

“Aquatic Metaphors”: an Innovative Interface for Virtual Learning Spaces

Antonio Simao Neto

Pontificia Universidade Católica do Paraná, Brazil

antonio.simao@pucpr.br

Ph D student - University of London Institute of Education

asimao@ioe.ac.uk

Abstract. Virtual learning environments are widely used in distance education as the learning space of choice, mainly for interaction and collaboration. However, they generally don't provide means to integrate easily other learning spaces. This paper presents and explains a new interface which can unite information spaces - such as the web or online learning materials - with interactive spaces such as virtual learning environments (VLEs). Originally developed for an online course offered by a network of Brazilian universities, the interface was inspired by what we call the "aquatic metaphors" (navigation, surfing, diving and others) widely used on the internet. This interface is flexible enough to accommodate traditional teaching methods centered on instruction and written materials, as well as more open methodologies and active practices based on discussion, team work and collaboration.

1 Introduction

Interface design for virtual learning environments and other digital resources for distance education often start with a metaphor to provide a recognizable representation of the computer system being employed. This widespread trend in interface design has an established tradition, dating back to the first interfaces claiming to be "user-friendly", with the ubiquitous desktop metaphor as the best example.

"It is not hyperbole to suggest that without metaphor, interaction design today would be severely limited, especially in the digital realm. After all, no one addresses his computer without some metaphoric mediation; we do not speak machine language. Metaphor provides us with the means to understand our complex digital devices." [6, p.7] A metaphor is "a device for seeing something in terms of something else. It brings out the thisness of a that or the thatness of a this". We

need a common ground to "conceptualize one domain in terms of the other". Therefore, a metaphor is always grounded in culture and language.

The seminal work on metaphor is the book by Lakoff [3], in which he challenges the traditional vision that took metaphor merely as a figure of speech. He states that metaphors work as "cross-domain mapping" and that because our mind is essentially associative, the use of metaphors and comparisons are an important part of our day-to-day experience.

In distance education, when we try to minimize the difficulties brought by the spatial and/or temporal separation of the educational agents, a well-chosen metaphor can be part of the necessary bridge between the familiar environments and the new setting, through sharing a common referential that is recognized and valued by all.

"Having a shared metaphor helps to maintain a common understanding of a project and makes it easier to negotiate compromises as the pressures ... increase throughout a project" [9]. The metaphors we present below [7] were the starting point in the design of the interface linking information and interaction spaces in an integrated virtual learning environment for distance education courses and activities.

2 Aquatic Metaphors

To navigate the internet, to surf the web, to dive into the ocean of data: these are aquatic metaphors that reveal something about the fluidic nature of the new information and communication media.

We meet those metaphors in various kinds of texts (in newspapers, academic journals, web sites and even popular songs), showing that this imagery helps us in some way to make sense of the internet and its multiple levels and components, surfaces, connections, fluxes, refluxes, and currents.

To surf suggests a promenade on the surface, when we let ourselves be conducted by a force that carries us in a pre-defined, unquestionable direction. As when we follow links, we click on buttons and image-maps that take us to other pages, through ways that have been laid out for us beforehand. Surfing is a movement a bit loose, without the pressure of making important decisions all the time. It is enough to know how to enter the wave and use its impulse, enjoying the ride until the wave weakens. We return then to engage with another wave. We surf the web following interests and motivations triggered or instigated by the information we find and by the forms in which it is presented to us.

To navigate - when we think about navigation, old explorers, bold sea-farers come to mind, moving from known harbors to discover new lands without knowing for sure if they would succeed or even if they would manage to return. To navigate is to dare, to investigate, to explore, to follow moving paths on changing, fluid surfaces. On the internet, navigation is the movement par excellence since the volume of hyperlinked web pages began to grow until - drop by drop, page by page - this vast ocean of data and information was formed.

To dive is to deepen our point of vision, to change our relative position to the surface, descending towards levels which were not visible when we surfed or sailed.

To dive is to penetrate the ocean of information with purpose and care, to move with a certain degree of planning, going beyond the upper level, the surface.

The proposal we will present next is based on the aquatic metaphors. It was developed to meet certain challenges and demands in a specific context. In this paper, we will first present the context, with the demands we had to address, and then we will move on to lay out the design components and pedagogical foundations of the proposal with which we intend to meet those challenges.

3 The context

The motivation for the creation of an interface capable of uniting two different (although complementary) virtual learning spaces came from two directions.

First, from the Distance Education Centre at the Pontifical Catholic University of Parana, Brazil (PUCPR) which was re-organizing into the course-based, business-minded PUCWeb, offering extra-mural, diploma and post-graduate courses as well as corporate and professional training. Second, from the invitation received from the management committee of the Virtual Learning Community of the Network of Catholic Universities (CVA-RICESU), which challenged us to develop a course on technology in education, to be offered to all the institutions of the network, future multipliers of the course in a regional level. The course, however, should be designed in an innovative way, innovation in distance education being one the major objectives of the network, which is organized as self-managed virtual learning communities.

Teachers engaged in preparing distance education courses often own teaching materials they have developed themselves, either as support to their face-to-face lectures or as independent study materials. It is quite understandable, then, that those teachers may want to use their materials, in a direct or adapted form, in their distance learning courses as well. However, online courses should not be a direct transcription of ink-on-paper texts into pixels-on-screen ones. The internet medium demands less linear, more interactive forms of communication.

The transition from classical ways of teaching to new learning practices is, for many teachers, a difficult and painful process. We wanted to find ways to make this transition easier and less frightening, bringing more teachers to participate willingly in the educational transformations our institutions are struggling to implement.

It may be reasonable to assume that educators agree about teaching not being merely the act of "exposing students to contents". In these days of constructivist fashion, it would be very difficult to find a written defense of traditional expositive lectures as the best teaching strategy.

Nevertheless, when we look beyond the introduction and justification parts of a DE project, when look attentively to what is actually happening in the VLE, we are prone to find conservative attitudes, mostly supporting (not always explicitly) traditional instructivist, information-passing, teacher-centered practices.

This contradiction reveals that the major "distance" to be found in distance education is the distance between discourse and practice.

4 Virtual learning environments and the issue of content

The majority of the virtual learning environments developed under the inspiration of constructivist or interactionist ideas offer few tools to deal specifically with the "content". Emphasis is on communication and interaction tools, not on resources for systematically organizing and displaying information.

On the other hand, there are many VLEs which are basically a set of content pages, grouped under a home page with a graphical interface. Even with the addition of a few communication tools, they are as far from being a learning environment as, say, a book or a film.. The design of content "pages" (a revealing expression...) tends to be excessively linear and static, treating information in a single-level way, therefore missing the chance to explore the potential of digital media for non-linearity and non-sequential display of information. Besides, classical interfaces are not known for their flexibility and adaptability, facing many difficulties to grow in sync with the course and with the needs of the educational agents involved in it.

Even when we have some resources for dealing effectively with information in DE courses, our teaching experience shows us that the average student is the one we tend to address in our face-to-face lectures and in our printed study materials. We find it very hard to give proper attention to those students who have the potential to go beyond the average as well as to the ones who are not managing to follow the average group. The important issue here is that if we aim for just the average, we should not be surprised if we get back only the average, and afterwards we should not complain when we need the above-average and we don't have it. Digital technologies can help us in our effort to address all students, not only the average, making distance education truly innovative and significant in its contribution to pedagogical change.

5 Learning Spaces

We understand virtual learning space as the social, cultural, intellectual locus where learning takes place, mediated by digital technologies.

Our proposition involves two complementary, integrated virtual learning spaces linked by an interface designed under a structuring metaphor.

The first of the two spaces is the information space. A space for content, required and complementary reading, organized and systematized knowledge, references, material for further analysis and discussion, cases and examples, made available to the students in written and multimedia materials, conceived and prepared (initially) by the teacher/author. Students access these resources via our interface, using a computer connected to the internet.

The second is the interaction space. A space for communication, discussion, debate, collaboration, cooperation, collective construction, open to all educational agents in interaction - teachers, authors, tutors, invited participants. University-developed or commercial virtual environments can be used for this purpose, as long as some basic technical specifications are met.

The integration between the two learning spaces is done through the activities. It may be said that this proposal is activity-based, even though, at first sight, it may give the impression of being either content-based or discussion-driven, if the first or the second space is seen in isolation. In our understanding, the activities (tasks, questions, challenges and problems) are the heart of the course, although the interface brings to the front-end the information space.

The design of the activities is central to this proposal. Being the main link between the information and the interaction spaces, the activities must be designed following a set of guidelines derived from an overall pedagogical strategy which includes specific strategies for developing, coordinating and assessing activities according to the degree of interaction, cooperation and autonomy of the participants of the course in focus [8].

6 The interface for the information space

Metaphorically compared to a shifting ocean of information and multimedia, the internet comprises a diversity of movements, such as the ones the aquatic metaphors refer to: movements over a line (surfing), on a surface (navigation) and in depth (diving). As we wanted to treat course contents as information, we were attracted to the possibilities of the main structuring metaphor, which could help us to meet the challenges mentioned earlier and even go beyond them, creating an innovative learning environment where different teaching and learning styles could co-exist.

The areas of the interface

1. Map of the Journey (planning your trip). This icon, once clicked, drops down a list of the study themes of the course. Study themes or study units are the major course components and can be modules, chapters or even lessons. They are designed, both technically and pedagogically, as learning modules, similar to learning objects, so it would be possible to reuse a module in other courses.

When a study unit (one "leg" of the voyage) is chosen, a screen with the first page of the corresponding "Navigate" area is automatically opened. In it, a short story, taken from day to day life, focusing the main subject of the study unit, is used both as a teaser and as a case from which the "content" of the unit begins to flow.

2. Navigate. In this area, the teacher-author offers the basic text (we use here the word "text" in a broad sense, including audiovisual and multimedia texts) corresponding to the study theme chosen by the student.

The content here must be the one the teacher considers as the necessary minimum for the students to obtain an acceptable understanding of the subjects grouped under the chosen study unit. Being so, what we find in the "Navigate" area is the product of a deliberate, conscious choice of the teacher and precedes contact with the students. It corresponds to the latitudinal cut in the information universe.

Navigate corresponds to what the teacher would select for his/her written material, tutorials, study books or face-to-face lectures. In the "Navigate" area the students must find the essential content, the base reading and viewing material for the module being studied. This means that if a student does not have the time or the will to expand or to deepen his/her studies on that theme, he/she can go forward in

the course without being penalized in any way and without the risk of missing something crucial for latter studies, as long as the readings and activities in the Navigate area are completed satisfactorily..

Pre-existing material, written or prepared for other media, can be re-used here, but we advise teachers to re-write them in order to take full advantage of the medium and explore all the possibilities opened up by the new interface.

In fact, re-thinking the materials that were used in face-to-face classes in order to produce a distance education course presented via our multi-level interface is a great exercise and may well be one of the important outcomes of the whole process we are experiencing in this project. Face-to-face classes may, hopefully, benefit from the recreation of the study materials, balancing information, discussion and action.

It was said before that the **activities** are the main bridge between the information space and the virtual learning environment. They are the pedagogical artifact which should instigate the students to start discussions and debates that motivate them to engage in collaborative practices and other forms of interaction that the environment may support. For this course, the strategy suggested by [8] was followed. This strategy lays out a series of layers, beginning with task-based learning and moving towards learning based on processes, aiming to achieve the necessary conditions for the developing of collaborative learning.

Complements of the Navigate area

- Rowing...

This mark is shown beside the text presenting an activity, setting it apart from the main body of text. It contains a link which points to the appropriate area of the VLE where the activity is expected to take place, such as the chat room or a forum topic. Rowing implies moving by our own strength and will in a chosen direction, without the help of wind and sails, an effort the participants will have to make (individually or collectively) in order to accomplish the activities being proposed.

- Synthesizing...

Students are expected to produce a synthesis of what was read, discussed and experienced in each stage, sharing it with the other participants in the learning spaces being used by the course. This activity can become an essential part of the evaluation process..

- Clarifying...

This icon signals annotated reading references, audiovisual aids, new activities and other forms of presenting the information in different ways than the one used in the Navigate area and its complements. The objective here is to provide students that are, or may be, facing difficulties, with the opportunity to engage with the course material in new, refreshed, ways. Sometimes through the use of different media, sometimes with a different kind of activity, examples, cases and other resources meant to clarify central ideas of the study unit.

3. Sailing. Here the teacher has the opportunity to expand the horizons of the study unit, bringing connected subjects for which there was not enough time (in face-to-face classes) or space (in printed materials) to present and discuss properly.

In the Sailing area the surface can be extended or enlarged to cover subjects which are connected to the study unit main theme. To sail, then, is to expand, to amplify the surface defined in the Navigate area, allowing the teacher/author to bring

into the course subjects which would not fit into the tough constraints of time (in face-to-face courses) and space (in printed or sequential media).

4. Diving. In many occasions we face the frustrating situation when a student comes to us after class and asks us for more information or comments about the subject we have just presented. Often on these occasions, pressed by the short time we have for such interactions, by other appointments or tasks, or even by tiredness, we give the student one or two references, tell him/her to send us email asking for more stuff and walk away, with the unpleasant feeling that we failed to respond as we should - and would, in more favorable conditions. Only in a few opportunities do we have the time, the resources and the will to give an inquiring mind the attention it deserves.

In other occasions, when we are preparing printed study material, we have to conform not only to the limited space we are allotted, but also to the way study units should be dealt with. We cannot - at the same time, in the same material - write in a way that is both appealing to the majority of the readers and complex enough to satisfy advanced students. We have to opt between covering the whole surface or to dive in some spots, reaching new depths. In other words, the choice we have to make - taking the subject matter in a broad way or in depth - defines the form we are going to give to the subject and eliminates the other possibility. There is no compromise, unless we are given more space or time, both of which we rarely get.

In a digital media like the web, this is not an eliminatory choice. We can treat a subject matter with the degree of complexity we want, while still retaining the choice to enlarge and expand the surface we covered in the basic text. In this way, the Diving area is where the teacher/author introduces topics and subjects prepared for the students who want to go deeper into the study unit's main subject. They can (at any point of their navigation) plunge into the information and reach deeper levels, augmenting the complexity of what is being discussed in the Navigate or Sail areas.

Dive and Sail both lean on one of the main potentials of the digital media: that of establishing non-sequential connections between parts of given material. This, in turn, opens up the opportunity to address the whole range of students, including those who wish to go further or deeper than the average: in properly designed digital material they can also find information, opportunity and guidance to do so.

5. Anchoring. Here is where students may stop at a calm bay to reflect on the journey made so far, linking previous experiences to the new landscapes seen in each leg of the trip. Authors of many different streams agree that one of the more important conditions for learning is the establishment of meaningful connections between what we are trying to learn and our previous knowledge and life experiences. Placing the newly constructed knowledge in the broader context of our professional and personal lives is essential for significant learning. The Anchoring area is where we provide the stimulation and the opportunity for the students to make those connections and to share them with fellow crew members, who may find in those reports a rich source of ideas, views and inspiration.

6. Orientation. In this area the students can find general information about the course, such as its syllabus, timetable, methodology, assessment and other components. Future versions will include a personal map (a "Chart"), in which each student's trip can be dynamically represented, and used both as a record of visited places and as a planning tool for future movements. Guidance and advice about the process of learning at a distance are also offered in this area.

7. Diary. This area is where the students keep their records of their own trip. According to the pedagogical choices of the teacher, these records can take a variety of forms, ranging from a simple description of the student's chosen path of studies to a full portfolio.

8. Interact. Clicking on the Interact icon takes the student immediately to the virtual learning environment, where he/she can start a new topic in the discussion forum, contact other participants via email, open a chat session and so on. This can be done at any point whenever the students feel the need to engage in conversation, synchronous or asynchronous, with other participants.

We explained earlier that all activities demanding interaction among crew members have an accompanying icon (Rowing) that takes the student directly to the area of the VLE where the specific activity may be carried out. However, Rowing is a teacher-centered action (at least at its start) and so the choice of the interactive tool to use with it rests with the teacher. The Interact icon allows the students to decide what to discuss, when and with which VLE tool, at any given time of their trip.

9. Help. This is a standard area where the student can find information and advice on how to use the interface and its elements through a guided tour of the interface that uses an exploratory approach.

10. Crew. This includes a list of all the participants - students, teachers, tutors, support staff - who are actually engaged with this specific course and group. Multimedia self presentations by the group members are encouraged. This is an important feature of the interface, not just a nicety. Social interaction is one aspect of face-to-face classes that students would like to keep, even in a different format, in distance education courses. A dynamic page soon becomes a meeting point. An open notice board enriches the page.

New elements can be added to the interface, following the main metaphor, as new situations and learning needs arise. The interface is flexible enough to incorporate new features without losing consistency.

7 Benefits of the proposal

The proposal is expected to help students to establish the essential connection between what is being studied and their previous knowledge, life experiences and practices, which are not usually considered as they should be in distance education. It also considers students as active learners, capable of learning in many ways, accessing and re-signifying information, discussing ideas and concepts, constructing knowledge individually and collaboratively, developing cognitive, practical, affective and social skills and competences.

This proposal was firstly conceived as a helpful resource for authors of online teaching materials and instructional designers of distance education courses. As such, it allows authors and teachers:

- to organize information in different levels (from the more basic to the more complex, from the more panoramic to the more focused) in accordance to the non-linear potential of the web.

- to structure each course around modular components, which can be re-used in other courses and situations and to combine study units in new ways.
- to address students with different degrees of motivation, commitment, available time for study, experience and learning styles.
- to address the whole range of the students, from the ones who are not up to the average to the ones who want to and can go further or deeper into the subjects being studied.
- to treat course content as multi-level information.
- to use, in the digital media, teaching materials previously developed for print media, as long as they are adapted to the logic of the interface and the language of the new media.
- to amplify the study themes with more information, questions and discussions than face-to-face classrooms or printed materials allow.
- to incorporate future growth and development, adding new areas, functions and tools, following the central metaphor of navigation.
- to integrate activities, information and interaction in the same environment under the interface designed.
- to promote individual and group practices, seen as necessary steps towards collaborative learning.
- to follow a less abrupt transition from teacher-centered practices based on information transmission, to student-centered practices based on interaction among learning agents and continuous (re)construction of knowledge, with support of interactive technologies.
- to develop collaboration, progressive discussions, communicative exchanges, meaningful interactions, the building of common references and repositories, self and group evaluation, and other collective actions.

8 Closing remarks

The "content" pages of the information space can, of course, be considered as being still teacher-centered, and as such, affiliated to a transmissive-instructionist model, because it focuses on ready-made content. We take this criticism as an alert for authors developing such teaching materials.

We must stress the importance of the metaphors employed as orienting ideas for the design of the interface presented above. They are not a mere background or a holding place for pages that are not substantially different from book pages. They offer recognizable references for the establishment of an organizational space which encourages teachers/authors to think about their areas of specialization from different angles. Preparing a course following the guidelines embodied by the interface is a challenge that includes treating content as information, and information as a multiple-level universe. It also stimulates the teacher/author to conceive and develop engaging activities, which should be designed in such a way as to foster reflection, critical thinking and the individual and collective reconstruction and re-signification of knowledge.

Our experience showed that the decisive aspect for the success of such proposition is the design of the activities meant to bridge the two learning spaces. Metaphor, interface, information pages, and VLE, used as they were in such an integrated form, permit the development of motivating, enriching activities, but it is in their conception, design, implementation and follow-up where the greatest challenges reside. Being so, we point out the importance of the innovative interface we designed for bridging information and interaction spaces in virtual environments and distance education courses, but it must be emphasized that without good, appropriate activities, creatively designed and competently developed, interfaces, metaphors and virtual environments will be of little help in surpassing the limits of the face-to-face classroom and the shortcomings of traditional pedagogies.

This proposal, although centered on aquatic metaphors, was conceived with feet on the ground. In a certain measure, it is quite pragmatic, taking into consideration the need to facilitate, for the teachers/authors, the exercise of their teaching practice in this modality, which is a new one for many professionals and uses technologies and media with which not all teachers are familiar with. It is a provisional proposition and so is open to modifications which may lead, more than to its improvement, to its overcoming. It is a transition proposal, and, as such, doomed to be transitory. In a certain way, the success of this interface will be judged by the degree of its mutability...

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