Supporting cognitive processes in English for Specific Purpose online learning: task and environment design

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Abstract

This paper wishes to contribute to the development of interactions that actively engage the reader in an online ESP course. We will explore techniques for enhancing cognitive processes, look at goal-based scenarios and problem-based learning shells, discuss tools for presentation and communication and examine interface designs that support learning outcomes.

Keywords: e-learning, environment design, ESP, instructional design, task design.

A. Task Design

Third year students at Lisbon School of Accountancy and Administration are required to take a compulsory Business English course that focuses particularly on Accounting, Auditing, Banking and Taxation. We will therefore use this course as the background for the examples we will provide throughout this article.

The learning task helps students make connections between what they already know and what is new. Computer-supported tasks such as the retrieval and reorganization of information from the Web may require reconceptualizing existing semantic networks, a process of active learning. Active learning can be supported by using cognitive tools or Jonassen's mind tools (1996) that help learners develop a deeper understanding of key learning concepts in a course. These include tools for:

- Organizing and re-presenting information (e.g. in outlines or study guides)
- Annotating and elaborating (e.g. asking questions)
- Building on experience or scaffolding
- Self-assessment (e.g. online quizzes)
- Reshaping knowledge or representation (e.g. collaborative problem solving)
- Critical reflection (e.g. conferencing)

Techniques that Enhance Organization and Retrieval

Learners can be helped to retrieve and organize new information by making the scheme explicit. Including or embedding techniques that encourage the cognitive processes of attention, encoding, and retrieval are good possibilities of doing so. Some techniques that support these processes are illustrated below.
**Advance organizers**

Advance organizers are tools that motivate and help learners organize new information by suggesting a scheme or framework into which new concepts can be "slotted." These can be an outline of the content, a preview of activities, or other pre-instructional information. By having prior access to lecture outlines highlighting the key concepts to be covered, learners can organize the material for learning as well as use a guided, note-taking strategy during face-to-face lectures (Ausubel, 1968).

Posting a question via e-mail or the class conference that requires personal reflection is another strategy that motivates and prepares for new learning. For example, to prepare for a class where Banking is approached participants can be asked to comment on the statement: «A credit card is an anesthetic which simply delays the pain.»

Other examples of advance organizers include: requesting a response to a controversial statement; issuing a challenge; asking that several key terms be defined before class; prompting a memory from childhood or adolescence; asking learners to view a television program with a key question in mind in advance of the learning task; posing a riddle or problem.

**Focusing Questions**

Use focusing questions at the beginning of a lesson or each new content module. These questions draw learners’ attention to the important points and help them organize their thinking around these ideas. For example, this question focuses learners on Taxation: What taxes are levied in your country?

**Highlighting**

Providing emphasis directs learners’ attention to a specific aspect of the information that you want them to retain. Highlighting signifies importance (Newby et al., 2000). Emphasizing techniques include style elements like bold or italic, visual techniques such as color, text elements like labels, and arrows. Additionally, you can use signal phrases orally or in written form. Nothing gets attention like the ubiquitous «This will be on the exam» or «This is the key concept in this module».

**Analogies**

An analogy links something new to something familiar and accomplishes three important goals: making abstract information more concrete; helping organize complex information; providing a retrieval cue. For example: The interface is the bridge between the learner and the content.

**Imagery**
Images are mental representations of new information. Images can serve as cues for recalling new information and can represent ideas that would require a fair amount of text to describe. Remember: more effective images are often simple and may be layered if illustrating a complicated idea.

B. Activities that Support Scaffolding Through Representation

Learning results from making personal meaning out of information and experiences, and applying that learning in new situations. Strategies that support these cognitive processes include: case-based learning and problem-based learning.

Case-based Reasoning

Learners acquire knowledge and critical thinking skills by studying cases and preparing case summaries or diagnoses. Cases are anchored in authentic contexts, encouraging learners to manage complexity and think like practitioners. Recollections of prior experiences are key to learning. Learners build on these experiences as they seek solutions. Cases provide multiple interpretations, perspectives and viewpoints of content with multiple, related cases. Stories are the primary content and pedagogical source.

Developing a case-based environment includes: collecting a set of cases; identifying lessons in each case (indexable, perhaps in a repository); characterizing contexts in which each case will be most meaningfully used; developing an index; presenting its features in a way that allows cases to be recalled when needed.

In the context of a Business English course, students may be asked to discuss the concept of business ethics. In order to prepare for the discussion, they can be encouraged to find examples of recent cases that involved this issue, which will help them form an idea of how to deal with unethical situations.

Problem-Based Learning

Learners can focus on complex projects consisting of multiple cases. They debate ideas, plan and conduct experiments, and communicate their findings. As we continue to emphasize collaborative social learning in higher education we see increasing numbers of e-Courses and programs based on this approach.

Problem-based learning fosters learning by thinking like members of a practice community usually by playing a role. In a Business English course, students can be asked to present a business company to the class, who act as investors ready to invest in a new venture.

A problem-based learning shell contains: problem/project context, representation and manipulation space; related cases; information resources; cognitive tools; conversation/collaboration tools; social/contextual support.
C. Tools and Methods that Support Communications and Presentations

Distributed communications

The Internet is an excellent medium for distributed communications, wherever participants are located, whether at the same time (synchronous) or at a different time (asynchronous). These communications can be interactive (two-way) or one-way.

Social constructivist learning

Communication tools support social and constructivist learning, as well as course management. Groups working collaboratively on a project, case, or problem can use these tools. For example, the tools may be used by a learner seeking academic help from a tutor, an instructor leading a class discussion, or in a myriad of other ways. Many Learning Content Management Systems (LCMS) include a set of communication tools, both asynchronous (e.g. threaded discussion forum) and synchronous (e.g. a text chat). The system can usually link out to other Web-based systems.

Tools that enhance presentations include

- Webcasts
- Synchronous conferences
- e-Texts

Tools that enhance two-way communications include:

- E-mail
- Discussion groups
- Screen-sharing (e.g. whiteboards)
- Synchronous conferencing

D. Environment Design

Navigation

Optimal layout and interfaces

From deductive through inductive models, the goals of the website need to be clearly understood before deciding on an optimal layout. For example, pages may be directive - directing learners to other information or act as navigation or be informative - presenting content for online reading (McMullin et al., 2000).

These examples involve different learning tasks; optimal layout for one type is not optimal for the other. For example, we expect different reading experiences from a
romance novel and an accounting textbook, different viewing experiences from a feature-length film and a newscast, and different participation experiences from a small-group seminar and a lecture to 400 students in a large multimedia hall.

In an e-Learning environment, the nature of the content and the interactions within it are represented and enabled by the design of the interface.

While it might be tempting to assign the confusion between media and real life to problems of age, knowledge, distraction, or convenience, research shows that social and natural responses are remarkably common, and true for every group tested, including children, people in business, and technology experts. Everybody automatically and unconsciously responds socially and naturally to media (Reeves & Nass, 1998).

Well-designed interfaces are coherent, consistent, and transparent. They are also positive, relevant, and clear. In other words, a good interface does not require the user to figure out what to do on each page again and again or make the learner feel ignorant or technically hopeless. Cognitive and emotional effort should be directed towards the learning task. Poorly-designed interfaces, however, increase the user's cognitive load and can lead to anxiety, frustration, and rejection.

If a LCMS is being used, one may have limited options for designing a user interface. Nevertheless, there are still decisions to be made about visual elements, placement of e-Texts, and relationships of ideas.

Interface or navigation decisions should be based on one’s understanding of our readers or learners and their diverse needs and expectations. Interface design is a key stage in user-centered design.

Navigation Systems

Many information architects advise to keep the website shallow and broad. In other words, the user should not have to dig deeper than three to five levels to retrieve the information needed (Rosenfeld & Morville, 1998).

The «rule of three» suggests layers of related content, tasks, or administration in a site.

- Layer 1 may contain a preview of the learning environment, an overview, links to other areas (e.g. discussion board), access to help;
- Layer 2 may contain a complete development of the main, high-priority ideas and related activities;
- Layer 3 may contain rarely needed subjects, supporting or additional resources, external links that extend the experience for interested or advanced learners, evaluation or feedback forms, etc. (Horton, 2000).

Keeping these guidelines in mind, we can consider three types of navigation systems:

- Hierarchical: this is very useful for information that is conceptually organized in a top-down structure. Textbooks tend to be organized hierarchically, with main topics and
related subtopics. Many LCMS systems offer this type of interface, with main choices and management features available on the homepage, through which the specific topics are accessible. This kind of scheme is often represented with a table of contents.

- **Global**: this system permits greater vertical and lateral movement throughout the entire site and does not suggest information hierarchies. The navigation system may be graphical, with each image the same size. As these schemes are relatively flat, they may have an index.
- **Local**: such system may organize a sub-site within a larger site. The navigation design may even be different, although it should be coherent. For example, an online catalogue may have an overall scheme based on categories of items for sale. In each main item area, there may be many smaller «sites» based on item attributes or characteristics. A site map, in combination with other navigation schemes, is quite common in sites with this organization.

**The Navigation Bar**

The navigation bar is placed in a consistent place on the screen. For example, if your secondary pages place the bar at the top of the screen, keep it there for every other secondary page on the site. A top placement provides context for the learner. Many sites place the same navigation bar at the top and the bottom of the screen, which supports scanning. A side placement is often used in a table format. Usually the navigation bar remains constant as the user navigates the site. Rosenfeld and Morville do not recommend this placement, although if supported with a top or bottom bar a side bar may help anchor the learner (Rosenfeld & Morville, 1998).

Site maps provide a graphical representation of the information architecture. Site maps represent visually, although sometimes in text only, where you are in the site and where desired information can be located.

**Metaphors**

One way to think about the interaction of form and content is through a metaphor. An icon by itself is usually a metaphor, but the reader needs to understand its symbolic meaning. Remember to constantly challenge your decisions about the use of icons or visual images through the eyes of an international reader.

**Links**

Embedding links into e-Text is a very common navigation device. Hypertext environments are really shaped by the interrelationships of ideas or the semantic web of ideas that the reader creates. However, hyperlinks are not always used effectively to support readability or the process of semantic linking. Problems include, among others: interrupting the reading flow; leaving a page and not being able to return; distracting the eye from important information; broken links.

**E. Summary**
In this paper we considered the two key elements of an e-Learning space: Task and Environment. We have presented a series of strategies and techniques to organize online content, structure a design shell, and integrate learning activities. The space in which learners interact with the content is the interface. We have also explored elements of the interface and some guidelines for designing or evaluating an effective interface, including the use of metaphors. To support our ideas, we have used examples taken from a Business English course, focusing on several key areas. We believe both concepts of task and environment design to be helpful to structure learning and teaching an ESP course.

References


