STUDY OF THE LEARNING UNITS ORGANIZATION IN ELEARNING SYSTEMS

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Abstract: *The paper describes the content organization in the eLearning system: it is a process of fragmentation and integration of knowledge. According to the learning objectives, the knowledge is fragmented in "chunks" of information – named learning units. The connections between learning units are very important for improvement of the learning process and/or product. In the paper there are analyzed different types of connections: series, parallel and mixed. The discussions and conclusions of the paper are useful for the eLearning materials developers and users.*

1. INTRODUCTION

Now a days, the increasing interest and spreading of Information and Communication Technologies in learning require strictness and accuracy. The learning process has to emerge from the learning material and the learner has to fulfill his/her own objectives. These issues are to be taken into account from the development phase of the eLearning system.

In order to design a coherent eLearning material, a deep understanding of the learning organization is necessary. The lessons learnt from Instructional Design and from General System Theory are applied in order to develop a framework for eLearning materials meant for providing a meaningful learning environment.

The paper describes the content organization in the eLearning system: it is a process of fragmentation and integration of knowledge. According to the learning objectives, the knowledge is fragmented in "chunks" of information – named learning units. After the learning process, the learner is expected to reconstruct the knowledge, by integrating the "chunks". Each learning unit contains a piece of information that is to be learned and the item that check the information understanding/leaning. We describe the possibilities for learning units' organization. There are analyzed a set of organizational maps and discussions of the possible routes are done. The conclusions

are drawn in terms of "success probability" which is calculated based on the learning achievements, evaluated step by step in every learning unit.

2. LEARNING AND INSTRUCTIONAL SOFTWARE

The proposed method deals with instructional software development and combines lessons learnt from General Systems Theory and Instructional Design and their synergy. In this paper the general concept of this method is described and can easily used in practical applications.

We discuss about instructional software that can be used in an integrated e-learning system.

It is well-known that learning is both a process and a product and the instructional software has to provide an appropriate environment for development of the learning process and emerging the learning as product. This issue has to be addressed form the instructional software development phase, by providing a tool in order to predict the probability of learning occurrence.

We can assume that the instructional software is a collection of elements (learning units) which interacts.

The interaction between two learning units has two meanings:

a. the instructional one – learning of one unit can induce learning in another, and vice-versa, the misconception of misunderstanding of information from one learning unit can induce misunderstanding/misconception related to another. These issues might have effect in learning of the entire concept. In this meaning the change occurred in the system is interpreted as learning or not, that can be assumed as „learning failure". The learning failure can be predicted by a simple calculus involving the logic rules.
b. the technical one – one action (pressing a button, an icon, typing etc.) in one learning unit induce a response in another learning unit.

At this moment the following assumptions are made:

- the instructional software is a tutorial one, aimed to provide the learning environment for one or more concept learning. This corresponds to one or more learning objectives. The concept is considered that is learned when the instructional objective(s) are achieved.
- for each learning objective one or a group of learning units is associated. Each learning unit contain a piece of information („chunks" of information) to be learned and the item that assess the level understanding/learning. Aggregation of the information from each learning unit emerge the learning of the concept.

The learning unit is the smallest element of instruction that the instructional software may assign to a learner and for which a learner's position may be traced.

3. POSSIBLE CONNECTIONS BETWEEN LEARNING UNITS

The learning units can be linked as elements of an electrical circuit: series/parallel/etc. For each type of link we consider the organizational map and the logic related expression correlated with the success probability which significance is the learning as a product and process. The learning unit has the dichotomic system

variable x_i with two different states: 0 for wrong answer to the test item included in the learning unit and 1 for correct answers to the test item. The learning objective is considered achieved when the whole system variable has the 1 value and the learning failure is considered when the 0 value.

The "success probability" can be calculated considering the probability to give the correct answer for one item.

To simplify the description, we will consider instructional software containing 6 learning units, each learning unit contain a multiple-choice quiz with 4 possible answer, only one correct.

3.1. Series connections

The specific organizational map is presented in figure 1 and the associated function in equation (1). In order to achieve the learning objective (S=1), each variable has the value 1.

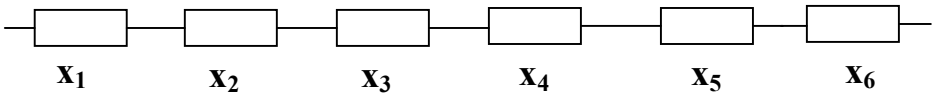

Figure 1. Organizational map of series learning units

$$S = x_1 \wedge x_2 \wedge x_3 \wedge x_4 \wedge x_5 \wedge x_6 \quad (1)$$

The instructional meaning of this type of connection is related to the optimization of success probability. In order to achieve the learning objective, the learner has to give correct answers to all 6 items. This type of connection is recommended when the learning process is to be improved mainly by providing balanced learning units. The balance is understood in terms of difficulty, information complexity, information length etc. When the learner is faced with learning units connected in series, he/she has to follow a certain route through the instructional software. The entrance in one learning unit depends of the previous. Thus, the learner can be "trapped" into the instructional material, what can induce frustration and failure in learning process or result.

3.2. Parallel connection

The specific organizational map is presented in figure 2 and the associated function in equation (2). In order to achieve the learning objective (S=1), at least one of the variables has the value 1.

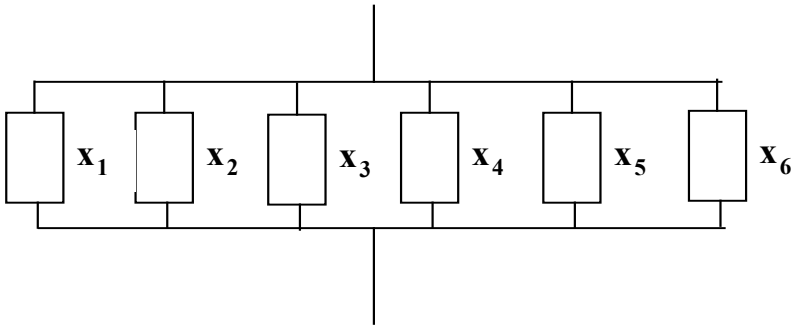

Figure 2. Organizational map of parallel learning units

$$S = x_1 \vee x_2 \vee x_3 \vee x_4 \vee x_5 \vee x_6 \quad (2)$$

Following instructional software in which this type of connection is provided, the learner has to give a correct answer at least at one item, in order to improve, for instance the learning product. In this case, the information contained in the learning units can be redundant and the redundancy can be due to different media used for information communication (text, images, animations, graphics, sound etc). The learner can choose the appropriate type of media (one or more) for his/her own learning style.

3.3. Mixed connections

The previous examples are, of course, the extremes. In real and complex instructional software the mixed connection is recommended in order to improve both learning process and product. Keeping in mind that the instructional software is meant add flexibility to the learning environment and to be tailored to own learning style the mixed connection is recommended.

This kind of recommendations is useful for ones who involved in the e-learning systems – developers, users or learning advisors.

4. CONCLUSIONS

Inspired from general systems theory, the instructional software is considered a system whose elements are the learning units.

The paper offers a framework for analysis of the learning units' integration in instructional software.

By using different types of connections (series, parallel, mixed) for the process and/or product of learning can be improved: the series connection improves the learning process, the parallel connection improves the learning as a product. The mixed connection is recommended for tailoring the instructional software to different learning styles and more learning objectives.

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