

# Theoretical framework: Towards a Grid for the Pedagogical Analysis of Online Courses

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**Abstract:** After a review of reports on online learning and the evident lack of conclusive studies comparing online learning, traditional distance learning and classroom learning, a research team funded by the PAREA program of the Ministère de l'Éducation du Québec has developed a tool for comparing various online courses. This is based on the theoretical principals of multimedia communication, online collaborative learning and online instructor/student roles. The tool is applied in the learning impact assessment of a virtual program in the natural sciences.

## Introduction

E-Learning has become a buzzword in the field of training and education where it is employed loosely to designate a wide variety of teaching situations. Industry Canada in a report from the Advisory Committee for Online Learning published in February 2001 said: "Online learning can be defined as what occurs when education and training (typically credit but also non-credit) are delivered and supported by networks such as the Internet or Intranets. Learners are able to learn any time and any place. In this report, we use the terms "online learning" and "e-learning" interchangeably. In either case, we mean both distance learning and the provision of technology-enhanced learning within a traditional classroom, lecture hall or lab." Therefore, on the one hand, we talk about online courses in which students have more or less infrequent access to web sites associated with classroom teaching and, on the other hand, courses designed entirely to be delivered via the net and followed from home.

## Theoretical Framework

The theoretical framework adopted is based on Depover's (et al.) three dimensional model for interactive multimedia (1998), Henri's (and Lundgren-Cayrol) online student collaborative learning model (2001), and Teles' (2000) and Salmon's (2000) online instructor/student roles.

**Student/Teaching Material Interactivity.** Depover et al. define educational interactive multimedia as the computer-generated integration, distribution, and management of sound, text, and graphic. An interactive multimedia teaching material gains the attention of the learner through the *perceptive channels* (hearing, sight, etc.) and is composed of interactions between the machine and the user. This later must know what the system expects of him in order to navigate properly into the multimedia. Furthermore, interactive multimedia facilitates the *intellectual activity* of the student by proposing *teaching strategies* and by structuring the learning content into different kinds of knowledge representations. It includes all the information needed to build a model *representing the student* and to propose appropriate activities. Each of these intervention levels (perceptive, transaction-driven, cognitive, pedagogical and evaluative) must satisfy clarity, coherency, pertinence, analogy, redundancy and control criteria.

**Student/Other Participant Interactivity.** The interactivity between the student and the other participants is influenced by collaborative learning and by the role of the instructor. We have regrouped the student collaboration model by Henri and Lundgren-Cayrol (2001), the instructor role by Teles and the stages of student progress in online learning situations by Salmon (2000) into four components describing activities, tools and participant interventions.

Access and motivation allow students to become technically operational and to prepare themselves psychologically for active participation in their learning experience.

Online involvement and socialization consist in building a real sense of belonging to a virtual community and the development of group working methods.

Communication of ideas or information exchange, knowledge building and learner development constitutes the actual learning components.

Coordination includes all the operations that the instructor and the students do for managing the learning experience.

Each component implies interventions made by students and the instructor to be taken into account in some cases at the design phase of instructional material and for others during the delivery phase.

## Steps for the Application of the Tool to Online Courses

To assess an online course with regard to teaching, one must examine the student/educational material interaction by determining first the symbolic systems in play. One must then determine the function of each of the system elements as to the five levels of interactivity (perceptive, transaction-driven, cognitive, pedagogical and evaluative) described by Depover et al. (1998). This is the first step and allows us to put together Table 1.

In the second step one must apply the six quality criteria (clarity, coherence, pertinence, analogy, redundancy and control) as proposed by Giardina and Mottet (1996) to each of the elements and for each level of interactivity.

And finally, in the third step, one must determine the elements making up the student/students and student/instructor-expert interactivity. This allows us to produce a series of tables for each component of this dimension. As an example Table 2 illustrates the dimension of Online involvement and socialization.

## Conclusions

The tool has been applied to several courses in the virtual program in the natural sciences and has revealed an interesting progression in the use of the internet teaching potential. Courses designed in 2000 were more interactive than those designed in 1998-1999.

Furthermore, the tool is still at the final validation stage with a number of experts in the field. These people are testing it in an iterative process in other courses of the virtual DEC as well as in courses of [Cégep@distance](mailto:Cégep@distance).

## References

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<b>Symbolic Systems</b>	<b>Perceptive</b>	<b>Transaction-driven</b>	<b>Cognitive</b>	<b>Pedagogical</b>	<b>Evaluative</b>
Sounds : words, music, reading texts, songs, oral expression, etc.	Hearing (tone, pitch, volume)	Multimedia navigational information (written or oral commands, page-number indications in the section scrolling arrows.)	Explain, detail, specify, (adapted for the target population)	Determine the teaching objectives. Present the content and activities.	Present teaching and summative evaluations. Allow users to know their level of achievement of objectives, etc. Evaluate progress.
Texts (attributes)	Sight			Define and expose learning strategies, cognitive and meta-cognitive teaching strategies. Bold and capital letters, etc. are often used to attract attention, to accentuate something.	
Attributes of letters ( fonts, style)  Hypertexts, Drop-down menus Pop up  Shading (colour changes) Flashing  Colours		Click-on prompt Click-on prompt  Indicates places already visited. Indicates who should intervene and where  Indicate a section, a module, a unit	Define Detail Specify   Hold a cultural meaning.		
Graphic	Sight				
- Icons - - Hourglass - Drawings - - Photographs - Diagrams - Comic strip, Animation - Trees - Tables - Arrows - - Video	Hearing and sight	Can (but not necessarily) be click-on prompts Indicates that the system is busy Can (but not necessarily) be click-on prompts Idem Idem Idem  Idem Idem Forward or backward prompts  Combine media effects	convey a command.  convey a notion, a concept. convey a notion, a concept.  Structure content.  Combine media effects	Can be used to attract attention.  Combine media effects.	

**Table 1:** Student/Teaching material Interactivity

Components	Sub-components	Tools	Activities	Role of the Host-Instructor		Comments
INVOLVEMENT (HENRI AND LUNDGREN) ONLINE SOCIALIZATION (SALMON)	Group cohesion	Forum Chat Directory (student list) Visitor card Resums Messages	Participate in a forum or in a chat room, fill out the visitor card, Get to know the other participants.	Encourage the students to participate, to share their motivation and their expectations, to give personal information (hobbies, civil status, etc.) , to consult the visitor cards of every participant.	Communication space offered to everyone. Room for personal information on everyone.	This activity prepares the setting up of the teams.
	Belonging	Forum with interactivity sociograms	Training at collaborative learning:	Organise and supervise a group negotiation session concerning the collaborative model and the conditions which will apply in order to carry out the training activity (participation rhythm, frequency, intervention size, team constitution, kind of contributions from everyone, parameters or characteristics of group or team productions, work schedule and any other development which applies). Bring back those who tend to remain apart from the group, etc.	Public communication space	The group discovers, understands and evaluates its needs in order to later define the way in which the collaboration will work and which jobs will be done.  The instructor studies the interactivity sociogram to intervene with those who do not participate sufficiently.
	Perception of group productivity	Forum Tool for following up projects. Instant questionnaires.	Fill out work-progress questionnaires regularly by the students.	Release the results of the questionnaire to students, informing them of their progress as a group and allowing them to reflect on their team effort.	Public communication space.	

**Table 2:** Student/Other participant Interactivity