of the acquisition after the negotiation; the planning of the succession of the hypermedia learning units; the search, the selection, and the visualisation of the hypermedia learning units and the students' assessment(Zidat et al., 2007).

4. Conclusions

Using the information and communication technologies in education presents a number of opportunities.

a) The first is undoubtedly the *pedagogical / educational opportunity* because it represents the very purpose of education. Despite the existence of a close relationship between education and information and communication technologies, some institutions still prove 'resistant' to the adoption of the ways mediated by the new learning technologies and the new technologies which help transmit knowledge through the distance learning system.

b)While applying the information and communication technologies in education one should consider the *social opportunity* and the *economic opportunity* because these technologies require significant investment. Researchers say that once the societies entered the post-industrial and post-modern age, the higher education institutions are required to build new skills and provide highly trained professionals on the labour market, people who are able to fulfil their role in innovative and pragmatic positions.

c) The access to the digital content available on the Web is a controversial field, the *legal opportunity* having great importance. One of the problems which arise is whether the inserted content or the one created directly on a remote access system by a teacher should be (or not) freely available and if this work gives the teacher the right to royalties.

d) TheWeb development can not be explained without the concept of digitization and its implications. Hence, the importance of the *technological opportunity* in the development

of the information and communication technologies applied in education. Thus, the innovations introduced by informatics in the media based on hypermedia facilitate the mobility, generativeness, spontaneity, interactivity and relocation.

References

Brusilowsky, P. (2003). Developing Adaptive Educational Hypermedia Systems: From Design Models to Authoring Tools. In: T. Murray, S. Blessing & S. Ainsworth (Eds.), *Authoring Tools for Advanced Technology Learning Environments*. Kluwer Academic Publisher.

De Koninck, G. (1996). *À quand l'enseignement? Plaidoyer pour la pédagogie*. Montréal: Les Éditions Logiques.

Deschênes, A.-J., Bourdages, L., Lebel, C., Michaud B. (1993). Quelques principes pour concevoir et évaluer des activités d'apprentissage en formation à distance. *Revue Canadienne de l'Éducation*, 18 (4), pp. 335-348.

Deschênes, A.-J. (1991). Autonomie et enseignement à distance. *Revue Canadienne pour l'éducation des adultes*, V(1), pp. 32-54.

Després, C., George, S., (2001). Supporting Learners activities in a distance learning environment. *International Journal of Continuing Engineering Education and Lifelong Learning*, Volume 11, nr. 3.

Desseaint, M.-P. (1995). Au coeur de l'apprentissage: les objectifs et les activités. In M.-P. Dessaint (Ed.), *La conception de cours: Guide de planification et de rédaction* (pp. 141-203). Sainte-Foy: Presses de l'Université du Québec.

Duffy, T.M., Jonassen, D.H. (1992). Constructive criticisms. In T.M. Duffy și D.H. Jonassen (Eds.), *Constructivism and the Technology of Instruction: A Conversation* (pp. 183-204). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

-
- Grisé S., Trottier, D. (1997). *L'enseignement des attitudes: guide de formation pour les programmes développés selon l'approche par compétences*. Romouski: Regroupement des collèges Performa.
- Hameline, D. (1990). *Les objectifs pédagogiques en formation initiale et en formation continue*, 8^{ème} édition. Paris: Edition ESF.
- Landry, F. (1985). L'imprimé, un moyen d'enseignement privilégié. In F. Henri et A. Kaye (Éds.). *Le savoir à domicile* (pp. 209-259). Sainte-Foy, QC: Presses de l'Université du Québec.
- Legendre, R. (1993). *Dictionnaire actuel de l'éducation*, 2^e édition. Montréal: Guérin, Éditeur.
- Lewin, K. (1959). *Psychologie et dynamique*. Paris: P.U.F.
- Noël, B. (1991). *La métacognition*. Bruxelles: De Boeck-Wesmael.
- Rowntree, D (1994). *Preparing materials for Open, Distance and Flexible Learning*, 2^e édition. Londres: Kogan Page.
- Saint-Onge, M. (1992). Les objectifs pédagogiques: pour ou contre? *Pédagogie collégiale*, Vol. 6 (2), pp. 23-28.
- Spiro, R.J., Feltovici, P.J., Jacobson, M.L., Coulson, R.L. (1992). Cognitive Flexibility, Constructivism, and Hypertext: Random Access Instruction for Knowledge Acquisition in Ill-Structured Domains. In D.H. Jonassen & T.M. Duffy (Eds.). *Constructivism and Technology of Instruction: A Conversation* (pp. 57-75). Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- Tagliante, C. (1991). *L'évaluation*. Édition Clé international, France.

-
- Talhi, S., Djoudi, M., Zidat, S., Ouadelf, S. (2007). *Intégration des TIC en pédagogie universitaire: proposition d'un modèle de tutorat en line*. Premier séminaire international sur l'ingénierie pédagogique de Batna, Algérie.
- Talhi, S., Djoudi M., Zidani, A. (2001). Un système auteur de tuteurs intelligents: évolution du mono-usager vers coopération. *Revue Sciences et Techniques Educatives*, Volume 8, nr. 1, 127-138
- Talhi, S., Djoudi M., Zidani, A. (2002). *Camits: Système Auteur Coopératif de Tuteurs Intelligents*. Actes du 5^{èmes} CIDE'5, Hammamet, Tunisie.
- Talhi, S., Djoudi M., Zidat S., Batouche M. (2005). *Un système tuteur intelligent hypermédia pour l'apprentissage à distance asynchrone*. Congrès international en informatique appliqué, CIIA'05, Bordj Bou Arréridj, Algérie.
- Talhi, S., Djoudi, M., Batouche M. (2006). A cooperative authoring for intelligent tutoring system. *Asian Journal of Information Technology (AJIT)*, Volume 5, nr.5, 497-503.
- Tardiff, J. (1992). *Pour un enseignement stratégique. L'apport de la psychologie cognitive*. Montréal: Les Éditions Logiques.
- Zidat, S., Djoudi, M., Talhi, S. (2007). *Les TIC au service de la formation universitaire*. Premier séminaire international sur l'ingénierie pédagogique de Batna, Algérie.