

## **An Online System for Managing Student Review and Self-Evaluation<sup>1</sup>**

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This paper describes a web-based question-answering system called E-teacher that can be used in both traditional and distance learning courses to review academic contents. E-teacher is a self-editing template-based system consisting of a set of PHP scripts that generate the HTML code dynamically, or "on the fly." E-teacher was developed to help students review course content and reinforce the knowledge gained during traditional or distance learning courses.

E-teacher permits individual teachers to employ nine different self-editing templates that record questions, answers, additional instructions and help in resolving problems, as well as hyperlinks into the system database or Internet. This information is stored according to question type in the database where students can then review for tests. The teacher can select individual questions from the different question types and create a series of online tests for the students to self evaluate as they review course material. E-teacher also allows individual students to practice the different question types and receive feedback through an overall "grade" that is constantly actualised as the student progresses through the system exercises.

### **Introduction**

Teaching and learning are increasingly becoming intertwined with technology in many higher education institutions. Indeed, technology has become an all-encompassing fabric that facilitates the educational process and helps make our daily lives more fruitful. Teachers are changing how they teach and institutions are presently evolving to incorporate technology to an even greater degree as they recognize the benefits it affords and attempt to avoid the "technological divide" and the competitive disadvantage this represents.

It is important to bear in mind that technology is but a tool in the learning process, not an end in itself. Consequently, before employing technology in the classroom, it is important for the teaching materials to be well grounded from both the pedagogical and technological points of view.

Educational technology is a fascinating field which has yet to be fully explored and widely used in English Language Teaching (ELT). There are, however, extensive Computer Applied Language Learning (CALL) tools for the field of ELT. Many of these tools are sound from a technological point of view, but empty from a pedagogical perspective, or vice versa. Others, fortunately, are both pedagogically and technologically sound, yet they do not possess the characteristics that meet the more specific needs of particular groups of language learners.

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The University of Colima is in the process of creating CALL educational materials, mainly in the field of medicine, to better meet student interests and needs. In ELT, a small team of enthusiastic teachers has shown interest in using educational software or designing their own so that a substantial number of English students benefit as much from the University's technological infrastructure as possible. This is what led us to create E-teacher, an online resource designed to meet our students' specific needs.

The overall purpose of this resource is to promote learner autonomy; its aims are:

- a. to promote the use of information technology for learning purposes including, but not limited to, English Language Teaching among students and teachers, and
- b. to provide students with systematic, free, voluntary practice.

### **Target Audience and Setting**

The University of Colima (UdC) has a student population of approximately 24,000, all of whom take required English courses via the University's English Program (PUI). English is a compulsory subject at secondary and high school levels in Mexico. This means that first year undergraduate students at UdC have already received 5 to 6 years of English teaching, and they will receive a further 4 or 5 years instruction for the duration of their undergraduate studies.

Despite the number of years of instruction, many students do not become proficient in English. One reason is the lack of student intrinsic motivation, a result of the fact that English is a compulsory subject and that they do not see an immediate need to learn it.

Another factor, one that also has an effect on teacher motivation, is teaching conditions, a problem that is widespread in the world of ELT. A single teacher may have up to 10 35-student groups and see them 3 times a week for a teaching load of 30 hours, but each student receives only 3 hours per week of instruction. The lack of instructional time, the excessive workload and the number of students per group make instruction much more difficult. The lack of outside resources that afford practice represents an additional important factor contributing to the lack of motivation among some students.

### **Background for Developing E-teacher**

#### Self-Access Centres and online materials

One approach to increasing motivation and learning is a self-access language centre (SAC). Around the world, educational facilities have started to create their own sites. The University of Colima has a SAC at each of its five campuses. The next goal is to develop further resources. Technologically speaking, the challenge of our work is to produce an online resource that can, at least in part, replicate the usefulness of the SAC itself. Copyright issues also represent a major motivation for this project as the majority of materials in a SAC—video, audio and textbooks—are copyrighted. An SAC can only refer to materials which it physically owns; it cannot provide access to them online unless it possesses the copyright, which is not usually the case. E-teacher, the system we propose, was

not conceived as a replacement for the SAC, but rather as a complement. SACs are performing their function well; E-teacher will work as an additional tool for both teachers and students.

### Promoting learner autonomy—several theories

Learner autonomy refers to the ability individuals have to govern themselves. Autonomous individuals can decide for themselves what is right or wrong, what is true or false (Kamii & Clark, 1993). Learner heteronomy is the opposite term. Heteronymous persons cannot judge for themselves and therefore depend on the judgement of others. Unfortunately, the school system in many countries, especially in compulsory education, is still producing heteronymous students.

An autonomous learner is often a more responsible learner. Dickinson (1995) suggests that students who see the reasons for their success or failure as depending on external factors are more likely to fail than those who take responsibility for their own learning. Gremmo and Riley (1995) point out that developments in technology have made "an undeniable contribution to the spread of autonomy and self-access" (qtd. in Motteram & Slaouti, 2000), but they also warn against calling behaviouristic programmes "self-directed." What this implies for the design of materials is that technology may contribute to promoting learner autonomy, but that a constructivist pedagogy is not easily embedded.

Regarding software development in general, Motteram & Slaouti (2000) discuss two issues: "its failure to promote any level of reflective pedagogy and the absence of choice," which means that many materials that have been created do not promote learner autonomy, regardless of how effective they may be at transmitting knowledge. They suggest that what we need to aim for is critical choice in the feedback. Selfe (1995) states one key feature of teachers who work within virtual environments is that students "labor constantly to develop and maintain the habit of continuing to learn. They must make themselves attend to and explore student perceptions and behaviors, especially those that are not congruent with patterns typically displayed in traditional learning environments" (p. 29).

### The Behaviourist View

Learner autonomy cannot be achieved in a class where everyone has to go at the same pace. You are normally asked to learn a lesson in a 50-minute session, no more, no less. Even in small classes, teachers are aware of the differences in students and end up punishing the slower ones and boring the faster ones. Skinner (1968) saw "machine instruction as the solution for this problem" (p. 30). He believed that by allowing each student to go "at his own rate," learner autonomy would be promoted.

### The Constructivist View

Another theoretical model is constructivism. Beatty (2003) describes it as follows: "Constructivism is a humanistic model that differs radically from behaviourism, suggesting that learning is a process by which learners construct new ideas or concepts by making use of their own knowledge and experiences. The learner has greater control and responsibility over what he or she learns and re-

lies on schema... to select and transform information, create hypotheses and make decisions" (p. 91). Schema are mental models that condition the learner's acquisition of new knowledge. Schema theory is important to CALL because many aspects of schema mirror the organization of hypertext, hypermedia and multimedia (p. 92). In the constructivist model, the learner should be able to decide much more than his or her pace of learning. The schema theory suggests that the learner could end up learning everything but what the teacher expects them to learn.

The E-teacher proposal does not pretend to be constructivist or behaviourist. It is just a modest attempt at helping students achieve learner autonomy. As Beatty (2003) puts it: "As with behaviourism, not all aspects of constructivism are likely to be found in all learning materials labelled constructivist, nor is constructivism likely to be pervasive in any teacher's daily classroom practice" (p. 97)

### Educational Technology-- Computer-Assisted Language Learning (CALL)

Computer-Assisted Language Learning (CALL) has existed for nearly four decades. In the 1960's and 1970's, it existed almost exclusively for an intellectual elite. The reason for this was simple: as computers were very expensive, only a limited number of institutions, universities and government programs could afford them. CALL was transformed with the advent of the personal computer. It is then that individual teachers, and eventually companies and institutions, started creating CALL software *en masse*.

The communicative approach that emerged in the 1970's, and has since prevailed in language education, has permeated into CALL design, although most CALL software is still predominantly behaviourist. It was hoped that the so-called communicative CALL, with the technology available in the 80's, would make content more meaningful, but it was not "communicative" in its purest sense. In this mode, computers acted as "the teacher," and all feedback they were able to provide was "right" or "wrong." This is not to say that this type of approach to design was erroneous. Students who learned using behaviourist software at the time can testify to its effectiveness.

Also, design has long been constrained by available technology. We are at a stage in which technology has become more flexible and there is room for more creative design, and what is more, it is possible to adapt technology to our needs, provided we have the necessary resources.

### Some Benefits of the Internet in Education

The Internet has extended the possibilities of a class. It is possible to store everything one does for web access. With a little editing, a course can be re-cycled. There is also the possibility of virtually limitless delivery possibilities, as hundreds—or even thousands—of students can use the same material. Owston (1997, p. 30) suggests that the web can be "*capitalised*" by the instructor, providing for flexible learning. Once teachers put their materials online, they can be accessed numerous times. A word of warning is the copyright issue. Unless proper permission is granted, one should not make copyrighted materials available. This gives educators both the opportunity and challenge to create their own materials. Linking to existing pages is permitted and advisable as a time-effective

way of gathering useful information. However, as Internet addresses often change, linking to pages can often become frustrating as students sometimes cannot find the information they seek. Being the author of information, although time-consuming in the first stages, gives us the advantage of being in control of the materials. When providing links to external sites, we need to periodically check them for functionality.

### **E-teacher: Description**

E-teacher is a template-based system which is managed through Microsoft's Access database, where data are captured and retrieved upon request. The system will be integrated into distance education courses offered by the Facultad de Telemática of the University of Colima (FT), (<http://telematicanet.ucol.mx>). E-teacher is composed of nine activities that can be used as independent modules or in combination and can be easily integrated within online courses.

E-teacher is being piloted by English as a Second Language (ESL) professors at the FT as a complementary tool in their face-to-face courses. The implementation of this Web-based question-answering system will make student self-evaluations and the interactivity with the course materials easier and more efficient. This is in contrast to other simple strategies for handling student questions, such as bulletin boards, newsgroups, listservs, and e-mail, which are more open-ended and promote learner autonomy more overtly and adapt more obviously to the constructivist model. This system has a set of modules to increase the interactivity of students with course materials. For instance, E-teacher has a module that rates the performance of each individual student, based on random exercises and exams for their personal use without recording any data about the results. The activities for students within this system and their full descriptions are listed in Table 1.

Activity	Description
WordScramble	The system randomly misarranges the letters within a response, which students must appropriately order to reproduce the correct answer.
SentenceScramble	The system randomly misarranges the syntax of a sentence or phrase, which students must appropriately order to reproduce the correct answer.
MatchCols	The system produces two columns which students must correctly correlate.
Fill	The system produces sentences or paragraphs with spaces which students must complete with the correct response.
SingleChoice	The system produces multiple choice questions with between two and ten options with a single correct choice.
MultiChoice	The system produces multiple choice questions with between two and ten options with an equal number of possible correct choices.
Dialog	The system misarranges elements (dialogs, processes, etc.) within two columns which students must correctly order.
Random	The system accesses the database of the type of exercise the student chooses (Fill, MatchCols, etc.) to randomly produce exercises from all the categories contained within that specific database.
Exams	The teacher selects a maximum of 20 questions from the 7 different question-type databases (Fill, MatchCols, etc.). Students then select any number of practice tests the teacher has previously captured.

**Table 1. Different types of activities on E-teacher**

### Question-answering system

The E-teacher system consists of a set of PHP (Hypertext Protocol) files that generate all the HTML code dynamically. This PHP code handles all the operational tasks. The files reside in an Apache Web Server operating in a Windows 2000 server with a PHP module version 4.0. In addition, the system is also installed on a PC running the Linux operating system. The database that handles all the files can be accessed transparently through ODBC (Open DataBase Connectivity) in any platform that supports this open database connectivity. The system consists of student, teacher and administrator modules.

The E-teacher is an open system for students. Any student can access the system to review course materials independently of the topic or teacher. Teachers, however, must be registered by the system to add, modify or delete review materials. Figure 1. shows the main screen for the E-teacher system.

It is important to mention that students can not modify the contents, graphic interface or functionality of the system. This can only be done by the teacher(s), previously authorized by the administrator of the system, who possess the access code.



Fig. 1. E-teacher main screen

In the main screen, students can select the teacher with whom they wish to study. Once they select the teacher, they can choose the type of exercise and the specific topic they wish to review.



Fig. 2. E-teacher personalized activity screen



Option	Description
Menu	Returns students to the activities main screen.
Instructions	Provides specific instructions on how to resolve the item
Review	Provides feedback about the degree of accuracy of the response
Next Item	Provides student with a new item

**Table 2. List of standard selections for students**

One important characteristic is that teachers can provide students with several levels of difficulty depending on whether or not they wish to incorporate the optional selections. As Beatty (2003) states: "The challenge of mastery learning in CALL is the necessity of providing new material or new approaches when a learner fails to accomplish the initial goals. It is important that, in a restricted time frame, learners do not abrogate the task of thinking and take advantage of a software program's willingness to supply default answers. Like a good teacher, a computer should prod and stimulate learners to consider an answer rather than just giving in to the first 'I don't know' and supplying the answer" (p. 89).

Figure 3 shows how options to "prod" students along are provided. It should be noted that the options are placed side-to-side on the upper right hand corner of the screen, and the options are listed from left to right, according to the level of cognition required to resolve the problem. Table 3 shows the different options available to students:

Option	Description
Lesson	Provides a hyperlink to relevant pages related to the contents of the review material so that students can research the problem and find their own solution
Hint	Presents additional specific information to assist students resolve the item, so that students can find the "missing piece of the puzzle"
Tip	Gives the next correct part of the answer so that the student can "infer" the rest
Resolve	Provides the correct response

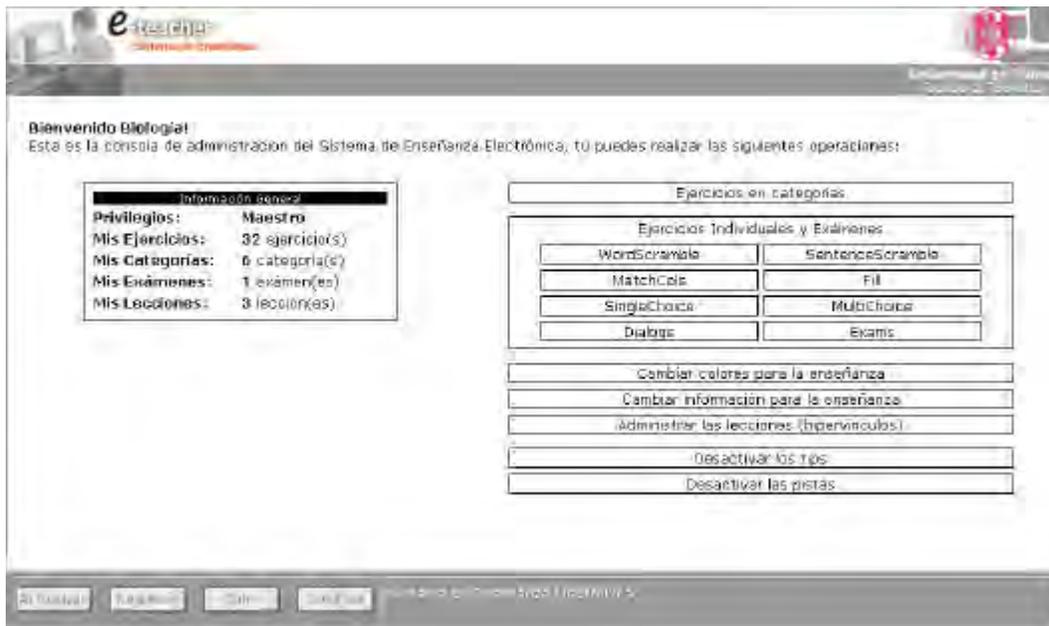
**Table 3. List of selections useful for resolving items**

Finally, the lower left hand corner of the screen (cf. Fig. 3) has the options of "Refresh," "Return," "Exit," and "Credits." These are options that provide system-wide navigation. Again, the principles of usability are very important. Levy (1997) states that good design and ease of use should be paramount and that technology should be adapted to user needs, not the reverse, and that the focus should be on cognitive principles that lead to more intuitive computer systems. (p.69) Table 4 provides a brief list of the options and their description.

Option	Description
Refresh	Permits the student to begin the same exercise anew
Return	Allows the student to navigate back to the E-teacher personalized activity screen (see Fig. 2)
Quit	Permits the student to leave the E-teacher system
Credits	Provides credits and system information

**Table 4: List of standard navigation options**

The teacher work screens should also be intuitive from the teacher's point of view. In the 1970s and 1980s, for example, authoring software forced teachers to adapt to the demands of the computer. These programs were often difficult to understand or use by teachers with limited experience. Program design did not take into account the user's computer experience and ability. Consequently, missing a full stop or semicolon sometimes resulted in the program not functioning. (Levy, 1997, p.69 ) Figure 4 shows the teacher main screen and the primary options afforded teachers using the E-teacher system.



**Figure 4. The teacher main work screen**

It is important to note that teachers can deactivate the "tips" and "hints," making the exercises increasingly more cognitively demanding. The "lesson administrator" (hyperlinks) permits teachers to provide hyperlinks for related investigation, bibliography, etc. by the students, thus providing for learning under the constructivist model.

Beatty (2003) observes: "A strength—and a weakness—of some computer-based materials is their lack of a clearly determined scope and sequence. Instead, they allow individual learners to pursue links which they perceive as being both useful and interesting. This ability to choose a path of learning means that different learners are not all constrained to learn the same materials in the same

way, but may instead find new answers and solutions to questions and problems” (p.148).

Table 5 provides a list of the options for teachers using the E-teacher system.

Option	Description
General Information	Displays the general information and the summary of lesson exercises incorporated by the teacher and his privileges
Exercise categories	Creates the databases needed to present the review activities as a coherent set.
Individual Examinations and Exams	Creates individual activities that can be included in the Random and Exams databases for either review or inclusion in practice tests.
Change Colors for Instruction	Suggests a variety of color combinations teachers can use as backgrounds for their activities.
Change Interface Information	Individualizes information within the system, according to teacher requirements
Administer Lessons (hypertexts)	Creates a hyperlink database where the teacher can select hyperlinks to provide additional information (i.e. readings, diagrams, etc) to help students solve items, provide additional information or otherwise promote leaning.
Activate/Deactivate Tips	Allows the teacher to activate or deactivate the tips captured in the database, allowing for different degrees of difficulty.
Activate/Deactivate Hints	Allows the teacher to activate or deactivate the hints captured in the database, allowing for different degrees of difficulty.

**Table 5. Different options that appear on the teacher main menu**

#### General Goals of E-teacher

Our students’ needs are similar to those of many students in other contexts, which is why we are piloting this system hoping that its use may be extended to a larger public. The primary goals of E-teacher are:

- a. to promote the use of information technology for learning purposes in the area of ELT
- b. to provide students with systematic voluntary grammar and vocabulary practice

Online resources are often problematic because of their sometimes questionable quality or limited access. The kind of support these resources offer varies, although content, in the form of lessons, is a constant. Some sites offer grammar or vocabulary lessons, readings, fun activities (games), and many offer links to other sites, which represent an economical way of making the most of a site in its early stages. Links should be constantly updated, as Internet sites tend to vanish without a word of warning. Also, new, interesting sites may emerge that one may want to add to the links.

#### Specific Benefits of E-teacher

At present E-teacher will help learners by:

- offering nine different exercise types which can be edited by teachers, providing them a choice to produce dozens of exercise permutations
- permitting students to review and practice content, not only for weekly exams, but for semester or yearly evaluations.

- giving students immediate feedback as they work on individual exercises and at the end of the activity.
- providing users with an online examination upon finishing the 9 types of exercise to provide students more global feedback about their progress.
- offering useful links that will help them do their assignments (dictionaries, literature, grammar, etc.) and spend time on the net while learning (games).

However, in the future, E-teacher can be modified to also:

- provide scaffolding for student interaction both synchronously and asynchronously.
- permit students direct contacting with their teacher through several Computer Mediated Communication (CMC) tools.

All of these objectives are aimed at contributing to the development of student autonomy. It is difficult to become an autonomous learner in a world where materials are not at hand. With resources available, with this and other tools we expect to promote learner autonomy.

### Design Features of E-teacher

Clarke (1997) reviews many multimedia and Internet environments which were tested with users. Some of those suggestions for screen and navigation features were considered in the design of E-teacher.

Each contributor to this online resource can select a single colour combination that is used throughout the student interphase, and all hyperlinks are a standard colour. Furthermore, all control buttons are standardized (i.e. size and shape) throughout the system. The background colours are lightly shaded, which is intended to avoid eye strain.

The site, at present, can be accessed exclusively from within the College of Telematics, where it has been piloted. However, the intention is to install the system in one of the University of Colima's SACs to carry out a larger pilot program, before putting the system into use in the other four Centres.

### Development and Requirements

E-teacher was developed, initially, using PHP/4.2.3 to manage the online database and it runs on Apache Server v.1.3.26. The advantages of using these two tools are: they are "freeware," meaning that developers who choose to use these tools do not have to pay any royalties and there are no copyright issues.

PHP is "open source," which means that developers can program and personalise what they do with this tool because the source code is provided gratis. The product of any Internet tool developed with these two resources is compatible and will function equally well with the two major browsers: Netscape or Microsoft Internet Explorer.

## **Conclusion**

The fast and increasing development of distance education courses via the World Wide Web has made the development of computer systems that increase the interactivity of student-contents and student-interface necessary. With this goal in mind, we have developed E-teacher, a system based on a set of PHP

scripts and templates to help students review materials and to self-evaluate with a high level of interactivity with the course content.

Students are still heavily dependent on teacher guidance in our context. Intrinsic motivation and learner autonomy is what drives students who perform better. The purpose of E-teacher can be summarised in one sentence: E-teacher helps students achieve learner autonomy through interaction with course content and the Internet, a vast source of learning materials and authentic language, as they improve their language skills on the material they review. Whether our goals have been achieved or not is a difficult question to answer if we consider students as a whole. For that reason, our next plan is assess the performance of our system with students.

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