

# Interaction Protocol for Questions & Answers through Screen Capture, in Virtual Learning Environments

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**Abstract.** *Virtual Environments for Learning typically include a FAQ (frequently asked questions) repository, built up from interactions between students and teachers. Based on Media Richness Theory, there is evidence that dynamic audiovisual demonstrations show advantages over text and still-image based tutorials. A protocol with a structured modus operandi seems suitable for those interactions. This paper accounts for a project startup, which will compare two communication procedures for building a low cost FAQ repository with screen-capture software CamStudio and YouTube. Six sample courses will compare highly structured protocol and a low one. We expect evidence in favor of a more structured protocol.*

**Keywords.** *Media Richness, e-Learning Tutorials, Protocols, Screen Capture*

## Background

Previous research (Angulo, 2006; Liu et al, 2009) based on Media Richness Theory (MRT) provided evidence that the use of dynamic audio-visual demonstrations present advantages over static multimedia or the use of software manuals to teach digital applications. Enriched media may be an effective resource that can improve learning and provide an efficient strategy of development in e-Learning tutorial production, in terms of its costs.

MRT is a theoretical framework that helps to describe the level of adjustment of mass media, relating its suitability to reproduce the information that it transmits in a particular context. Developed by R. L. Daft and R. H. Lengel in the late 80's, in the context of the organizational communications. Amongst different communication channels, major or minor richness can be distinguished and their own advantages or disadvantages according to their context (Daft, 2004) of application. For example e-mail cannot reproduce the tone of voice, and all the codes of corporal and oral expression from the emitter, cues that assist the receiver with the affective content underlying the words. This is why we have enriched written communication mediated by computer with such simple visual codes as emoticons. A telephone call, or still more a videoconference, enriches communication with more information, when incorporating additional media such as audio and image. Face to face interaction would be the richest channel for communication. Nevertheless, an e-mail message can have advantages over an actual conversation, because the last one does not leave a record of the issued message, whereas the second does. For this reason it is that the memos have such an extended use in organizations (Daft, 2004). MRT affirms, that to greater ambiguity and uncertainty in a task, increasing the richness of the media used increases the symmetry between the issued message and the message understood. In other words it increases effectiveness (efficacy + efficiency) of communication.

An example of this ambiguity and uncertainty can be observed in the teacher's action of explaining a complex procedure for managing a graphical user interface or an interface device. In the actual explanation, often the instructor is more effective demonstrating with its own actions by means of a digital projector or in the computer of the student, than verbalizing word by word. In this sense, the educator spontaneously searches for enriched channels of communication. But this work is repetitive and tedious, still more when students in a computer lab sometimes pay more attention to their own display that

to the demonstration carried on by the teacher for the whole group. This behavior is not explained only by a lack of interest but also by the fact that –increasingly– we observe self-learning strategies amongst our students. Design students show different learning styles within an experiential learning model, composed of phases of concrete experience, reflective observation, abstract conceptualization and active experimentation (Demirkan & Demirbas, 2008). Another aspect that characterizes the problem is that more and more the teacher must work in bimodality, combining face to face teaching with Virtual Environments for Learning (VEL) characterized by remote, synchronous and asynchronous communication, mediated by computers and.

Nevertheless, it has been observed in this VEL context, the convenience of orienting with certain structuring the application of the interaction means between teachers and students. In this sense, it is necessary to distinguish between the richness of media used and the didactic procedure for its use adapted to teaching-learning (Hamuy et al, 2006). We claim that Enriched Media (EM) cannot guarantee greater effectiveness as a didactic resource by itself. Although a resource can have a higher level of EM, the teacher's procedure of implementation exerts a fundamental mediating action in the learning process (Medina & Salvador, 2002).

## A video FAQ repository

This research approaches an issue in the process of teaching-learning design disciplines. In the process of developing professional competencies in the realm of digital design technologies in the obligatory curricula and elective subjects of architects and designers (graphical and industrial), there is a group of subjects that deal with learning software applications for the generation and composition of represented information —preferably— of graphical manner. These applications unfold in graphical interfaces and require learning a series of complex operation. These procedures are characterized by: toolbars, menus, parameters, variables, besides the selection of commands. The learning of these competencies involves blending fine visual-motor skills, coordinated, precise, judicious and often expressive manipulation Human Interface Devices (HID) together with Graphical User Interfaces (GUI) (Martin & Eastman, 1996). On the one hand, characteristic HID are used, such as mouse, keyboard, graphical tablet, trackball, touch screens, besides other multiple emergent technologies in this realm. On the other hand, typical GUIs are menus, windows, icons, scrolls and cursors (that in this environment represent a great

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variety of functions grouped in toolbars and palettes), plus a great number of parameters and options to be set.

Traditionally, the teacher resources such as software manuals, develops notes, presentations and summaries in addition to actual demonstrations. It is in this context that the need to create tutorials arises, in order to respond to consultations from students about precise procedures. Tutorials are guided instructions that describe a procedure. Often VEL gather together in a repository of Frequently Asked Questions (FAQ) emergent knowledge, product of the interaction between experts and learners. These repositories help to avoid the repetitive tasks of responding the same inquiries over and over. Nevertheless, when as much the questions as the answers — regarding interactions with GUIs and HIDs— are formulated in written form, both users (student and teacher) must make an effort to translate those complex interactions to a written language. Many times, they must assist their writing with still images of the screen display they are facing. MRT (Daft, 2004) may help us understand (Fig. 1) the levels of EM present in different didactic resources and the potential advantages and disadvantages that each of these pose.

We put forward that the construction of a repository of FAQ with resources and modes of communication based on EM, would present considerable advantages over traditional methods, enhancing the communication flow between teachers and learners with a repository of emergent knowledge (Fig. 2). On the one hand, it would be a more effective didactic resource, since the questions as the answers would undergo less distortions in their formulation and understanding, when expressed in a narrated visual animation of the dissonance or problematic situation and its solution (Hilgard & Bower, 1983), in the same Interface environment where it takes place. It would also deliver a more efficient communication for both, when maintaining the discussion in context and reducing the chore of translating complex actions into written and static forms.

The need to define a protocol (a code of correct conduct or norms to follow in a certain communication) arises from earlier search for the most appropriate didactics in a VEL (Hamuy et al, 2006). Previous research contributed evidences that when using a forum resource for group generation of alternatives in a design process of a studio course, a more structured protocol generated higher levels of interaction, reflection, argumentation and collaboration, than a less structured protocol. This attention for greater structure, may be particularly appropriate in the cultural context in which the authors teaching practice unfolds.

This idea of generating a FAQ with EM is simple to put in practice (since the technological means are handy) and may offer twofold benefits. It can be a didactic resource that may also be a cost effective strategy for compiling EM tutorials, a means to gather together helpful digital contents that can be reused in tutorial e-learning.

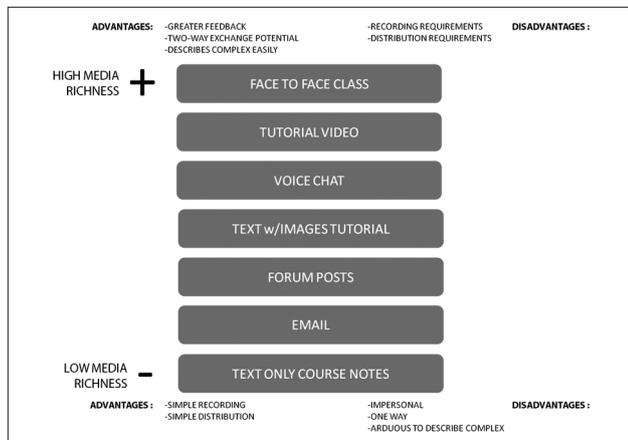


Figure 1. Different didactic resources according to MRT

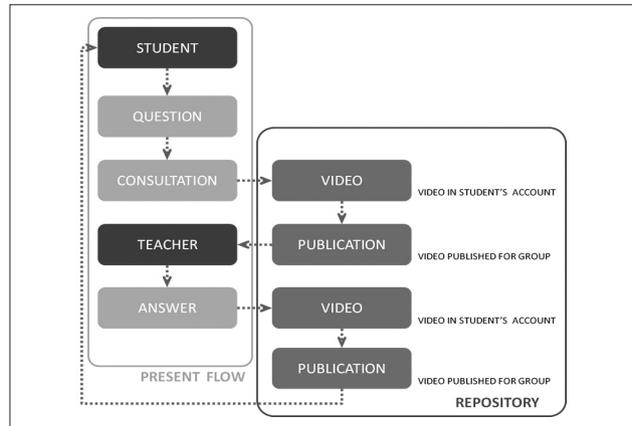


Figure 2. FAQ EM repository enhances present flow

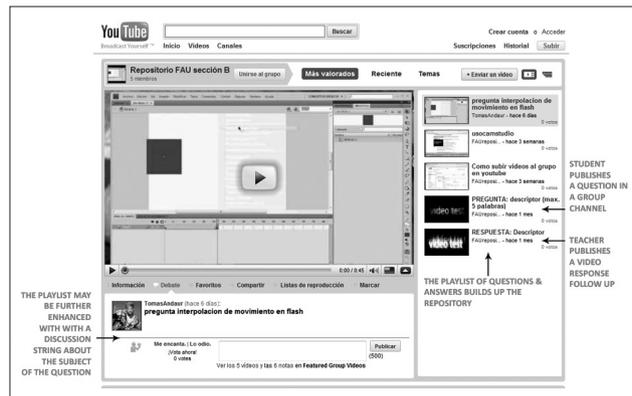


Figure 3. YouTube channel based on PLS FAQ

## Objectives

- Evaluate 2 protocols for feeding a FAQ with EM, teaching-learning digital design software context.
- Explore a low cost a strategy for production of tutorial videos.
- Start-up a repository of FAQ in EM format with tutorial aims.

## Testing protocols

This project will follow a quasi-experimental and exploratory design, merging descriptive elements and qualitative analysis. The variables in study will be: Protocol of Low Structuring (PLS) and Protocol of High Structuring (PHS); defined conceptually and operationally as follows:

We will use as a means to generate the entries to a web based FAQ, screen capture software Camstudio (<http://camstudio.org/>), freeware software that can be downloaded and installed in any PC without charge. Students as well as teachers will have to use it in a sample of 6 Computer Graphics courses for architects, graphic designers and industrial designers. The variables that will be studied are described as observable elements in Table 1.

Both protocols (PLS and PHS) will be tested in 6 courses in two different instances (event 1 and 2). These will occur during the second semester of 2009. If needed they may be repeated during the first semester of 2010 with other groups. In an event 0 the intervention procedure was tested. As a means for controlling order and accumulation of experience, as factors that could affect students' learning or the quality of consultations, the instances have been distributed equally in PLS and PHS in alternate form. Each group will experience randomly both protocols, as is shown in Table 2.

Techniques of qualitative data analysis will be applied with NVivo, software that imports, sorts and analyzes videos, web content (and most types of digital content). In the first place, coding will be applied to the consultation videos using categories such as: duration, time restriction, question category, voting, and rubric criteria. Additionally emergent categories will be

Protocol	Elements	PLS	PHS
Use of CamStudio	CamStudio Download Link	Yes	Yes
VEL	The course has a web space in a CMS or Blog	Yes	Yes
Video channel publishing	A YouTube Channel is available to collect FAQ videos	Yes	Yes
Instructions	Brief tutorial video that teaches how to use CamStudio and publish in YouTube channel, plus a written instructions are provided through web	Yes	Yes
YouTube Account	Each student must have a subscription to YouTube and channel	Yes	Yes
Introductory video Unit publishes			
introductory video	Yes	Yes	
Due date	Students are informed of a due date to submit their consultations	Yes	Yes
Voting	Students have the possibility of emitting a vote on the usefulness of the	Yes	Yes
Time Restriction	Students are informed of 30 secs. time limit for recorded consultation	No	Yes
Question category	Students are informed of a Table of criteria to tag the published videos: Unique action: 1 single action in the same software Compound action: 1 or more action in the same software Interoperability procedure: 1 or more action of interoperability between 2 or more applications	No	Yes
Rubric	Students are informed of a Table of criteria for analysis of published videos		
Originality: the question has not been posed and answered before in FAQ	3 levels of assessment (Optimum, Sufficient and Deficient)	No	Yes
Relevance: the question is relevant to software and processes of generation and composition of graphical information	3 levels of assessment (Optimum, Sufficient and Deficient)	No	Yes
Formulation: the question is clearly, coherently formulated and synthesized			
(75% or more of the time it is focused in the consultation subject) but with the sufficient information	3 levels of assessment (Optimum, Sufficient and Deficient)	No	Yes

Course	Teacher	Career	Event 0	Event 1	Event 2
1	A	PG	PHS	-	-
2	B	Arch	-	PHS	PLS
3	B	Arch	-	PHS	PLS
4	B	ID	-	PLS	PHS
5	A	ID/GD	-	PLS	PHS
6	A	ID/GD	-	PLS	PHS
7	A	GD	-	PHS	PLS

coded. Later, the implications and details of these categories will be described in a systematic manner, to help make sense of the data with respect to the emerging theory.

The authors expect that consultations related to a PHS, should reflect greater complexity and signs of richer experiential learning, than those realized with a PLS.

Presently, Event 1 is in development, with separate and parallel YouTube channels for both protocols (PLS and PHS). We present in Figure 3 the visual layout of the web page.

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