

Integrated EFL Skills and Technology: Focus on Learners' Perceptions

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Abstract

This study reports on the results of an experiment conducted on 612 advanced learners of English as a foreign language. The paper attempts to explore the students' attitudes towards the value of using technology in language teaching. The study is based on the premise that one of the guiding principles that shapes the planning of an innovative computer curriculum is involving all those as the most important factor as it is upon them that any innovation can be accepted or rejected. After having presented the theoretical framework, the problem we are encountering and the rationale for the study, we reviewed the literature on pertinent issues such as foreign language learners and technology; learning theories and technological instructional design; technology and language learning, and technology, teaching and research. The focus of the paper is on the integration between EFL skills and technology, and on how L₂ learners may have significant insights into the way they learn.

Keywords: EFL teaching, Learners' attitudes, Technology in L₂ classroom.

Introduction

The emergence of the information society, resulting from advances in information and telecommunications technologies, has led to an information revolution. Orem and Holliday (1993) remind us that "over the past quarter century... major developments in educational technology have given us computers, networks, and electronic mail" (p.95). We are reminded every that the information age has arrived. Politicians and policy makers constantly remind educators of their duty to introduce students to the tools of this new era. Unfortunately, however, educators are seldom given the time to become comfortable, to experiment and to practice integrating these technologies into their lives and classrooms (Baron, 2004; 2008; 2010; 2011; Schrum 1992).

The changing demands of the information age have been well documented. Naisbitt and Aburdeen's (1990) assertion that "we are drowning in information and starved for knowledge" (p.10) has characterized our era and will continue to do so in the future. As the power of computing and the amount of information increases, it follows that "people who can creatively analyze, edit, or act on information in ways that cannot be automated" will be highly valued in our society. (Malone and Rockart, 1991; p.18)

Egyptian universities respond to changes in society, and it is natural they should follow the trend to use technology. In fact, information and communications technology (ICT) is changing the face of the classroom. Schools value computers as a resource and as a teaching medium. Computers and other interactive technologies that provide students with visual and audio support offer tremendous potential for helping students develop their language abilities. Unfortunately, new technologies and new ways of doing things often meet with resistance (Beauvois & Eledge, 1996; Crystal, 2004; 2006; 2008; 2010a,b; 2011).

1. Theoretical Framework

Language teachers are always interested in how they can help students learn a second language to become proficient in that language. This question may look simple, however it is actually quite complex and entails many issues. In the last thirty years, volumes of material have been written advancing new theories of language acquisition, proclaiming revolutions in language teaching, and proposing a succession of innovative approaches and methodologies. This proliferation of ideas has yielded some extremely valuable insights into the learning-teaching process, yet it has also left many of us feeling somewhat bewildered. In this regard, Richards & Rodgers (1986) maintained that:

The proliferation of approaches and methods is a prominent characteristic of contemporary second and foreign language teaching... while to some this reflects the strength of our profession; to others, the wide variety of method options currently available confuses rather than comforts... methods appear to be based on very different views of what language is and how a language is learned. (p. 14)

More specifically, linguistic structuralism and behavioristic learning theories totally dominated language teaching in the fifties and sixties. As a response to these linguistic and psychological changes, audiolingualism was at its zenith and very popular at that time. Recently however, teaching methods have been moving away from the doctrinaire, restrictive, audiolingual approach toward more flexible procedures. Researchers, methodologists, and

classroom teachers are focusing on teaching language for communication. Studies in sociolinguistics and communicative competence have stressed the importance of exchanging ideas and information as both the means and goal of language learning. As Pienemann (1989) explains, language teaching has always been a discipline dependent on the theoretical capacities of 'parent' disciplines, such as psychology, linguistics, or pedagogical 'methodology'. This kind of 'theoretical dependence' has appeared in all the major upheavals experienced by modern language teachers.

In the 1960s the scene of foreign-language teaching was invaded by the spread of language laboratories as the most effective answer to most of the problems facing learners of foreign languages; a move which was initiated by the behavioristic theory in learning and reinforced by the audiolingual approach in language teaching. Since the 1970s and with the rapid development in educational technology, it seems that the computer has taken up a similar role in foreign-language teaching, especially in western countries and some of the more affluent countries in the third world. In this regard, Mail (1989) maintains that "supported by the behavioristic theory in language learning and learner-centered pedagogy, the computer has surfaced as a possible substitute for classroom conditions with its structured procedures".

Technology is now allowing us to integrate information of different kinds and from different media. The whole multi-media explosion can, if controlled and thought through in educational and methodological terms, add unimagined richness to learning. Jordan (cited in Scott, Johns and Murison-Bowie, 1993) has identified five learning environments where technology has a place: a computer room, a classroom, a self-access room, the public areas in a school, and the learner's own home. Murison-Bowie (1993) argues that we need to build applications that are realistic within one or more of these environments.

The most important potential of the technology is for integration. We are concerned about the tendency in language education to see the teaching of language and culture as separate, even if complementary, but for example with video we can present language in its cultural context. Language and literature are often separated in our curricula, and learners often experience a difficult transition from reading pedagogical prose to reading authentic texts or from hearing pedagogical audio to understanding natural spoken language: the use of computers and interactive technologies can allow teachers to select materials of all kinds to support them as learners' needs dictate (Garrett, 1991). Videos in a foreign language are intuitively appealing to language teachers and students alike. Videotape players are widely owned, not only in schools but also by the general public (See Davis & Brewer, 1997). The use of videotape is by now widely familiar to language teachers, and rapidly increasing numbers of schools own videotape players for various purposes: 1) playing videos in class; 2) playing in-house productions; 3) teachers and students' interaction on video; and 4) students' performances. In this regard, Garrett (1991) points out that:

Videotaping of actual classes can serve pedagogical purposes... [but] the extent to which authentic video can be genuinely integrated into a language course depends on teachers' ability to gauge the comprehensibility of the language content and the intrinsic interest of the material for their classes... Without these efforts, the most authentic linguistic and cultural material in the world is likely to be regarded passively by the students, not integrated into learning, and to be of little long-term value. (p. 76)

2. Statement of the Problem

First, many technologies have been heralded as solutions to the poor state of our

educational system (Palumbo, 1990). Proponents of motion pictures, television, media centers, and video recorders have claimed that these devices can make a substantial and lasting improvement in the way we teach our children. Yet, most supporters of these technologies have promised more than they have delivered. The computer has likewise been heralded as the technology whose use in learning will help move education ahead in this century and for centuries to come (Salomon, 1985). As Salomon points out, however, there is often a gap between the opportunity afforded by technological advancements in education and their actual contribution. In this regard, Maddux (1986) states that:

There is no problem in finding computer advocates who will emphatically praise the computer for what it can and will do for our educational system. However, the effect that the microcomputer will have on education can sometimes be seen as wishful thinking, because little research has provided evidence that these desired effects are easily attainable. (p. 29)

Second, to prepare our students for tomorrow's world, we must teach them how to reason and communicate effectively through available technologies. Very few ESL students, however, have access to advanced technologies, and those who do are too often relegated exclusively to drill and practice exercises. Hunt (1993) maintains that "the nature of drill and practice software runs counter to the natural acquisition approach for L2 instruction because it tends to present isolated, non-contextualized exercises that focus on accuracy rather than fluency". Instead, activities should offer opportunities for students to develop their language and critical thinking skills (US Congress, 1988). One obstacle to getting involved with technology is the prevalent fear that the path into the technological jungle is steep and slippery and that it is difficult to explore it without running risks:

Conservative teachers fear that the technology will weaken or interfere with their control of the class and are willing to consider only those technology-based materials which perform electronically the most traditional teaching tasks. (Garrett, 1991, p. 92)

Murison-Bowie (1993) maintains that "teachers are adept at inventing reasons for not seeking out and employing worthy, newer technologies (p.6). It is possible, even in the 1990s, to offer one's own technophobia and/or maladroitness as reasonable excuses for avoiding available technologies. Why? Is it teachers' innate conservatism or is it that materials developers are failing to deliver?"

For a long time, the greatest part of present Foreign Language (FL) software material is devoted to grammar and vocabulary lessons. The underlying assumption is the notion that language is a set of facts, information, or habits in which learners must receive instruction, over which they must demonstrate mastery. Language is now more often seen as a dynamic interactive system for conveying meaning, and language learning is the acquisition of the ability to construct communicative meaning in a new system. Since so complex an ability can hardly be 'taught', our job is "to create an environment - in class or in our materials - in which students can work on acquiring that ability, and we are increasingly aware how differently students undertake the process of acquisition" (Garrett, 1991). In fact, language teaching specialists have long foreseen changes in language instruction as a result of emerging microcomputer technology and have anticipated significant differences in the duties classroom teachers would have to perform (Goodwin, Hamrick, & Stewart, 1993).

Some of our most important priorities -focus on the individual learner, a true integration of the teaching of language and the teaching of cultural understanding and literature, bridging the gap between theory and classroom practice - can be strongly supported by intelligent uses of technology. But these will not be accomplished unless and until teachers themselves take the initiative to think through what the technology should be able to do for them and for their students and make their needs known (Garrett, 1991). Murison - Bowie (1993) argues that "teachers need to be inquisitive about the world in which they and their students live - a world that includes technology - and make connections between this world and their teaching. Being open to new ideas means being ready to spend time becoming familiar with them in order to make them one's own" (p.6). Unfortunately, many educators have a narrow view of how technology can be used; that is, they see computers being used for independent skill practice and, perhaps, word processing (U.S. Congress, 1988). Some are not aware of the newer technologies and how they can be used to shift the role of the learner from that of a passive receiver of information to that of an active learner experimenting with language.

Computers cannot yet be taken for granted in every school or every household; they are much more expensive and have an elitist aura, and to most teachers the idea of programming is daunting. As the classic joke format has it, "there's good news and bad news" (Garrett, 1991; p.16). The good news is that the technology does offer the potential for enormous enhancement of foreign language learning. The bad news is that potential cannot be easily realized... There simply is no such thing as an ideal configuration of hardware or an ideal set of software for language learners in general, and there probably never will be. Therefore, materials developers, that is, authors, program designers, and publishers must understand the potential of new technologies, interpret that potential in the light of what they know of the profession's needs, and produce programs that can use those technologies appropriately and effectively. Thus, they share the teachers' obligation to find connections between technologies and teaching English.

There is evidence that students need to be better prepared for the real world. The information age is here and some of our schools in Egypt are not currently equipped to prepare their students for using advanced technologies and sciences (Bievenue and Toth, 1992). As Stowe (1992) states:

To the surprise of almost no one, the MI-predicted Information Age has arrived. Perhaps not as swift to arrive is education's response. How swift is the nation's educational system preparing its graduates to live in, work in, compete in, and thrive materially, vocationally, and personally in the new milieu? Moreover, how well are teachers prepared to aid their students toward such goals? How well equipped are the teachers themselves to participate in the Information Age professionally and personally? (p. 357)

The integration of technology in the classroom is generally viewed as an effective instructional strategy, but some have found that the implementation of technology has resulted in increasing education inequities and discriminatory practices among different groups of students (Apple, 1988). These inequities include gender inequities, socioeconomic inequities, and racial inequities (Compbell, 1984). Educators are especially concerned about this issue because they fear that computers in schools will widen gaps between lower - achieving and higher - achieving students (Gains, 1998; Hodziahmetovi-Jurida, 2007; Johnson & Maddux, 1991).

The increasing number of computers in the classroom does not insure their use promote their infusion into the curriculum. Similarly, their presence in classrooms has been accompanied by major discrepancies in the relative degree of access, participation, and benefit enjoyed by particular groups

of students' (Cummins & Sayers, 1990). In addition, integration of technology into methods classes can be difficult and slow to accomplish. Equipment and facilities are lacking in many institutions. Many educators have not taught with computers and other advanced technologies and so are not sure how to teach others to use them. Consequently, they need strong support from a specialist or an experienced user in order to feel comfortable. This support does not exist in most institutions. Finally, changes that take time and energy may not be encouraged or rewarded in institutions of higher education (Brent, 1992,; Mahfouz, 2010; Meyer, 2009).

3. Rationale

As technological advances offer new learning opportunities, there must be recourse to the theories that guide the new models of technological instructional design. As Wild and Quinn (1998) point out, a number of themes emerge in any discussion about educational theory, learning and instruction, any one of which may be of use in informing our application of these technologies for pedagogical ends. Biggs (1987a, b) suggests that the process of learning is determined by students' approaches to learning; that is, a composite of students' motives and strategies (to learn) as well as their perceptions of tasks. And learning should be seen in terms of cognitive change. The goal of learning, then, is to develop frameworks or schemas (Rumelhart & Norman, 1988) that provide explanatory and predictive power across situations. In this sense, we can consider the process of learning to be through cycles of action and reflection (Wild & Quinn, 1998). Moreover, there are probably three distinctive influences at play that impact on cognitive change: the learner's existing knowledge and experience, the learner's 'style' or predisposition to learning, as well as their acquired and individual approach to learning (Wild & Quinn, 1998).

As Diaz et al. (1998) point out, positive students' and teachers' attitude towards the system is required to guarantee a successful introduction of new technologies in traditional classrooms. That is, teachers' attitudes toward using computers should be taken into consideration when trying to integrate the use of technology into the curriculum. If the attitudes regarding the use of computers in the classroom are negative, the value of this tool may not be fully realized. But if computers are viewed positively, their value can be achieved (Proysen, 2009; Seifeddin, 1993; Thurlow, 2006).

4. Literature Review

4.1. Foreign Language Learners

Learners possess pre-determined learning preferences with respect to environmental, emotional, physical, sociological and psychological conditions (Price, Dunn, & Dunn, 1991). For example, there is some indication that learners have a preference for the representational format they tend to think in. Learners have been differentiated according to whether they are visual, auditory, or kinaesthetic learners. In addition, since preferences are largely determined biologically, a learner's learning style will necessarily be resistant to change, implying that instruction needs to take account of learning styles rather than trying to change them (Murray – Harvey, 1994). Relatedly, Ritzen (1995) recommends that there be specific support for learners to identify their own learning style, to experiment with other styles and to be aware of what pitfalls exist for each learning style.

Recent research on specific differences in the way learners approach learning tasks strongly suggests that true individualization of CALL (Computer-Assisted Language Learning) materials should provide alternative approaches or presentations for students who tend to have, for example, a field-dependent or a field-independent cognitive style, or provide different scoring strategies for those who tend to be impulsive or cautious. For example, hint or feedback messages might be useful or congenial / suitable to some learners but altogether unhelpful to others. Therefore, sophisticated

programs should eventually allow students to choose from a variety of approaches, though to choose appropriately they themselves will have to learn to understand their own learning styles and strategies (See Garrett, 1991; Al-Momani et al., 2014; Al-Ayyoubi & Farrah, 2014; Ezza & Bakry, 2014; Li dawn, 2014; Patronis, 2014).

As Els et al. (1984) point out, "it was not until fairly recently that L2 learning researchers began to look to the already extensive body of literature on cognitive styles, also termed learning styles" (p.80). Cognitive style has been defined by Ausubel (1968) as "self-consistent and enduring individual differences in cognitive organization and functioning" (p.170). In addition, Freeman and Long (1991) maintain that "cognitive styles are typically discussed as if they were polarities; in reality, humans, more likely, show a tendency towards one pole or the other, with their scores on cognitive style tests arranged in a continuum between the poles" (p.192). Witkin and Goodenough (1981) use the term 'mobility of functions' to refer to the fact that those usually favoring one particular cognitive style may switch to another in some circumstances.

A field independent person tends to perceive analytically, that is, he or she tends to perceive particular relevant items in a 'field' as discrete from the surrounding field as a whole, rather than embedded in the field. A field dependent person tends to perceive globally; his or her perception tends to be dominated by the total field such that the parts embedded in the field are not easily perceived (Witkin et al. 1977). It is worth-mentioning that it has been found that field dependent persons tend to show a strong 'social orientation', as Witkin et al. (1977) point out. They are usually more empathic and more perceptive of feelings than others. Field independent persons, on the other hand, tend to show an 'impersonal orientation'; they are generally individualistic and less aware of the things by which others are moved. Taking these findings further Brown (1989) observes that two conflicting hypotheses could be advanced with reference to L2 learner, on the basis of these findings. First, it could be hypothesized that the field independent person is a better L2 learner, as he or she would be better able to focus on the relevant variables in a language lesson or a conversation than a field dependent person would. This hypothesis is supported by the results of the Toronto study of the 'good language learner' (Naiman et al. 1978), in which field independence was found to correlate positively and significantly with L2 learning success in the classroom. Other studies have also shown a positive correlation between field independence and successful L2 learning (Jucker et al. 1976, Hansen and Stansfield, 1981).

Moreover, some researchers have suggested that the tendency to field independence or dependence may be culture bound. Ramirez, Herold and Castaneda (1974) link field dependence- or 'field sensitivity' as they call it -with Mexican-American culture. However, Fradd & Scarpaci (1981) found that students from Latin American countries were not significantly more field-dependent than their non-Latin counterparts. By way of contrast, Hansen (1984) did find cultural differences for this cognitive style. Hansen studied 286 subjects between the ages of 15 and 19 in six Pacific island cultures. She found that Hawaiian subjects were more field-independent than Samoan, Tongan, Fijian and Tahitian subjects. Hansen's finding provides some evidence for Cohen's (1969) hypothesis that the more analytic style develops in highly industrial and technological societies, whereas field dependence is more typical of agrarian societies.

Reflectivity / Impulsivity is another learner style usually measured by the Matching Familiar Figures Test (MFFT). In each of the test's items, the subject is asked to select from the alternatives the one that exactly matches the standard. So, when confronted with a problem solving task an impulsive person tends to make a quick, or gambling guess, whereas a reflective person tends to make a slower, more calculated decision (Brown, 1980). Els et al. (1984) point out that subjects whose response time is above average and whose number of errors is below average are called reflective, and the subjects

who are below average on response time and above average on Errors are called impulsive. Reflectives tend to be more anxious about the quality of their performance than impulsives. They are also more capable of sustained attention. Doron (1973) found that ESL learners who had been designated as reflective on the basis of their scores on the MFFT were slower but more accurate readers than their fellow students who had been designated as impulsive.

Aural or visual cognitive styles refer to a person's preferred mode of presentation. Levin et al. (1994) observed that many learners could be considered bimodal; that is, learning via one mode or the other does not contribute appreciably to a difference in outcome. But for approximately 25 per cent of all learners, the mode of instruction clearly does influence their success as learners. Lepke (1977; cited in Freeman and Long, 1991), reporting on a study of university students in the US learning German, claimed that when students were taught through their preferred modality, they performed better. In another study reported by Lepke (1977), French students at a junior college in Texas not only performed better when they had a choice of modality presentation, but there was also a substantial increase in enrolment in language courses when students' preferences did not determine the modality of instruction.

The last type of cognitive styles is the tendency that people have to categorize items either broadly or narrowly. Broad categorizers tend to accept a wide range of items or instances as belonging to a category, thus risking the inclusion of items that do not really fit the category and narrow categorizers tend to accept a much more restricted range, thus, risking the exclusion of items that do in fact fit the category. According to Brown (1980) and Schumann (1978), L2 learners who are broad categorizers tend to produce lots of overgeneralization errors, in that they tend to subsume too many items under one linguistic rule, whereas narrow categorizers have difficulty in making the generalizations necessary for efficient L2 learning, in that they tend to create rules for every item. Accordingly, Naiman et al. (1978) hypothesized that the best learners would be those who neither generalize too much nor too little.

To sum up, it should be kept in mind that to ignore what students typically expect, and what they consider to be important or necessary regardless of our point of view, is to invite resistance, either overt or covert to our teaching. Therefore, it seems more reasonable to try to expand and broaden their expectations than to try to change them. This does not mean that teachers should only follow students' wishes. Rather, they should keep their students' needs in mind when they design language lessons. An observant ESL teacher does not need to be told that students learn in different ways. Research in educational psychology (Gronbach and Snow, 1977; and Witkin et al. 1977) suggests that there are at least two distinct ways in which people can learn anything, including second or foreign languages. Some learners, consciously or unconsciously, have an analytic style and learn best by formulating and testing hypotheses or rules. Other learners have a holistic style and learn best by experiencing relevant data and doing little or no analysis. In addition to keeping L2 learners' various preferences and styles in mind, there must be recourse to the theories that guide the new models of technological instructional design. In fact, computer assisted learning is characterized by a number of theoretical perspectives, which have influenced the role it plays in relation to patterns of teaching and learning.

4.2. Computer Assisted Learning and Learning Theories

Until the 1980s the success of computer assisted learning was due to its capacity to individualise instruction, as Saljo (1994) maintains. Computer software of the drill and practice variety is designed according to the behaviourist principle that learning is best achieved by an individual practising tasks in a repetitive manner until mastery is accomplished. The computer is

regarded as a teacher, giving immediate feedback on responses and enabling further practice. Such software can achieve high levels of task engagement, at least for short intervals, and free up the teacher's time which would otherwise be spent grading and preparing routine tasks for practice. In this regard, McLoughlin & Oliver (1998) point out that

While there is a place for this type of software in the classroom, it is limited in terms of engaging students in higher level cognitive processes such as comprehension, hypothesis formation and reflection. It is also driven by a behaviorist paradigm which sees skilled behavior resulting from repeated individual practice and feedback. Computer tasks of this nature also limit educational goals to the attainment of lower order skills such as remembering, reciting or producing isolated segments of information. (p. 126)

Other perspectives on the relationship of theory to computer use in schools emphasize a constructivist view (Knight and Knight, 1995) whereby children learn by discovery and experimental learning. One of the best known applications of constructivism is the work of Papert (1990) with LOGO environments. This perspective treats the computer as a tool; through programming the learner is able to control the technology and generate responses (Varnhagen et al., 2010; Weik, 2000).

Within the last few years, a distinctly different body of theory has begun to attract the attention of the field of instructional design and development: constructivism (Knuth & Cunningham, 1993). Constructivism starts with the view that knowledge must be constructed within the cognitive structure of every individual, so that it is fundamentally personal, while being dependent on experiences in the learning environment and on social interactions (Grabinger & Dunlap, 1995; Lebow, 1993). It can be contrasted with objectivism, the traditional view that knowledge is an external entity with an absolute value which can therefore be transferred from teacher to learner (Clayden et al. 1994; Duffy & Jonassen, 1992).

Constructivism is particularly relevant to higher education (Entwistle et al. 1993; Jonassen et al. 1993), but mass higher education often has limited resources, increasing student / staff ratios, increasing diversity of student types and 'legacy systems' of time-tabling and assessment. The role of the teacher in a constructivist learning environment, according to Barnes (1992), is to facilitate learning through provision of programming tasks and to support individual development by creating microworlds. By providing contexts for learning, the teacher merely activates the learner's latent understanding.

There is no specific place for language, dialogue and communication in developing cognition whereas these processes are now recognised as important to learning. In fact, McLoughlin and Oliver (1998) argued that "the constructivist view of learning does not fully take into account how social processes, such as peer interaction, collaboration and language use contribute to learning. The emphasis of constructivism is on individual development through the use of resources, and accommodation of new experiences to existing understanding". Grabinger and Dunlap (1995) summarize the constructivist approach as a "rich environment for active learning", characterized by five principles described below.

4.2.1. Authentic assessment

The major motivation for degree students is assessment (Gagne, 1985). Therefore, inappropriate assessment will undermine any course design. Assessment must test the learning objectives, in particular, the assessment of skills must involve using the skills not describing verbally

Assessment must be authentic: realistic in complexity, requiring student to contextualise their knowledge, requiring knowledge in depth rather than breadth, and diverse in form to allow for students' differing intelligence and strengths (Wiggins, 1989). Students must be told of the assessment criteria at the start of a course, revealing the standards of the domain to the student and as well as revealing student performance to the examiner.

4.2.2. Student responsibility and initiative

Students should have initiative, responsibility and control in their learning. This self-regulation promotes a reflection on their own learning processes which is typical of "adult" learners (Ferrence & Vockell, 1994). This reflection will improve learning.

4.2.3. Generative learning strategies

Active learning involves using knowledge and skills to 'generate' a product, such as text, diagrams, or a physical artifact which embodies knowledge. This may involve investigating to create a solution to a problem (Kafai & Rersnick, 1996).

4.2.4. Authentic learning contexts

Learning experiences should be realistic and faithful to the original phenomena. Instruction should be anchored in real-world problems, events or issues which may be appealing and meaningful to students. Realistic problems allow students to take ownership of their solutions, develop deeper, richer knowledge structures, require more systematic problem solving methods, and are more likely to benefit from collaborative efforts.

4.2.5. Co-operative support

Collaboration with fellow students can have several benefits to learning. Students can encounter different points of view which may contribute to effective solutions to problems, clarify misconceptions, and give rise to synergistic insights. Group members must understand their different roles and learn to accommodate conflicting ideas. This reinforces individual responsibility and has been shown to benefit learning (Slavin, 1991). The question, then, is can all students cope with the demands of constructivist learning? In the literature, there is a range from mild to strong constructivism (Lowyck & Ellen, 1993; Merrill, 1991). In this regard, Entwistle et al. (1993) claim that there are good reasons from empirical evidence that learning environments should not be strongly constructivist. Individuals have different styles of learning, for example varying along continua from holist to serialist. Some students will enjoy the challenges of constructivist learning while others will sometimes find them uncomfortable and need more objectivist instruction. A radically constructivist course would be more difficult to implement within the constraints of large numbers, resources and institutional culture, so it is encouraging to think that a partial implementation of constructivist principles may actually be optimal for the majority of students.

Moreover, learning is thought to be culturally influenced and a social rather than an individual process. In this regard, Vygotsky (1978) believed that "human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them". Language plays a vital role in enabling the learner to participate, interact with others and also solve problems, and is therefore essential to learning. The increased interest in Vygotskian ideas has led to a shift in thinking about the role of computers in education, in general, and in language teaching, in particular. Evidence from classroom observational studies (Hoyles, Healy & Pozzi, 1994) indicates that there are positive effects on motivation, learning and problem-solving behaviors as a result of

collaborative work around computers. The social dimension of learning has gained increased prominence and computers are recognized to be part of the social context of classrooms, where the products of students' work are a focus for discussion and exchange of views (Crook, 1994).

To sum up, learning with computers is a social activity where learners share resources, talk, discuss ideas and collaborate. In view of the social context in which computers are used and the acknowledgement that collaborative learning can lead to higher level cognition, a theory of computer supported learning to help teachers promote learning in their classrooms is needed. In this respect, McLoughlin & Oliver (1998) argue that:

The quality of learning around computers is not entirely dependent upon the interface between learners and the technology. Instead, it is related to the whole social climate of the classroom and the opportunities created for interaction and exploratory talk between participants in the learning process. (p. 134)

4.3. Technology and Language Learning

A computer is a 'fast idiot'; an electronic device for processing numbers, letters or symbols at extremely high speeds. It cannot think and does only what it is told to do (Clark, 1985). A computer will not replace teachers anymore than calculators replaced math teachers; calculators freed students from performing time-consuming numerical calculations. A computer can not only calculate numerical statistics but is exceedingly efficient at storing and retrieving information and compiling reports. Used properly, a computer is a marvelous teaching and learning aid. The question that follows, then, is can using computers actually help students learn another language? More to the point, can it help them learn to communicate in another language? Clark (1985) addresses three general areas of instructional computing research. The first, which he terms 'cultivation', focuses on the use of computers to develop new cognitive skills in students when they are appropriately exposed to computers in an instructional setting. The second area; 'uniqueness', relates to designing computer experiences in novel ways that will faster learning not possible in traditional learning environments. 'Generalizability', the third area, addresses the extent to which material learned in the computing environment will transfer to other environments, thus providing a framework for use in novel problem situations.

The view that computers may replace the language teacher is over ambitious. The humanistic domain is the most important input in the learning situation. The role of the teacher as a class manager, as a facilitator of the learning process, and as an initiator of natural and genuine communication in the classroom will never be replaced by electronics. It would be helpful to consider computers as an aid to the teacher just like any other teaching aid, except that, by being more sophisticated, they can offer the teacher much more to enhance his or her teaching. Computers can also offer the learner more freedom in his or her learning task by being more accessible and more versatile. Garrett (1991) points out that:

The computer is rather a medium or an environment in which a wide variety of methods, approaches, or pedagogical philosophies may be implemented. Computer materials could be designed to carry out a grammar-translation syllabus, or audio-lingual drills or cognitive analysis of language, or a good deal of the kind of learning activities that make up a communicative syllabus (p. 75).

Although computers have been with us since the 1940s, they were not used for educational

purposes until the 1960s. The 1940s and 1970s witnessed the evolution of CALL (Computer-Assisted Language Learning) as a result of development in research related to the use of computers for linguistic purposes. As Dhaif (1989) points out, "from a theoretical point of view, the evolution of CALL was greatly influenced by developments in four areas of research: (a) individualization of instruction, (b) experiments in programmed instruction, (c) developments in computational linguistics, (d) work on machine translation in the 1950s" (See Al-Momani et al., 2014; Al-Ayyoubi & Farrah, 2014; Ezza & Bakry, 2014; Li dawn, 2014; Patronis, 2014).

4.4. Computer-Assisted Instruction (CAI)

Computer-assisted instruction has evolved around three distinguishable, though interrelated, instructional ideals: individualization, record keeping, and answer judging. Individualization in CAI refers to the fact that the computer enables students to work alone and at their own pace. Through the use of individualized instruction, poor students can attain additional practice outside of the classroom so that the teacher does not have to slow down the rest of the class. Individualization also allows the teacher to maintain the interest of good students by providing them with advanced materials. CALL programs have the following advantages: 1) they present the learner with a novelty... that is they teach the language in different and more interesting learning conditions; 2) they offer a valuable source of self-access study adaptable to the learner's level, with immediate feedback for error identification and self-correction; 3) they offer unlimited types of activities, and 4) they provide the learner with some sort of computer literacy, which is becoming essential in our modern societies. However, CALL programs also have some limitations: 1) learners who do not have prior experience in using a keyboard may waste a lot of valuable time identifying letters on the keyboard in order to write their responses; 2) working with computers normally means that the learners work in isolation, which does not help in developing normal communication between the learners; 3) CALL programs deal mainly with reading and writing skills, whereas spoken language is almost completely neglected, and 4) the time and effort required to develop CALL programs could be considerable, and thus their cost effectiveness becomes questionable (See Al-Momani et al., 2014; Al-Ayyoubi & Farrah, 2014; Barry, 2006; Ezza & Bakry, 2014; Li dawn, 2014; Patronis, 2014).

Reading comprehension is the skill for which the use of CALL is most obviously suited. It is also an area of pedagogical theory which has changed a great deal in the past decade, and teachers looking for computer-based reading comprehension materials should be aware of the different kinds of help that CALL can offer and the theoretical basis for the differences. Traditionally, reading comprehension has been seen as a kind of decoding, where the most important help is lexical, and programs designed from this perspective can be extremely sophisticated in the ways they allow students to call up literal, idiomatic, or contextually sensitive translation equivalents. However, recent theoretical work on reading has down-played the value of lexical decoding and has focused on the wide variety of strategies employed by readers such as skimming, scanning, inferring, predicting, etc. (Barry, 2006 & Yunker). In programs designed from this perspective the computer can highlight the appropriate textual clues to these strategies or use automatic timing to pace a learner through a text for various purposes (See Al-Momani et al., 2014; Al-Ayyoubi & Farrah, 2014; Ezza & Bakry, 2014; Li dawn, 2014; Patronis, 2014).

Gupta (1998) found that when students with inadequate language proficiency compose their essays on a computer, they use spell check for two purposes. Like more experienced writers, they use it to locate typographical errors but they do not always act on the feedback. One reason could be the difficulty involved in coordinating multiple skills but it could also be that their attention is diverted to a second function; that is, from word-correction to word-generation. This may explain why studies

(such as Owston, Murphy & Wideman, 1992) find that student writers do not always use the suggestions offered by the spell check.

One of the most revolutionary writing aids in recent years is word processing, which does not help people write better, but it certainly makes writing easier. It greatly reduces the clerical time it takes to type, revise, make corrections, locate references within a manuscript, and set up tabular material. However, a computer does not have thinking skills which means the writer must still proofread, but a computer can minimize the mechanical errors and secretarial drudgery of writing. In this regard, Dayton (1986) maintains that "if we truly believe... that excellence in writing across the curriculum is a primary goal of education, word processing will be a high priority item in our purchase of software" (p. 108).

Sullivan (1993) described her 2-year experience working in a computer-assisted writing laboratory at the University of Texas at Austin. Courses for both native and non-native speakers of English were conducted in the lab, and she used an approach to instruction in which computer conferencing was an integral component. Sullivan points out that "one of the most appealing characteristics of computer conferencing was that the students had an opportunity to negotiate meaning and improve their problem-solving skills" (p. 35). This finding was supported by Smoke's (1993) research on using computer-networking system to write a play:

Using the computer network to write a play collaboratively enabled these students to create together, recognize differences, and make compromises. It also gave these ESL students the opportunity to go out into the college and gain recognition for their work. The students were from countries as diverse as the Dominican Republic, Puerto Rico, China, and Vietnam. By writing and acting, together, the students discovered what they had in common. (p. 40)

Speaking has had top priority in many language learning programs for some time now, but the computer is far from ready to substitute a human being in spontaneous authentic communication. However, some teachers may believe that structured work on grammar and vocabulary is necessary, so that communicative practice on the computer may contribute significantly if indirectly. According to Garret (1991):

Any activity which "provokes thinking in the target language can be an important precursor to speaking. Moreover, the computer's ability to provide the stimulus for inter-student target language discussion should not be overlooked. (p. 83)

Listening practice requires audio either on its own, in the context of video, or interfaced with the computer. Video can provide a vivid communicative context. However, the computer can also provide textual support for listening (transcripts, glossary help, structural clues), which is particularly valuable at upper levels of language study where literacy and knowledge of formal language play a much greater role in comprehension.

4.5. Technology, Teaching, and Research

For many language teachers research and teaching are two separate activities; literary scholarship often has little connection with language teaching, methodological research may not be valued, and teaching loads may prevent the undertaking of either. Using technology-based materials to collect data on the learning process may well develop into one of the most interesting options for both pedagogically and theoretically motivated research (Garrett, 1991). In principle, of course, teachers

can always collect data on their students' learning, but the often heavy teaching loads carried by many foreign language teachers strongly militate against their doing so. The time and thought required to design significant research is the same regardless of research methodology, but once a task has been created on the computer it can cover larger number of students and far more complex data than any teacher could possibly handle otherwise.

Furthermore, the computer can enable research we cannot undertake any other way, because it can collect data on the learner's process of dealing with language, rather than only on the product. For example, a pilot research project at Cornell has attached a tracking program to system D so that every key pressed by individual students is recorded-what they write, what they look up at what point in composing, what use they make of what they look up in the next words or phrases written (James, 1993). In this regard, Garrett (1991) maintains that "in more complex computer-based projects the computer can not only track what the learner does in the learning environment but also interact with it; lessons should be designed to respond or provide feedback of some kind to learners' input and to collect data on how they make use of that feedback (p.8). In this sense, technology-based classroom research can be of direct use in shaping our pedagogy (both materials design and the classroom approaches into which material use is integrated) and at the same time can contribute significantly to a growing body of second language acquisition theory.

One of the strengths of computers is their capacity to measure and record. Applying this to language learning, one can easily see that diagnostic and adaptive testing can enable a learner to start a teaching/learning program at the best point and to continue with the program at a speed that relates to his or her ability to learn. If constant evaluation and record keeping are part of the learning culture, then both are most efficiently handled with technological assistance. The great strength of computers is that they can be programmed to provide interactive activities, such as those focused in simulations and models, which have the potential to promote reflection in the learner. In relation to this, Wild and Quinn (1998) point out that technologies can mediate and encourage reflection in several ways, such as providing a communication link between learners, providing tools for knowledge and outcome representation during activities (Hedberg et al. 1994), or simply displaying a record of the learner's activities (Schauble Raghavan & Glaser, 1993).

4.6. Learners' Incorporation into the Technology Environment

To embark on such a mission requires careful consideration of the many variables that affect the learning and teaching environment. To this end, Andrew Chirwa (1992) proposed a conceptual model for incorporating the learner into the technology environment (ILTE). Factors of the model are the student, the teacher, human wants and needs, and technology. These factors must be viewed as the structural components that maintain the stability of relations in the technology environment. The dynamics of the model are maintained by interaction, society, and exposure, as Figure (1) illustrates.

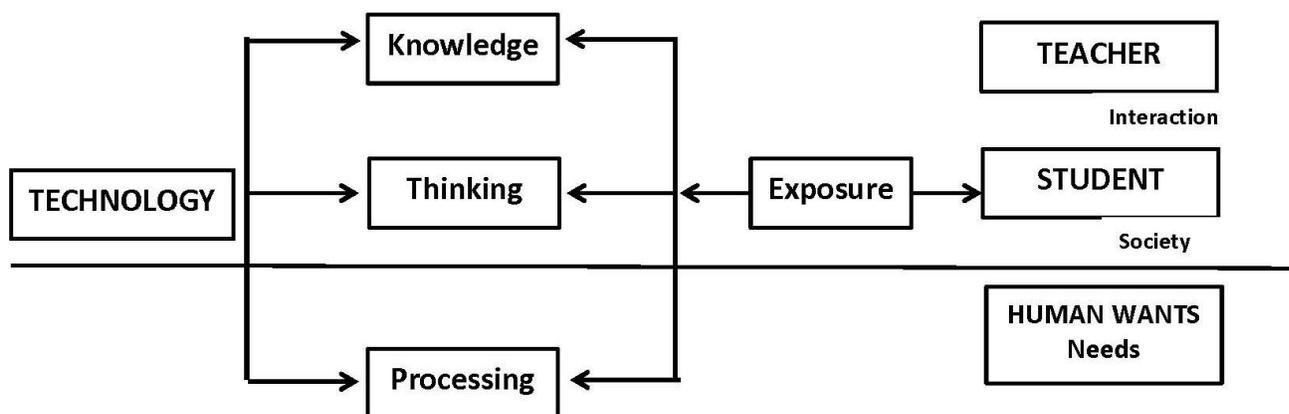


Figure 1, Conceptual framework for incorporating learner into the technology environment.

1. Student

As Chirwa (1992) argues, technology acts on the student's intellect and intuition to stimulate thinking and processing capabilities (see Figure 2). That is, the student is teachable and can learn. Therefore, the technology environment must provide the learner with the resources and strategies to learn and acquire knowledge. Incorporating the learner into this environment with the student as the basis for learning can be achieved through the following: 1) defining the learning environment with respect to the availability of materials; 2) selecting materials that match the needs of the student, and 3) providing the learner with a competent and knowledgeable teacher

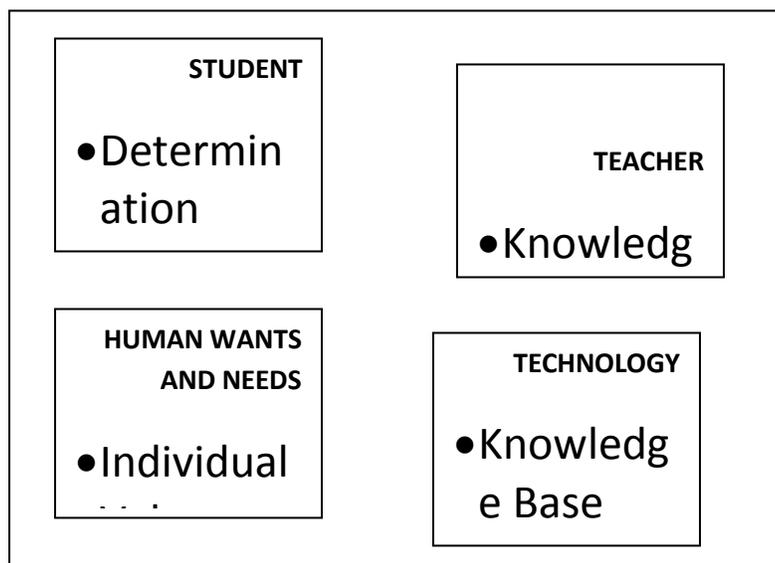


Figure 2, Factors of ILTE

2. Teacher

The teacher should have the skills to impart knowledge to the learners competently and to guide them through difficult learning events. In this regard, Chirwa (1992) argues that incorporating the learner into the technology environment with a teacher capable of stimulating learning can be achieved in the following ways: 1) teachers have to determine the levels students are functioning at; 2) teachers have to explore and determine the nature and prior knowledge of

students; 3) teachers should adapt learning material to the special needs of their students; 4) teachers have to center teaching strategies on challenging students' motivational strategies into courseware.

Educational change depends on teachers. What teachers think and do with respect to an innovation governs the possibilities for success of the program. When the change involves the use of computers and advanced technology in the classroom, the task is compounded by the attitudes toward the technology that teachers have at the outset. As Lee (1992) maintains:

When computers are used in teaching, the key to success depends on how well the teacher can function with them. With better computer skills, the likelihood of a negative attitude toward using computers for teaching is decreased. (p. 183)

The integration of technology and teacher education involves more than just a physical change, a supplemental add-on to instruction, or a curriculum that dictates the integration of technology (Dwyer, 1991). It is a blend of thinking, learning, and instruction using the tools of technology to form an entire system of learning and teaching. This kind of blend necessitates that teachers have full usage, easy accessibility and understanding of the potential of technology (Sheingold, 1991). In this regard, Ritchie & Dodge (1992) argue that:

To insure the integration of technology across the curriculum, it (is) imperative that teachers gain both a conceptual understanding of how technology assists the learning process and the basic skills for using the required hardware and software. (p. 640)

Teachers cannot use technology unless they understand how, when, and where to use it (Young, 1992). The current educational reform movement has focused on changes that should occur if our schools are to meet the needs of students as we move into the 21st century. Many of the reform models suggest that changes in our schools should include incorporating more technology into the classroom. "If our teacher education programs are going to meet the expectations of the reform movement, we need to prepare teachers for a technologically advanced environment. Additionally, if we expect to see successful change in our educational system, teacher training must incorporate experiences that will provide future teachers with the confidence to utilize technology in their classrooms" (Downs, 1992, p. 83). Copley & Williams (1992) maintain that:

The integration of technology into existing curriculum and instructional practices has recently been advocated as the impetus for necessary reforms in teacher education programs. Combined with current research on learning and teaching, the use of technology seems to have potential for the educational community. Despite encouraging results in some educational arenas, however, the promise of technology as it is integrated into the teacher education program has not realized its full potential. (p. 381)

3. Human Wants and Needs

In this regard, Chinva (1992) maintains that "the goals of technology education is to educate for value, identity, and cultural understanding. Man has endowed technology to serve as the instrument to bridge the communication gap between people of different beliefs". He also argues that incorporating the learner into the technology environment with human wants and

needs as a basis for structuring teaching and learning can be achieved in the following ways: 1) teachers have to examine human wants and needs; 2) teachers should select values that can be addressed with available resources; 3) teachers should engage students in experimenting with various societal values; 4) teachers should select learning materials that enhance self-esteem and create motivational factors; and 5) teachers should create learning environments that give students a sense of belonging.

4. Technology

The introduction of new technologies produces changes in the entire school system. Chirwa (1992) argues that "to the enlightened teacher technology can be used for advancing instruction and creating new horizons for discovering new ways of survival. Technology is a value system that has an impact on society". Dede (1990) believes that current information technologies - computers, video-players, television - can improve instruction because: 1) Intelligent devices can create learning environments tailored to individual student needs; 2) Educational technologies can present complex, motivating stimulations and multimedia experiences otherwise unavailable to learners; 3) Sophisticated technology can reduce teachers' involvement in training students about basic concepts and skills, freeing instructors to focus on the higher-order and human-centered aspects of education; 4) Educational technologies can unobtrusively collect detailed information essential for the diagnosis and evaluation of individual learner performance; 5) Distance learning technologies can bridge barriers of distance and time to deliver instruction to students who have no other means of access to this knowledge; 6) Computer-supported cooperative learning can enhance small group interaction as a pedagogical strategy; 7) Using information technology in schools prepares students to use similar devices in societal settings; and 8) Empowering environments for creating learning materials can speed curricular evolution.

Many authors suggest that we should make a choice between computer labs and integration of computers into regular classrooms. However, it could be argued that this is not an either /or issue. At the present time, it appears that there is a critical shortage of: (1) Excellent educational software; (2) School based computers and peripherals, and (3) Expertise among regular educators. Until such shortages are corrected, calls for integration may be premature. In addition, there will probably always be a need for computer labs and educational computing specialists, even when and if computing is integrated into the entire curriculum. In this time of promoting the use of the technology across the curriculum educators must continually be aware of the impact that this promotion is making upon their captive audience of students: 1) Are our students involved in learning? 2) Do we place computers in the back of the room to be utilized as a reward for the student who has completed the assignment early?; 3) Do we keep our computers conveniently placed in a lab, allowing our students access only during the one week each term the teacher is assigned lab use? and 4) Do the students benefit when we only have one computer for use in each classroom? According to Braswell (1992), "these questions raise several issues that must be addressed as the use of technology becomes more pervasive and more commonplace throughout the curriculum" and therefore more research is urgently required.

5. Methodology

The present study attempts to explore advanced foreign language learners' attitudes towards the value of using technology in language teaching. It is based on the premise that one of the guiding

principles that shapes the planning of an innovative computer curriculum is involving all those as the most important factor as it is upon them that any innovation can be accepted or rejected. In the first phase of the study, a questionnaire was distributed on 800 students enrolled in the third and fourth years of the Department of English, Faculty of Arts at Minufiya University. The analysis, however, was conducted on the 612 students who returned completed questionnaires. All subjects were asked to answer all questions as completely as they could. The analysis was mainly interpretative with a view to determining the attitudes of the students towards using technology in language teaching.

6. Findings and Discussion

The first question asks 'How do you regard the importance of using technology in EFL learning and teaching?'

Out of 612, 458 students chose (A. very important); 142 students chose (B. quite important); 4 students chose (C. not very important); and 2 students chose (D. not important at all). Six students didn't make any choice. The following table illustrates such a situation;

Table 1. The importance of using technology in EFL learning and technology

Q (1)	How do you regard the importance of using technology in EFL learning and technology?	
A	Very important	458
B	Quite important	142
C	Not very important	4
D	Not important at all	2
No response		6
Total #		612

Question (2) says 'How do you regard the situation of technology use in EFL in learning and teaching in your faculty?' Out of 612, 72 students chose (a- very good); 280 students chose (b- quite good); 163 students chose (c- quite bad), and 97 students chose (d- very bad). The following table illustrates such a situation as follows:

Table 2. The situation of technology use in EFL in learning and teaching in your faculty

Q (2)	How do you regard the situation of technology use in EFL in learning and teaching in your faculty?	
A	Very good	72
B	Quite good	280
C	Quite bad	163
D	Very bad	97
Total #		612

Question (3) says 'Among the different means of technology, which one is available for you to use?'. The subjects were allowed to make more than one choice. 392 subjects chose (A- audio-tapes); 83 subjects chose (B- video tapes); 143 subjects chose (C- computers; including Internet and Multi-media), and 54 subjects chose (D- electronic dictionaries), as the following table illustrates.

Table 3. The different means of technology

Q (3)	Among the different means of technology, which one is available for you to use?	
A	Audio tapes	392
B	Visdeo tapes	83
C	Computers	143
D	Electronic dictionaries	54

Question (4) says 'Among the different means of technology, which one did you have the chance to use?'. The subjects were allowed to make more than one choice. 481 students chose (A-Audio-tapes); 200 chose (B-videotapes); and 137 subjects chose (C-computers, internet and multi-media).

Question (5) says 'How many times did you have the chance to use each of these means of technology?'. The following table summarizes the results as follows:

Table 4.1 Using means of technology

A (Audio tapes)	B (Video tapes)	Computers	Electronic dictionaries
543	279	129	99

Question (6) says 'What do you know about the Internet and Multimedia?'. Out of 612 subjects, 138, appeared not to know anything about the Internet and Multi – media. They are about to graduate or have only one year to earn their degree in English literature.

Question (7) says 'How are they used in EFL learning and teaching?' Out of 612 subjects, 279 seemed not to know how the Internet and Multimedia can be used in learning and teaching English as a foreign language.

Question (8) 'How many times did you have the chance to use the Internet or the Multi-media in EFL learning?'. Based on the subjects' responses, 498 out of 612 reported not using the Internet or the multi-media even once.

Question (9) says 'How many times did you have the chance to use the language lab?'. Although the number is not so high compared to the total number of subjects, it is still surprising given that these students are about to graduate.

Question (10) says 'to what extent was the use of the lab effective? Why?' There was total agreement among the subjects that the use of the lab is very effective. However, a small number of students considered the language lab not effective.

Question (11) says 'Among the four EFL skills, which skill can be effectively developed by the use of technology?' The respondents were allowed to choose more than one answer. The following table summarizes the responses.

Table 4. 2. Using means of technology

Listening	Reading	Writing	Speaking
529	108	56	447

The above table shows that both listening and speaking were chosen by the majority of the subjects, followed by reading and, finally, writing.

Question (12) says "How often do you listen to or watch TV and radio programs dealing with

EFL learning and teaching?" The following table summarizes the subjects' responses.

Table 4. 3. Using means of technology

Very much	Quite a lot	Not much	Not at all
68	216	287	36
284		323	

Question (13) says 'How effective are these programs?' The subjects' responses are summarized below:

Table 5. The affectivity the programs

Very effective	Quite effective	Quite ineffective	Very ineffective
254	354	20	9
608		29	

Question (14) says 'How often do you watch or listen to radio and TV channels broadcasting in English?' The subjects' responses are summarized, below.

Table 6. Watching or listening to radio and TV channels broadcasting in English

Very much	Quite a lot	Not much	Not at all
135	222	234	22
357		256	

Conclusions

To sum up, analyzing the responses leads to the following conclusions:

1. The subjects of this study considered technology very important in foreign language learning and teaching. However, the use of technology in their department does not satisfy their aspirations or meet their academic needs. Although 600 subjects (out of 620) greatly value the use of technology in EFL, nearly half (or give actual %) described the use of EFL technology in learning and teaching in their countries as being 'quite / very bad.' In this regard, a very important observation can be made. Sometimes students are often blamed for not being ambitious and, therefore, their academic standard is not as high as it should be. Instead, it could be argued that they should be provided with the tools, equipment, training, and an encouraging atmosphere for each student to display his or her real abilities and talents.
2. Although audio and video tapes are available for the respondents to use, only (143) subjects chose computers, including internet and multi-media, and only (54) subjects chose electronic dictionaries. This means that although the subjects are advanced, they are still 'traditional' and not familiar with advanced technology. It could be argued, however, that the whole educational system is to blame. Based on the subjects' responses, only 99 students had the chance to use electronic dictionaries and only 129 had the chance to use computers, internet and multi-media. In addition, out of 612 students, 138 appeared not to know anything about the internet and multi-media, or electronic dictionaries. Finally, (279) subjects did not seem to know how the Internet and multi-media can be used in learning and teaching English as a foreign language.
3. Although the subjects of this study are in their third and fourth years of tertiary education, they seemed to

suffer from what can be called "technological deprivation" based on the fact that x% have never used the Internet or Multi-media. Even the language lab was not totally known to (55) students.

Moreover, (323) subjects have never listened to or watched TV and radio programs dealing with EFL learning and teaching. And, although (608) subjects considered these programs as "very effective / quite effective" (256) mentioned that they had never listened to radio or watched TV channels broadcasting in English.

The findings lead us to conclude that the use of technology in foreign language learning and teaching in the context studied is far from effective. Much effort is needed as well as a great deal of changes in our educational system, curricula and teaching materials. To embark on such a mission requires careful consideration of many variables that affect the learning and teaching environment.

7. Concluding Remarks

Many authors suggest that we should make a choice between computer labs and integration of computers into regular classrooms. I believe that this is not an either/or issue. At the present time, it appears that there is a critical shortage of: (1) Excellent educational software; (2) School based computers and peripherals, and (3) Expertise among regular educators. Until such shortages are corrected, calls for integration may be premature. In addition, I believe that there will probably always be a need for computer labs and educational computing specialists, even when and if computing is integrated into the entire curriculum. In this time of promoting the use of the technology across the curriculum. We, as educators, must continually be aware of the impact that this promotion is making upon our captive audience of students: 1) Are our students involved in learning? 2) Do we place computers in the back of the room to be utilized as a reward for the student who has completed the assignment early?; 3) Do we keep our computers conveniently placed in a lab, allowing our students access only during the one week each term the teacher is assigned lab use? and 4) Do the students benefit when we only have one computer for use in each classroom? According to Braswell (1992:24), "these questions raise several issues that must be addressed as the use of technology becomes more pervasive and more commonplace throughout the curriculum" and therefore more research is urgently required.

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