DISTANCE EDUCATION TECHNOLOGIES: A CLASSIFICATION AND EVALUATION

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NOTICE

This study has been completed in article format and complies with the official A-rules (A.11.2.5) of the Potchefstroomse Universiteit vir Christelike Hoër Onderwys.

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Summary

Key words: distance education, distance learning, interactive learning, telematic, computer-assisted language learning, technology multimedia, cost effectiveness, language

We are at a point in the history of higher education in South Africa when radical changes are occurring in instructional delivery system models. Of increasing significance is a mixed mode of traditional and distance delivery (i.e. Telematic Learning Systems at the PU for CHE). In this changing environment, language lecturers, the persons responsible for developing language modules within various Telematic programmes, remain a key element in the teaching and learning process. However, these lecturers are suddenly expected to make appropriate decisions in terms of distance education technology classification, evaluation, and consequent selection without the necessary knowledge and/or capacity to make effective technological decisions. The purpose of this article is to assist "Lone Ranger" language lecturers, in making pedagogically sound decisions when classifying, evaluating and selecting distance education technologies by: (a) considering technology selection as part of the instructional design process, (b) referring to some reasons for using technology for language learning, (c) focusing on criteria for classifying and evaluating distance education technologies, and by (d) reviewing selected studies in order to indicate the application possibilities of technologies for language teaching and learning.

Opsomming

Ons is by 'n punt in die geskiedenis van hoër onderwys in Suid-Afrika waar radikale veranderinge plaasvind in onderrigafleweringsmodelle. Van toenemende belang is die gemengde modus van tradisionele en afstandsaflewering (bv. Telematiese Leersisteme aan die PU vir CHO). In hierdie veranderende omgewing bly dosente wat taalonderrig aanbied, d.w.s. die persone wat verantwoordelik is vir die ontwikkeling van taalmodules binne verskeie Telematiese programme, 'n kernelement in die onderrig- en leerproses. Daar word egter skielik van hierdie dosente wat taalonderrig gee, verwag om gepaste besluite te neem in terme van die klassifikasie, evaluasie en derhalwe die seleksie van afstandsonderrigtegnologieë sonder dat hulle oor die nodige kennis en/of kapasiteit beskik om effektiewe tegnologiese besluite te neem. Die doel van hierdie artikel is om "Lone Ranger"-dosente wat taal onderrig, behulpsaam te wees in die neem van gefundeerde pedagogiese besluite wanneer hulle afstandsonderrigtegnologieë kies deur: (a) aan te dui dat tegnologie seleksie deel is van die onderrigontwerpproses, (b) te verwys na die redes waarom tegnologie gebruik moet word vir taalonderrig en leer, (c) te fokus op kriteria vir die klassifikasie, evaluasie en seleksie van afstandsonderrigtegnologieë, en om (d) 'n oorsig van geselekteerde studies te gee om sodoende die moontlike toepassings van tegnologie vir taalleer aan te dui.

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1. Background

Higher education institutions do not exist in a vacuum. Various social, economic, political, demographic, and technological forces are currently challenging higher education administrators to think very differently about how education and training are organised and delivered in order to meet the educational needs of an increasingly diverse student population and society at large in the 21st century (cf. Willis, 1994; Daniel, 1997; Department of Education, 1997; Owston, 1997).

The result is that many contact universities, both nationally and internationally, are taking up the challenge and embracing the idea of a distributed learning environment (cf. Bates, 1997; Dreyer, 2001; Jordaan, 2001). Bates (1999:p. 2 of 9) states that: "In a distributed learning environment the vast majority of applications of new technologies are used to supplement or enhance regular classroom teaching." In general, distributed learning refers to a learner-centred approach to education (cf. Bates, 1997; Gubbins et al., 1999).

A number of South African institutions (e.g. Potchefstroom University for CHE; Rand Afrikaans University; University of Pretoria; the University of South Africa) are using information and communication technologies (e.g. The Internet) for teaching and learning for the first time in a significant manner (cf. Dreyer, 2001; Grobler & Henning, 2001; Jordaan, 2001; Heydenrych, 2001). University administrators, Directors of Academic Support Services, Directors of Distance Education Units or Telematic Learning Systems, and lecturers themselves offer a number of different reasons to justify the use of technology as part of a mixed mode delivery system (i.e. contact and distance delivery). Some of the most frequent reasons given for using information and communication technologies include:

- to improve the effectiveness of education by raising the quality of teaching and learning;
- to increase enrolment and extend access to geographically, economically or socially isolated learners;
- to improve cost-effectiveness of education; and
- to produce graduates with better adaptability to information-based technological environments, and capable of lifelong learning (cf. Dede, 1995; Bates, 2001; Butcher, 2001; Jordaan, 2001; Van Wyk, 2001).

Given then that information and communication technologies have an increasingly important role within a distributed learning environment (cf. Blumenthal, 2001; Jordaan, 2001; Heydenrych, 2001), what do South African universities, making use of mixed mode delivery systems, need to do to ensure that their selected technologies address the above mentioned aspects?

One of the most important aspects needing urgent attention is the needs and concerns expressed by lecturers who are actually responsible for developing the courses to be delivered within this new distributed learning environment (cf. Kotze & Dreyer, 2001; Dillon & Walsh, 1992). One of the concerns forms the focus of this article, namely that lecturers, specifically language lecturers, are expected to have the knowledge and capacity as well as the interest to develop these courses, especially with regard to appropriate educational technology classification, evaluation and ultimately selection (cf. Kotze & Dreyer, 2001; Rockwell et al., 1999; Betts, 1998).

2. Introduction

Consider the following scenario:

> "I've been hearing a lot about using technology-based teaching in my classroom and also for my telematic courses. I suppose I'll have to try it out sooner or later", said the English lecturer.
>
> "Great", responded the department chairperson. "The university administrators want us to enter that market and provide access to a new audience of students. I'm glad to hear that you are willing to be our guinea pig. I'll tell the Director of the School and the Dean."
>
> "So, what do I do now? What technologies can I use for language and literature teaching? How do I go about selecting them, and how do I know that my students will actually be learning?" the lecturer asked.
>
> "Uh.....Uh..... Let me get back to you," stumbled the chairperson.

If this is the way your language department, school or faculty handles technology selection decisions, join the club. According to Butcher (2001), many institutions leave it to the individual, enthusiastic and creative lecturers to use whatever technologies they can lay their hands on, or with which they are most familiar. Technologies are, therefore, very often selected by the "Lone Ranger and Tonto"

(Bates, 2001), the professor with his/her trusty computer-skilled graduate student, who does the HTML mark up and scanning. The language lecturer becomes a "Jack of all Trades" - subject specialist, instructional designer and educational technologist. According to Bates (1997:p.7 of 25), Lone Ranger materials usually lack quality in the final product because of inappropriate technology decisions in the early stages of development. In a survey conducted by Rothwell (1997), selecting technologies was ranked first by the respondents as the duty they performed most frequently. It is also a well known fact that many lecturers are not IT (information technology) literate to a level where they can begin the curriculum development process (Blumenthal, 2001). If the classification, evaluation, and subsequent selection of technologies are not done appropriately the above mentioned scenario is certainly a recipe for disaster.

The purpose of this article is to assist "Lone Ranger" language lecturers, in making pedagogically sound decisions when classifying, evaluating and selecting distance education technologies by: (a) considering technology selection as part of the instructional design process, (b) referring to some reasons for using technology for language learning, (c) focusing on criteria for classifying and evaluating distance education technologies, and by (d) reviewing selected studies in order to indicate the application possibilities of technologies for language teaching and learning.

3. The instructional design process

Instructional Systems Design (ISD) consists of recognised procedures that are used to develop well-structured instructional materials (cf. Moore & Kearsley, 1996:102-123). The central idea is that the development of instruction can be divided into a number of phases, or stages, each of which involves certain procedures. These stages include: analysis, design, development, implementation, and evaluation. In the analysis stage, the most important activity is to conduct some form of job or task analysis in order to identify the skills that are involved in the task or job. Another step in the analysis phase is to profile the learners and the learning environment, and find out what the students need to learn in order to achieve the specified outcomes. In the design stage, the goals and objectives of the programme are articulated, as well as the structure and format of the course. Media selection can also be made in the design state based on the information collected in the analysis phase. During the development stage, instructional materials are created and tested. In the

implementation phase, students register, instructional materials are delivered, and various forms of interaction take place (i.e. student-tutor, student-student, etc.). The evaluation stage involves the assessment of students, as well as the assessment of instructional effectiveness of the course and materials (Moore & Kearsley, 1996:102).

Producing language courses for mixed mode delivery, therefore, involves many kinds of design expertise; expertise that the "Lone Ranger and Tonto" might not have. According to the South African Institute for Distance Education (SAIDE, 1995:61), "The crux of the problem is that teachers in the distance institutions do not design courses properly. The amount of time spent by staff on planning and development of new courses and the revision of existing ones is very small by international comparison ... Some use is beginning to be made of team approaches. But, typically, courses are developed or revised by one academic who may or may not consult an editor during the project but who will not have the benefit of an instructional designer." Moore and Kearsley (1996:9) state that: "While there are content experts who have both instructional design skills and knowledge of technology, it is better if these responsibilities are carried by different specialists". Graphic designers, producers, and other media specialists should also be brought in to turn the ideas of the content experts and instructional designers into good quality course materials and programmes.

Many questions must be addressed in the design and development of a course to be delivered via mixed mode delivery. For example:

- What content should be included or left out?
- What is the best way to sequence and organise the material?
- What are the best media/technologies to use to present/deliver the material?
- What kind of teaching strategies should be employed?
- How can learning be measured most appropriately?
- What feedback should students receive about their progress?
- What methods should be used to create the materials?

Even from this cursory overview, it should be clear that there is a great deal of interdependence among the stages in the instructional design process, as well as

among the persons involved in this process. Because so many skills are needed to design a course for mixed mode delivery, one of the key characteristics of most successful courses is that they are designed by course teams in which many specialists work together (Bates, 1997; 1999; 2001; Moore & Kearsley, 1996)

4. Why use technology for language learning?

With the advent of multimedia computing and the Internet, the role of computers in language instruction has now become an important issue confronting large numbers of language teachers/lecturers throughout the world (cf. Warschauer & Healey, 1998:57). The multimedia networked computer, with a range of informational, communicative, and publishing tools now potentially at the fingertips of every student, provides not only the possibilities for much more integrated uses of technology, but also the imperative for such use, as learning to read, write, and communicate via computer has become an essential feature of modern life in the developed world (cf. Oxford et al., 1998; Owston, 1997).

By the late 1980s and early 1990s, critics pointed out that the computer was still being used in an ad hoc and disconnected fashion, and thus "finds itself making a greater contribution to marginal rather than central elements" of the language learning process (Kenning & Kenning, 1990:90). This corresponded to a broader reassessment of communicative language teaching theory and practice. Many teachers were moving away from a cognitive view of communicative teaching to a more social or socio-cognitive view, which placed greater emphasis on language use in authentic social contexts (cf. Kern & Warschauer, 2000). Task-based, project-based, and content-based approaches all sought to integrate learners in authentic environments, and also to integrate the various skills of language learning and use (Warschauer & Healey, 1998:57-58). This led to a new perspective on technology and language learning, which has been termed integrative Computer-Assisted Language Learning (Warschauer, 1996), a perspective which seeks both to integrate various skills (e.g., listening, speaking, reading, and writing), and also integrate technology more fully into the language learning process. In integrative approaches, students learn to use a variety of technological tools as an ongoing process of language learning and use, rather than visiting the computer lab on a once a week basis for isolated exercises

(whether the exercises be behaviouristic or communicative) (cf. Warschauer & Healey, 1998).

In its recent *Standards for Foreign Language Learning* (American Council on the Teaching of Foreign Languages), for example, ACTFL (1996:31) suggests:

> Access to a variety of technologies ranging from computer-assisted instruction to interactive video, CD-ROM, the Internet, electronic mail, and the World Wide Web, will help students strengthen their linguistic skills ... and learn about contemporary culture and everyday life in the target country.

By providing additional possibilities to receive input and produce output in the foreign language, communicating through the electronic medium can establish a rich context for language development to occur. According to Vygotsky's (1978) Zone of Proximal Development, language learners communicate by negotiating meaning, thereby creating an environment "to learn language, learn about language, and learn 'through' language" (Warschauer, 1997:471). Research in theoretical linguistics shows that language acquisition depends on the amount of comprehensible input the acquirer receives and understands (Krashen, 1981:103). Internet resources and activities provide opportunities for additional comprehensible input, and for using a range of functional language skills in a variety of contexts (Omaggio Hadley, 1993:104-105). The use of the Internet offers self-paced, learner-centred instruction which helps to lower students' "affective filter" (Krashen, 1981:110), and allows for more individualised learning styles (Omaggio Hadley, 1993:63). Taylor et al. (1996-1997:32) state that: "Multimedia offers some effective solutions for language teachers nurtured in the proficiency movement who have inherited the daunting challenge of making their classes rich and varied sources of 'comprehensible input' through authentic communication."

Language learners with access to the Internet, for example, can now potentially communicate with native speakers (or other language learners) all over the world twenty-four hours a day, seven days a week, from university, home, or work. The fact that computer-mediated communication occurs in a written, electronically archived form gives students additional opportunities to plan their discourse and to notice and reflect on language use in the messages they compose and read (cf. Warschauer,

1997; Kern & Warschauer, 2000). Given these possibilities, it is not surprising that many language lecturers have enthusiastically embraced networking technology and have developed creative ways of using networked computers with their students. On the other hand, many other lecturers remain sceptical of the value of computer use in general. It is important to remember that the computer, like any other technological tool used in teaching, does not in and of itself bring about improvements in learning. Research questions should include: Which forms of technology enhance second language learning, (a) with reference to which broad educational goals, (b) with application to which language skills and subskills, (c) for which kinds of learners, (d) with which kinds of lecturers, and (e) in what social and physical environments? (Oxford et al., 1998).

Many of the changes in Computer-Assisted Language Learning flow from economic and social changes. Today's workplaces and communities - and tomorrow's - have tougher requirements than ever before. They need citizens who can think critically and strategically to solve problems. These individuals must learn in a rapidly changing environment, and build knowledge taken from numerous sources and different perspectives. They must understand systems in diverse contexts, and collaborate locally and around the globe (cf. Chute et al., 1994).

5. Classifying and evaluating distance education technologies

In order to understand the classification of distance education technologies, it is worth differentiating between media and technologies, two concepts that are often used interchangeably.

5.1 Media and technologies

According to Bates (1995:31), the distinction between technology and medium is important, particularly when trying to understand potential educational roles for different technologies. To use an analogy offered by the South African Institute for Distance Education (1999), the technology might be considered to be the type of pipe (i.e. the means of delivery) used while the medium (or media) is the form of the substance (or combination of substances) flowing down the pipe. Thus, a key criterion in assessing the potential educational value of a particular technology is to understand which medium - or combination of media - can travel down the "pipe" under evaluation and in which directions it can travel. This understanding can then be

related back to predetermined learning outcomes in order to determine whether or not a specific technology can be used to support or enhance an identified teaching and learning environment.

5.2 Criteria for classifying and evaluating distance education technologies

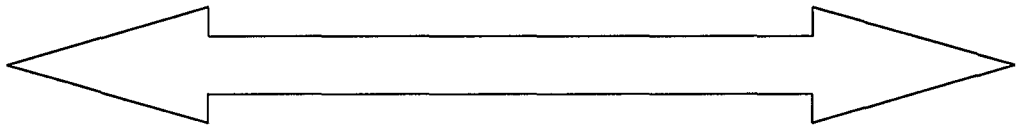
Bates (1995:35) states that: "If there is no clear rationale for the selection and use of particular technologies, there is likely to be inconsistency and confusion between the various stakeholders (subject experts, media professionals, and, critically, learners) regarding the design and function of the different technologies within a course".

On the basis of an overview of the literature (cf. Chickering & Gamson, 1987; Oxford, 1993; Bates, 1995; American Psychological Association, 1997; Reeves, 1997; Deden, 1998; McCombs, 2000) the following criteria are suggested as a starting point for classifying and evaluating, and consequently, selecting distance education technologies. The purpose of the classification and evaluation is to guide lecturers, specifically language lecturers, to those technologies that are most useful in enhancing language learning within a distributed learning environment. The criteria are divided into two groups, namely primary criteria that relate to decisions concerning the potential of distance education technologies to enhance learner-centred learning principles, and secondary criteria that relate to decisions about the access, cost and operability of distance education technologies.

The point of view espoused in this article is that distance education technologies that do not enhance or facilitate students' language learning (i.e. learner-centred learning principles) should be considered with great circumspect. This does NOT mean that lecturers should abandon the selection and use of technologies that support low level learning outcomes (i.e. knowledge). These technologies still have value, especially if they deliver instruction to those who would otherwise not have access to it, or provide access to information that would otherwise be unavailable. What is important is adapting those technologies to support learner-centred learning. The technologies should, therefore, be classified, evaluated and selected, on a continuum, based on their potential to enhance learner-centred learning principles (cf. Figure 1). The learner-centred learning principles are derived from Chickering and Gamson's (1987) "Good Practice" principles.

Figure 1: Distance Education Technology Classification and Evaluation Continuum

Long-standing pedagogical practices	*Newly preferred pedagogical practices*



• Content	Outcomes
• Passive language learning	Active language learning
• Individual language learning	Cooperative language learning
• Non-existent/limited interaction	Multi-faceted interaction
• Non-existent/limited accommodation of individual learner differences	Multi-faceted accommodation of individual learner differences
• Limited feedback	Multi-faceted feedback

The **primary criteria,** therefore, include an emphasis on:

- Learning outcomes
- Active language learning
- Collaborative language learning
- Multi-faceted interaction
- Multi-faceted accommodation of individual learner differences
- Multi-faceted feedback

According to Battersby (1999), learning outcomes are best viewed in the context of an approach to thinking about teaching and learning rather than a formula or a change in course outline terminology. The learning outcomes approach to education emphasizes the application of knowledge, and focuses on integration. The learning outcomes approach emphasizes that for competencies to be useable they must be integrated. Competencies such as being able to punctuate correctly or know appropriate vocabulary must be recognized as subordinate to the learning outcome of writing and communicating effectively. In practice this means assessing vocabulary in the context of use not via some multiple-choice test. Teaching should aim clearly at enabling

students to attain an effective level of integration. Therefore, outcomes are not discrete skills or mere collections of knowledge, but the integrated complexes of knowledge, abilities and attitudes. In essence, the focus is on what the student should be able to DO at the end of a course or programme (Department of Education, 2001).

Oxford et al. (1998: p.4 of 16) state that technology can enhance second language learning when teachers/lecturers focus on the learning outcomes and then choose the type of technology and the tasks that best suit the outcomes. Appendix A gives an example of how the attainment of specified learning outcomes can be achieved by making use of an email activity. For example, students should be able to:

- Research a topic on Crime and Punishment.
- Write an email in which they state an opinion in a topic sentence.
- Support their topic sentence by using examples, presenting related ideas and refuting opposing arguments.
- Cite at least two authorities.
- Read and identify points of similarity and contrast.
- React to classmates' messages.

Language learning is not a passive activity (Scarcella & Oxford, 1992:5). Students do not learn much just sitting in classes listening to lecturers, memorising pre-packaged assignments, and spitting out answers (cf. Chickering & Gamson, 1987; Miller & Padgett, 1998). Viewing learners as empty vessels and passive recipients of information tends to encourage inactivity rather than thinking (El & Amerlia, 1998:695). Passive learning limits learners and causes them to mirror the presented knowledge rather than allowing them to grow their own experience (Moller, 1998:115). Active learning seeks to actively engage students in the learning process. This can be accomplished when students are engaged with the course content through reading, writing, discussing, listening and reflecting on ideas and issues taught in the course (Meyers & Jones, 1993). Active learning also seeks to tie in students' own life experiences, an excellent way of linking to prior learning, which in turn helps to increase long-term retention of the material (Bransford, 1979). Having and manipulating language data in multiple media provides learners with the raw material they can use to re-create the language for themselves, using their own organizing

schemes. Activities that encourage students to explore and be creators of language rather than passive recipients of it further the idea of the learner as an active participant in learning (Brown, 1991). For example, Lee (1994:154) states that individuals who "receive e-mail are not passive recipients of data, but active produces of meaning." Active learning is also very effective at developing higher-order thinking skills like analysis, synthesis and evaluation. By developing students' critical thinking skills in this way, it enables students to apply the information they are learning in new settings (Meyers & Jones, 1993).

Good learning is collaborative and social, not competitive and isolated (cf. Chickering & Gamson, 1987; Johnson & Johnson, 1992; Slavin, 1996). Working with others often increases involvement in learning. Sharing one's ideas and responding to others' improves thinking and deepens understanding. Recent research (Kern & Warschauer, 2000) has demonstrated that collaborative computer-based learning yields a number of significant educational benefits to English Second Language students. This is especially true when the collaboration engages students in tasks that require independent problem solving and critical thinking. According to Christison (1990), the increased frequency and complexity of linguistic input and output resulting from collaborative work contribute to substantive gains in communicative second language competence. Collaborating with peers and experts to solve a problem, explore an issue, or create a product requires that students assert and justify their own viewpoints, and it exposes them to alternative perspectives and approaches. For example, email exchanges give students greater opportunities for carrying out collaborative projects, such as comparisons of film and literature (Soh & Soon, 1991). This process of active interpreting, clarifying, organising, and applying course material facilitates comprehension and retention of focal lesson concepts and terminology (McGroarty, 1992), and also nurtures in students the fairly elusive yet widely stated educational goal of "learning to learn" (Kinsella & Sherak, 1998:85). Further, sustained teamwork in heterogeneous groups can provide a stable and supportive environment for learning for students from various ethnic and linguistic backgrounds (Holt, 1993).

Many educators place dialogue at the center of the process of teaching and learning (e.g. Laurillard, 1993). Laurillard (1993:98), for example, believes that technologies

have a rightful place in higher education if they incorporate a critical dialogic element. The increasing recognition of the place of dialogue arises from recent theoretical perspectives within the general literature on educational knowledge where we find an increasing belief that all learning is fundamentally a social process, the result of interaction between two or more individuals and their contexts (Kafai & Resnick, 1998). Second language researchers have discussed the importance of the social context in the development of second language awareness (cf. Lantoff & Appel, 1994). Interaction with peers is seen as an essential element in learning and plays a central role in language learning (Norton, 1997). Research has found that computer-mediated interaction by second language learners has proven more syntactically and lexically complex than face-to-face interaction (cf. Kern, 1995), likely due in part to the increased planning time.

The value of interactions among learners is frequently overlooked in even the most traditional educational settings. Learner-learner interactions are desirable for pedagogical reasons (Slavin, 1996), as they provide more opportunities for students to discuss the content with others, resulting in quantitatively and qualitatively improved cognitive processing. During these interactions, students are able to negotiate the meaning of particular concepts with their peers. Such interactions aid in the construction of new knowledge, and are central to the theory of social constructivism (e.g. Holmberg, 1995; Kearsley, 2000). In distributed learning environments, learner-learner interactions are increasingly viewed as critical to learner success and the development of an active learning community (Simonson et al., 2000).

Many roads lead to learning. Different students bring different talents and styles to the teaching learning environment. Students need opportunities to show their talents and learn in ways that work for them (Grasha & Yangarber-Hicks, 2000). Then they can be pushed to learn in new ways that do not come so easily (i.e. style flex) (cf. Oxford et al., 1992). Many theoretical models of learning treat individual differences among learners as the major predictor of differential learning outcomes (cf. Carroll, 1963). In most learning contexts, we cannot be guaranteed that learners will be homogeneous in terms of aptitudes, prerequisite knowledge, motivation, experience, learning styles, etc. Therefore, we must provide scaffolding, cognitive bootstrapping and other types of metacognitive support to promote learning (Resnick, 1989).

Knowing students' learning styles can help lecturers decide which students need what kind of technology-based assistance. Leader and Klein (1994) conducted an experiment to examine students' facility with various kinds of computer search tools for a programme called Earth Quest. The search tools included: a) browser, b) index/find, c) map, and d) all tools (browser, index/find, and map). Significant interactions existed between the search tool and the students' cognitive style. For example, field independent students performed significantly better than field dependent students in using the index/find tool and the map tool. In addition, field independent students accessed significantly more screens than did field dependent students. Learners must, therefore, be able to engage with the learning materials at varying levels and depths and be capable of accessing resources, which accommodate their learning style preferences.

Knowing what you know and don't know focuses your learning (Chickering & Gamson, 1987). In getting started, students need help in assessing their existing knowledge and competence. Students, therefore, need frequent opportunities to perform and receive feedback on their performance. At various points during a language course, and at its end, students need chances to reflect on what they have learned, what they still need to know, and how they might assess themselves (Scarcella & Oxford, 1992). Robinson (1989) believes that feedback which is guiding, and which leads or encourages students to be able to discover their own errors, should lead ultimately to higher achievement levels than that which only discloses errors and gives the correct answer. This she believes will develop learners' control over their second language performance and knowledge.

Secondary criteria are based on critical differences between different technologies, in terms of:

- Access
- Costs
- Operability

Bates (1995:36) states that: "No matter what the quality of the teaching material, it will not teach if learners do not receive it". Access, therefore, means making

education more attainable by more people. That is, providing educational opportunities in the workplace, community, or the home, for those unable to attend university because of cultural, economic, or social barriers. Education technology has the potential to provide equal learning opportunities in several ways. Grabe and Grabe (1996) note that technology in the form of telecommunications allows access to people (through electronic mail), access to interactive services (through online discussion groups, interactive conferences, etc.), and access to files (through online databases). The use of technology creates a cost-efficient mechanism that gives students access to materials and resources that were previously unavailable.

Cost is a strong discriminator between technologies. Bates (1995:3) states that: "It is necessary to distinguish between one-way technologies, which do not include the very substantial additional costs of tutorial support systems, and two-way technologies, in which tutorial-style interaction is usually incorporated." It is also important to distinguish between the cost of technologies for courses with low student numbers, and those with large student numbers. Lastly, each institution needs to analyse its own cost structures, as local context and differing assumptions about costs will influence the outcome of such an analysis. It is, therefore, important to take the following questions into consideration:

- How much money do we have or need?
- What will be the cost of development, and of delivery, and what parts of this will the student pay for?
- What will be the cost per full-time equivalent student, over the duration of the course, for the various possible technologies for the course or programme?

Operability refers to the ease and convenience of using the technology. Learners should be familiar with a particular technology and how it works because this will allow students and lecturers to spend maximum time and energy enjoying and using the resources they access, rather than spending their time and energy on learning how to use the technology and or performing complex and time - consuming procedures to move from one programme or format to another (Jones et al., 1995).

In Table 1 current distance education technologies, commonly used in a language teaching and learning environment, are classified and evaluated based on the suggested primary and secondary criteria mentioned above. We have not attempted to review all the studies in this field, but have reviewed a sample of studies, selected to represent the interesting findings of these studies, as well as the diverse application possibilities of technologies for language teaching and learning.

Table 1: Classifying and Evaluating Educational Technologies for Language Teaching and Learning

Studies	Technology	Primary criteria	Secondary criteria	Language learning applications and research findings
Bates (1984)	**Radio** ***Audio cassettes***	• Learning outcomes (Specific types): communicative competence - linguistic (phonology). • Active learning limited. • Cooperative learning limited. • Doesn't allow for two-way interaction between learners, or between learners and lecturer. • Accommodates students with an auditory learning style. • Feedback limited.	• Most accessible of all technologies particularly in South Africa as they are used extensively in rural areas, even where there is no grid electricity. • Radios are relatively cheap and can operate using the mains power supply or batteries. • Easy to operate does not require much skill.	• Source material for analysis. • Collecting the views or experiences of specialists and experts. • Poets reading own poetry. • Dramatisation of literature. • To analyse or process detailed visual material - the purpose of the cassette is to "talk" students through the visual material. • Can be used to familiarise students with an argument. • Effective for supporting communication skills. • Explanation of concepts.
Soh & Soon (1991) Kroonenberg (1994/1995) Trickel & Liljegren (1998)	**Internet** ***E-mail***	• Learning outcome: - Language use - Language functions - Compare and contrast opinions - Cultural awareness - Writing skill • Encourages active learning.	• Need access to telephone lines. • Cost of Internet connection and software package; cheaper than sending a letter. • Relatively easy to use if student is familiar with the	• Produces more expression than ordinary conversation. • Serves as a thinking device by allowing reflection in the midst of interaction. • Contact with native speakers.

		• Encourages collaborative learning – projects. • Rapid interaction between learner and lecturer/facilitator as well as between learners. • Accommodation of visual and kinaesthetic learning styles. • Detailed feedback.	Internet and the software programme (e.g. Microsoft Outlook, Groupwise, etc.)	
Kelm (1992) Kern (1995) Sullivan & Pratt (1996) Warschauer (1996) Warschauer (1997) Brammerts (1996) Crotty & Brisbois (1995) Janda (1995)	**Email Synchronous computer-assisted discussion** over local area networks Internet Relay Chat - special software - Daedalus Interchange	• Same as above	• Same as above.	• Greater participation by L2 students than via face-to-face discussion. • Participation enhanced because email communication reduces social context cues related to race, gender, handicap, accent and status. • Encourages people to state their own opinions rather than rapidly concurring with others. • Breaks pattern of teacher-dominated discourse. • Language more lexically and syntactically complex than in face-to-face discussion • Participation beneficial to development of student writing. • Language use more accurate. • Students produced stronger arguments.

				• Helps L2 learners develop their analytical, narrative and descriptive writing skills. • Authentic writing assignments. • Enhances cultural awareness of L2 students.
Wang (1993) Gonzalez-Bueno, (1998)	**E-mail** **- dialogue journals**	• Learning outcomes: - Language functions • Students actively busy constructing meaning. • Effective student initiated interactions. • Learning styles - visual and kinaesthetic. • Detailed and rapid feedback on immediate problems and questions of students.	• Same as above.	• Potential to improve both writing and speaking skills. • When compared to paper-and-pencil groups – students using electronic journals asked more questions, used more language functions, and adopted a more conversational tone in their language. • Enhanced quality of participation – also for shy students; don't face embarrassment of making a mistake in front of class. • More student-initiated interactions.
McCarthy (1994)	***Computer***	• Learning outcome: - language functions (drill and practice exercises) • Active learning limited. • No collaboration. • Interaction limited. • Accommodates visual and kinaesthetic learning styles.	• Access still limited in rural areas of South Africa, but access is improving especially where students have access to computers at study centres. • Computers are becoming more affordable.	• Computer-based practice exercises for L2 grammar and vocabulary learning (e.g. drill-and-kill). • Limited value.

		• Rapid feedback.	• Software expensive. • Basic computer literacy necessary and essential.	
Osuna & Meskill (1998) Owston (1997)	**Internet** **WWW**	• Learning outcomes: - Language knowledge increased; - Cultural knowledge increased; - Use a variety of language forms and functions - Gathering, selecting, planning, organising, analysing and evaluating information from the Internet • Encourages active learning. • Encourages collaborative learning – projects. • Multi-faceted interaction – not dominated by lecturers. • Accommodation of learning styles promoted: - Visuals for visual learners; - Audio for auditory learners; - Tasks for kinaesthetic learners • Rapid feedback.	• Access improving – especially where students have access to study centres where the technology is provided. • Site easy to access; • Site easy to use. • Basic Internet and WWW literacy skills are essential.	• Permits learners to use a variety of learning strategies such as skimming and scanning for reading. • Involves higher order cognition processes. • Develop linguistic skills through the study of authentic texts. • Language and cultural awareness. • The attainment of communicative competence requires a diversity of cultural understandings and theory recognises the intrinsic role culture plays in L2 development. • Activities: - *Plan* a trip to Madrid; - - *Describe* photographs - *Compare* … • Develop communication skills. • Writing to an authentic audience rather than only to the teacher has long been viewed as critical for the development of students' writing ability.

Sengupta (2001)	**Contact** (2 hours) **Web** classroom per week (1 hour): - bulletin board - materials used in class available online - students' own web page - learning log - critique of assigned readings - tasks posted - Web resources – for information searching.	***CONTACT*** • Limited achievement of learning outcomes in contact sessions especially if dominated by the lecturer. • Mostly passive learning. • Limited collaboration. • Mostly teacher dominated and teacher-initiated interaction. • Accommodation of mostly auditory learning styles. • Limited (relatively slow) feedback. **WEB** –see previous comments.	***CONTACT*** • Access limited – not possible for many students to attend contact sessions. • Fairly expensive. • Requires no technical skill from learners.	• **Contact** sessions used to provide overview and explain basic concepts. • **WEB** - Student exchanges suggest they were learning to use language as a means of socialisation. • Settings norms of appropriate discursive practices for their "Community" of learners. • Web was making each individual much more accountable because all the evidence of participation was there on the Web classroom. • More and better feedback is given – also more difficult because the feedback demanded quality. • The kinds of discussions that were going on about the content showed an applied, practical and co-constructed development of knowledge.

Levine et al., (2000)	• **Computer** - (Microsoft Word - word processing) • **WWW** Locate material • **E-mail** - Submit assignments; - Questions; - Requests for clarification.	• Learning outcome: Skimming – main idea; Skimming – writer's purpose and conclusion; Critically evaluate content; Draw and test inferences. • Encourages active learning • High degree of cooperation and collaboration on topics. • Multi-faceted interaction. • Multi-faceted feedback.		• Encouraged use of critical reading skills: - text interpretation - Reflective thinking - Follow relationship between ideas. • Increasing awareness of own reading abilities. • Able to identify reading problems. • Independence in reading and decision making. • Assume responsibility for own progress.
Oxford et al. (1993)	Interactive **satellite TV**; **Printed** manuals; **Contact** – in-class activities led by a facilitator; **Telephone tutoring; Asynchronous videotape**	***PRINT*** • Difficult to achieve all learning outcomes by print alone (i.e. meaningful communication in an authentic environment). • No opportunity for collaborative learning. • Interaction only with content. • Limited individual learner difference accommodation. Difficult to extend learner engagement mainly due to	• Cost of satellite TV broadcast was high – changed to asynchronous videotape; • Access to and operability of video much easier. • **High cost for satellite** transmission uplink. • Cost of **video tapes** dependent on number of students. • **Print** accessible to most	• Provides culturally authentic contexts. • Possibility of developing sociocultural competence • Multi-faceted interaction and collaboration possible when a combination of technologies are used. • Students with diverse learning styles are accommodated. • Variety of language forms and functions used. • Communicative competence improved. • Meaningful and authentic tasks.

		linear and sequential presentation. • Limited/non-existent ability to assist learners who have not understood parts of the text (feedback). • Difficult to use print to provide feedback to questions that have a variety of acceptable responses. ***VIDEO*** • Learning outcomes: Language forms and functions; Cultural awareness • Tends to encourage passivity among students. • Limited interaction. • Accommodates visual learning styles. • Limited feedback.	learners (Physically) – however dependent on efficiency of postal service. • Cost of printing and distribution. • Can easily access the information for the technology (except for literacy skills, print doesn't require any additional learner expertise).	

Although distance education technologies play a key role in a distributed learning environment, lecturers must remain focused on learning outcomes, not the technology of delivery. The key to effective education and training is focusing on the needs of the learners, the requirements of the content, and the constraints faced by the lecturers, before selecting a technology to enhance language learning. This will typically result in a mix of media, each serving a specific purpose. The goal is to build a mix of distance education technologies, meeting the needs of the learner in a manner that is instructionally effective and economically prudent.

6. Conclusion

Technology is not a panacea that suddenly transforms all learning. The effectiveness of educational technology depends on how it is employed to meet educational goals (i.e. learning outcomes) for particular kinds of students in specific language learning environments. Doughty (1992:129) states that: "There is no justification for further comparisons of human language instruction vs. computer-assisted language instruction. Rather, it is more appropriate to initiate research on those aspects of language learning that can be implemented effectively using technological resources."

Nevertheless, we still need to maintain a balance between teaching and learning done through face-to-face contact, and technology-based learning. Many skills cannot or should not be taught solely through technology, although the range of knowledge and skills that can be taught effectively in this way is probably much greater than most lecturers would credit.

In this article we examined various criteria that need to be taken into consideration when classifying, evaluating, and subsequently selecting technologies for use in a distributed learning environment. It should be apparent by now that the selection of technology for language teaching and learning needs to be accompanied by major changes in the way lecturers are trained and supported. Teaching with technology is not something that can easily be picked up along the way, as something to be done off the side of the desk while engaged in more important or time-consuming activities such as research. The goal of lecturer development should be to empower lecturers to make intelligent choices, so that their students can learn more effectively through a variety of media and technologies.

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APPENDIX A

EMAIL DISCUSSION (CRIME AND PUNISHMENT)

We have been reading in class about different issues involved in crime and punishment. In particular, we have discussed the issue of Capital Punishment (the Death Penalty). Most of you have strong opinions on this issue. For this activity, we are going to debate the issue using email.

Research: Before you begin writing your first argument, follow the links below to get some information and opinions about the Death Penalty.

Pro Death Penalty Pages

Capital Punishment – Life or Death

CAPITAL PUNISHMENT

Execution Chamber

UAA Justice Center – Focus on the Death Penalty

Oklahoma Coalition to Abolish the Death Penalty

Capital punishment

Formulate: Using the information in the above links as resources, formulate your arguments for or against the Death Penalty. Take notes on your thoughts.

Write: Write an email in Hotmail to the entire class (including me). In your email, you should:

- Clearly state your opinion on the Death Penalty in a well-informed topic sentence.
- Support your topic sentence by using examples, presenting related ideas, and refuting opposing arguments.
- Cite at least two authorities – do not directly quote; paraphrase.

Read: Read the arguments of your classmates. Look for points that you either agree or disagree with strongly.

React: React briefly to at least two of your classmates' messages.

(Trickel & Liljegren, 1998).