FROM CLASSROOM TEACHING TO E-LEARNING: THE WAY FOR A STRONG DEFINITION

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ABSTRACT
In any process of adoption of e-learning is important to understand his elements and the way they interrelate. This work tries to achieve the e-Learning definition using a graphical interpretation supported by mathematical language that helps the understanding, step-by-step, of the transition from “Classroom Learning” to “e-Learning”. In the last step, the obtained graphic and formula is used in order to reach what we call the strong e-Learning definition.

KEYWORDS
e-Learning, e-Learning concepts.

1. INTRODUCTION
To obtain the e-learning definition we use the following method: first we describe the classroom teaching and come base in this scenario, we make the necessary changes, in successive iterations, in order to achieve the e-Learning model. With this purpose we have created a set of graphical pictures supported by the mathematic translation illustrating the successive steps from the initial state “Classroom teaching” until the final state “e-Learning”.

2. STEP ONE: THE CLASSROOM MODEL
The first step of our journey is to define the face-to-face teaching in a graphical form. Figure 1 shows the “entities” or “players” (Teacher, Content and Student) (Terry 2002) and the constrains (Place and Time) (Retalis, Makrakis et al. 1998) that as a whole represent the classroom teaching (CT):

- The Teacher (T)
- The Content (C)
- The Student (S)
- The Place (P)
- The Time (W)

Figure 1 – Classroom teaching

The initial state (CT), Classroom Teaching, is translated to mathematical language thru this formula:

$$CT = T \cup C \cup S \cup P \cup W$$
From this initial state, we will make step-by-step, successive adaptations in order to reach the “electronic learning” stage.

3. STEP TWO: THE CONTENT

The content, or, the content format, location and type of electronic support, assumes much more importance in e-Learning (Anderson 2004). In this new paradigm the content is no longer “in the teacher”, in “is brief case” or in his “teaching support materials” to be in a “way” that make them accessible “24 hours a day, 7 days a week”. In e-Learning, the content (C), is placed (Zetterman and Lindblad 2003) at the internet (Ci), stored in a CD, or in an Internet-CD combination (Cdi). Therefore, electronic learning, implies that the (e-)Student needs a computer with CD-Rom reader (PC) and/or an internet connection (PCi). Graphically:

<table>
<thead>
<tr>
<th>e-Learning Content</th>
<th></th>
</tr>
</thead>
</table>
| [1A] Content on Internet | ![Diagram](image)
| [1B] Content on CD | ![Diagram](image)
| [1C] Content on Internet and CD | ![Diagram](image)

Figure 2 – e-Learning content

Mathematically the graphic specification origins 3 formulas:

\[
\text{def } (1A) = T \cup Ci \cup S \cup PCi \cup (P = ?) \cup (W = ?) \\
\text{def } (1B) = T \cup Cd \cup S \cup PC \cup (P = ?) \cup (W = ?) \\
\text{def } (1C) = T \cup Cdi \cup S \cup PCI \cup (P = ?) \cup (W = ?)
\]

The case 1C (the content is on the internet and CD) is a particular case of 1A, for this reason we have simplified the schema reducing it to the cases 1A and 1B:

<table>
<thead>
<tr>
<th>e-Learning Content</th>
<th></th>
</tr>
</thead>
</table>
| [1A] Content on Internet | ![Diagram](image)
| [1B] Content on CD | ![Diagram](image)

Figure 3 – e-Learning content (simplified)
Mathematically:

\[
\begin{align*}
    \text{def}(1A) &= T \cup Ci \cup S \cup PCi \cup (P = ?) \cup (W = ?) \\
    \text{def}(1B) &= T \cup Cd \cup S \cup PC \cup (P = ?) \cup (W = ?)
\end{align*}
\]

In this figure the clarification of the entities “Place” and “Time” is missing. As above-mentioned, the content is available “24 hours a day, 7 days a week”, or, at “anyplace anytime”, which means there’s no “Place” or “Time” constrains. What about the teacher? What’s the teacher influence in those question marks? That lead us the next step: the teacher-course relation.

4. STEP THREE: THE TEACHER

We start the teacher-course relation study, analyzing if the course has (T), or not (\(\nabla T\)), a teacher in charged:

<table>
<thead>
<tr>
<th>e-Learning – The Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
</tr>
<tr>
<td>With Teacher</td>
</tr>
<tr>
<td>(T)</td>
</tr>
</tbody>
</table>

Figure 4 – The teacher

The mathematical translation:

\[
\begin{align*}
    \text{def}(1Ai) &= T \cup Ci \cup S \cup PCi \cup (P = ?) \cup (W = ?) \\
    \text{def}(1Aii) &= (T = 0) \cup Ci \cup A \cup PCi \cup (P = 0) \cup (W = 0) \\
    \text{def}(1Bi) &= T \cup Cd \cup S \cup PC \cup (P = ?) \cup (W = ?) \\
    \text{def}(1Bii) &= (T = 0) \cup Cd \cup S \cup PC \cup (P = 0) \cup (W = 0)
\end{align*}
\]

That is equivalent to:

\[
\begin{align*}
    \text{def}(1Ai) &= T \cup Ci \cup S \cup PCi \cup (P = ?) \cup (W = ?) \\
    \text{def}(1Aii) &= Ci \cup S \cup PCi \\
    \text{def}(1Bi) &= T \cup Cd \cup S \cup PC \cup (P = ?) \cup (W = ?) \\
    \text{def}(1Bii) &= Cd \cup S \cup PC
\end{align*}
\]
Easily we can conclude that the courses without teacher involved aren’t time or place dependent (cases 1Ai and 1Bi). In those cases the course is totally learner-led. For the courses with a teacher, we have to study the kind of relation, or interaction that exists between teacher and students.

5. STEP FOUR: TEACHER-STUDENT INTERACTION

The teacher-student interaction (I) can be made using the following methods:

- e-mail support – which implies asynchronous interaction (Ia) moments;
- Chat or video sessions - which implies synchronous interaction (Is) moments;
- Face-to-face sessions - which implies the characteristics of classroom (Ic) teaching (at the same time in the same place).

Graphically:

<table>
<thead>
<tr>
<th>e-Learning Teacher-Student Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1Ai1 Asynchronous moments</td>
</tr>
<tr>
<td>1Aii Without Teacher</td>
</tr>
<tr>
<td>1Bii Without Teacher</td>
</tr>
</tbody>
</table>

Mathematically we have:

\[
\begin{align*}
\text{def } (1Ai1) &= T \cup Ia \cup Ci \cup S \cup PCi \cup (P = 0) \cup (W = 0) \\
\text{def } (1Ai2) &= T \cup Is \cup Ci \cup S \cup PCi \cup (P = 0) \cup (W = 1) \\
\text{def } (1Ai3) &= T \cup Ip \cup Ci \cup S \cup PCi \cup (P = 1) \cup (W = 1) \\
\text{def } (1Aii) &= Ci \cup S \cup PCi \cup (P = 0) \cup (W = 0) \\
\text{def } (1Bi) &= Cd \cup S \cup PC
\end{align*}
\]

Which, after simplification origins:
eLearning!

"moments."

The strong definition has to hold all the entities (including the student and teacher, from the weak definition).

Then, the “strong e-Learning definition” is: “The process, by which the student learns through the content placed in the Internet and/or CD-Rom. The teacher, if exist, is at distance, using the internet to communicate (synchronously or asynchronously) with the students, possibly intermediated with some face-to-face moments.”
REFERENCES


http://it.coe.uga.edu/itforum/paper63/paper63.htm, Posted at ITFORUM website.