Knowledge Communication Programs Design

Ioan Maxim[1], Tiberiu Socaciu-Lendvai [2]

Teacher Training Department
„Ştefan cel Mare" University Suceava, Universitatii, 13, ROMANIA
e-mail: maximioan@yahoo.com
(2) Economics and Public Administration Faculty
„Ştefan cel Mare" University Suceava, Universitatii, 13, ROMANIA
e-mail: socaciu@seap.usv.ro

Abstract

The design of knowledge communication programs presume one strategy of knowledge presentation, succeeded by a scenario for developing interactive learning. Many didactic use products in informatics often neglect one of the two aspects. A conceptual and projective clarification is necessary for doing logical projects for assisted learning programming, programs that satisfy the defining characteristics of educational software: correspondence with the programmatic documents, accuracy and completeness of the content discussed, interactivity, correspondence with the target population, the feed-back and the formative assessment, pointing out achieving the objectives and so on.

An attempt to transform into algorithms the learning programs design is late and harmful; success lies precisely in diversity. Moreover, specific procedural particularities of different disciplines, the diversity of learning methods and procedures implemented in the educational software, non-uniformity of contents, specificity of target population or its samples, impose some very important projection rules in the design of learning programs practice.

Keywords: Assisted learning, Logic project, Educational software, Learning scenario

1. Introduction

Constant communication deficit between the segments involved in the learning programs design, psycho-pedagogy and informatics segments, is being concretized in learning informatics products for educational use of questionable value and utility.

Undeclared dissensions between the two areas work together with conservatism of the educational system, sluggish and obsolete, which has facilitated and benefited from the lack of constructive dialogue between the two segments involved in logical and effective design of learning programs.

The system reform requires a sinuous way, long and costly, which supposes the removal step by step of invoked obstructionist elements by the three parts; informatics and psycho-pedagogy segment, and educational system, which should validate the efficiency of informatics product for training.

Certification of the final product of the education system is a condition for quality and efficiency for the informatics product in educational use. Therefore, the design of

learning programs can not be disengaged any time from the evolution, from the changes which regard permanently the national education system and it must be every time subject of laws which govern the system.

2. Results and argumentations

The computerized educational system, as designed by the Promoting Informatics Technology Group, in spring 2001, doesn't fit and does not meet the requirements of assisted learning Romanian education system (Siveco, 2009).

Declared as being the system for the educational reform, based on the education reform objectives proclaimed by e-Europe strategy developed by the European Community and integral part of the initiative European e-Learning, the SEI program although using numerous human and material resources, has failed.

Designing learning programs should be based on defining characteristics of educational software (Maxim, 2008):

- conformity with the curriculum;
- accuracy and completeness of onset contents;
- interactivity;
- compliance with the characteristics of target population;
- feedback and the formative evaluation;
- marking the objectives achievement and so on.

The content diversity and peculiarities of procedural features, specific for different disciplines, arsenal of methods and procedures implemented in the training programs, specificity of target population, exclude any attempt to algorithm the design of training programs. At the same time, the unity is in the diversity and the rules absence or methodological settlements would maintain the system in the craft area, in the moment inspiration area, situation categorically excluded from learning theory and practice. For this reason, the settlement of the design rules, which lead to quality informatics product, interactive, attractive, bearing appropriate scientific content, producing skills and competences proclaim through the specific objectives for each discipline, is a necessity.

A learning program is for students, book and teacher at the same time and must include educational valences of the book, informative and formative task of this, as and the procedural part included in the methodological and didactic task of the teacher and to impose the relationship with the student, to achieve operational objectives.

Starting from requirement that the manual should achieve the consistence with the curriculum and have the complexity degree in agreement with the particularity of the target population, the educational software should fulfil the same requirements:

- to submit same elements of scientific content, but by means that are specific for it;
- to achieve the same level of difficulty as a book;
- to ensure equally, scientific accuracy of the transmitted content.

Unlike the book, the educational software has one virtually unlimited space that can back up and complement elements of scientific content by images, audio and video recordings, to present the processes and phenomena described by the text of the manual, on the dynamic processing of theses.

This way of transmitting informatics by text supported and complemented by audio and video records, represents an important advantage for the learning programs, but at the same time an element that must be judiciously controlled. Students are not used to "learn watching", and therefore, the illustrated scientific content must be supplemented with comments or appropriate subtitles, which will highlight the essential elements of transmitted content, will emphasize the students into the essential and will protect from harmful elements of the image or video recording.

Scientific content can be presented in the three forms:

- image or video recording;
- audio recording;
- custom text, activated by elements associated with the two previous modes of representation, explanatory tools, links to pages or windows for thoroughgoing study or extension, starter, processing of feed-back in learning situations.

The presentation and representation manner of scientific content must be in conformity with the particularity of the target population:

- in preschool and primary cycle content is transmitted primarily by image, less codified forms of representation of informatics, stick up by audio records;
- learning tasks is transmitted by audio records and they must be short, clear, concise, without ambiguities or possibilities of interpretation;
- learning tasks should be illustrated by demonstrative elements;
- the difficulty degree to grow progressively, to avoid bottlenecks, situation of difficulty to be asseverate by help elements, which enable the student to solve the problem by fragmentation and a return to the original problem by defragmentation (Maxim and Moroşanu, 2008).

A strong point of a learning program is interactivity. Even if the program is primarily for communication of new knowledge and through learning scenarios most situations where the student may be in difficulty are forecast and obviously there are set and applied some learning methods and processes which help the student to overcome these moments, no scenario can intuit and implement in a program all these situations. For this reason it is desirable to identify some dialogue techniques that allow students to question the software, in a manner familiar to them, in cases of student's doubt of communication.

It is widely known the passivity and un availability of the student for dialogue in communication in knowledge situations, but it can be reasoned by the volume of new information and the absence of cognitive structuring or reorganization of information, which occurs only after one prior assessment, a renewal of initial synthesis resulted by strengthening retention and by operating of the content.

Therefore feed-back must be done after the presentation of a relatively low volume of knowledge, usually at the end of a paragraph or a sequence of paragraphs that address a common, dominant element of scientific content. Identifying sequences of content, after which is the feedback done and the learning situations that start the feedback, are important elements in designing the learning scenario. The feedback is for the student the most important occasion to highlight and clarify communication errors, understand and maintain the transmitted scientific content; and is the first step towards the activation of the contented elements. Moreover, it is an opportunity for the student to accommodate with exercise techniques.

The transit through the last communication knowledge sequences and getting to the afferent feedback moment marks the beginning of the exercise sequence, for a systematic summary and the contents activation moment. A side effect of this sequence is to obtain a measure of the degree of achieving operational objectives and training skills derived and which can be expressed by the mark.

This way the possibility to have a measure of the efficiency of its work and to build up a plan for improvement is offered to the students (and teachers), even if only by going over of the learning program, where the acquired outcome is not satisfactory.

Although there is a very rich literature in this domain, which contains definitions of these key concepts, none manifested a tendency to unify those different meanings.

This inconvenient has not been an obstacle to rapid progress, theoretically and in particular, in its application. The accumulated knowledge and the newly introduced paradigms require, from time to time, reassessment of key terms by the resumption of the effort to redefine and clarify the concepts.

The comprehensive bibliography makes possible the formulation of a concrete response to the question: „What is an learning program?". The notion of educational software allows the definition of the concept of computer-assisted learning and today is increasingly felt the need for assimilation of results from artificial intelligence domain, result which will gradually lead to intelligent systems training.

Intelligence of such training systems is linked to their ability to teach and to adapt to the requirements, capabilities and to the peculiarity of the student, although it is possible that soon we can talk about training programs which infer with the own persuasions and with student's emotions and which are able to express, in turn, emotions and feelings alike humans.

The concept of intelligent agent its felt more often usefulness in the design of teaching programs (Maxim, 2008).

With no unitary concept regarding the definition of the agents, research advance so rapidly that it can be said that an unitary point of view and an unifying concept is already shaping, so we appreciate that the domain is heading towards an inevitable international standardization.

In training programs designing, the agent is often treated as the "attribution and effect", alternately, according to the learning situation for teacher and student. However, the concept is substituted to a kernel of informatics product, which manages besides the elements of scientific content or learning situations, attitudes, behaviors, responsiveness, experience, feelings of students, action expressed during the process of learning subordinated by educational software.

The agent defined in this case, as „an entity that guides the process of instruction directing it to achieve operational objectives", indicates that it meets one task of training, causing a change in attitude and behavior for student. In terms of targets, educational agent exceeds the register act, considered a defining characteristic of the agent's concept („pursuing an action, changes something in the environment" or „Agents act: that is why they are called agents") (Maxim, 2008), involved in shaping the student's personality, acting on the attitudinal and emotional register, intrinsic of training.

Educational agents implemented in learning programs are based on their models of action upon learning procedures and methods; this makes them affect the "environment" and themselves at the same time.

If an efficient educational process requires a proper approach, achieved through a systematic manner of activity and a correct decision regarding the selection and application of training methods, the methods represent specific organization forms of the relationship between agents and between agent and the environment. The "educational environment" includes a suite of elements that concerns also the knowledge, training, and at same time, the agent-student personality shaping.

The learning procedure is the way of expressing the method, is the practical way of achieving it and is the fact that imposes an operating model to the agent-teacher and conditions the operating model of the agent-student. Relationship method-procedure is dynamic, so one method can become a procedure in the other methods and vice versa.

Rationality presupposes student's initiation of an action in the intention of maximizing their performance in relation with the evaluating function (Shardlow, 1990).

The rational autonomous action, as defined, is too large for a criterion, which extends too much this object's category. An acceptable "specific difference" is made by the definition of the Jennings (Jennings, Sycara and Wooldridge, 1998) for which "an agent is a computing system situated in a certain environment, which is capable of flexible autonomous action to achieve its designed objectives".

It is remarked that three key concepts are used to define an agent: positioning in relation to the environment, autonomy and flexibility. Positioning, in this context, means that the agent receives input from its environment (scientific contents) and it is capable of actions that change the environment (expand contents by student's action) in a manner specific for the environmental knowledge (science) addressed.

The environment is a stage characteristic, positioning is a temporal property and autonomy and flexibility are dimension actions (Jennings, Sycara and Wooldridge, 1998). These defining features make the difference between the agents based system and the expert systems, which don't interact directly with the environment, but receive information and knowledge through the knowledge engineer, which is a human "agent". The expert system does not act directly on the environment, but through the human factor.

The tend to approach the learning programs to expert systems is more conspicuous, expert systems where the human intervention is essential in knowledge environment changing, investigated by the student. It's the case of socio-human sciences, languages and literature, philosophy and so on, sciences for which the use of subjective items is a current practice in achieving the process of feedback and formative assessment. The trend is accentuated by the difficulty of subjective items algorithm implementation in the design of learning programs (Maxim and Moroşanu, 2008).

Autonomy is understood as the absence of human intervention, but does not exclude the intervention of other agents, because learning occurs in a social environment, perceived as a competitive environment and therefore, the rationality of an agent's actions is conditioned or is situated in the context of the environment and action of other agents.

An agent can completely control its own actions and its internal status, but the influence of other agents on his action is achieved by prior changes that they produce on the environment. Sometimes autonomy is understood in a strict sense, an ability that the agent has to learn from his experience (Russell and Norvig, 1995).

Educational agent is by definition *responsive* - perceives and responds to the timely and appropriately to changes that occur therein, which allows learning programs to make sequential feedback, is *proactive* – his actions are not simple reactions to the environment, but the expression of the ability to exercise behavior orientated towards a specific purpose, expressed through the action that approaches it to the goal, of achieving operational objectives that it has established, having in this meaning, its own initiative, and *social* – the agent is able to interact with other agents to solve its own problems and help others in their work, which gives educational software the interaction attribute.

Luck, M. and others define the agents very synthetically, but comprehensively: "Agents can be defined as computational entities problems solver, autonomous, able to execute operations in dynamic and open environments" Luck, Mcbumey and Preist, 2001).

If the first part of this definition is compatible with other definitions discussed above, the second part shows that the interest has moved from the individual systems, stationary, seen more as tools able to help the man in his activities, towards the situation in which the power of these computing systems is used to operate in distributed environments, unpredictable, open and dynamic.

3. Conclusions

Such a system is an educational software, that must interact, must overpass the organizational predictability limits through the lesson's project, they must operate efficiently, in terms of problem-situations that change quickly and dramatically, to attain operational objectives common to different types of educational agents integrated in the program of instruction.

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