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*Designing an INTERACTIVE SELF-  
INSTRUCTIONAL Online COURSE of  
ENGLISH for USTHB STUDENTS*

*Thesis submitted in fulfilment of the requirements for the Degree of  
Doctorate ES-Sciences in English -Linguistics & Didactics*

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**DESIGNING AN INTERACTIVE SELF-  
INSTRUCTIONAL ONLINE COURSE OF ENGLISH  
FOR USTHB STUDENTS**

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## *Declaration*

*I hereby declare that the substance of this thesis is entirely the result of my investigation and that due reference or acknowledgement is made, whenever necessary, to the work of other researchers.*

*Date: December 2016*

*Sakina Lahdir*

## *Dedication*

*My dissertation is dedicated to the memory of my late:*

*Beloved parents to whom I owe a huge gratitude that I cannot repay;*

*My brother and sister who had so much supported me with their love and encouragement.*

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*“Computers will not replace teachers. However, teachers who use computers will replace teachers who don’t”*

Clifford, R., (1998, p. 5).



*“Finally, our campus environments—physical and online—are the places where structured teaching and learning takes place. Just as we evaluate and redesign the teaching and learning processes between faculty and students, so too must we redesign the environments in which such processes occur, ensuring that the design and tools we select support the growth of the unique brains we are responsible for nurturing.”*

Boettcher, J., (2007, p. 9).

## TABLE OF CONTENT

List of tables.....	xii
List of Figures .....	xii
List of screenshots from the interactive, self-instructional course for computer and biology science students.....	xiii
List of Acronyms.....	xiv
Introduction .....	1
<b>CHAPTER 1 Technology Assisted Learning .....</b>	<b>11</b>
1.1. CALL and E- Learning .....	11
1.2. An Overview of developments in CALL.....	16
1.2.1. Computer-mediated communication (Via Texts):.....	24
1.2.2. Computer-mediated communication (Via Audio/Video Tools):.....	27
1.2.3. Computer- mediated communication and virtual learning environment systems:.....	28
1.3. Relating technology to pedagogy .....	31
1.4. Pedagogical applications of some learning theories on learning models.....	37
1.4.1. Learning theories .....	37
1.4.2. Learning models.....	52
1.4.3. Hubbard's framework and pedagogical implications for our e-course design .....	69
1.5. E-Learning in practice .....	77
<b>CHAPTER 2 .....</b>	<b>82</b>
<b>2.1. Research Design and Procedure.....</b>	<b>82</b>
2.1.1. The context of the study .....	83
2.1.1.1. The participants .....	83
2.1.2. The research methodology: The rationale and the research questions.....	85
2.1.3. Data collection tools .....	87
2.1.3.1. Questionnaires .....	89

2.1.3.2. Interviews.....	93
2.1.4. Data collection procedure.....	94
<b>2.2. Results and Discussion.....</b>	<b>98</b>
2.2.1. Results from the questionnaires .....	98
2.2.1.1. Results from the teachers' questionnaire.....	98
2.2.1.2. Results from the students' questionnaire.....	103
2.2.2. Summary of the interviews, and of the respondents' suggestions .....	105
2.2.3. Answers to our research questions and discussion .....	109
2.2.4. Suggestions and recommendations.....	114
<b>CHAPTER 3 The rationale for the design of the online course .....</b>	<b>119</b>
3.1. The development of the course objectives.....	121
3.1.1. Learning activities and pedagogy.....	130
3.2. The criteria for the evaluation of the online course .....	133
3.2.1. Moodle and quality requirements .....	140
3.2.1.1. The Pedagogical implications of MOODLE use .....	146
3.2.1.2. Illustrating Moodle use in some higher education courses.....	153
3.2.2. The criteria for the evaluation of the online course content.....	161
3.2.2.1. The criteria for authentic learning and authentic activities.....	165
3.3. The online course's learning resources and design templates .....	170
<b>CHAPTER 4 The online course design review, piloting and feedback .....</b>	<b>185</b>
4.1. The online course implementation on MOODLE.....	185
4.2. An overview of the course structure design.....	192
4.3. Review of the course content and its evaluation .....	198
4.3.1. Content flow and sequencing within the course.....	202
4.3.2. Course materials and the free content issue.....	204
4.3.3. Types of assessment.....	206
4.4. A detailed review of the topics.....	208
4.5. Analysis of the feedback on the piloted units and evaluation.....	232
<b>Conclusion .....</b>	<b>239</b>

<b>Bibliography.....</b>	<b>246</b>
<i>Appendix A1: Teachers' Questionnaire .....</i>	<i>261</i>
<i>Appendix A2: Students' Questionnaire.....</i>	<i>265</i>
<i>Appendix A3: Rubric for assessing interactive qualities of distance learning courses (Roblyer and Ekhaml: 2000) .....</i>	<i>269</i>
<i>Appendix A4: Description of lessons for biology and computer science students. ....</i>	<i>270</i>

## List of tables

Table 1: The changing focus of educational technology (Nicholson, 2007, p.7). .....	23
Table 2: The three types of integrating IBT into language curricula (adapted from Liu and Chen, 2007).....	34
Table 3: Learning theories and their pedagogical applications/ implications (adapted from Boettcher, 1998).....	39
Table 4: Learning theories and their applications to Instructional Design (adapted from Boettcher, 1998).....	42
Table 5: Bloom’s six levels for cognitive learning, Huitt (2011). .....	53
Table 6: The cognitive processes dimension - categories, cognitive processes (and alternative names), Center for Excellence in Learning and Teaching- CELT (1995). ....	55
Table 7: The Knowledge Dimension - major types and subtypes, Center for Excellence in Learning and Teaching-CELT (1995).....	56
Table 8: Robert Gagné’s instructional events in the left column and the associated mental processes in the right column (Kruse, 2006).....	60
Table 9: Pedagogical implications/applications for our e-course rationale. ....	68
Table 10: Specification of our students’ learning objectives based on Grave’s framework and Trimble’s rhetorical levels. (1996).....	128
Table 11: The classification of our students’ learning objectives based on Bloom’s revised taxonomy (adapted from CELT, 1995-2017). ....	129
Table 12: Learning activities based on our course objectives.....	131
Table 13: Levels for Promoting Learners ‘Autonomy (Nunan, 1997).....	138
Table 14: Course design, part 1: Learning activities, learning resources & modalities.....	182
Table 15: Course design, part 2: Learning environment, instructor’s role & learner’s role. ....	183
Table 16: Course design, part 3: Assessment, feedback and modes. ....	184

## List of Figures

Figure 1: Alignment of objectives, class activities, and assessment (Center for Online Learning, 2008).....	<b>58</b>
Figure 2: Developing Learners' Autonomy in Foreign Language Learning. Littlewood (1996)..	64
Figure 3: The Orientation, Coaching, Tuning and Routinization Model (Chan et al., 1993) .....	<b>65</b>
Figure 4: Hubbard's CALL framework interrelationships (1996, 2011).....	<b>70</b>
Figure 5: Operational Description (Hubbard, 1988, 1996).....	<b>72</b>
Figure 6: Hubbard's CALL Evaluation Framework (1996, 2011).....	<b>74</b>
Figure 7: A framework for planning e-learning (activity and approach). (Beetham, 2004).....	<b>164</b>

## **List of screenshots from the interactive, self-instructional course for computer and biology science students**

Screenshot 1 The Course front page. ....	<b>187</b>
Screenshot 2: English for Biology students Part 1.....	<b>188</b>
Screenshot 3: English for Biology students Part 2.....	<b>189</b>
Screenshot 4:The outline of our course of English for computer science students (part 1).....	<b>193</b>
Screenshot 5:The outline of our course of English for computer science students (part 2).....	<b>194</b>
Screenshot 6: Topic 1 What is a program? (part 1).....	<b>209</b>
Screenshot 7: Topic 1 What is a program? (part2).....	<b>210</b>
Screenshot 8: Topic 2 An example of programming languages: The Python programming language. ....	<b>213</b>
Screenshot 9: Topic 3 Programming errors and debugging.....	<b>216</b>
Screenshot 10: Topic 4 What is a Flow of Execution? .....	<b>219</b>
Screenshot 11: Topic 5 Formal and natural languages 1. ....	<b>221</b>
Screenshot 12: Topic 6 Formal and natural languages 2 (part 1).....	<b>224</b>
Screenshot 13: Topic 6 Formal and natural languages 2 (part 2).....	<b>225</b>
Screenshot 14: Topic 7 Understanding 'Multicore Programming Primer and Programming Competition' .....	<b>228</b>
Screenshot 15: Topic 8 Describing a process in DVD construction.....	<b>230</b>
Screenshot 16: Activity report of the overall course participation.....	<b>233</b>
Screenshot 17: Learners' actions in topic 1 activities .....	<b>234</b>
Screenshot 18: Learners' participation in topic one.....	<b>235</b>
Screenshot 19: Grader report.....	<b>236</b>
Screenshot 20: Lesson one main page from the course for biology students. ....	<b>271</b>
Screenshot 21: Understanding science and biology.....	<b>273</b>
Screenshot 22: Understanding aspects of language. ....	<b>274</b>
Screenshot 23: View and listen part1.....	<b>275</b>
Screenshot 24: Lesson six main page from the course for computer science students.....	<b>276</b>
Screenshot 25: Understanding formal and natural languages 2.....	<b>277</b>
Screenshot 26: Understanding aspects of language. ....	<b>277</b>
Screenshot 27: View and listen part 6.....	<b>278</b>

## **List of Acronyms**

- CAI:** Computer-Aided Instruction
- CALL:** Computer -Assisted Language Learning
- CALI:** Computer -Assisted Language Instruction
- CBLT:** Computer-Based Language Training
- CEFR:** Common European Framework
- CEIL:** French acronym for the Center of Intensive Teaching of Languages
- CELL:** Computer-enhanced language learning
- CMC:** Computer-Mediated Communication
- CMS:** Course Management Systems
- EFL:** English as a Foreign Language
- E-Learning:** Electronic Learning
- ESP/EST:** English for Specific Purposes/ English for Science and Technology
- ICT:** Information & Communication Technology
- IBT:** Internet-based technologies
- LMS:** Learning Management System
- MOODLE:** Modular Object-Oriented Dynamic Learning Environment
- MESRS :** French acronym for the Ministry of Higher Education and Scientific Research
- ONEFD:** French acronym for the National Office of Teaching and Distance Training
- OCTR :** Orientation, Coaching, Tuning, Routinization
- PLATO:** Programmed Logic for Automated Teaching Operations
- QA:** Quality Assurance
- SCORM:** Sharable Content Object Reference Model
- TBLT:** Task-based language Teaching
- TELL:** Technology-enhanced language learning
- TALL:** Technology-assisted language learning
- UFC:** French acronym for The University of Continuing Education
- USTHB:** University of Science and Technology Houari Boumediene
- VLE:** Virtual Learning Environment

## *Abstract*

Our research is related to e-learning and to action-research. In this respect, we were concerned with the existing problems related to the teaching/learning of the current classroom-based course of English at the University of Science and Technology Houari Boumediene (USTHB). Some difficulties were already highlighted in our previous study (magister thesis, 2002; summary pp.3-5) on the development of a rationale for the design of common-core syllabi corresponding to the teaching of English in the same university. This led us to investigate the question of whether an online course would be a complementary solution to the conventional, face-to-face course given the fact that the latter has shown limitations in the Algerian context and that new needs for change are necessary. The present research is thus aimed to explore the need for the design of an interactive, self-instructional online course of English for science and technology. Such a technology-mediated solution may indeed be suggested as a remedy to the overcrowded classrooms, and as a means to overcome the impediments of time as well as place constraints. To answer that first question, there was a need to respond to the second question of what would the online course objectives be as compared to those of the current classroom-based course. This led us to check whether the findings of the present research showed any change in the students' learning objectives, which gave rise to the third research question on what would the online course content be as compared to the classroom-based one. To obtain answers to those research questions we opted for a needs analysis assessment, using questionnaires and unstructured interviews. After the gathering, analysis and discussion of the collected data, the findings revealed that the majority of respondents were in favour of an online course and provided information on the students' learning needs. We hence opted for an action research based on the use of the learning environment MOODLE, an eclectic approach, and evaluation criteria, like in Hubbard's framework (1996, 2011). We subsequently developed two courses, one related to biology and the other to computer science some units of which have been piloted on the university's platform. The online course we have designed for the targeted learners could be used by other institutions having the same subjects. It could also be used by other people in business English as a model to be followed and refined, which may provide further insight to the field.

**Keywords:** Computer-assisted language learning, e-Learning, task-based language learning, English for specific purposes, English for science and technology.

## **Introduction**

### **1- The context of the study and the statement of the problem**

The course of English, a mandatory component at the University of Science and Technology Houari Boumediene (USTHB) academic curriculum, is not run in all the existing faculties. Regarding the outcomes of our earlier research (magister thesis, 2002, summary pp.3-5), and according to our experience in teaching in this institution, no major change has occurred with respect to the overall teaching/learning situation. We may cite difficulties in terms of the availability of teaching materials, namely appropriate textbooks, in addition to the lack of didactic tools and of ICT use in teaching. On the other hand, with the enlargement of the classes size, an adapted management is to be catered for, which leads us to think whether the teachers at the Centre of Intensive Teaching of Languages (CEIL, USTHB) could deal with such a situation besides the challenge to teach English for science and technology, should their educational backgrounds allow it. As for the objectives of the current classroom-based course, they were inferred from our previous findings as to be summed up later on (pp.3-5). They are broadly related to academic skills, like reading and writing for science and technology-EST. Our present research will however allow us to update all such data.

Given this teaching/learning situation, we thought of exploring the need for the design of an online course based on the students' learning needs, as a complementary solution to the classroom-based one. For this, researching the teaching/learning situation in which the classroom-based course is run becomes necessary, in order to identify its strengths and weaknesses. With this view, such areas

related to the present teaching tools, the teachers' educational background and the students' learning needs are to be investigated. The yielded formation will guide us in the design of the online course on an informed basis. Further details about this work will be provided in the coming sections.

## **2- The background of the study**

Our research is part of Computer Assisted Language Learning (CALL) as it involves the use of a computer, and is also related to the field of Electronic Learning (e-learning) where language teaching and learning is web-based and implemented on a platform with Internet, Intranet or computer access (Yucel, 2006). By technology we mean here therefore a teaching/learning platform that is, an all-inclusive educational system of tools and applications, encompassing computers as well as the Internet, like MOODLE (Modular Object-Oriented Dynamic Learning Environment). Such platforms are designed to create, deliver, and manage teaching/ learning materials, in addition to online communication, keeping track of learners' activities. As far as we are concerned, we shall interchangeably use the terms 'E-Learning', 'CALL', 'Distance Learning ', 'Online Learning' and 'Open Learning' to refer to teaching/learning using a platform, as well as a combination of different methods which are likely to enhance the learning process.

In line with this, building on the argument that 'technology provides opportunities for language learners to engage in a range of new literacy skills' (Warschauer, 2004, in Hiradhar, 2015), several studies have been carried out like Hiradhar's that attempted to explore the effectiveness of the design and incorporation of technology-mediated module for writing skills, concluding that specifically

designed technology-mediated tasks contributed to improving students' writing skills required at the tertiary level. Other studies put forward the effectiveness of online learning, describing experimentations connected to online design of courses related to specific skills, like Alm's (2015) about extensive listening, Appel and Pujolà's (2015) about speaking skills, Stockwell and Hubbard's (2014) about training in learning English vocabulary, or Chang's (2014) about EFL students' learning to write through an online corpus-based corrective feedback system. Most of such studies dealt mainly with specific skills each time and not with a complete course like the online course we intend to design, aimed at covering all the skills needed by our learners as specified by the needs analysis results. Our interest falls therefore within pedagogy and design rather than with a simple integration of technologies (as in Colpaert, 2013; Levy et al., 2015, in Whyte, 2015).

### **3- The summary of our previous study**

As we sometimes need to refer to the findings of our previous study for various comparisons relating to the present research, we present in this section a short summary of the students' learning objectives and any relevant aspects. Our previous study (magister, 2002) about a rationale for the design of developmental common-core syllabi was related to a basic concern with the teaching/learning situation at the university USTHB where students did not seem to progress in their learning of English. Their general command of English remained low after many years of English instruction, as validated by a proficiency test. We were then led to explore what could be done to improve the teaching/learning situation of that course. A needs analysis assessment using questionnaires was opted for to examine the conditions into which

that course was run and their effect on the students' learning. The results of the investigation showed the students' difficulties in reading comprehension of subject-related documents, although they regularly exercised that skill in class. They also revealed their low command of the basics of the English structure (like tenses, articles) and of important aspects inherent to scientific/technical discourse such as compounds, passive forms, comparison/contrast constructions, although 'grammar' was the most practised component during the course. The findings also put forward their inability to write adequately. Other aspects were pointed out as well like the lack of variety in the pedagogical activities mainly the reading ones, the teaching of grammar in a discreet way, and the unsuitability of the reading materials. Moreover, the course as run failed to meet the academic and target needs of the students since it was not directed towards the reading skills as well as strategies inherent to scientific/technical discourse. The outcomes of that study consisted in the development of a rationale for a global educational management of the course of English, seen in a continuum. The latter was aimed at following the students' learning from the introduction of English instruction in the curricular (the beginning of the continuum), up to the last year of it (the end of the continuum). The aim was to help the students to progress in their learning. The course objectives were set as briefly described herein:

- First, content as knowledge was aimed to focus on reading, from general scientific/technical knowledge to authentic subject-related documents.
- Content as skills and strategies with the related tasks and activities were intended to train students in reading comprehension of subject-related documents as well as in writing skills, by building up linguistic features (from the beginning of the continuum)

in addition to rhetorical clues specific to EST discourse like defining, comparing/contrasting, describing, linking ideas.

- Research skills like note taking, making presentations, reading and synthesizing information were to be scheduled for students at the last year of English instruction (by the end of the continuum).
- The skills of listening and speaking were integrated, though with less emphasis than reading or writing.
- In dealing with the different tasks, the emphasis was on training students to adapt the different skills being exercised in, to different learning situations through information gap or problem solving activities for instance, as in descriptions or comparisons of processes.

#### **4- The purpose of the study and the research questions**

Our purpose through this research is to examine the need for the design of a relevant online course for science and technology students, namely at the USTHB university. We thought of this initiative within our action research work, on the basis of the existing problems prevailing in the teaching/learning situation of the module of English at the USTHB. We therefore turned to what technology might offer as a solution that would help in overcoming the time and space impediments, in addition to allowing more practice to our students. This led us to ask our first research question:

1. Would an online course be a complementary solution to the conventional, face-to-face course given the fact that the latter has shown limitations in the Algerian context, and that new needs for change are necessary?

Such alternative referred to as E-learning or CALL (used here interchangeably), is likely to present a lot of advantages, like students having unlimited time to spend working at their own pace with the available resources, and revising work at frequent intervals (Davies et al., 2012). Moreover, they can carry out such activities at the time and place of their choice, individually, in pairs, or in groups of students, difficult and time consuming to create in large classes, but simplified by the use of a learning management system like Moodle (Campbell, 2014). Concerning the online course design, the need for which is being examined in this research, the focus is on the students' learning needs and their learning objectives, to be effective. In this regard, effective learning is believed to involve "... *knowing when to use a specific strategy, how to access that particular strategy, as well as when to abandon an ineffective strategy*" (Filcher and Miller, 2000, p.61). Having already identified USTHB students' learning objectives through our previous research as summed up earlier, we wanted to check whether any change has occurred since then, in order to put them at the core of the online course. Indeed, to answer the first research question we need to verify whether the learning objectives set for the classroom-based course are still relevant, which motivated our second research question:

- 2- What would the online course objectives be, compared to those of the current classroom-based course?

If the findings show no change, this will lead us to find an answer to the following question:

- 3- What would the online course content be as compared to the classroom-based one?

To have answers to all those questions, we resorted to an investigation, as described in the next section.

### **5- The research methodology, design and procedure**

Exploring the need for the design of a relevant online course, our aim through this research, implies investigating the teaching/learning situation related to the classroom-based course, as already stated. This entails yielding information that is, amongst others, numerical data. Our research is therefore basically action-research oriented, but is also qualitative. As a course should be designed on an informed basis, we proceeded to a needs analysis assessment of the teaching/learning situation of the classroom-based course. Areas related to the present teaching tools in terms of didactic materials and equipment used in the course were investigated, as well as the teachers' experience in the educational field. Knowing about the students' learning needs and whether teaching/learning in large classes has any impact on the teaching/learning process, were also examined. To ensure an acceptable level of reliability, triangulation is to be observed. For this, we opted for research tools that would generate the maximum of relevant data. We chose to design questionnaires that we distributed to first year master students and teachers of English at the CEIL, with almost the same questions in order to match answers, for more clarity. We also held unstructured interviews with the teachers of English to yield additional data that might not have been provided through the questionnaires, and to complete or check ambiguous answers. The results from both questionnaires were described, matched and then completed with the feedback from the unstructured interviews. Subsequently, a

summary of the respondents' suggestions was made. Next, and on the basis of the weaknesses identified during our research, some recommendations were formulated.

## **6- Limitations of the research**

During the development of the online course, some difficulties were encountered in obtaining a technical help that subsumes pedagogy and design, as it was difficult to find multidisciplinary teams (including language pedagogues, software engineers, content providers, and instructional designers) as advocated by Colpaert (2006), which would have facilitated our work. We thus had to undertake a series of training courses in this field to be able to develop this course. Our attempt to design and develop an online course, without any technical assistance or expert aid in the field of design, will therefore bring about an online course that certainly includes some weaknesses. We hope we shall overcome these, and subsequently refine our course.

## **7- Structure of the research**

Our research is divided into four chapters since we put the 'research design and procedure' and 'results and discussion' as two sections (respectively 2.1, 2.2.) within the same chapter (i.e. chapter 2) to avoid having unbalanced chapters.

The first chapter consists of the literature review related to our research aimed at exploring the need for the design of an online course. This literature deals therefore with E-Learning/CALL (computer assisted language learning) in general, regarding its evolution, tools, use in pedagogy, in addition to the different learning theories and models from which most of its principles have been drawn. We may cite the three learning models that we have chosen i.e., Bloom's taxonomy (1956) for course design revised (Anderson and Krathwohl, 2001), Robert Gagne's "Nine Events of Instruction"

(1965), and the model of learning stages proposed by Chan, Lin, Lin and Kuo (1993) called, the OCTR Model (Orientation, Coaching, Tuning, Routinization). As the online course is to be built on the students' learning needs and objectives, principles from English for specific purposes, more precisely English for science and technology (ESP/EST), in addition to their subsumed authentic or authentic-like learning, which is evocative of task-based language teaching (TBLT) are to be examined. This leads us to consider as well related strategies, particularly those needed in a self-instructional mode of learning, like how to develop learners' autonomy (Nunan, 1997). Moreover, to be adequately guided during the development of the online course, relevant literature about design (Coterall, 2000, Lombardi, 2007) and evaluation criteria related to both the chosen learning environment and the course content (Cole and Foster, 2007, Hubbard's framework, 1996, 2011) is to be reviewed and used as a reference.

In the second chapter however, we shall present in section 2.1 the research methodology we adopted. We shall deal with the investigation procedure, the areas of investigation, the research tools used, namely questionnaires and unstructured interviews, in addition to the population concerned by the inquiry.

As for section 2.2 of this chapter (the second), it will be devoted to the description of results and their discussion. Answers from both questionnaires, the teachers' and the students', will be dealt with separately, in addition to the feedback from the unstructured interviews. The respondents' suggestions will be subsequently summed up and discussed. In the light of all those results, answers to our research questions will be highlighted. Some recommendations will then follow.

In the third chapter however, the rationale for the online course design will be dealt with. In this respect, the findings of the investigation concerning the teaching/learning situation, the students' learning needs as well as objectives, in addition to the knowledge built from the reviewed literature like the evaluation criteria, constitute a constant reference. The latter will be guiding the online course design, subsuming the development of appropriate learning materials along with activities, in addition to an adequate choice and use of technology.

Finally, in the fourth chapter and once the online course is designed and developed, the different units will be described in addition to the feedback from the implementation of some units (or lessons) on the university's platform, illustrated with corresponding screenshots allowed thanks to Moodle's tracking system. The course objectives will be highlighted in the various course activities which will be matched against the different evaluation criteria dealt with earlier.

## **CHAPTER 1 Technology Assisted Learning**

Before starting our review of literature, we may point out that some of its parts are more descriptive than critical. We may have indeed to resort to some explanations because many readers may not be familiar with some technical issues tackled in relation to the present research work.

### **1.1. CALL and E- Learning**

Computer Assisted Language Learning (CALL) may be defined as "the search for and study of applications of the computer in language teaching and learning" (Levy, 1997, p.1). Accordingly, CALL or what has become now known as e-learning (used here interchangeably), that is teaching/learning using sophisticated technological tools, began with a modest use of a basic computer. We now refer, in a broad sense, to the new technologies with different acronyms such as 'IT' (information and technology), 'ICT' (information and communication technology), or their use in teaching considered in 'ICTLT' (information and communication technology for language teaching). These different labels indeed correspond to the use of computers in the language learning field.

'CALL' or computer assisted language learning has become so widely spread in some countries since the 1960's that it is referred to indeed, with different names like 'TELL' (Technology-enhanced language learning), 'TALL' (Technology-assisted language learning), 'CELL' (Computer-enhanced language learning), 'CALI' (computer-assisted language instruction) 'CBLT' (Computer-based language training),

and 'NBLT' (Network-Based Language Teaching) which hints to some of its recent developments, where the web cannot be overlooked. 'E- Learning' may now be considered as an umbrella term for all those acronyms. CALL is however adopted by some researchers (Hubbard, 2009) as the generic term, putting forward that: "*CALL is the acronym for computer-assisted language learning... [and] will be used to refer to any endeavor involving the computer in some significant way in language teaching and learning*". (p.1)

Therefore, whenever teaching/learning involves the use of a computer we may think of CALL, whether a computer-tutor or a computer-tool (Levy, 1997). By CALL tutorial is meant language courseware (i.e., language learning programs), while an example of tool is what is known now as CMC i.e., computer-mediated communication (Colpaert, 2004). These two concepts of a computer as tutor or as tool may also be explained further by making a distinction between a computer having a teaching function (computer as tutor) providing language drills, skill practice or used as an incentive for interaction (Warschauer, 1996). It may also be used (computer as a tool) for writing, like using a word processor, and research (e.g. searching the web for authentic materials). Concerning these two views, of the computer as 'tutor' for material practice and interactive language learning delivery or the computer as tool whereby authentic language and communication opportunities are allowed and facilitated, we agree with Hubbard who considers them as converging rather than diverging. They may even be exploited for effective language learning: "*In fact, it is possible, even preferable, to recognize these not as opposing philosophies but as end*

*points along the same sort of language teaching continuum ... In other words, effective language learning can include elements of both” (Hubbard, 2009, p.1).*

Accordingly, we may distinguish between computer mediated learning, done exclusively via the computer (students working without the teacher’s presence), and hybrid or blended learning which is a blend of distance learning online (individual work) combined with face-to face tutorials (students work with the teacher’ presence). There are indeed many activities which can be extremely time-consuming to accomplish in class and which may be completed individually by students, like learning and revising vocabulary, intensive listening practice, and practice of grammar structures.

Concerning the different labels which refer to the use of computers in the teaching/learning process, there may sometimes be confusion between CALL, E-learning, Distance learning, and Open learning. It may be therefore useful to distinguish between these labels in order to explain our choice of interchangeably using the terms CALL and E-learning. In this context, individual learners choosing a place, a time, an order, and a pace to work by themselves is what Hewer (2001) refers to as distance learning which subsumes according to her, aspects of open learning in terms of degrees of openness, regarding place, time, pace as well as content of learning. The other elements encompassed within distance learning (Hewer, 2001) relate to resource-based learning insofar as learners, in developing their knowledge of the target language, are required to work with multiple media resources particularly, in reading and listening skills. Furthermore, distance learning specifically involves a

substantial element of self-study (Hewer, 2001), with the provision of tutors that may be contacted by learners connected to a centre from which they are at a distance.

According to the above distinctions made by Hewer (2001), distance language learners follow online courses or online language learning materials provided and organized by institutions for home study, like 'l'Université de la Formation Continue' (UFC), 'l'Office National d'Enseignement et de Formation à Distance' (ONEFD, formerly called 'CNED' which is specialized in distance learning, or the BBC website (UK). Here, it is useful to remind one that distance language learning existed much earlier than the advent of the Internet and was dispensed via letters, television and CDs. Online courses adopt a multiple-media approach, like learning packs encompassing textbooks, audiocassettes, videocassettes, or even TV and radio programmes as support materials. We may cite the BBC programmes which provide students with a learning environment involving both distance and face-to-face contact modes, which may be qualified as 'blended learning' or 'hybrid' learning.

E-learning (electronic learning) however, may be considered as learning materials on the internet, or online learning to mean distance learning on the Internet and to use CALL (Computer Assisted Language Learning) as a catch-all term for the use of computers in language learning and teaching (Hewer, 2001). E-learning is also defined (Yucel, 2006, p.1) as "*...a web-based educational system on platform with Internet, Intranet or computer access*". It may include then the use of web-based teaching materials and hypermedia in general, multimedia CD-ROMs or web sites, discussion boards, e-mail, blogs, text chat, computer aided assessment, simulations, games, learning management software, as well as a combination of different methods

which are likely to enhance the learning process. Recently, mobile eLearning has come into use but we shall not deal with it in this work.

In this research, I shall interchangeably use the terms 'E-Learning', 'CALL', 'Distance' and 'Open Learning' or simply online learning, to refer to teaching/learning using the computer, the web-based teaching materials and hypermedia in general, since boundaries between them are now blurred, and features of each may be present in our online course.

Here, it may be useful to consider what is exactly meant by 'multimedia', and 'hypermedia'. What was first referred to as multimedia consisted of books, audiocassettes, and videocassettes seen then as revolutionary. With the development of computer tools more labels have been subsumed under this term (multimedia). Originally referring to packages of learning materials consisting of books, audiocassettes and videocassettes, the term multimedia now indicates materials based on a computer that can display high-quality texts along with graphics, play pre-recorded audio as well as video material, and even create new ones, integrating listening, speaking, reading in addition to writing (Warschauer, 1996). The changes in meaning this term (multimedia) has known, has followed the subsequent developments in technology, and the way they have been used. With the advent of the Internet and the Web, the term 'hypermedia' came as a new label which became considered by some as a sub-set of multimedia since all these tools are now integrated (Warschauer, 1996). The term 'multimedia' will be used in this research work as a catch-all term.

Now that these different concepts have been introduced, and the distinctions between the various terms made, which will help us in using appropriate wording

throughout this research work, it will be easier to focus on the development and use of some CALL tools and applications in teaching/learning languages.

## **1.2. An Overview of developments in CALL**

In this section we shall consider the technological development of a range of computer tools as well as applications, and find out about their use in the teaching/learning process.

From programmed whole-class teaching to distance learning, encompassing a range of constantly developing technologies, CALL went through three phases (Warschauer, 1996) which reflect the development in EFL teaching. Those phases (behaviouristic, communicative, and integrative) correspond to the ways in which the computer has been used in language learning and teaching. This term (CALL) however has come to be favoured only in the 1980's since the older term was CALI (Computer Assisted Language Instruction) associated with programmed learning, i.e. a teacher-centred rather than a learner-centred approach. Thus, since the generalization of computer assisted instruction in the 1960's with the Programmed Logic for Automatic Teaching Operations system (PLATO), mainframe-based computer programs were developed by teachers on Apple II, IBM PC, and BBC computers. They consisted (Godwin-Jones, 2007) in drill, self-paced auto-correcting exercises and practice materials of discrete areas of language learning, following the movement of the language learning approaches' pendulum swing, dedicated then to the structuralist-behaviourist trend. These approaches gave way to audio lingual methods, practiced in traditional labs.

Then, with the shift of that pendulum swing towards the communicative language learning, supporting meaningful task-based interactions with the language, a new era has been inaugurated to let way to greatly interactive and communicative support for the practice of the four skills (listening, speaking, reading and writing), along with the considerable use of multimedia CD-ROMs. The computer pattern drills revealed, as a matter of fact, to be less compatible with human language, than with other areas of knowledge which are exact like mathematics (Godwin-Jones, 2007), for instance. This does not mean however abandoning totally such exercises which may still be useful mainly when matched with more open-ended, communicative tools and integrated into a multimedia-rich, language learning environment according to Godwin-Jones (2007). It is to be noted however that communicative ways in teaching have not come into use only with the advent of computers. In fact, the Council of Europe for Language References for instance had already adopted the communicative dimension before the arrival of microcomputers in different educational institutions (Davies, 2012). Here, it may be useful to mention the Common European Framework (CEFR) of Reference for Languages which developed six levels of Language proficiency that constitute a coherent framework of reference for the description of language learning and teaching at all levels. This has become to be considered as a basis for the international comparison of objectives and qualifications, to facilitate personal and vocational mobility in Europe.

With the introduction of laser discs however, dedicated computer labs for language learning came to substitute those traditional labs. During the 1980's and particularly in the 1990's, the computer became widely spread and some of its tools

like word processors very much in demand. Thus, they have been exploited for teaching writing skills, and some other applications have been developed for the PC. Such contributions have promoted certain learning activities (like assignments), which seems (Eib and Cox, 2003; Hubbard, 2009) to enhance learners' motivation and increase their involvement in such interactive learning. The mid-1990s however knew two major changes. One consists in an increase in commercial learning programs or what is called 'courseware' on CD-ROMs which have come to be integrated in home computers. This term 'courseware' designates software intended for use as support to formal language learning, and may refer either to complete software packages for independent study, or to software integrated in a language learning course (Hubbard, 2011). What we mean by the term 'courseware' in this work is any software designed for language learning purposes.

The other shift is related to the development of the internet, and the World Wide Web which is part of the former, allowing various skills to be integrated, which has become possible with the association of different information and communication technology tools (ICT). This phase (integrative) is considered however by some researchers, as describing developments in technology more than in pedagogy and methodology (Davies et al., 2008). Hence came the web and the use of CMC (Computer-Mediated Communication) one of the applications adopted in the 'social constructivist methodology' (Vygotsky, 1978). This approach considers knowledge as fundamentally social, and mostly results from the interpretation of personal experiences (Resnick, Levine and Teasley, 1991; Salomon, 1993). This is particularly

pertinent when groups of learners sharing the same interests, or subject of study collaborate on authentic tasks.

To define what is meant by task, we may cite Willis (1996) who states that a task is an activity which allows the learner to use the target language for a communicative purpose (goal) to realize an outcome. Here a task or activity, terms used interchangeably in this research work, is meant to have a communicative purpose. Accordingly, CALL typology has been tackled (Davies et al., 2000), and includes gap-filling exercises, multiple-choice exercises, free-format exercises, tutorial programs, exploratory programs, simulations, re-ordering, Cloze exercises, text manipulation, and writing - word-processing. Some of these activities, like multiple-choice exercises, cloze activities, gap-filling, text manipulation, are useful in that they allow students to work out various areas of language, like the use of tenses, appropriate comparison/contrast constructions, cohesive devices and so on, in addition to checking vocabulary comprehension. Such activities are therefore interesting to be integrated in a course. Constructivism is therefore a learning theory that promotes student-centered learning concepts. This approach opened the way to collaboration and communication via computers, and supported the idea of learning by doing, that is interacting, learning by carrying out authentic learning tasks (simulation), or collaborating with peers on projects. To better understand this approach, it may be useful to consider the following principles of constructivist learning put forward by Bruner (1996, p. 5):

- An individual learner must actively "build" knowledge and skills.
- Instruction must be concerned with the experiences and contexts that make the student willing and able to learn [readiness].
- Instruction must be structured so that it can be easily grasped by the student [spiral organisation].
- Instruction should be designed to facilitate extrapolation and/or fill in the gaps [going beyond the information given].

What may be retained therefore is that the constructivist approach to learning involves the learner's active participation in knowledge building, through interactive and structured (cyclic, spiral) instructional contexts, as well as experiences. The 'WebQuest', an inquiry-oriented activity which generally follows the procedural form of 'Introduction, Task Process, Evaluation, Conclusion' (Dodge, 1995), is an example of a constructivist approach to online learning. It is an activity whereby learners interact, partially or entirely, with internet-based information and may be supported with videoconferencing. Varying activities and providing learning materials for further practice is also recommended. A multitude of online materials are offered. Their creation and availability have been made possible thanks to many factors, among which the web.

Thus, the development of the Web (particularly of JavaScript, a computer programming language used to create animation or interactive effects) and digital multimedia has provided new options along with capabilities for the creation of language exercises. More than that, the Web has become the favourite platform for delivery of intelligent tutoring systems like LMS (Language Management Systems), and CMS (Course Management Systems), which provide a rich context for self-paced instruction, an opportunity for language teachers to become active participants in this process. Acknowledged educational technology standards, like SCORM (Shareable

Content Object Reference Model) provide new opportunities for the creation and distribution of on-line language learning resources. SCORM, the result of the Advanced Distributed Learning project initiated (in 1997 and released in 2000) by the United States Department of Defense and White House Office of Science and Technology Policy, is a wide framework for how to describe, use course material, provide learning assistance, in addition to tracking the progress of learners (Nishtar and Abdul Rahman, 2006). Thus, being in conformity with such standards and specifications while designing and delivering web content is required for the latter to be perceivable, operable, as well as usable by all users in spite of the growing, diverse devices (laptops, mobiles, etc.) used to access the web (Dale, 2009). Accordingly, online learning materials can be re-used, shared, and 'operable', i.e., may be run on any other learning environment systems (LMS). Lately, we heard of 'Web 2.0' technologies developed to increase functionalities, visual appearances, and ease of use. We may cite some Web 2.0 integrated technologies like synchronous JavaScript and video streaming, which contribute to varying online courses' activities in addition to boosting learning opportunities. With the emergence of such technologies, much information can be visualized on the web, multiplying therefore sources for e-learning. Potential blogs, media-sharing services and other social software, not designed specifically for e-learning, are being explored by educators to eventually exploit them for the creation of new learning opportunities (Suwannawut, 2008). On the grounds of such a supportive situation, developing online learning seems quite convenient.

We may therefore sum up the three stages of CALL, illustrating the development of ways in which the computer has been used in language learning and teaching (Warschauer, 1996) as follows:

**(i)- Behaviouristic:** In this phase the computer illustrates a tutor's role in releasing instructional materials to the learner.

**(ii)- Communicative:** In this phase the computer is used for skill practice, whereby students choose, control and interact with the material, but in a non-drill format. The computer is thus used for writing or critical thinking, and stimulating discussion through simulation programs. The computer is also used as a tool (word-processors, spellcheckers and grammar checkers), in addition to the use of concordancers.

**(iii)- Integrative:** During this phase two important innovations have been introduced: multimedia, and the Internet. Multimedia packages allowed the integration of reading, writing, speaking and listening skills in mixed activities, with the learner's control and choice in tackling the learning materials. Furthermore, building on multimedia technology, the Internet enabled asynchronous and synchronous communication between learners and teachers, opening the way to an array of new tasks like Web searches, and collaborative writing.

To illustrate the overview of developments in CALL and complete it with dates, hereinafter is a table (Nicholson: 2007, p.7) that recapitulates its main phases, from programmed learning to e-learning:

<b>Era</b>	<b>Focus</b>	<b>Educational characteristics</b>
1975-1985	Programming; Drill and practice; Computer-assisted learning – CAL.	Behaviourist approaches to learning and instruction; programming to build tools and solve problems; local user-computer interaction.
1983-1990	Computer-Based Training; Multimedia;	Use of older CAL models with interactive multimedia courseware; Passive learner models dominant; Constructivist influences begin to appear in educational software design and use.
1990-1995	Web-based Training	Internet-based content delivery; Active learner models developed; Constructivist perspectives common; Limited end-user interactions.
1995-2005	E-Learning	Internet-based flexible courseware delivery; increased interactivity; online multimedia courseware; Distributed constructivist and cognitivist models common; Remote user-user interactions.

**Table 1:** The changing focus of educational technology (Nicholson, 2007, p.7).

Being aware of those phases of CALL and adopting from each whatever features might reinforce learning may imply an eclectic approach, which is likely to be adopted since we hope through this work to contribute in improving the teaching/learning of English in the university USTHB.

Concerning the late developments in computer technology, we may point out the elaboration of various applications and tools which continued in the first decade of the 21<sup>st</sup> century, allowing CALL to be integrated into language learning activities both in and out of class. Knowing which tools are appropriate for one's different course items and objectives require a prior knowledge of various CALL tools along with applications. This will allow us to gain more insight in this area and make an appropriate choice of tools.

CALL implies obviously the use of a computer. However, the degree and ways of using it may not be commonly known. That is why we attempt to bring some clarifications concerning the different uses, or more precisely applications and computer tools. In doing so, the implication of their use in language learning/teaching shall be put forward. We may thus consider in one category of tool uses computer-mediated communication or 'CMC', according to Hubbard's order of presentation (2009) because it facilitates the understanding of the various applications and tools, as it follows:

**1.2.1. Computer-mediated communication (Via Texts):** Computer-mediated communication or 'CMC' is a computer tool use whereby a teacher uses a computer to communicate with learners. The latter can also communicate with one another, or even with native speakers. Here, it may be useful to consider certain elements (Hubbard, 2009) like 'the number and patterning of participants' such as one to one, or one to many, 'the medium' i.e., text, video, or voice, and 'timing'. Concerning this last element, it is important to distinguish between 'synchronous' (direct, real time) and

'asynchronous' (indirect, like e-mail use) communication. The latter is conveyed then through texts about which it is worth knowing more, particularly concerning their use in language learning, taking into consideration the 'timing' parameter. This is the concern of what follows.

**(i) - Asynchronous text:** This implies, as explained earlier, that the interaction is not in real time, in that even if an email is sent and received within a very short time, it may not be read or responded to until later. Obviously, this is not the case with communication through conversation (which is synchronous). But what is the implication of such asynchronous communication for the teaching /learning process?

To answer such a question, it may be useful to remind that the first use of CMC in language teaching came through email exchanges from teachers to students and between the students themselves. The latter may use email when collaborating on projects, or carrying out tasks, or even when discussing issues through an exchange of questions/answers. Learners may as well use email with what was traditionally known as penfriends or penpals (Hubbard, 2009), now called 'keypals' to follow the technological development terminology, and there are even sites to promote such correspondences like Interpals.

Teachers however may exploit email to make students complete tasks in pairs, receive homework, or find classes of other English language learners to communicate with, through discussion lists or listservs (Hubbard, 2009). In this case, the email is rather addressed to a group (one to many) on a list as one possibility, or maintained on the web to be read later by that list members as a second possibility. Such exchanges may be orientated towards specific subjects of interest to the group(s), which is planned and

structured communication. Possibilities like these are integrated in what is called 'web-based bulletin boards or discussion boards' like WebCT/Blackboard ([www.blackboard.com](http://www.blackboard.com)) or Dave's ESL Cafe ([www.eslcafe.com/student](http://www.eslcafe.com/student)) dedicated to ESL learners, which may as well be available for non-members (Hubbard, 2009). The content may be organized therefore in topics and subtopics and may even be exploited for online learning. Indeed, such email lists or discussion boards may be incorporated in course management systems 'CMS' or platforms like in the platform MOODLE ([www.moodle.org](http://www.moodle.org)). Obviously, the content should be related to the course's objectives.

**(ii) - Synchronous Text:** Here, communication is also in text form, but in real time. According to Hubbard (2009) some of the early research on CMC was based on a type of chat program, 'InterChange', that was part of 'the Daedalus Integrated Writing Environment system'. Using this tool, students could exchange synchronous discussions through texts, although they were in the same computer classroom. This seems, as shown by some studies, to enhance their communication more than when speaking face to face (Wraschauer, 2001), and they (students) tend to use a wider range of discourse functions than in face-to-face settings (Kern, 1995).

Chat rooms using IRC (internet relay chat) or other protocols can be accessed on the web through portals like AOL, and some are dedicated to English language learners like Dave's ESL Café (already mentioned). It is possible as well to integrate chat software in a language lab. Texts messages may be the mode of communication between groups of individuals in a virtual environment, through the use of MUDs

(multi-user domains) or MOOs (multi-user domains, object-oriented) which are virtual worlds, considered as ‘relatives’ of chat rooms (Hubbard, 2009).

**1.2.2. Computer-mediated communication (Via Audio/Video Tools):** With the development of a considerable range of computer tools, texts are no longer the only medium through which computer-mediated-communication occurs. Audio and video tools have also been exploited as effective means of communication as it will be shown in the following parts:

**(i) - Asynchronous audio:** As it is carried out through texts, either asynchronously or synchronously, communication also takes place though audio or video means in the same two ways.

It is also possible to send audio messages in .wav or in another format like mp3s as attachments to emails. Some more elaborate versions of asynchronous messaging with specific applications for language learning have been developed as well, to add voice messages to email and also to add sound to a website.

**(ii) - Asynchronous video:** Here, the video message is shared rather than exchanged (like [www.youtube](http://www.youtube)). There are some services however which allow the setting up of groups for teaching purposes. Visual representations allow the viewing of facial expression, which facilitates comprehension and pronunciation development (Hubbard, 2009).

**(iii) - Synchronous audio/video:** Using the telephone or an internet telephony allows one to one conversation in synchronous audio like ‘Skype’. Such uses have become popular in education circles (Hubbard, 2009) and allow for group interaction.

Recent developments in technology have given a further impetus for CMC (computer mediated communication) with the creation of virtual 3D environments where a student has an 'avatar', a movable image that represents him/her in a cyberspace and interacts with other avatars.

### **1.2.3. Computer- mediated communication and virtual learning environment systems:**

In the light of this review of developments in CALL, we may deduce that developments in technology brought about a mode of communication which corresponds to face to face communication. It is synchronous CMC that occurs, as explained earlier, in real time. This implies, for the teaching/learning process, that accuracy is unlikely to occur in the learner's language production. We may decide then to rather opt for asynchronous CMC which requires more thought and planning (Hubbard, 2009), therefore more attention to language forms. In all cases, either synchronous or asynchronous, computer mediated communication (CMC) seems to present more advantages (Hubbard, 2009) than tutorial CALL (CALL courseware, or learning software packages). In CMC indeed, resources are readily available and the language content is not prewritten. It is rather created by the activities themselves (email, discussion boards, internet browsing to search documents), which provides more opportunities for interaction.

Accordingly, we may say that whether opting for tutorial CALL or synchronous/asynchronous CMC, the language learning objectives of the course are always to be targeted, and clearly specified. Here, it may be useful to consider this computer-mediated communication (CMC) and examine its contexts of use, or Virtual

Learning Environment (VLE) systems like Course management System (CMS), Learning Management System (LMS), Learning Support System (LSS), and Managed Learning Environment (MLE). Knowing about what those acronyms stand for is presented hereinafter.

A VLE is a Web-based package designed to help teachers create online courses with facilities for communication between the teacher and the learner as well as between the learners themselves, as stated in the following definition (Goba, Agasi, Saul, and Cook, 2004, p.1):

A Virtual Learning Environment (VLE) is an IT application designed to facilitate pedagogical communication amongst those participating in an educational process, whether it be distance learning, classroom-based or any combination of the two. The purpose of a VLE is to distribute educational material in digital format and to provide access to online debates and discussions on aspects of the course study program, to introduce relevant content from the Web or to enable external experts or professionals to participate in debates or talks.

VLEs are therefore characterized by an ease of delivery and management of learning materials, and are also used to refer to labels such as Course Management System (CMS), Learning Management System (LMS), Learning Support System (LSS), and Managed Learning Environment (MLE). These systems like the LMS are designed to manage courses as defined by Nishtar and Abdul Rahman (2006, p.234): *“An LMS is a software application that automates the administration, tracking, and reporting of classroom and online training events, enabling detailed analysis of the effectiveness of your training investment”*.

In completion to the above definition, a clear distinction is made between a CMS, and a LCMS. The former is designed to simplify the creation and administration

of learning content, allowing the latter to be stored, edited, updated, and then delivered in diverse ways. The latter (LCMS) however, mostly web-based, is dedicated to authoring, approving, publishing, and managing learning (Nichani, 2001).

The VLE Moodle for instance, is an open free source that may be loaded freely and modified. Some Algerian institutions already use it, like ONFED, in addition to universities like that of Blida, Bejaia, Laghouat, Telemcen, and also the university USTHB. This is likely to facilitate one's practice and use of this VLE and build on other users' experiences. So, what is exactly MOODLE?

Moodle is an online learning platform. It includes a system of content management, a course management system and communicative functions to create an online learning environment. It is an application which creates communication through networks' interactions between teachers, learners and pedagogical resources. Moodle seems to be popular among language teachers, as stated in the following quotation (Berggren et al., 2005, p.2):

Although Moodle can be used for many kinds of educational applications, it is based on socio-constructivist principles (Dougiamas, 1998; Dougiamas 2000) and most suited for an educational approach involving interaction amongst people rather than transmission of content. Furthermore, the PHP scripting and modularity of Moodle even allows teachers to supervise the creation of new activity tools in the LMS - the emergence of the teacher-developer.

It is therefore based on the socio-constructivist approach which favours building knowledge while 'doing', since it encourages the learner to participate in constructing his/her own learning experience. The PHP scripting and modularity of MOODLE allow teachers to choose, or add tools that fit the learning purposes of their students,

which may have useful pedagogical implications. What is implied from this review for teaching/learning is that a lot of opportunities are now available. Thus, tutorial CALL material may either be presented online for independent study without the teacher's presence, or under her tutoring, in a synchronous or asynchronous way in CALL, like 'TESOL' online workshops. Moreover, with the development of virtual learning environments or VLEs, the delivery and management of learning materials have been tremendously enhanced like with Moodle.

In concluding this overview on the developments in CALL, we realize that the importance of involving computers or ICT in general in the teaching/learning field seems to be well established. But is focus on technology sufficient to build a successful computer technology- based course? This is what we shall tackle in what follows in terms of the integration of some technology tools in certain language curricula, and the features that distinguish online course design from face-to-face course design. Then, we shall consider some learning theories as well as approaches, with a focus on their adaptation for online learning models, before presenting a framework (Hubbard's, 1996, 2011) which builds on other learning models, and seems to be more exhaustive. These models may be helpful guidelines while designing our interactive course.

### **1.3. Relating technology to pedagogy**

Indeed, the advent of various technological tools is not sufficient to produce appropriate courses if not backed with an adequate pedagogy. Ways should be found to relate technology to pedagogy. In connection with this statement, a certain number

of researchers in the field of CALL suggested that multidisciplinary teams work together, like Colpaert (2006, p.480) who states:

Attempts to bridge this gap have been rather unsuccessful. Basically, there are two ways to try to solve this problem. The first is to work with multidisciplinary teams (including language pedagogues, teachers, software engineers, content providers, artistic designers, and instructional designers). A second way is to work with language teachers who have learned how to write programs and with software developers who have been shown the ropes in language pedagogy. Both approaches have not been instrumental in major breakthroughs in CALL system development thus far.

According to Colpaert, the collaboration of multidisciplinary teams is likely to yield dedicated CALL. He also emphasizes the important role of teachers as contributors in this field. This emphasis on the role of teachers may be explained by their dedication to pedagogy and practice, which software engineers for instance may lack. But, can teachers choose appropriate tools for the different teaching practices? Do they know how to integrate those tools effectively in their teaching? They certainly need a thorough and pertinent, related training, in addition to being informed of the available tools and applications. Regarding the latter, some researchers (Davies et al., 2012) pointed out that CALL software applications are established according to their authors' beliefs about ways of language learning. They are designed for explicit or implied language learning objectives, providing either discrete or mixed skill activities, and may be content-specific (teachers cannot change the linguistic content or the format of the activities), or content-free (teachers can supply the content to the software, to be used as data for the pre-programmed activities).

The concern of any teacher is indeed to choose the most appropriate and practical applications of CALL that may be exploited in the teaching of different language skills (listening, reading, writing, and speaking) as well as language areas, such as grammar, vocabulary, and pronunciation.

To gain further insight, we examined a description of the internet-based technologies (IBT) which includes some of the tools and applications presented earlier in our section ‘CALL tools and applications’. This description classifies IBT classrooms into three categories: (A) those integrating CMC tools, therefore providing peer-supported learning environments; (B) those integrating LMS, thus control is mainly given to the teacher, supplemented with peer-supported and/or self-controlled assignment; and (C) those integrating CALL programs, hence endowing learners with self-paced learning environments. This description is worth considering indeed, because it constitutes a useful framework (Liu, and Chen, 2007), in that it may help in specifying one’s choice of tools as shown below:

- Category A: Programs integrating CMC tools. These tools which may be asynchronous (e.g., email, forum, etc.) or synchronous (e.g., chat, conferencing, etc.) do not contain learning content but allow learners in language curricula to be involved in written and/or spoken communications with one or more peers.
- Category B: Programs integrating LMS. Here LMS, (like Blackboard, or WebCT) refers to virtual classrooms with assessment tools as well as resources for students’ use. Those programs integrate an online space, for learning materials and for students’ collaborative work, in addition to two-way synchronous and asynchronous CMC tools for the instructor and the students.

- Category C: Programs integrating CALL. These CALL programs which stand for online language-learning lessons (like BBC Learning English, IBT language-learning websites, testing systems and games) allow learners to complete learning tasks alone.

Accordingly, we may say that this description is worth examining in order to think of the various available CALL applications and tools, before determining which to adopt. Choice may consequently be made on an objective basis, after analysis of the course's rationale based on the learners' needs, and on the affordances of the available technology. For a better illustration, the forthcoming table (Liu and Chen, 2007, p. 936) may be helpful as it sums up the different tools and applications as follows:

	<b>A</b>	<b>B</b>	<b>C</b>
Category	Integrating the CMC tool (chat, conferencing, MSN Messenger, Skype, forum, email, etc.)	Integrating the LMS (Open-source learning platforms, Blackboard.com, WebCT.com, etc)	Integrating the CALL program (BBC Learning English, language learning websites)
Locus of control	Mostly peer-supported; tools only	Teacher-led, peer-supported, and self-controlled; tool-enhanced content	Mostly self-controlled; tool-enhanced content
Instructional mode	Drill-and-practice; one-to-one and one-to-group, collaboration	Lecturing; one-to-one and one-to-group, collaboration; Drill-and-practice	Tutorials, testing, simulations, games, etc.

**Table 2:** The three types of integrating IBT into language curricula

(adapted from Liu and Chen, 2007).

The table above represents one possible dimension of IBT use as Liu and Chen (2007) stated, adding that Internet uses in the educational setting are manifold, in regard to

activities related to communication as well as collaboration, research, real-time data collection, and web publishing.

The Web indeed encompasses a large number of sites which offer huge amounts of current written, audio/ video dedicated and authentic materials, language references, as well as CALL tool applications, allowing web-based activities such as publicizing research findings. The web is also liable to promote language learning through ‘meaning technologies’ as well (Hubbard, 2000) such as transcripts, dictionaries, and translators, favoring material comprehension.

Likewise, building comprehension skills, increasing background and subject-related knowledge as well as training in writing skills, may be enhanced. This does not however occult the disadvantages the Web use sometimes entails. In agreement with this statement, Hubbard (2009) hinted to the long time required sometimes when loading or viewing certain web pages. Such delays, worsened when servers are busy, may compromise these materials’ relevance for supporting language learning. Moreover, this will demotivate learners and lower interactivity. Also, it is sometimes difficult to locate the desired material among the huge amounts available, but whose sources are sometimes of a questionable accuracy.

Now that we have had an overall knowledge about technology and considered some of its implications for pedagogy, we shall examine the features that distinguish online course design from traditional, face-to-face course design in order to gain further insight into this subject. So, what distinguishes online course design (instructional design) from traditional (face-to-face) course design?

When we hear of an online or CALL course and what one may describe as ‘traditional’ course, we may think of completely different designs. This is true to some extent; yet they still share some basic points. For instance, any learning resource which does not have a clear rationale within the scheme of work and which is not integrated with other resources is not liable to yield learning opportunities (Walker et al., 2008). This is relevant to computer-based materials which do not therefore differ from more traditional materials in this respect. Communication seems however to be the most important factor in online courses, knowing that there are different types of communication. Consistent with this statement, we may cite (Center for Online Learning, 2008) explicit communication (like instructions to guide students through the learning process), static communication (a welcome page, a well-planned course schedule), and dynamic communication (planned, guided exchanges between the instructor and learners via email, discussion areas). To maintain a dynamic communication in online instruction is therefore a necessity, in the absence of a face-to-face contact. Moreover, it should be planned and structured to avoid any eventual ambiguity and to guide the learner throughout the online course. Communication is embodied in the layout of the web page (static communication) which must be well designed, and in the email, chat, forum discussions (dynamic communication) as well.

Now that some of the distinctive features between the two modes of instruction delivery (traditional and online) have been pointed out, it may be useful to remind one that online learning models have not been created exclusively for this sake; they are grounded in ‘traditional’ approaches and theories related to language learning/teaching, as well as to course design. Those approaches’ and theories’

principles have been exploited for online instruction design, as it will be shown in the following three learning models.

#### **I.4. Pedagogical applications of some learning theories on learning models**

In this section, we shall discuss some learning approaches and theories which have been translated into learning models and principles that enhanced online learning design, which may subsequently be exploited for an e-course rationale. Moreover, gaining knowledge from this review is likely to help one assess the validity and coverage of an e-course design.

##### **1.4.1. Learning theories**

To begin with, we would like to highlight the fact that the basic approaches to most learning theories and models are the traditional approaches i.e., behaviourism and cognitivism, followed by constructivism consolidated later by its social dimension, to lead to social constructivism. CALL premises can indeed be dated back to the nineteen sixties, when individualized learning using computers was already thought of. Suppes (1966), whose research focused on how to generate ‘better’ learning and become a ‘better’ teacher with computers, stated that (Nicholson, 2007, p.3):

... in the future it would be possible for all students to have access to the service of a personal tutor in the same way that ancient royals were once served by individual tutors, but that this time the tutors would be in the form of a computer.”

Nicholson cited Suppes in relation to Bloom's research (1984) which advocates that one-to-one tutoring improved student achievement over group instruction (Nicholson, 2007). Thus, the use of computers in education for individualized instruction was already an envisaged possibility, which developed in parallel with research on individualized teaching/learning using a computer. To focus however on aspects that are likely to help us gain more insight and may guide us in our course development, we summed up in tables below some theories, their advocates, in addition to their pedagogical applications and implications. Concerning the latter, we shall deal with aspects that serve online instruction design, since our interest is related to online learning design. We used a table adapted from Boettcher (1998), which we divided into two parts in order to preserve the coherence of our sections. They have been named respectively, 'Learning theories and their Pedagogical implications', and 'Learning theories and their applications to Instructional Design'. The former is the following:

Learning Theories			
Behaviorism		Cognitivism	Constructivism
Proponents	B.F. Skinner	J. Bruner	J. Dewey Knowles L. Vygotsky
Applications	Training	any deep processing: exploring, organizing, synthesizing content.	Collaborative learning
Instructional design focus	Instructor designs the learning environment.	Instructor manages problem solving and structured search activities, especially with group learning strategies.	Instructor mentors peer interaction and continuity of building on known concepts
View of learner	Basically passive, just responding to stimuli.	Learners process, store, and retrieve information for use. (Bruner's Discovery Learning).	Learners create their own unique education because learning is based on prior knowledge
Assets	Integrating complex muscular and cognitive activities.	Vygotsky's Zone of Proximal Development focuses on interactive problem solving.	Learning is interactive, dialogic.
Implications	<b>Climate for Learning:</b> Does the environment have the right stimuli to promote learning?	<b>Readiness:</b> Students will learn concepts that are maturing.  <b>Opportunity:</b> ZPD = area between what a learner can do individually vs. assist by peer interaction, research and teaching.  <b>Learners Customize Their Learning:</b> Provide a range of learning activities and concepts for core course objectives.	<b>Prior Knowledge:</b> Design learning to assist students to build on what they know.  <b>Inquiry Learning:</b> Adult learners have a mutual vested interest in their learning and want to involve real experience; teachers are not the sole possessors of knowledge and perspective but co-learners and guides. (Knowles' andragogy)

**Table 3:** Learning theories and their pedagogical applications/ implications (adapted from Boettcher, 1998).

To briefly describe the above table, we may say that representative proponents of the three major theoretical fields are first presented, some general applications are then provided, concerning the process of learning, the instructors' along with the learners' roles within that process, the latter's areas of emphasis, and finally some of those theories' applications/implications for pedagogy. These points are introductory, and are developed all along this section. As a general remark, we may note 'training' for behaviourists until the achievement of the correct behavior, as in drill and practice activities. For cognitivists, focus is rather on understanding the process of learning in order to organize it and sequence it. As for the advocates of constructivism, priority is for learners' centeredness, in allowing them to construct learning. With the addition of the social dimension (social constructivism), learners are encouraged to share their learning experiences with peers, with others, in order to expand their learning. More knowledge is constructed while interacting with others, and with learning resources; hence the example of collaborative learning.

Here, we may recall that for behaviourism cause and effect condition behaviour (Skinner, 1957). Measurable and observable data prevail over ideas, inner mental experiences and emotions. In the educational field, learning is considered as a behaviour that displays knowledge. It is a process of stimulus-response and to be promoted, there must be incentives or stimuli. Now, in the area of learning environments, the criterion is to know whether the latter encompass the right stimuli that would improve learning. Accordingly, we may say that the availability of various communicative functions in an online learning environment like the platform MOODLE for instance, creates communication through networks' interactions

between teachers, learners and pedagogical resources as explained earlier in this work, which may constitute stimuli for learning. Thus, principles from learning theories help in determining the choice of appropriate technological tools and applications.

Regarding this, Saettler (1990) reported the impact of behaviorism on some areas in Educational Technology. The latter refers to the study that facilitates learning and enhances performance through the creation, use and management of relevant technological processes and resources (Richey, 2008). Among the identified areas that have been influenced by behaviorism, computer-assisted learning and the behavioral objectives movement have been cited. According to that movement, learning objectives are set in "*specified, quantifiable, terminal behaviors*" (Saettler, p. 288, 1990). As an illustration, we may cite Mergel's example of a behavioral objective (1998, p. 11) stated as: "*After having completed the unit the student will be able to answer correctly 90% of the questions on the posttest*", indicating that the 'audience' refers to the student, the 'behavior' to the act of answering correctly, the 'condition' that of precising "*after having completed the unit, on a posttest*", and the 'degree' 90% correct. In this context, research reports that evaluation in both behaviorism and cognitivism shares the requirement of answering specific objectives (Mergel, 1998). This may be illustrated in the following table adapted from Boettcher (1998).

Presentation vs. Participation	Designing Instruction
<p><b>Moore:</b> Inducing knowledge results from student participation sparked by the right questions. Instructors mentor students, consult on content, motivate, help students integrate and contextualize learning, and run classes through participatory management principles.</p>	<p><b>Robert Gagne</b> originated systematic instructional design, analyzing learners and course goals to make objectives, sequence instructional experiences, set the medium of instruction, and assess student performance and the course.</p>
<ul style="list-style-type: none"> <li>• Behavioral objectives are the basis of performance assessment--for the students and for the course.</li> <li>• Learning activities engage the learner by providing chances for interaction with information sources (instructor, other experts, peers).</li> <li>• 9 Events of Instruction (Gagne): Each portion of instruction should engage learners, make them aware of objectives, trigger relevant prior knowledge, put students with material to be learned, guide students as needed, get students to use their learning and give feedback before assessing performance, and then help students to retain and transfer concepts.</li> <li>• Actually, cognitive and affective learning interact complexly in modern course goals and objectives.</li> <li>• Learning may involve "just-in-time" database access in addition to sequenced study.</li> <li>• Applying instructional technology requires applying up-to-date findings in communications, computer science, and learning theory.</li> <li>• Applying instructional technology also requires faculty to balance the interaction of students with content, instructor, and peers, along with selecting appropriate learning and assessment strategies specific to particular technologies.</li> </ul>	

**Table 4:** Learning theories and their applications to Instructional Design (adapted from Boettcher, 1998).

The table above sums up some principles from behaviorism and cognitivism, after presenting two of the latter's advocates, respectively, Moore and Gagné, in addition to their related views about learning. The first, with the view that focuses on the outcome, or learning, which occurs when triggered with the right stimulus or question.

The instructor's role is mentoring content and learners, who are passive (responding when stimulated). In addition to that role, instructors manage classes towards objectives (behavioral objectives) which are based on performance on tests, as exemplified earlier in this section.

In the second (cognitivism) however, the students have an active role in the learning process since they are involved in various interactions with instructors and with peers. They are encouraged to reflect on their learning and connect it to prior knowledge. Learners and course goals are analysed and the feedback is used to adjust and sequence learning, in addition to setting objectives. Performance of both the learner and the course are evaluated. Accordingly, both behaviourism and cognitivism are concerned with specifying objectives but for different reasons, as explained above. This leads us to cite Bloom's taxonomy (1956) which provides us with a formula for thinking about instructional design, i.e., objectives, class activities, and types of assessment. Concretely, using Bloom's Taxonomy (to be elaborated on later in this work) to design our courses implies that students should be informed of what they will study and how they will be evaluated; while instructors are guided in assessment as well as in teaching strategies, in addition to knowing whether the latter worked (Center for Online Learning, 2008).

Hence, with the cognitive theory, unlike the behaviourist, focus is on the process of learning and how it occurs in the learner's mind. Cognitive processes like recognizing expectancies, encoding and parsing information, in addition to monitoring performance are analysed. Activities like problem-solving are enhanced, and connecting prior knowledge to current learning encouraged. Learners are enhanced to

use external learning sources like 'just-in-time' databases, in addition to their sequenced instruction which is enriched with findings from computer science, communications and learning theories. Networked interactions of the learner with learning content, instructor, peers, are managed, and assessment strategies specific to the available technological tools adopted. Analogies are made with the way a computer processes information, stores and retrieves it, as translated in the information processing model (Atkinson, & Shiffrin, 1968). Information principles are, in fact, typical of online instruction where small chunks of instruction are presented each time on web pages to facilitate reading and retention, in regard to the limits of short-term memory. Some researchers however disapprove this principle of breaking down subject materials into small parts, thinking it would rather turn learners away from grasping the "whole" (Saettler, 1990).

To carry on with the pedagogical applications/implications of some learning theories on learning models, we may point out Vygotsky's (1978) social constructivism (presented earlier in relation to computer-mediated communication). The latter highlights the interaction between the learner and the social environment, which leads to learning. According to Vygotsky (1978), higher mental processes in the individual have their origin in social processes. Thus, social interaction is important for the development of cognition, and the social environment models the behaviour. Vygotsky's concept of "zone of proximal development" (ZPD) represents the level of development achieved when a child takes part in social behavior. Thus, ZPD stands for the gap between what he/she (a learner) could do alone and what could be done with the help of a more experienced person (a teacher). What is developed while learning in

collaboration with peers and a tutor's guidance far exceeds what can be achieved individually; therefore ZPD full development is determined by full social interaction. The learner's cognitive processes (like attention, retention) and personal factors (like motivation) interact with environmental events to yield learning which should be tested to measure his/her understanding.

Other aspects related to this theory (constructivism) have been tackled in research. We may cite dialogic learning (Mello, 2012) which implies 'knowing through dialogue', meaning that understanding is achieved through argumentation (Habermas, 1987). Also, current research has shown that actions like explaining, reasoning, and asking questions, which are language based, constitute "...*instruments for encouraging thinking, the development of knowledge and metacognition...*" (Plaza, 2010, pp. 61-70). Still in relation to constructivism, recent research reported learning in communities of practice (Wenger, 1998). This is the concept of 'cognitive apprenticeship' which has been put forward (Collins, Brown & Newman, 1989; Lave & Wenger, 1991) to refer to learning as a process of participation in communities of practice. Moreover, this learning occurs in interaction through cognitive apprenticeship in real contexts, in authentic learning tasks, like groups of science students sharing knowledge and problem-solving (which is the case in our university). Learners are therefore encouraged to take part in the construction of knowledge. They are asked for instance to search the web for more knowledge, to enrich a definition or to contribute to a glossary building. This is known as Dialogical Knowledge Construction (DKC) which "... *facilitates teacher/student and student/student interaction allowing the exemplification of concepts, negotiation of meaning, and*

*sharing of content*” (Brunk et al., 2007, p.1). Learning is also interactive in that, the learner is not passive but rather takes part actively in the learning process.

Consistent with this, we may cite a definition which describes interaction as: *“Structured opportunities for the learner to engage with the content by responding to a question or taking an action to solve a problem”* (Clark and Mayer, 2003, p. 315).

This seems to be a general definition compared to another (in Roblyer and Ekhaml, 2000, based on Gilbert and Moore, 1998) which considers interactivity in computer-mediated instruction as being a mutual exchange between the technology and the learner, knowing that the terms interaction and interactivity are used interchangeably. This is not the case of Wagner (1994, 1997) who distinguishes between them, underlining people’s behaviours as the centre of attention of interaction, while characteristics of the technology systems constitute the focus of interactivity (in Roblyer and Ekhaml, 2000). As far as we are concerned, we shall use those two terms interchangeably in so far as they embody this common interchange between the learner and the technology. It goes without saying that a well-structured course, with appropriate activities, involving the use of varied technological tools and applications, is likely to generate interaction or interactivity. Using a checklist to evaluate a course’s interactive level may be useful in order to remedy any eventual deficiencies.

To this end, we have chosen to cite a rubric (see appendix A3) which includes four elements that promote a course’s interactive level. The grid is exhaustive and one may not meet all of its criteria; however, these should be cared for, if an online course is to be built appropriately. After reviewing all elements in the grid and circling the appropriate level, the points are added up to find out the course’s level of interactive

qualities as being for instance low, moderate, or high (Roblyer and Ekhaml, 2000, pp. 2-3) as follows:

Low interactive qualities     1 - 7 points.

Moderate interactive qualities 8 -14 points.

High interactive qualities     15-20 points.

In the light of this table, we shall try to analyze the four variables put forward by Roblyer and Ekhaml (2000), which are (1) Social Goals of Interaction, (2) Instructional Goals of Interaction, (3) Types and Uses of Technologies, and (4) Impact of Interactivity-Changes in Learner Behaviors.

As far as variable 1 (Social Goals of Interaction) is concerned, we may deduce that the more the activities are oriented towards increasing social rapport like the exchange of personal information, pair work and collaboration, the higher the degree of interactive qualities. This meets the principle of social constructivism which asserts that the learner's cognitive processes as well as personal factors interact with environmental events like social factors and lead to learning. In other words, ZPD full development is determined by full social interaction.

As for variable 2 (Instructional Goals of Interaction), the level of interactive qualities increases with the multiplication of not only collaboration on carrying out course activities, through pair or group work, but also sharing findings between peers and working with outside experts as well. This again brings to our mind the assertion of constructivism that adult learners are particularly interested in their learning, willing to involve real experience. They do not consider teachers as the only source of

knowledge but as co-learners and guides. Therefore, they look for other sources of knowledge like external experts, and 'just-in-time' databases.

Variable 3 (Types and Uses of Technologies) however focuses on the technological tools involved in the course activities, as well as the way they are used. The level of interactive qualities rises exponentially with the integration, along with two-way asynchronous exchanges of text information, of synchronous exchanges of written information, through chatrooms as well as synchronous voice. This is in addition to visual communications between instructor and students, as well as among students through videoconferencing for instance. This is why it is important to choose a virtual learning environment (VLE) which encompasses the appropriate tools and applications that contribute to the promotion of interaction.

Concerning variable 4 (Impact of Interactivity-Changes in Learner Behaviors), it is based on the student's willingness to use the work with other students, exchange information, in addition to sharing findings with peers available technological tools in order to initiate interaction with the instructor, , other and more than when required. The more the student has recourse to the varied available technological means to initiate interaction, the higher the level of interactive qualities.

Having examined some of that rubric's elements described as assessing a course's interactive level (Roblyer and Ekhaml, 2000), we may state that we have no corroborative evidence for the validity of those evaluation factors. We take therefore this rubric with caution, but its elements may be taken into consideration while designing our online course, in case it is assessed.

Consistent with this issue of interactivity, important in online courses, it is useful to remind one that interactive theories, either the communicative or the task-based ones, imply exposure to and use of authentic language (Willis, 1996) based on meaningful tasks (Prabhu, 1987). According to Ellis (2003), meaningful tasks are exercised through not a mere display of knowledge, but through real world-like activities. These should involve multiple skills as well as cognitive processes (selection, classification, evaluation, problem solving), and imply meaningful production.

In task-based learning (TBL), tasks are the core of learning and concentrating on them brings about learning. Willis (1996) describes a three stage process i.e. 'Pre-task - Introduction to the topic and task', 'Task cycle - Task planning and report', and 'Language focus - Analysis and practice'.

In the pre-task phase, the teacher stimulates the learners' knowledge without providing detailed instruction. The bulk of students' work consists in tackling the task. It is only when they have achieved it that they are engaged in language instruction, examining the language used in the process of task completion, and making the necessary corrections. This is the TBL process whereby output is likely to enhance intake according to Willis (2011). It is to be remarked however, that the fact that language instruction is 'relegated' to the end of the lesson seems to provoke some teachers' apprehension that this would lead to 'deeper fossilization of incorrect language' (ELTNews.com, 2011). With regard to this issue, focus on negotiation of meaning only seems to weaken the learners' knowledge of grammar instruction, as they are likely to "bypass syntax" (Skehan, 1992). This is reported in research to

occur, among other situations, when learning is exclusively task-based. Consistent with this view, Skehan (1992, p. 196) explains that, involving learners:

...in task-based learning may well, if not balanced by other activities, lead to the use of comprehension and communication strategies, and encourage a performance-oriented approach to learning, with the result that fluency and synthesis are developed at the expense of accuracy and restructuring.

Despite this dilemma of opting for ‘fluency and synthesis’ or ‘accuracy and restructuring’, TBLT is widely adopted as it is based on meaningful tasks, likely to better anchor learning. Indeed, task-based teaching has recently transcended the traditional, classroom-based setting (Whyte, 2015) to technology-mediated contexts (Doughty and Long, 2003; Thomas and Reinders, 2010; Van den Branden et al., 2007). In the light of the diverging views related to task-based language teaching in relation to the core principles of TBLT, Swan (2005, pp. 3-4) summed up the characteristics that constitute points of agreement between most advocates of task-based language teaching. Some of those characteristics that seem to fit our research purposes are the following:

Instruction should support learner-centeredness rather than teacher-centeredness. Because totally naturalistic learning does not normally give rise to target-like accuracy, engagement is essential to promote the internalization of formal linguistic elements while keeping the perceived benefits of a natural approach. This can be realized best by offering opportunities for focus on the form, which will attract students’ attention to linguistic components as they emerge incidentally in lessons whose main focus is on meaning or communication. Communicative tasks are especially suitable devices for such an approach.

Such a compromise may be adopted in an online course, by adapting TBLT and including some aspects from other approaches where language instruction is cared for. This is likely to convey a meaningful content, particularly if based on the students' target objectives and related to their subject of study.

What may be retained accordingly is the existence of common grounds for the different theories described so far. For instance, breaking tasks into small chunks is required for both the behaviourists and cognitivists. However, for the former it is important to break the learning process into small steps because the aim is to find the most efficient method of shaping a learner's behavior, by controlling and guiding her learning through the right stimuli (information and tests) towards realizing acceptable outcomes (performing on tests). As for the latter (cognitivists), tasks are analyzed then broken into smaller ones to obtain information that would be exploited to build instruction based on prior knowledge, and developed from simple to complex (Mergel, 1998). Stimulating recall of prior knowledge is also claimed by constructivists who also advocate (as cognitivists) the view of information processing (like a computer) that takes place when adults are provided with various stimuli which they use to expand their knowledge. This is a way of organizing educational content that has been adapted for online pedagogy (Center for Online Learning, 2008; Gagné, 2009).

Conclusions from the learning theories dealt with so far, will contribute to developing templates for instructional design which will inform our section of the e- course rationale, if retained as a solution. All may not be applied in a single learning/teaching situation. What is needed is the type of instructional strategies that best suites our course's objectives. Indeed, adopting whatever application relevant to one's course

objectives based on the students' learning needs, is more likely to yield effective learning.

To have a deeper insight however, and make exhaustive conclusions for our e-course design, it would be more appropriate to consider the models into which those learning theories presented so far have been translated.

### **1.4.2. Learning models**

The learning models to be described in this section therefore, were originally intended for face-to-face instruction, but have been adapted for the online environment, taking into consideration for instance the computer interface (like breaking instructional material in chunks). The three learning models we have opted for seem to be representative since they are usually referred to as a basis for online course development. Knowing about them will help in better understanding how online instruction is organized and presented. So, what are these representative learning models? The three learning models we have chosen are: Bloom's taxonomy (1956) for course design revised (2001) by Anderson and Krathwohl, Robert Gagne's "Nine Events of Instruction" (1965), and the model of learning stages proposed by Chan, Lin, Lin and Kuo (1993) called, the OCTR Model (Orientation, Coaching, Tuning, Routinization).

#### **1.4.2.1 Bloom's taxonomy revised**

Bloom's taxonomy known as, knowledge, comprehension, application, analysis, synthesis and evaluation, constitutes a method of classifying educational objectives, and learning processes, as illustrated below (Huitt, 2011, pp.1-2):

<b>LEVEL</b>	<b>DEFINITION</b>	<b>SAMPLE VERBS</b>	<b>SAMPLE BEHAVIORS</b>
<b>KNOWLEDGE</b>	Student recalls or recognizes information, ideas, and principles in the approximate form in which they were learned.	Write List Label Name State Define	The student will define the 6 levels of Bloom's taxonomy of the cognitive domain.
<b>COMPREHENSION</b>	Student translates, comprehends, or interprets information based on prior learning.	Explain Summarize Paraphrase Describe Illustrate	The student will explain the purpose of Bloom's taxonomy of the cognitive domain.
<b>APPLICATION</b>	Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction.	Use Compute Solve Demonstrate Apply Construct	The student will write an instructional objective for each level of Bloom's taxonomy.
<b>ANALYSIS</b>	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question.	Analyze Categorize Compare Contrast Separate	The student will compare and contrast the cognitive and affective domains.
<b>SYNTHESIS</b>	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	Create Design Hypothesize Invent Develop	The student will design a classification scheme for writing educational objectives that combines the cognitive, affective, and psychomotor domains.
<b>EVALUATION</b>	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	Judge Recommend Critique Justify	The student will judge the effectiveness of writing objectives using Bloom's taxonomy.

**Table 5:** Bloom's six levels for cognitive learning, Huitt (2011).

Each level (first column) encompasses cognitive processes (second column) associated with relevant verbs (third column) that are used to state objectives, and represent the actions that learners will do in order to prove knowledge, as exemplified in the last column (the fourth). If we consider however, verbs like: know, familiarise, comprehend, study, cover, understand, learn and realize, we shall find out that the student's learning cannot be measured with any of those cited verbs. They are not suitable for stating learning objectives, but rather for stating the general goals of a course or topic (Center for Online Learning, 2008). Levels in Bloom's taxonomy are ordered successively from less to more complex, and each level must be grasped before the next (Huitt, 2011). Those six levels within the cognitive domain can provide a framework for planning units of content from lower-order (knowledge, comprehension, and application) thinking skills, to higher-order (analysis, synthesis, and evaluation) thinking skills (Center for Online Learning, 2008). Anderson and Krathwohl (2001) revised Bloom's taxonomy, transforming the nouns into verbs (application: applying), and bringing changes into three broad categories: terminology, structure, and emphasis. Concerning structural changes, it may be noted that Bloom's original taxonomy was a one-dimensional form. With the addition of products, the Revised Bloom's Taxonomy takes the form of a two-dimensional table. One of the dimensions 'The Cognitive Process Dimension' or the process used to learn (table 6), a continuum of increasing cognitive complexity, is described (Anderson and Krathwohl, 2001) as including nineteen specific cognitive processes. 'The Knowledge Dimension' or the kind of knowledge to be learned (table 7) however, is the second dimension. For the sake of clarity, these two tables are presented in a successive order:

Lower order thinking skills			Higher order thinking skills		
<b>recognizing</b> (identifying)	<b>interpreting</b> (clarifying, paraphrasing, representing, translating)	<b>executing</b> (carrying out)	<b>differentiating</b> (discriminating, distinguishing, focusing, selecting)	<b>checking</b> (coordinating, detecting, monitoring, testing)	<b>generating</b> (hypothesizing)
<b>recalling</b> (retrieving)	<b>exemplifying</b> (illustrating, instantiating)	<b>Implementing</b> (using)	<b>organizing</b> (finding, coherence, integrating, outlining, parsing, structuring)	<b>critiquing</b> (judging)	<b>planning</b> (designing)
	<b>classifying</b> (categorizing, subsuming)		<b>attributing</b> (deconstructing)		<b>producing</b> (construct)
	<b>summarizing</b> (abstracting, generalizing)				
	<b>inferring</b> (concluding, extrapolating, interpolating, predicting)				
	<b>comparing</b> (contrasting, mapping, matching)				
	<b>explaining</b> (constructing models)				

**Table 6:** The cognitive processes dimension - categories, cognitive processes (and alternative names), Center for Excellence in Learning and Teaching- CELT (1995).

Concrete knowledge		Abstract knowledge	
Factual	Conceptual	Procedural	Metacognitive
Knowledge of terminology	knowledge of classifications and categories	knowledge of subject-specific skills and algorithms	strategic knowledge
knowledge of specific details and elements	knowledge of principles and generalizations	knowledge of subject-specific techniques and methods	knowledge about cognitive tasks, including appropriate contextual and conditional knowledge
	knowledge of theories, models, and structures	knowledge of criteria for determining when to use appropriate procedures	self-knowledge

**Table 7:** The Knowledge Dimension - major types and subtypes, Center for Excellence in Learning and Teaching-CELT (1995).

Now to comment on those two tables, we may first note that Bloom’s taxonomy was revised for the purpose of updating it, and adding relevance for 21st century students and teachers (Forehand, 2005), particularly in the light of the widespread technology use in the educational process. This is why we have chosen to expand on the revised version which is more exhaustive and seems to cover a wider range of learning types, such as self-knowledge. This last type is more likely to prevail

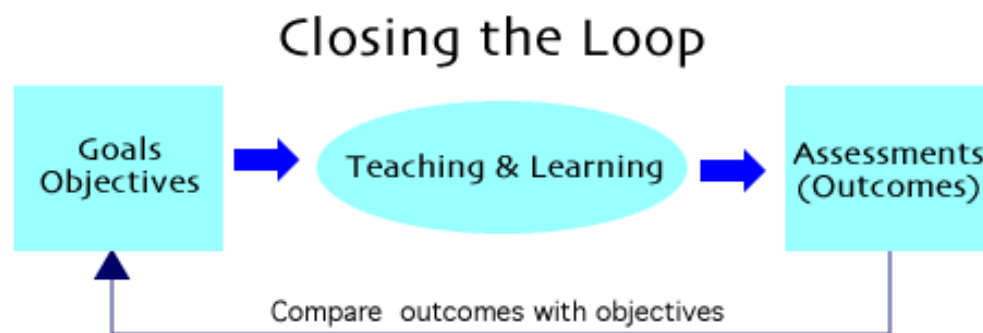
within our selection from the Knowledge Dimension category 'metacognitive', in addition to appropriate contextual knowledge; while from the type 'Factual', we may opt for knowledge of terminology with less knowledge of specific details and elements, since we shall not deal with highly technical content. Knowledge of classifications, of principles as well as generalizations, from the category 'Conceptual' may also be adopted, in addition to knowledge of subject-specific skills which belongs to the 'Procedural' type of knowledge.

Concerning the categories comprised within the cognitive processes dimension, we are likely to use most of the lower order thinking skills, like 'recognizing (identifying)', and 'summarizing (abstracting, generalizing)'. Likewise, most of the higher order thinking skills may be included in our design, but probably not categories such as attributing (deconstructing), and critiquing (judging).

Thus, Bloom's Taxonomy provides a framework for planning units that incorporate low to high-level thinking activities. Moreover, Bloom's taxonomy seems to fit online learning organization since it provides guiding principles concerning what the learner should study and be assessed on. Thus, it informs the instructor on assessing strategies, in addition to feedback on whether teaching as well as assessment strategies have been effective, as noted earlier in this section. Bloom's Taxonomy may constitute therefore useful guidelines to be taken into consideration in an e- course design (see our adapted selection, Ch. 4).

Accordingly, objectives should be measured in the assessment, either on test questions or student products, and class activities should support the objectives and assessments. The question however, is whether those objectives have been reached or

not. In case the answer is negative, issues may be considered such as whether instructions in the overview page were clear, and the objective statements "measurable"; whether the assessment strategies accurately measure objectives and the latter support the learning activities objectives; whether the checklists or other study guides were clear and present; whether rubrics were too complicated or absent, and whether the assignments were clear (Center for Online Learning, 2008). If objectives have been achieved however, there is probably 'good alignment of objectives, class activities, and assessment' which is called "closing the loop" (Center for Online Learning, 2008), as illustrated below:



**Figure 1:** Alignment of objectives, class activities, and assessment (Center for Online Learning, 2008).

#### **1.4.2.2 Gagné's 'Nine Events of Instruction'**

The second learning model is based on the 'Nine Events of Instruction' of Gagné (1965), an educational psychologist known for his research into a systematic design and approach to instruction and teaching methods. His instructional design theory was initially behaviouristically based and he emphasized the outcomes - or

behaviours - that result from training. However, he later shifted to a more cognitive approach. The reason for this shift may be (Mergel, 1998, pp. 14-15):

Because Cognitivism and Behaviorism are both governed by an objective view of the nature of knowledge and what it means to know something, the transition from behavioral instructional design principles to those of a cognitive style was not entirely difficult ...For example, the breaking down of a task into small steps works for a behaviorist who is trying to find the most efficient and fail proof method of shaping a learner's behavior. The cognitive scientist would analyze a task, break it down into smaller steps or chunks and use that information to develop instruction that moves from simple to complex building on prior schema.

Accordingly, we may say that even if the short target goal is not the same for behaviourists and cognitivists, and despite the different learning procedures they use, their goal is the same, i.e., to make learning effective. What is interesting to add is the similarity between cognitivism and constructivism (Mergel, 1998, p. 15) “...*they share the analogy of comparing the processes of the mind to that of a computer*”. So, using aspects from such diverse theories for the design of an online course does not create contradictions, but rather meets one’s specific course objectives and renders the course design more flexible , which is one of the characteristics of online design.

To carry on with Gagné’s ‘Nine Events of Instruction’, we have chosen the table below which clearly shows the instructional events and their corresponding occurrences in the internal mental processes (Kruse, 2006, p. 1), as follows:

<b>Instructional Event</b>	<b>Internal Mental Process</b>
1. Gain attention	Stimuli activates receptors
2. Inform learners of objectives	Creates level of expectation for learning
3. Stimulate recall of prior learning	Retrieval and activation of short-term memory
4. Present the content	Selective perception of content
5. Provide "learning guidance"	Semantic encoding for storage long-term memory
6. Elicit performance (practice)	Responds to questions to enhance encoding and verification
7. Provide feedback	Reinforcement and assessment of correct performance
8. Assess performance	Retrieval and reinforcement of content as final evaluation
9. Enhance retention and transfer to the job	Retrieval and generalization of learned skill to new situation

**Table 8:** Robert Gagné’s instructional events in the left column and the associated mental processes in the right column (Kruse, 2006).

The above steps, familiar to face-to-face instruction teachers, represent a model of learning based on the information processing model of the mental events that occur when adults are presented with various stimuli. It is a model of an organization of educational content (such as unit and lesson development) adopted for online-pedagogy (Center for Online Learning, 2008) as an approach to deliver instruction and to guide the learning. To understand what each event represents and implies for online

instruction delivery however, it may be interesting to consider the following points (Kruse, 2006):

**1-Gain attention:** To capture the learner's attention is a pre-requisite for any learning to take place. For instance, a multimedia program may include auditory or visual stimuli like an animation, or sound effects. Likewise, starting the course with a brainstorming question, or an interesting fact are likely to attract the learner's attention.

**2- Inform learners of objectives:** At the beginning of each lesson there should be a list of learning objectives to initiate the learners' internal process of expectancy and motivate them to complete the lesson. The phrasing of these objectives which should form the basis for assessment may be as follows: "Upon completing this lesson you will be able to. . .".

**3-Stimulate recall of prior learning:** Linking new information with prior knowledge helps in facilitating the learning process and allows a better anchorage of new information as far as there are links to personal experience and knowledge. Asking questions about the latter therefore is likely to stimulate recall.

**4- Present the content:** It is more difficult to read on a screen than on paper. So, content on a web page should be presented in small chunks. Moreover, it should be organized meaningfully, explained and then demonstrated. Making use of different learning modalities, a variety of media like text, graphics, audio narration, and video will contribute to attracting the learner's attention.

**5- Provide "Learning guidance":** To help learners encode information for long-term storage, the presentation of new content should be accompanied with additional guidance. We may adopt guidance strategies such as include the use of examples, non-examples, case studies, graphical representations, mnemonics, and analogies.

**6- Elicit performance (practice):** here, the learners are required to practice the new skill or behavior by eliciting performance (e.g., tests) in order to confirm their correct understanding. The latter is reinforced as well as retention through repetition.

**7- Provide feedback:** The learners' practice of the new skill or behavior requires specific and immediate feedback of their performance. It should be noted however that, unlike questions in a post-test, exercises within tutorials should be used for comprehension and encoding purposes, not for formal scoring. At this stage, the provided additional guidance and answers are called formative feedback.

**8- Assess performance:** Once learners complete the instructional modules, they undertake a post-test or final assessment, without any additional coaching, feedback, or hints. After achieving a certain score or percent correct, (a commonly accepted level of mastery is 80% to 90% correct) a mastery of material or certification is granted.

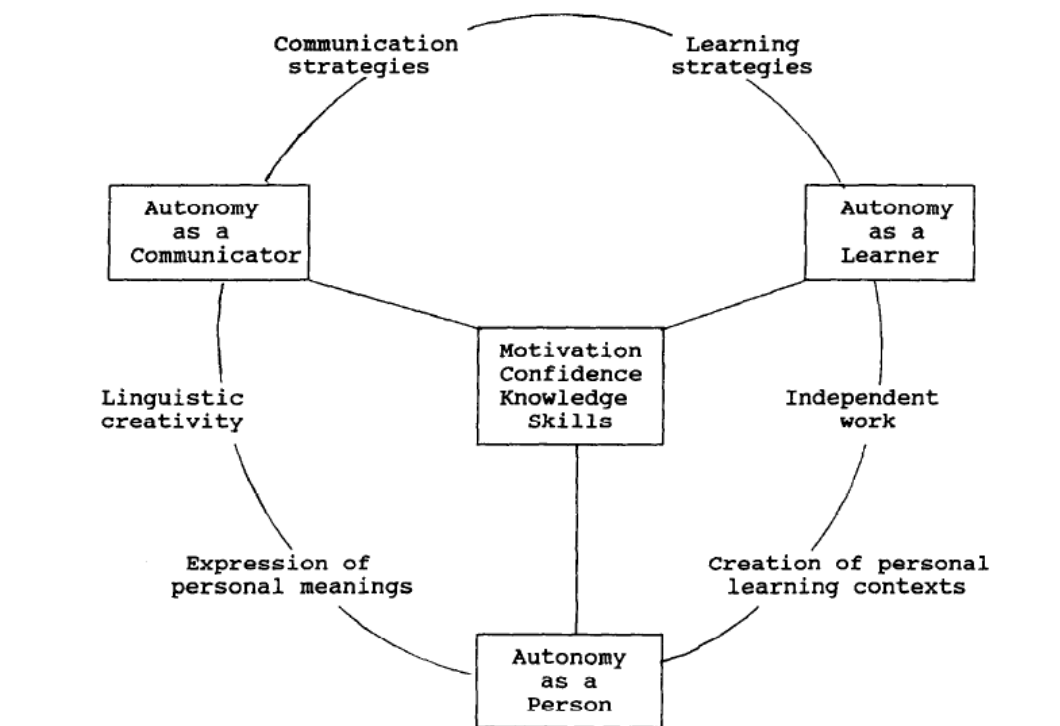
**9- Enhance retention and transfer to the job:** Training programs are aimed to provide learners with skills that would meet the target job requirements. To make therefore these programs effective, design and media are integrated to facilitate retention and transfer to the job, with repetition of learned concepts, which is a tried and true means of aiding retention.

Applying Gagne's nine-step model to training programs is likely to ensure an effective learning program and seems to be intuitively used by instructors, although not all of those steps may fit all instructional needs.

Regarding our design of an online course, all of those principles are likely to be used in organizing and sequencing learning objectives, particularly prompt feedback. However, while assessing performance (event 8) in the post-test or final assessment, no additional feedback or hints are recommended, which is not likely to be adopted in our design of an online course. Learners may rather be provided with feedback and a possibility to return back (via links) to aspects of the course where they meet difficulties, in order to review them. This is all important in self-instructional online learning within which we intend our online course design to be subscribed.

#### **1.4.2.3 The OCTR Model (Orientation, Coaching Tuning, Routinization).**

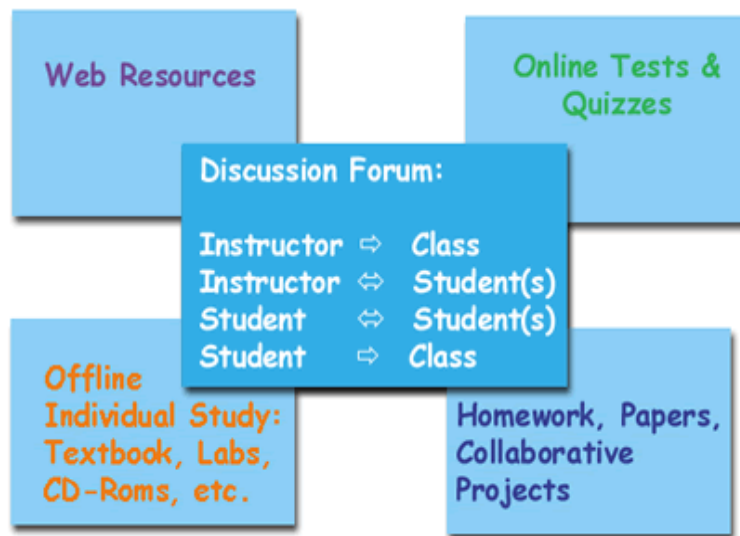
The third model however, is 'OCTR' which suggests four stages in human learning (Chan et al., 1993) namely, orientation (relating prior knowledge), coaching (apprenticeship learning), tuning and routinization (practice with gradually more student autonomy). Before expanding on this model, we may first point out an important included parameter which is that of student autonomy. The latter has become part of language teaching/learning, and ways are recommended to promote it. In this context, Littlewood (1996, p. 432) suggests a framework for developing autonomy as follows:



**Figure 2: Developing Learners' Autonomy in Foreign Language Learning. Littlewood (1996).**

In the light of this figure we realize that there are different aspects to be considered in regard to autonomy, like autonomy as a learner, autonomy as a communicator, and autonomy as a person. This implies the adoption of relevant strategies such as those tackled earlier in this work.

Now, we shall return to our third introduced model 'OCTR' illustrated in the following figure:



**Figure 3:** The Orientation, Coaching, Tuning and Routinization Model (Chan et al., 1993)

This model illustrates the constructivist view, with the assumption that knowledge consists of units and links (strong and weak links). The four stages in learning involve the creation of weak and strong links between "proper old knowledge" and new material. The stages in the learning model are explained in cognitive terms through processes of connection, whereby weak links are created between old knowledge and new knowledge; accretion, that is new weak links are created in order to expand knowledge; articulation, meaning that some links are strengthened while others are deleted; and solidification, subsuming the strengthening of both units and links (Chan et al., 1993). Such a process may also inform our online course design, since we intend to build on our learners' prior knowledge mainly that related to their subject, and then expand it (scaffolding).

In the light of the analysis of all those learning theories and models, we may say that the student's learning needs and objectives, as well as the use of appropriate CALL applications are considered in most learning models. The common point to be noted however is the search for a relevant learning model to build instruction on, and create the ideal design. A richer model may be built on an eclectic approach that would encompass aspects (from each) which are more likely to promote learning in an efficient way, as it may be understood from the following quotation (Ertmer and Newby, 1993, p. 60):

... a **behavioral approach** can effectively facilitate mastery of the content of a profession (knowing what); **cognitive strategies** are useful in teaching problem -solving tactics where defined facts and rules are applied in unfamiliar situations (knowing how); and **constructivist strategies** are especially suited to dealing with ill-defined problems through reflection-in-action.

To distinguish between such aspects and opt for those which are likely to meet the learners' needs, teachers should be trained to review and analyze the relevant theory, examine the affordances of the technology at hand, in addition to being aware of the learners' needs as well as course objectives. Teachers' role indeed is not only to teach, but also to be designers who should be well documented on the literature related to teaching/learning, designing, and evaluating. However, this does not mean applying rigorously checklists and principles (though useful). Teachers/designers as a matter of fact take whatever guidelines that are likely to fit their course objectives as stated hereinafter (Colpaert, 2006, p.494):

Teachers should become designers: designers of what they need...The main consequence for pre-service and in-service training is that teachers should not be trained in applying guidelines, checklists, and principles but in analyzing learning situations, setting their goals, defining their language method, reflecting on the requirements, and designing solutions.

Following this theory review, we may retain some features that are likely to serve our purpose in this research work and infer some preliminary, pedagogical implications/applications pertinent to the online course design. Among those implications/applications which we consider as relevant to the online course we aim to design, we may mention training in rhetorical functions related to scientific/technical discourse. Concerning instructional design, we may put forward the role of the instructor in suggesting meaningful tasks, in providing learning opportunities to enhance an ongoing building of learners' knowledge, and in suggesting principles for the organization of information, in addition to caring for coherence through cohesive devices. As for learners, they are brought to get engaged in their learning through interacting with the various provided stimuli. Among these, we may mention subject-related content, meaningful tasks, clear instructions, explicit objectives, and user-friendly affordances of the learning environment. All such applications have been drawn from the assets of sound theories and approaches like social constructivism. For a better illustration of those implications/ applications that have been inferred from the literature review for their relevancy to the online course, we have chosen to present them in a table, as shown below.

Application	Instructional design	View of the learner	Assets
<p>Training in rhetorical Functions related to scientific/technical discourse:</p> <p>-exploring&amp; recognizing the discourse organization);</p> <p>-describing processes, objects;</p> <p>-comparing and contrasting them;</p> <p>-classifying and synthesizing information;</p> <p>-reducing&amp; summarizing content;</p> <p>-collaborative: discussing issues on forums, arguing, agreeing/disagreeing.</p>	<p>Instructor structures content, and suggests meaningful tasks;</p> <p>Instructor provides stimuli to enhance continuity in building unknown words, subject related concepts;</p> <p>Instructor supplies appropriate micro-skills (the language of comparison/contrast), principles of organization of information from general to specific, ways of linking ideas and making transitions;</p> <p>Instructor mentors peer interaction &amp; suggests topics for debates, which he/she guides by feedback, and channels to stay within the topic at hand;</p> <p>The learning environment or platform provides various stimuli to promote interaction and learning.</p>	<p>The learner is actively engaged in the learning process;</p> <p>He/she responds to stimuli by reading/listening/viewing provided materials, and trying to understand words, concepts by checking them in the glossary and making associations to subject and/or background acquired knowledge;</p> <p>The learner examines the language relevant to the topic under study, processes information (analyses its context of use and its different patterns) and stores it;</p> <p>The learner tackles the tasks given by the instructor, by analyzing them and trying to predict expectancies (recognizing studied rhetorical functions and related micro-skills;</p> <p>Retrieval of stored information, and making associations with similar activities from authentic situations like building a flowchart from existing information by applying acquired, logical reasoning, and patterns of flowcharting practised and learned from subject study;</p> <p>The learner analyzes the topic suggested for discussion and tries to understand it and predict what is expected from it. He/she recalls stored information related to the topic, and prepares the feedback to the suggested question (writes down ideas, organizes them, uses matured concepts);</p> <p>He/she makes use of tools and applications available in the learning environment to edit the writing and post on the forum, once satisfied with the completed version;</p>	<p>Learning is interactive, the ZPD focuses on problem-solving:</p> <p>Learners interact with resources, activities, peers and the teacher (through e-mails, forums); negotiate meanings, ask for clarifications, and contribute to debates on issues with supplementary information (arguments, counter-arguments);</p> <p>Inquiry learning is typical to adults: university learners search additional sources of knowledge other than the teacher (databases, books, peers' exchange of links, share knowledge);</p> <p>In-time learning: use of recent information:</p> <p>Science and technology courses 'scaffolded' with progressive development of new concepts.</p>

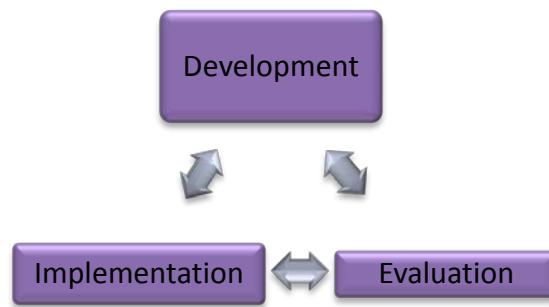
**Table 9:** Pedagogical implications/applications for our e-course rationale.

To design an online course however implies knowledge not only of learning theories, but also of the various stages of course construction, in addition to the different criteria of its evaluation. This entails referring sometimes to more inclusive frameworks instead of just being guided by simple checklists. The latter are likely to be less comprehensive than methodological frameworks which tend to be largely descriptive rather than judgmental in their form, in addition to being related to language teaching and learning that occurs outside of technology (Hubbard, 2006). For the design of the interactive, self-instructional online course, we have chosen to examine Hubbard's framework because it seems exhaustive in that, it subsumes some principles embodied in the learning models described so far, in addition to an important component which is evaluation.

Thus, we shall first describe this framework and examine its implication for an interactive, self-instructional online course in the forthcoming section.

#### **I.4.3. Hubbard's framework and pedagogical implications for our e-course design**

Hubbard's CALL framework based on Richards and Rodgers' categories of approach, design, and procedure (1982) brings together language teaching/ learning and the computer, putting forward CALL interrelationships as follows (Hubbard, 1996, 2011):



**Figure 4:** Hubbard’s CALL framework interrelationships (1996, 2011).

This framework therefore embodies a three dimensional process: development↔implementation↔evaluation. It is a process whose elements feed each other. It is cyclic, continuously revisited, assessed and updated on the basis of the obtained feedback. It is a framework which encompasses some criteria to be examined for evaluation. Such a framework may help us, together with the knowledge gained from the learning theories, models and the different evaluation criteria reviewed so far, in developing an online course, piloting it, and then using the feedback in adjusting the course and improving it. All the mentioned parameters are in fact interrelated, and being aware of them will help in designing an online course on an informed, sound theoretical basis. To get more insights on this topic which relates to the general field of instructional design, it may be useful to examine that framework’s components in the coming sections.

**(i) Courseware development.** This component should be based on general principles of instructional design, taking into account the pedagogical aspects specific to language learning (Hubbard, 1996, 2011). Here it may be useful to remind one of what Richards and Rodgers (1982) stated about (traditional) course design which:

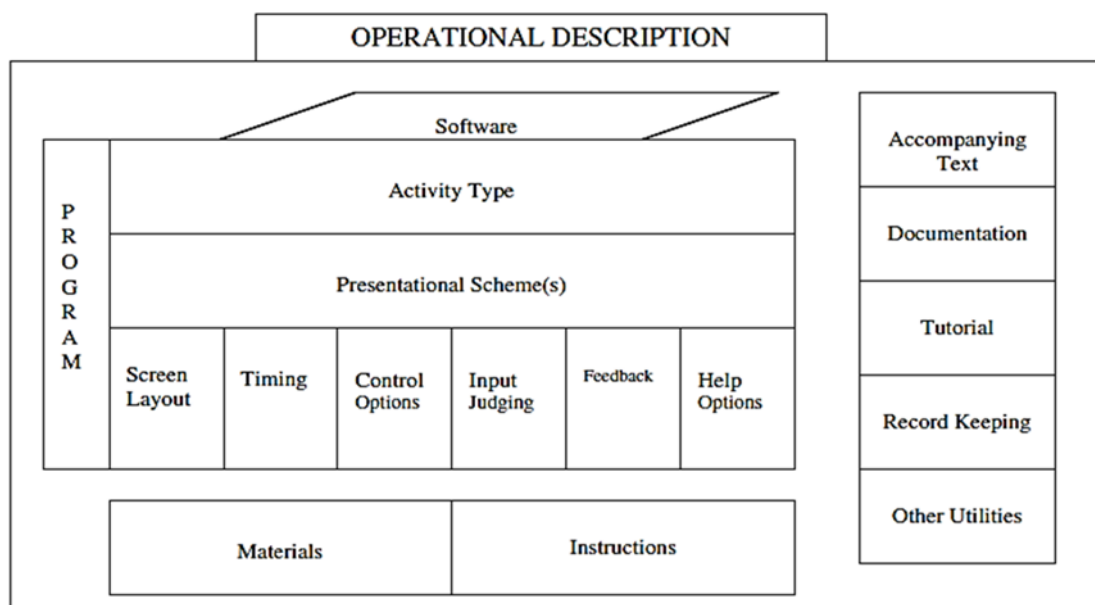
“...includes specifications of 1) the content of instruction, i.e., the syllabus, 2) learner roles in the system, 3) teacher roles in the system, 4) instructional materials, types and functions”(p. 157). Accordingly, the syllabus stands for content, the roles of both the learner and the teacher that should be clearly distinguished, in addition to the types of appropriate materials to be identified. These parameters constitute therefore the basis of design, either what we call ‘traditional’ or ‘CALL’ that we use here interchangeably with ‘online’, design.

Thus, inspired from Richards and Rodgers' categories of approach, design, and procedure (1982), Hubbard (1996, 2011) analogically subsumed in his framework, teacher fit, learner fit and operational description. He emphasized however individual language programs rather than whole methods, and took into account the computer parameter as the interface between the teacher/developer, the materials, and the learner. The component development involves approach, design, and procedure (Hubbard, 1996, 2011), standing for what follows:

- First, ‘approach’ or more precisely a language teaching approach, encompasses assumptions about what language is and how it is learned. In our case (of CALL), such assumptions are to be considered within the context of the computer delivery system. What is implied therefore is a set of approach-based software design criteria (examined later, in our course rationale).
- Second, ‘design’ subsumes elements which interact with the intended learner’s profile, and the syllabus’ objectives. We may therefore cite features like language difficulty, program difficulty, program content, language focus (also called program focus), skill focus (also called learner focus), and learner styles. It is important

however for these to be consistent with the approach-based design criteria (Hubbard, 1996, 2011).

- The third component is 'procedure'. Its related considerations deal with the layout (the computing environment) of the program which presents the materials. Within the context of evaluation, procedure is referred to as the operational description of the software. The latter has been sketched as follows:



**Figure 5:** Operational Description (Hubbard, 1988, 1996).

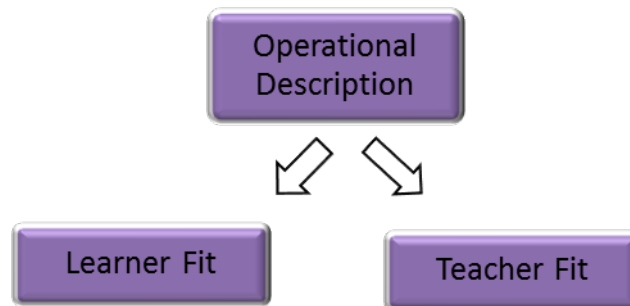
Among those procedure considerations illustrated in the figure above, there is the concept of "activity type", which refers to the general form of the exercise like a text with comprehension questions, or text reconstruction. There is also the presentation scheme which shapes the language presentation, involving the modalities such as text, graphics, video and what the general interaction sequence will be. Furthermore, the presentation scheme includes elements such as the screen layout, help and control options, the form of input judging, and the feedback in response to the input. Judging

the input depends on the type of input (letters, words, numbers, sentences, keyboard commands), and on what the input is a response to, i.e. the format of the stimulus the program presents. Regarding format, examples may be cited like whether both upper and lower case letters would be accepted, or whether alternative correct answers would be accepted in case a program presents a multiple choice question for instance (Hubbard, 1996, 2008).

**(ii) Courseware evaluation:** To begin with, it may be reminded that evaluation may be carried out for different purposes. Developers may do it for instance, in order to use the feedback for an eventual adjustment. Levels of evaluation may therefore vary, as well as its aspects. Among the aspects to be evaluated, we may point out the software's material as well as interaction, and their relevance to the learners' needs. The latter are considered according to their profiles, their learning objectives (probably dependent themselves on a course syllabus), and the assessor's (teacher's) language teaching approach (Hubbard, 1996, 2011).

Accordingly, the software is chosen on the basis of its relevance to the learner's profile, target needs, learning objectives, and on the teacher's language approach. These criteria dealing with relevance do not differ from those of traditional syllabus design, particularly ESP. In this context, we may cite Graves (1996) who states that: "*Appropriateness includes student comfort and familiarity with the material, language level, interest, and relevance...Feasibility and availability are also important to consider*". (p. 26). Therefore, relevance seems to be the main asset in the evaluation

framework illustrated below (Hubbard, 1996, 2011):



**Figure 6: Hubbard's CALL Evaluation Framework (1996, 2011).**

Thus, instructional design takes into account the relevance of the teaching software, but more attention is put on the operational description of the software, focusing the procedure level elements (explained earlier in the development component). Subsequently, and as put forward in the CALL evaluation framework above (figure 5), when we examine design components such as the course content and the language difficulty, we are having in mind the learner's needs. The question then is how well do design components meet those needs? This is what corresponds to learner fit which encompasses design elements. However, approach elements or approach-based evaluation criteria, coined as teacher fit, hint to the type of teaching the software is expected to convey. This refers to the latter's (the software's) underlying assumptions about the nature of language and the way it is learned, in addition to the compatibility of such assumptions with those of the teacher doing the evaluation (Hubbard, 1996, 2011).

To this end, information is drawn from the operational description of the software, which emphasizes the procedure level elements. Thus, the different components of the framework feed each other.

An earlier framework (Chapelle, 2001) based on SLA research theoretical principles pointed out six general evaluation criteria for both judgmental purposes and for evaluating outcomes. We may thus cite: language learning potential, meaning focus, learner fit, authenticity, impact, and practicality which are convenient not only for software but for CALL tasks in general, as well. Such criteria may also help us when designing our online course activities. Some of Chapelle's evaluation criteria join Hubbard's, like learner fit. Hubbard's framework however seems more exhaustive since it deals with the overall process (development↔implementation↔evaluation) and yields feedback for development. The last component of the framework is presented below.

**(iii) Courseware implementation:** Here what is important is how best to use the software that is available. Hubbard (1996, 2011) brings to our attention some key points to be considered such as the setting where the students will be using the software; the types of allowed preparatory activities; the kinds of follow-up activities; the extent of control to be exerted by the teacher and that to be left to the learner.

Accordingly, computer activities should be clearly linked to the rest of the course wherever they are practised, in a lab or in class, in pair or individually working on a computer. The setting may also be online, or in a virtual classroom. However, activities with CALL courseware (tutorial CALL) may be part of the classroom course, complementary or even optional but useful, as long as the computer work is

consistent in terms of content, level, and approach with the rest of the course material and activities (Hubbard, 1996, 2011). Consistency is therefore necessary at all levels.

So far, we have dealt with technology (tools and applications), pedagogy, or the different learning/teaching models which emerged from the main theories that contributed to shaping CALL or online learning, and then we analysed the different stages of Hubbard's CALL Framework. In the latter information from each phase feeds another, and builds on it for adjusting or completing gaps. In the light of this review, we may say that one should be alert to whatever feedback is yielded during the development of an online course, and that evaluation should be catered for, in making it operational at all levels of the course development. Most importantly, consistency is the key element that should be observed at all levels of the design process, starting with the approach adopted, which we have chosen to be eclectic, in order to establish relevance and coherence. These should be maintained between the student's learning needs and objectives, as well as the appropriate use of technology. These issues should be taken into consideration as they are likely to help us in our course design, and aspects that are relevant to our research purposes will be dealt with subsequently in this work (in the course rationale). Having dealt with the theoretical background related to CALL or E-learning, it may be interesting to examine some studies about such learning/teaching in practice.

### **1.5. E-Learning in practice**

Electronic learning presents therefore various advantages, such as the unlimited time students have to spend working with the available resources, their ability to work at their own pace, to revise work at frequent intervals, in addition to the possibility of using class time to focus on activities that cannot be carried out independently, such as introducing students to a new topic, conversation practice etc. (Davies et al., 2012).

Convinced of the effectiveness of using technology for teaching/learning languages, a certain number of researchers have recently adopted it for the development of courses to enhance the teaching of various skills. In this context, convinced that technology offers language learners opportunities to engage in a range of new literacy skills (Warschauer, 2004; Hiradhar, 2015), Hiradhar carried out a study to explore the effectiveness of the design and incorporation of technology-mediated module for writing skills, developed for English as Second Language (ESL) university learners in Hong Kong. The program included units with five distinct communicative functions of writing such as ‘Writing to Describe’, ‘Writing to Narrate’, ‘Writing to Report’, ‘Writing to Respond: Discuss’ , and ‘Writing to Respond: Argue’. That online task-based writing program was conducted through a one group pre-test post-test pre-experimental research design (sic), considering reinforcement, interaction, and scaffolding (terms to be defined subsequently in this chapter). The tasks were designed in such a way as to appeal for the learners’ linguistic as well as non-linguistic resources for their completion, such as using literacy skills like planning, researching, comprehending, interacting, evaluating, and organizing as well as processing

information (Hiradhar, 2015). The researcher found out that specifically designed technology-mediated tasks, such as completing controlled writing exercises based on online reading/watching/listening to materials, helped enhance students' writing skills required at the tertiary level. As far as literacy skills are concerned, while examining their relevancy in relation to our learners' learning needs, we identified for instance in the *Programme for International Student Assessment* (2013) reading literacy which "...includes a wide range of cognitive competencies, from basic decoding to knowledge of words, grammar and larger linguistic and textual structures and features, to knowledge about the world." (p.11). Moreover, according to this programme, reading literacy includes metacognitive competencies, activated when readers think about, and monitor their reading activity for a particular goal, making use of a variety of appropriate strategies during text processing (*Programme for International Student Assessment*, 2013, p.11). In this respect, we may mention some strategies that have been distinguished (O'Malley and Chamot 1987, pp. 241-242) as:

1. Metacognitive strategies: These involve executive processes in planning for learning, monitoring one's comprehension and production, and evaluating how well one has achieved a learning objective.
2. Cognitive strategies: The learner interacts with the material to be learned by manipulating it mentally (as in making mental images or relating new information to previously acquired concepts or skills) or physically (as in grouping items to be learned in meaningful categories or taking notes on or making summaries of important information to be remembered).
3. Social-affective strategies: The learner either interacts with another person in order to assist learning, as in cooperation or asking questions for clarification, or uses some kind of affective control to assist learning.

It may be noted here that such strategies are quite relevant to online learning, particularly self-directed learning, which may be interesting in a self-instructional course as the one we aim to design.

Further studies pointed out the effectiveness of online learning, describing experimentations connected to online design of courses related to specific skills, such as extensive listening (Alm, 2015) through the use of L2 podcasts (digital audio files made available for downloading on the Internet), improving speaking skills (Appel and Pujolà, 2015), training in learning English vocabulary (Stockwell and Hubbard, 2014), or EFL students' learning to write through an online corpus-based corrective feedback system (Chang, 2014). Another interesting study (Tsa, 2013) at a technical university in Taiwan dealt with English for specific purposes (ESP) instruction, combining Task based learning (TBL), terms to be elaborated on subsequently in this chapter, with courseware (educational software program) integration. The courseware described in the study deals with participating in international trade fairs into English for specific purposes (ESP) instruction. The implemented courseware-integrated ESP instruction was evaluated on the basis of pre- and posttests in three tasks, in addition to questionnaires' results reporting the students' satisfaction and attitude. Recent graduates of this courseware-integrated program were also involved and interviewed. On the other hand however, a control group was rather concerned with face-to-face instruction on the same topic. In the findings of the study, the students enrolled in the courseware-integrated instruction were reported to perform as much, and at times, even better than those of the control group concerned with completing problem-solving and higher-order thinking tasks. This led the author of the study to conclude

that in addition to providing authentic materials for learning the target ESP in situational settings, the integrated courseware also offered learning activities with prompt self-evaluation, leading the students to engage in cognitive processes related to their individual needs, improving their self-learning in both task performance and linguistic skills. Such courseware-integrated TBL (task-based learning) instruction may indeed, as the study's author concluded, constitute an alternative to problems in the development of ESP courses. However, we may point out that in the case of our science and technology setting, updating the teaching materials should be a continuous process, in the course of the fast technological progress, notably in the field of computer sciences. This may constitute an additional challenge.

Factors such as those tackled in the studies dealt with so far are likely to help us in the design of our online course. However, we may point out that, apart from some rare studies which dealt with a variety of skills at the same time like the study related to the four skills activity using the Moodle database module (Campbell, 2014), most studies were mainly concerned with specific skills each time and not with a complete course like the one we hope to develop. It is aimed to be designed as to cover almost all of our learners' needed skills and strategies, as identified in the needs analysis results.

Accordingly, in adopting CALL fully or partly, to reinforce the teaching/learning process, and enhance learners' motivation, one should be equipped with computing skills as well as with appropriate knowledge about online educational environments. In addition to this, being aware of course theory and design in order to know how to use technology in pedagogy is necessary, particularly to adopt adequate

teaching practices. In this context, Gold (2001) focused on associating pedagogical training and practice in operating on online educational environments: “*Without proper pedagogical training and online experience, teachers will continue to replicate their best existing practices onto the online medium*” (p.36). The integration of CALL in the educational field seems therefore indisputably beneficial in that, it contributes to the diversification of learning sources and activities, the reasoned management of the instruction time, as well as the optimization of learning opportunities.

Now, we shall deal with our research design and procedure in the coming chapter.

## **CHAPTER 2**

### **2.1. Research Design and Procedure**

Our research is about exploring the need for the design of an online course. However, such design cannot be carried out unless the teaching/learning situation is investigated. In this respect, the teachers' experience and training should be enquired. In addition to this, the students' needs have to be identified in order to determine the course objectives. In this context, we are also concerned with the identification of the strengths and weaknesses of the present teaching tools, to find out for instance whether the available didactic materials are relevant and sufficient, which may allow us to suggest alternatives. Such information will feed and guide the design of a relevant online course, the implementation of which will subsequently be considered.

Our research is therefore qualitative and is also to be subscribed within the framework of action research. The numerical data to be obtained through the questionnaires involve mere counting to make statements more precise as in Becker (1990). Moreover, this does not imply that the research is no longer qualitative as Maxwell (2010, p. 480) pointed out:

...the use of numbers is a legitimate and valuable strategy for qualitative researchers when it is used as a complement to an overall process orientation to the research. The inclusion of quantitative data does not inherently make the research a mixed-method study.

The present research methodology will therefore be dealt with throughout this chapter, and we shall first tackle the context of the study.

### **2.1.1. The context of the study**

To begin with, we may deal with the setting i.e., the University of Science and Technology Houari Boumediene (USTHB) which includes eight faculties where the module of English is compulsory, from the second undergraduate year of the different curricula until the semester before the last of master courses. In this regard, information is needed about whether this course is run at all levels, whether it takes place in language laboratories or in ordinary classrooms, in addition to knowing whether the didactic materials used are sufficient and appropriate. Concerning the books and/or the documents used, it is important to know for instance whether they are updated or not, given that science and technology are fast growing particularly in the field of computer sciences. Likewise, the use of multimedia tools in the course will be enquired about. Furthermore, it is important to know about the course objectives targeted by the different teachers in charge of this module and who are among the subjects of my research, as described in the coming section.

#### **2.1.1.1. The participants**

In this section, we shall first deal with the community of teachers involved in the teaching of the course of English, and then with the students.

**(i) The teachers:** The teachers' background, like the nature of their degree, their teaching experience as well as information about any possible training in the field of education, is to be investigated. We shall try to find out for instance, whether the teachers of English from a literary background meet any difficulties in dealing with science/technical texts, and know about the skills and language areas taught in the

course to infer the latter's objectives. These may be matched with the teachers' statements about the language aspects to be reinforced, according to them, to meet the learning needs of their students. These are to be presented in what follows.

**(ii) The students:** They are in an increasing number in enrolling at the University USTHB, which leads us to enquire about whether they all benefit from the course of English, and to what extent large classes have any influence on the teaching/learning process. This brings us to investigate the students' learning needs as well, by knowing about the difficulties they meet in different language skills and areas. Such information will allow us to update the results obtained from our previous research (Lahdir, 2002) summed up earlier (pp. 3-5), to check whether any change has occurred in USTHB students' learning objectives. The latter were related to reading/ understanding subject literature, which the students managed to cope with, although hindered by some inherent scientific/technical features like compounds, passive forms, and comparison/contrast constructions. Those findings also put forward their difficulties in writing, listening and mainly in oral skills. The conclusions of our previous study underlined USTHB students' need to study English mainly for academic purposes (EAP), to read subject-related literature, to take notes, to present talks during conferences, along with writing and publishing scientific/technical articles. This was in addition to using English for occupational purposes (EOP), when they work for instance in multinational settings. Checking whether such learning objectives are still relevant, to take them into consideration in the online course design is among the objectives of the investigation.

Considering this teaching/learning situation of the course of English in our institution, we wanted to reflect upon it and may be find answers to the questions that lie behind this research with the view of, we hope, contributing to its improvement. This is to be dealt with in the coming section.

### **2.1.2. The research methodology: The rationale and the research questions**

To explore the need for the design of an online course aimed at through the present study, finding out about the teaching/learning situation of the classroom-based course is necessary in order to identify its strengths and weaknesses. The encountered difficulties related to the course's teaching materials and didactic tools have to be highlighted, in addition to ICT use in teaching. The students' practice of this language in large classes is also to be examined. Moreover, given the fact that not all the students registering at the university USTHB benefit from the course of English as specified in their curricular, we had to reflect upon ways of teaching this mandatory course. This issue brings us to think whether that online course would be a supporting solution to the current classroom-based course, which leads to the first research question:

- 1.** Would an online course be a complementary solution to the conventional, face-to-face course given the fact that the latter has shown limitations in the Algerian context and that new needs for change are necessary?

Technology indeed might help us overcome those impediments related to time and space. In this respect, the limited amount of time allotted to the module of English (one hour and a half per week) restricts the students' practice during this classroom-

based course. The latter has gradually been developed and reinforced with the contributions of colleagues at the CEIL, in USTHB university, in accordance with the guidelines elaborated in our previous research (magister thesis, Lahdir, 2002) to meet the students' learning needs. The results of that study as summed up earlier (pp.3-5), led to setting the objectives of the classroom-based course of English, which will be investigated and updated to find out whether they are still relevant for the online course. This brings us to the second research question:

2- What would the online course objectives be, compared to those of the current classroom-based course?

If the findings show that no change has occurred in those objectives, we will be faced with the problem of whether we could simply adopt the content of the current face-to-face course for the e-course. This leads us to a third research question:

3- What would the online course content be as compared to the classroom-based one?

Feedback from such questions may help us to think of a relevant online course design that would meet our learners' needs, make up for the gaps of the teaching/learning situation of this module and may be, implement it once realized then refined. We are concerned in this work therefore with yielding data that could help us, we hope, answer our research questions, and think of an appropriate solution from which all our students would benefit. One of the ways that could inform us and allow to collect answers to our research questions is to carry out an investigation, which is the concern of the coming section.

### **2.1.3. Data collection tools**

In this section we shall deal with the eliciting tools adopted here namely, questionnaires and unstructured interviews which will help us in carrying out the investigation of the teaching/learning situation of the course of English in USTHB university. The interviews will mainly address the teachers, unless any need arises. The reason is that teachers are more likely to be aware of pedagogical issues, and to describe the learners' needs as well as objectives in a more comprehensible way, given their teaching experience. The questionnaires will concern however both the teachers and the students.

The questionnaires are intended to investigate four areas. The first area of investigation is aimed at finding out about the teachers' and students' views of their classes, i.e. size, and whether they encounter any difficulties while, respectively, teaching/learning English. This is to yield information about whether teaching/learning in large classes has any influence on the teaching/learning process. It is hoped such feedback will support our initiative of building an online course, and in answering our first question.

As for the second area of investigation, it is intended to elicit information about the language areas and skills where students meet difficulties. By language areas we mean pronunciation, grammar, vocabulary, discourse and by skills, speaking, listening, reading, and writing (Levy, and Stockwell, 2006). This will inform us on the learning needs of our students, and will indicate whether changes have occurred since our previous investigation (magister thesis, Lahdir, 2002). Moreover, the data obtained

will help us establish whether the course objectives developed during our previous research are still relevant, in order to be considered for the envisaged online course.

The third area of investigation is aimed at finding out about our informants' use of ICT tools in general, to have an idea on the degree of their mastery with the view of assessing whether any training is needed, mainly for teachers. The purpose of this area of investigation is also to know about the use of ICT means in the course of English in our institution, and to evaluate them in terms of availability and appropriateness. This is to answer our concern about changes that may have occurred in the teaching/learning situation since our previous investigation when we recommended their integration as a teaching-aid to improve the course of English. Feedback from this area may as well contribute to yielding ideas for the development of technology-supported activities for the course of English. This leads us to the fourth area of the inquiry which investigates the informants' view about having an online course, and probes related suggestions.

This investigation is intended therefore to find out about the present teaching/learning situation of the course of English in university USTHB, and about the students' learning needs in order to set their learning objectives. This investigation is also aimed to call forth suggestions for the online course with the view of, we hope, contributing to improve the teaching/learning of English in this university. Such suggestions are likely to inform the area related to recommendations as well. In addition, the feedback on the different aspects of language that could be reinforced through the online course may help in targeting the students' specific needs, and in refining the course objectives.

### 2.1.3.1. Questionnaires

Before presenting the questionnaires however, we may sum up the areas of investigation dealt with through the various questions, as follows:

(i) The identification of informants, like their academic positions, the students' specialties and the existence of any influence of the students' number on the learning/teaching process, according to all the respondents;

(ii) the language areas and skills being taught and considered, according to the teachers and the learners, as important to meet the latter's learning needs in addition to indicating those that present difficulties, in order to infer/check our learners' language needs;

(iii) the integration of Information and Communication Technologies (ICT, an acronym used here interchangeably with the term multi-media tools) in the course of English, as well as their availability and appropriateness;

(iv) finally, the informants' stand about having an online course is called for to know whether the latter is thought to enhance the students' practice, in addition to indicating the aspects of language that it could improve. The feedback could help in designing an online course based on our learners' needs and set appropriate learning objectives.

The questionnaires have been organized as described below:

**A- Teachers' questionnaires:** This questionnaire includes twenty one questions.

**Questions from 1 to 3** are aimed at identifying the informants, like knowing about their position, either permanent or part-time teachers, (question 1), the academic subject of their students (question 2), in addition to their class size (question 3).

**Questions 4 and 5** address the teachers involved in teaching large classes, to investigate whether the number of students per group has any impact on their teaching and on their students' learning of English (question 4), to subsequently lead them to describe the encountered difficulties (question 5).

**Question 6** invites teachers to tick off listed language aspects where their students meet difficulties and that should be reinforced, in addition to indicating further items not included in the list.

**Questions 7 to 9** investigate whether multi-media tools are used by the teachers in the course of English (question 7), and the type of those used tools (question 8). The teachers are also solicited to report whether the integration of multi-media tools in the teaching of English will make the latter more efficient (question 9).

**As for question 10**, it is divided into four separate parts, each one dealing with a different range of multi-media tools. This question is aimed at yielding simple answers since the respondents just have to put a cross in the box corresponding to a given multi-media means to confirm its availability at the CEIL, or deny it by leaving the box empty. This is to depict the state of the art of ICT means at the CEIL.

**Questions 11 and 12** are designed to elicit the teachers' evaluation of the amount and relevance of the available ICT means at the CEIL (question 11). They are led as well to state whether their students need further practice in English (question 12).

As for questions from 13 to 16, they are intended to investigate the informants' use of ICT means in general, in order to know about their overall skills in this field, have an idea on the degree of their use of such technology, and detect the areas where they need training.

**Question 17** is designed to obtain information on the ICT tools teachers would like to integrate in their course of English, which will elicit information that may help us assess the CEIL needs in terms of ICT means in general, and inform our section related to recommendations.

**Questions 18 to 21** however are aimed at yielding information about pedagogical suggestions for the integration of ICT means in the course of English (question 18), and about the necessity or not of implementing an online course (question 19). In this last part, teachers are asked to indicate the language skills and areas that would be reinforced through the online course (question 20). Finally, all the teachers (both the pros and cons) are invited to make related suggestions (question 21). This is worth considering since it will elicit answers to our research questions. In addition, the requested suggestions may bring useful insights in the teaching/learning processes in general, and those related to e-learning, in particular.

**B- Students' questionnaire:** It is designed in such a way as their answers could be matched with the teachers' because some questions are common to both, like those investigating the language skills and areas that should be reinforced. Such a design is likely to reinforce reliability. In addition, this allows us to compare both their views (the teachers' and the students') and complete missing information, or better understand ambiguous answers. We may subsequently make a useful synthesis of their different views and suggestions.

The students' questionnaire includes seventeen questions, targeting the information presented in what follows:

**Questions 1 to 4** are aimed respectively, at identifying the informants' subject of study (question 1), knowing about their class size (question 2), and inquiring whether the students' number per group has any impact on their learning of English, according to them (question 3). In case the answer to this last question is positive, the students are asked to cite the difficulties encountered (question 4).

**Questions 5 and 6** are designed to lead the students to cite the difficulties they meet in language skills and areas by ticking them off in the suggested list, and providing those that are not mentioned (question 5). They are subsequently asked to indicate those that should be reinforced, according to them (question 6).

**Questions 7, 8, and 9** however investigate the use of multi-media tools in the course of English, in which case the students are asked to tick them off in the suggested list (question 7). Then, their evaluation of the tools used in the course is solicited (question 8). Finally, they are invited to state whether they need further practice in English or not (question 9).

**Questions 10 and 11** investigate the students' different uses of various ICT means, in general. The aim is to have an idea on the degree of their use of such technology, which may constitute a hint to their readiness to study online.

**Questions 12 and 13** then follow to elicit information that could inform us on the usefulness or not of integrating ICT means in the course of English, according to the students (question 12). Next, they are asked to indicate the tools they would like to use, which they may select from the previous suggested list, and also propose further tools (question 13).

**Questions 14 to 17** investigate the necessity or not to have an online course, according to the students, and give the reason in case the answer is positive (question 14). They are also asked to state whether they prefer to have further online practice in English during or after office hours (question 15). Subsequently, they are solicited to put forward their suggestions concerning some aspects of language they think could be reinforced through this online course (question 16), and formulate further propositions (question 17).

### **2.1.3.2. Interviews**

They will be unstructured, to allow teachers to answer at ease. They are intended to clarify ambiguous and/or incomplete answers, elicit information that could add further data which may inform our research questions in as an exhaustive manner as possible. Thus, questions will be related to the following areas:

1- The teachers' educational level namely, the degree, specialty, the teaching experience prior to and in the USTHB, along with their confirmation or denial of having followed any training courses in TEFL, ESP or ICT, that could help them in their teaching. Such data will inform the section on the present teaching/learning situation of the course of English in our institution, and help in identifying areas where the teachers need training.

2- Information about their students' subject of study, the size of their classes, the availability and relevance of the didactic materials in use during the course of English, in addition to an inquiry about possible related pedagogical difficulties the teachers encounter. Such information, along with what may be yielded from the area above to

be investigated, could support our concern with the need of a complementary solution to improve the teaching/learning of the course of English in our institution, stated in our first research question.

3- The teachers' assessment of their students' learning difficulties in language skills and areas listed in the questionnaires, and those not mentioned. Such information will help us infer our students' learning needs, and check whether the objectives resulting from our previous research (Lahdir, 2002) have changed, which will help in answering our second research question.

4- The teachers' suggestions related to the language skills and areas that need to be reinforced, in addition to their enhancement through what they propose as multi-media tools. The ways they suggest of using those tools in the different language skills and areas, may provide information on their knowledge about how to integrate technology in pedagogy. Such feedback will help in assessing whether any training is to be recommended for the teachers, in addition to obtaining whatever useful suggestions teachers may have not thought of while completing the questionnaires. Most importantly, this will allow us to complete and set our students' learning objectives on an informed, sound, pedagogical basis, answering therefore our third research question. Results from those unstructured interviews may therefore be exploited to add information, or reinforce/justify arguments when necessary and required for our research purposes.

#### **2.1.4. Data collection procedure**

In order to collect data for our research work, we adopted as stated earlier two types of research tools namely, questionnaires and interviews. To begin with, and to

have a wide and representative range of informants, we opted for the following sampling:

**(i)- Teachers:** Only the teachers at the CEIL are concerned by the questionnaires and unstructured interviews since our investigation is related to the course of English.

We therefore selected 10 teachers of English who have students from different disciplines, and who have varied teaching experiences, aiming to achieve reliable information.

A number of ten teachers is likely to be representative since there are only eighteen teachers at the CEIL.

**(ii)- Students:** Here again, it is necessary to have a representative population of informants for more reliability. Thus, we opted for a random selection of 140, first-year master students from each of the different disciplines, from the faculties where English is taught at this level on a regular basis, which makes a total of 560 students out of 1001.

We first piloted the questionnaires, with two colleagues for the teachers' questionnaire, and with a group of six, randomly selected first year master students. On returning the questionnaires, the informants were asked to provide information on the length, ambiguity and complexity of the questions. Such information, in addition to some remarks inferred from the examination of the returned questionnaires, we made the necessary corrections. This procedure allowed us therefore to discard unclear wording, reformulate some questions, and limit the number of open questions, particularly in the students' questionnaire. We found out indeed, that the students were not inclined to write long answers.

The concerned teachers were very cooperative. The questionnaires were handed out to them after a review and explanation of the different included items, before the second term exams. In turn, the teachers have accepted to fill out the questionnaires and distribute others to their students, providing them with the necessary clarifications, in the beginning of the class time. After two weeks, they returned back the completed questionnaires. 417 of the students' questionnaires were returned back out of a total of 560, while the 10 teachers' were filled out and given back in their entirety.

For the sake of simplifying the procedure of counting and analysis, we rounded down to 400 the number of questionnaires, particularly that among those which were discarded, some were incomplete or unclear. The questionnaires include structured, closed- ended questions, and what may be called semi-structured questions in that, they include an item which allows an open answer, like questions 6, 16, 17, 18, 20 from the teachers' questionnaire, and questions 5, 11, 13, 14, 16 from the students' questionnaire. The latter contain open questions like number 4, and 17, while the teachers' questionnaire comprises the open questions number 5, 8, 13 and 21. Such open questions allow the respondents to answer freely and truthfully, particularly when making suggestions. In addition, both questionnaires include list and category questions (Bell, 2005) without order or ranking. We may for instance cite the list question 6 from the teachers' questionnaire, and question 5 from the students' questionnaire; while questions 11 (teachers' questionnaire) and 8 (students' questionnaire) are category questions. Number 1 is ascribed when there is an answer and 0 when there is none. So, percentages will be calculated for the list and category questions, while the open ones will be described and summed up.

Summary sheets are prepared with the different codes assigned to the informants to guaranty anonymity, for instance RSD stands for Réseaux et Systèmes Distribués, that is the specialty in computer sciences that deals with Networks and Distributed Systems. In investigating our research questions, we shall adopt a descriptive and analytic method. Accordingly, the collected data will be described, analyzed, and then conclusions will be summarized.

The unstructured interviews are primarily based on questions drawn from the questionnaire prepared for the teachers, with regard to the areas previously specified, and to whatever queries that may arise while research is going on. We may extend those informal interviews to the other teachers of English to whom questionnaires are not given. To avoid any influence, the teachers are interviewed individually. Those interviews are conducted in the setting and time that best suit the teachers. This makes them feel more relaxed and likely to answer freely, providing exhaustive feedback. Some notes are taken during the interviews, and completed a short time after for an easy recall. The yielded data will allow us to complete and/or clarify information obtained from the questionnaires. In addition, this data may as well feed the area related to the teachers' suggestions and shed light on potential issues on the learning/teaching processes. This may also enrich our knowledge both as traditional and technology-minded teachers.

The data collected from the interviews will be summed up and dealt with in the results' discussion section to complete missing information, explain unclear answers, and infer conclusions by matching the various answers obtained from both questionnaires.

## **2.2. Results and Discussion**

As we have adopted a descriptive and analytic method, we shall first describe the collected data from the questionnaires and then, convert the quantifiable data into percentages. There will be no need to illustrate them in tables, graphs or charts. This is to avoid expanding on this section which does not constitute the bulk, or the focus of this research. As for the non-quantifiable data, like that elicited through interviews, in addition to all the respondents' suggestions mainly in the open questions, they will be summed up in one section to avoid a liable redundancy. The open items included in the semi-structured questions will be used to elaborate on the overall answer of the related question. Subsequently, all the results (either from the questionnaires or interviews) will be analyzed and discussed within the section on answers to our research questions. Finally, conclusions will be drawn and summed up.

### **2.2.1. Results from the questionnaires**

In this section we shall deal with the results obtained from the questionnaires, starting with the teachers'.

#### **2.2.1.1. Results from the teachers' questionnaire**

**Questions one to three** concern the identification of the ten respondents' profiles. Except for one, all of them are part-time teachers. Third and fourth year undergraduates in mathematics, earth sciences, electronics, chemical engineering, mechanical engineering, in addition to first year Master studies in biology, as well as in computer sciences are the classes being taught by those teachers (questions 1-2). The average number per class varies from 27 to 31 students (question 3).

**Questions four and five** report that all the respondents (100%) agree that their teaching to large classes constitutes a problem (questions 4).

Concerning question five, 40% of the teachers state that the number of students hinders the running and progress of the course in all its aspects. Furthermore, they put forward the difficulty to meet the requirement of continuous assessment advocated by the LMD (Licence- Master- Doctorat, i.e. Bachelor-Master-Doctorate) system, particularly in the light of the growing number of students. 20% of the respondents note however, that the problem of the students' number arises mainly during reading sessions. They state that during the warm up activities their students cannot not all be allowed to take part in discussion, or be corrected (vocabulary, pronunciation, grammar), especially in view of the limited time of instruction in English. The latter's allotted time does not exceed one hour and a half per week, which limits the time assigned to each activity. 40% of the remaining informants however indicate that the number of students does not impede some activities such as note taking, or carrying out grammar exercises, but represents an acute difficulty when correcting exam copies mainly the writing part, knowing that each teacher takes in charge no less than four groups, as a minimum.

**Question six** deals with the aspects of language in which students need reinforcement. 20% of the teachers think their students need reinforcement in the skills of reading and writing, 50% focus rather on language areas such as the use of tenses, of compounds, of parallel increase constructions, of understanding inference/reference relationships in reading subject-related documents, in addition to writing compact, organized, and coherent pieces of writing, as in scientific writing. 30% of the teachers

however mention in addition to the language aspects put forward earlier (by 50% of the teachers), the speaking as well as the listening skills.

**Questions seven and eight** deal with the use of multi-media tools in teaching. 60% of the teachers confirm using them, while 40% of the remaining teachers state that they use no multi-media tools at all (question 7). The 60% of teachers report using computers with CDs in the course (question 8).

**Question nine** yields a result of 100% of teachers who agree that the integration of multi-media means in the course of English will make its teaching/learning more efficient.

**Question ten** is about the ICT means available at the CEIL. Teachers have to tick off the existing items. Concerning aspect (a), about language laboratories, only 60% of the teachers have marked the box corresponding to the audio headsets, used at the master level. Also, no one has ticked off video players. As for the availability of teaching platforms, no one has selected this item.

As far as aspect (b) about computers, 100% of the teachers have checked computers with CDs but not connected to the intranet or the Internet.

Concerning aspects (c) and (d) about the availability of overhead projectors and a data show, 100% of the teachers denied their availability at the CEIL (recently, a data show has been installed in each laboratory).

**Question eleven** about the evaluation of the ICT means existing at the CEIL, 10% think they are sufficient for listening purposes and appropriate. 90% think that they are rather insufficient because students should also work on computers or at least share their use in group activities for instance, and access some databases with

learning resources. They also think the available tools (i.e. computers with CDs) are inappropriate as well since the sound quality is not always good.

**Question twelve**, 100% of the respondents assert that their students need further practice in English.

**Questions thirteen and fourteen** are about the use of computers. The teachers use computers mainly for word-processing of texts and exercises, with a percentage of 100% (question 13). However, an average of nine hours per week of computer work has been reported by 70% of the teachers, compared to the other 30% who do not exceed an average of five hours per week (question 14).

**Questions fifteen and sixteen** are about the use of the Internet. All (100%) the teachers confirm their use of the internet (question fifteen) to read/write mails, and look for some information of various interests (question sixteen, items a and b); while 70% within that percentage of teachers reported also searching for resources for their course of English (item c) and 30% mentioned as well chatting, and loading songs (item d).

**Question seventeen** is about the multi-media means the respondents would like to use for the course of English, with reference to the items cited in question ten (items a and b, concerning respectively language laboratories, then computers). 20% of teachers mentioned platforms as the best way to convey teaching since they integrate various ICT means. 10% expressed the wish to be equipped, as well as their students with video players, while 70% of teachers think that having more computers in classes is a necessity and they should be related to the internet or any local database (e.g., intranet) to use various resources.

**Question eighteen** brought about an agreement of all the teachers, since 90% of them ticked off all the items suggested regarding the integration of ICT tools in the course of English, in listening, reading and oral comprehension, working referencing/inferencing, grammatical study, as well as in building up scientific/technical terminology. Moreover, 10% within the 90% teachers also suggested interactive games like puzzles to learn phrasal verbs. Only 10% percent of teachers stated however that ICT means are necessary only for listening comprehension.

**Questions nineteen and twenty** yielded a result of 100% of the informants who confirmed that an online course will be useful (question 19). Concerning the language skills and areas that would be reinforced through the use of an online course, 80% ticked off all the items, while 20% selected only speaking, listening and reading comprehension. Moreover, with regard to the open item (g) 30% asserted that it could help the students who do not benefit from the module of English. 70% however reported that it could add practice to students, particularly those who meet problems in the current course, and cannot be devoted more time due to the limited duration of instruction (question 20).

**Question twenty one** is about the teachers' suggestions. Among the latter, we may cite their proposition to be trained in the field of information and communication technologies. They would like to have practice in the ways to integrate them in the course of English in order to capture their learners' motivation and interest through varying activities as well as resources, particularly that there is a lack of materials at the CEIL.

### **2.2.1.2. Results from the students' questionnaire**

**Questions from one to four** inform us about the different disciplines of the informants namely, biology, computer science, electronics and chemistry (question one). Concerning the class size, an average of 27 to 31 students per class has been calculated (question 1). All the students (100%) asserted that learning in a large class constitutes a problem (questions 3). 80% of the respondents stated that this situation restricts their practice of English, like speaking and reading loudly. 20% of the respondents put forward however the impossibility for their teachers to correct all of them individually, when they carry out some writing tasks in class (question 4).

**Question five** yielded a result of 70% of the students who selected from the suggested list the items speaking, listening and writing as the major aspects in which they meet difficulties, in addition to some language areas like compounding, comparing/contrasting. They also reported having difficulties in reading and synthesizing information (item g). 30% of the other informants however, designated all the items on the list as representing difficulties in the English language.

**Question six** revealed that 70% of the students put forward the listening and speaking skills, in addition to the study of grammar, as priorities. However, 30% of the other students asserted that all the items mentioned earlier in the suggested list should be reinforced.

**Question seven** deals with the ICT tools used in the course of English. Students have to tick off the items from the same list as the one in the teachers' questionnaire. For the first item about language laboratories (a), 100% of the students reported using audio labs with no headsets, no video players, nor platforms. They

ticked off however (100%) the use of computers with CDs, but not connected to Intranet or Internet (item b). As for aspects (c) and (d), respectively about the use of overhead projectors and a data show, 100% of the informants denied their use in the course of English (recently, a data show has been installed in each laboratory).

**Questions eight and nine** concern the evaluation of the multimedia tools used in the course of English according to the students who all (100%) agreed that they are insufficient and inappropriate (question eight). They all reported (100%) the need for further practice in English (question nine).

**Question ten** is about the use of computers in terms of time, with an average of twelve hours per week, which may hint to their readiness for computer –mediated instruction.

**Question eleven** however is about the use of the Internet. All of the students (100%) asserted their use of it for different purposes like mail receiving/sending (item a), looking for general information (item b), and also subject related documents for their projects (item c). Concerning item d, 90% use it for general information searching, chatting, and loading songs as well as films. 10% however reported searching for information related to the course of English.

**Questions twelve and thirteen** are about the integration in the course of English of multi-media tools, which 100% of the respondents asserted will make its teaching/learning more efficient (question twelve). As for the multimedia means students would like to be integrated in the course of English (question thirteen) 80% of them cited computers connected to the internet for supplementary resources, activities, and 20% wished to have presentations on a data show.

**Questions fourteen, fifteen and sixteen** concern the necessity or not of putting a course of English online, which all (100%) of the students welcomed. 70% stated that it would certainly help in answering their learning needs, asserting it would be an opportunity for them to learn English without time constraints. However 30% of the students suggested maintaining at the same time classroom based instruction (question fourteen). They all (100%) answered positively to the question of having more practice online, outside office hours (question fifteen). Among the suggested language aspects (question sixteen) they think would be reinforced, 70% of them ticked off speaking and listening comprehension in completion of which 30% of the students added a review of the grammatical aspects related to scientific discourse (item g).

**Question seventeen** allowed them to formulate some suggestions like to review only the grammatical points they are likely to use to understand scientific/technical literature, in addition to training in writing scientific reports, articles, and making presentations. They insisted however on developing their aural and oral abilities which are very low, according to them, and have very rarely been practised during their previous courses of English.

### **2.2.2. Summary of the interviews, and of the respondents' suggestions**

To avoid redundancy, and as the unstructured interviews were aimed at completing missing information, clarifying ambiguous answers, in addition to yielding further information such as teachers' training, this section will include in addition to the interviews' results a summary of all the respondents' suggestions. All that may serve our research purposes from those results will be presented and discussed.

Regarding the area of investigation about the teaching/learning situation, the number of part time teachers exceeds that of permanent ones. The latter's teaching experience in USTHB varies from 3 to 22 years, while the former's goes from 0 (freshly graduated) to 5 years. Most of part timers leave for various reasons (low incomes, finding new jobs, etc.). Therefore, each year there are new recruitments, which is not likely to favour a stable teaching/learning situation. Apart from one teacher/ researcher, having benefited from training in TEFL, ESP and in the use of some teaching platforms, the other teachers have not benefited from any training. Most of them admitted learning on the job (from the experienced teachers), and gained hands-on experience as far as the use of computers is concerned, along with browsing the web while searching for relevant documents.

Concerning the size of classes which approximated 30 and in certain cases surpassed it, the results showed that the teachers and the students alike reported in a majority that teaching/learning in a large class hinders the running and progress of the course in all its aspects. Among these, they cited the impossibility to proceed to individual corrections of the students in class, the difficulty in practising oral skills, and that of coping with continuous, formative assessment (as recommended in the LMD regulation).

As far didactic materials are concerned, all the teachers in the suggestions and in the unstructured interviews insisted on the lack of teaching materials related to English for science and technology. They reported the availability of some grammar and general science books, rarely used because most of them have been over used, and others are completely out of date. Thus, most of handouts are based on documents

retrieved from the Internet and are exploited to teach some grammatical aspects, and general science texts.

As regards the availability of Information and Communication Technology (ICT) tools, all the teachers confirmed their paucity. The respondents (teachers and students alike) also reported the restriction of the available means to the use of a computer connected the classroom's loud speaker. It is used to listen to recordings (either stored in computers or on CD ROMs) exploited in listening/comprehension activities at the master level only, since there are not enough language laboratories. The computers are not connected either to the intranet or the Internet.

In the context of multi-media tools use and according to the questionnaires results, we realize that the students spend more time at computing and browsing the internet than the teachers, which may hint to their readiness to computer assisted language learning. In addition, the majority of the informants, among the students (answers to question 15) and the teachers (in interviews) expressed their preference of having more practice and more resources online. In that respect, the learners suggested their use in study out of office hours, while the teachers expressed the wish to resort to them during class time as well, to reinforce the students' practice.

On the other hand, all the informants acknowledged the multi-media tools' contribution in improving the teaching/learning of English. Thus, all the respondents agreed that their use in the course of English will make it more efficient, and will facilitate its learning. They indeed indicated that having in classrooms more computers related to the internet or any local database (e.g., intranet) to use various resources is a necessity. Most of the teachers in the interviews reported however their unfamiliarity

of how to integrate those tools in the course. A certain number of them admitted downloading online quizzes.

Regarding the development of an online course, both the teachers and the learners welcomed that idea, but the reasons differ. The majority of teachers underlined its appropriateness for additional practice of the language, and only a smaller proportion (30%) answered that it could be a solution for the students who could not benefit from the classroom-based course (the questionnaires' results, question 20, item g). It is to be noted here however, that a larger percentage of the teachers adhered to this last view during the unstructured interviews, when we enquired about the possible difficulties encountered in teaching to large classes. However, all of the students expressed their wish to have an online course to be accessed out of office hours. They added (justification of the 'yes' question number 14) that it could be available any time, any place and for whoever wanted to study English. A smaller number of students however reported willing to maintain, at the same time classroom-based courses.

Concerning the language aspects that are likely to be reinforced through an online course, the teachers think this technology mediation is interesting to involve all the skills, focusing on reading, writing and listening, while the majority of students (as shown in answers to question 16) rather insisted on using it mainly for aural and oral activities. A smaller number of students however indicated as well the review of the grammatical points likely to be needed in scientific discourse such as compounding, comparing/contrasting and the use of tenses.

The information yielded so far, has shed light on our research questions and elicited items that guide us towards answering them. This is tackled in the coming section.

### **2.2.3. Answers to our research questions and discussion**

The results described and discussed so far put forward pertinent information that allows us to proceed to answering our research questions. Thus, our first research question was:

**1.** Would an online course be a complementary solution to the conventional, face-to-face course given that the latter has shown limitations in the Algerian context and that new needs for change are necessary?

As a reminder, we aimed to investigate the teaching/learning situation of the course of English in order to examine the need for the design of an online course on an informed basis. We wanted to identify the strengths and weaknesses of the present teaching tools. These revealed to be insufficient and inappropriate in that, the content of the available textbooks is generally outdated, particularly as far as some subjects are concerned namely, computer sciences which are evolving rapidly. Moreover, as their number is limited some textbooks have been overused. The inexperience of some teachers and the lack of training of the majority of them, in addition to their literary backgrounds hinder the task of adapting the highly technical documents available in the university's library. This may have been facilitated if some cooperation existed between subject and English language teachers (as suggested in our previous research, summary of main points pp. 3-5). However, some initiatives exist as some teachers of English do their best to adapt and understand some documents, by browsing the web

and asking some subject teachers about some clarifications. Such cooperation should be organized and regulated in that, the concerned teachers' work load may be alleviated to allow an effective development of teaching materials, though an expert supervision may be necessary. This task of materials development should be subscribed within the overall process of course design. Exploring the need for the design of a relevant course seems indeed necessary and constitutes our main concern in this research work.

On the other hand, our results pointed out the paucity of the available multi-media means used in the course of English. The only tool used is a computer with CDROMs. More computers connected to the Internet or the intranet could have provided the course with useful teaching/learning resources. Using the university's platform for instance would have been a great support on condition that teachers are trained in using it, and the necessary arrangements made at the administrative level. The yielded information related to the teachers' illiteracy regarding the integration of technology in teaching, inferred from their answers to the questionnaire and put forward during the informal interviews, highlights the acute issue of training teachers in educational technology, as well as in the ways of integrating it in their teaching practices.

In addition to all those factors highlighted by the investigation and which hinder the enhancement of the teaching/learning of the course of English, not all the students in our university benefit from the current course of English, though a mandatory component on their curricula. Such a situation led some teachers (during the interviews) to express their skepticism as to continuing to ensure the face-to-face

course, in that context, to the increasing community of learners in the future. Accordingly, we may say that our concern is shared by the majority of the respondents.

Moreover, the amount of instruction devoted to the module of English which does not exceed one hour and a half per week, restricts the students' practice of this language. In this context, the students highlighted the expectancy that their aural as well as oral skills could be improved (answers to question 16), particularly that they are rarely practiced in the current face-to-face course. These results seem to answer therefore our first research question of examining the need for the design of an online course as a complementary solution to the current, classroom-based one especially that the investigation put forward the respondents' acceptance of such a suggestion. The issue that arises then concerns the online course objectives since the latter are at the core of any course design, hence our second research question:

**2.** What would the online course objectives be, compared to those of the current classroom-based course?

The area of investigation aimed at checking whether changes occurred in the course objectives set earlier for the classroom-based course (summary pp.3-5) showed no significant shift, as it will be discussed in chapter four. Developing reading and writing communication skills related to science and technology are still considered as the target objectives by both the teachers and the students. Training is thus needed in rhetorical functions (Trimble, 1985) related to scientific/technical discourse such as exploring/recognizing the discourse organization, describing processes/objects then, comparing/contrasting them, classifying and synthesizing information, in addition to

reducing/summarizing content. This is what we already identified and qualified as objective needs, as opposed to subjective needs (Hutchinson and Waters, 1987) which students still emphasize, i.e., aural and oral skills. The lack of training in these skills led the students to suggest their inclusion in the online course. This may be taken into consideration since students may use English for occupational purposes in case they work in a multi-national environment. Those skills may also be required in some international events, as stated by the students. Moreover, English has more than ever become the language of research; so, such skills may be needed in conferences, but also as the students suggested, in virtual communities of practice (groups of people sharing the same interests), or online research communities. The latter was not a common setting of practice during our first investigation (magister, 2002, summary 3-5). Thus, we may infer that there is a change at this level in that, building aural and oral skills turned out to be no longer subjective needs and should be catered for.

Accordingly, we may say that our second research question has been answered by the respondents in that, no significant change, in general, has occurred in the course objectives developed for the classroom-based course. They can therefore be taken into consideration and adapted for the online course, to be designed so as to meet the students' learning needs. This brings us to consider whether the current course materials could be used in the online course, since no major change has occurred in the course objectives, hence our third research question:

**3. What would the online course content be as compared to the classroom-based one?**

As shown in the investigation results, the majority of the students who already attended the classroom-based course expressed their wish of having more online

practice in English out of office hours (answers to question 15). In addition, they suggested developing the listening and oral skills from further practice through the online course (answers to question 16). Subsequently, we may retain that the online course should not have the same content as the conventional face-to-face course, but should be based on the learning objectives already developed according to our students' learning needs, then checked and completed through the recent investigation related to our current research. This is to allow all the students to benefit from it, even those who already attend the face-to-face course. Such findings answer therefore our third research question.

In the light of our results, we may conclude that the elicited information corroborate our concerns, that in the light of the difficulties encountered in teaching/learning of the course of English in our university, and of the inefficiency of the present teaching tools, the initiative of exploring the need for the design of a relevant online course as a complementary solution seems quite favourable and relevant. Such a course may be designed as an adjunct to the current, conventional one but not with the same content. It will be developed however according to objectives based on our students' learning needs, which is likely to be a plausible solution. It will be interactive and available for self-study to allow learners to study at their own pace, outside office hours, particularly when they cannot benefit from the current, face-to-face course. In that respect, we have to examine which technology is appropriate to convey such an interactive, online course. A relevant instrument is needed indeed that could be accessed without time or place constraints, and be all inclusive. In other words, it should include the necessary tools relevant to practise all the language skills

and areas identified through the investigation; provide opportunities for teaching/learning interactions; be flexible to integrate appropriate activities such as listening; doing quizzes enabled with corrective output, reading and checking comprehension through answering questions then receiving prompt feedback; in addition to allowing an easy navigation through the different course components. Most of all, it should allow the tracking of the students' learning and participation in the course, particularly in a self-learning context that we aim to adopt for this online course. Feedback from such tracking will be useful not only to help students in case monitoring them is opted for later, but also to refine and adjust the online course with a view of implementing it subsequently.

This enhanced us to first start searching in what I use here interchangeably e-learning or Computer-Assisted Language learning (CALL) literature. The latter informed us of the relevancy of VLEs (virtual learning environments) for such purposes like those described above. We then turned to the facilities offered by our university, since results from our investigation indicated that our centre of languages is not equipped with the appropriate infrastructure to host our online course. Our choice will figure among the recommendations to be presented in the coming section.

#### **2.2.4. Suggestions and recommendations**

On the basis of our research indeed, we identified several weaknesses that led us to think of some recommendations, some of which are already obvious. Our recommendations are:

- In regard to the paucity of ICT tools available in our Centre of Intensive Teaching of Languages (CEIL) as stated in the investigation results, our first suggestion would be that of settling an appropriate technology infrastructure. It is to be noted here that among the facilities available in our university, we found out a virtual campus and the platform MOODLE. This helped us in our choice of adopting it for the development of an interactive online course, though any of the numerous platforms like SAKAI may have been adopted. However and for the sake of practicality and appropriateness, we have chosen MOODLE which is one of the platforms adopted worldwide in teaching, and may be available for our use since it is free. This platform's affordances are expanded later on in this work.
- An appropriate equipment indeed, including a high speed internet connection should be installed at the CEIL instead of overloading the university's resource centre. This will allow an easy access to the platform, and will facilitate carrying out the different course activities.
  - After installing the appropriate technology, maintaining and upgrading it constitute unavoidable requirements.
  - The course may be delivered completely online, or in parallel to the face-to-face course. Indeed, hybrid learning may as well be opted for to tackle the activities that require individual or collaborative work, leaving those that necessitate the teachers' presence to the face-to-face course.
  - Given the scarcity of the teaching materials dedicated to teaching English in our university and the faced challenge of matching the steady evolution in the scientific/technical domain, it seems necessary to reflect upon ways of developing

educational materials for teaching English for science and technology, with a regularly updated content that addresses the students' learning needs and copes with the constant progress in this field.

- Among those ways, language teachers may be encouraged to work with subject teachers in organizing and adapting articles, or chapters of books as well as videos.

However, we should ease those teachers' workload.

- Experts may also be involved to help teachers develop appropriate teaching materials, and become themselves course creators through pertinent training.

- The lack of training if any of the teachers of English, as they revealed in the informal interviews, denotes the necessity to provide teachers with relevant, both educational and technological support.

- Training should indeed cover areas related to background educational theory namely, online teaching/learning, and course design.

- Training in educational technologies should be provided to teachers both in pre-service and in-service phases as previously stated. They should be endowed with computer literacy skills, and benefit from training on learning management platforms, like Moodle.

- This training should encompass practice in not only how to use the new technologies, but also how to integrate them in their teaching practices as well.

- It is also important to sustain that training through cyclic workshops in educational settings. This will allow the teachers being trained to update their knowledge, exchange information as well as teaching experiences, and clarify some issues in relation to teaching practices integrating technology.

Such a follow up in the field will certainly reassure the teachers about their teaching, and the students about their learning, which will enhance their motivation in addition to developing positive attitudes.

Ultimately, such training courses will enable teachers to use adequate tools to design and develop teaching/learning activities that will be pertinent, or likely to meet our students' learning needs as well as objectives.

- As for learners, generally used to rely on the teacher for their learning, they should be encouraged to be responsible for their learning, and deepen their knowledge through further reading as well as knowledge sharing. They may be enhanced to collaborate on tasks. We may give examples of expanding on definitions to enrich a course glossary, or contribute to wikis with pertinent knowledge by searching further information (webquest), and improving a subject-related article.
- They may as well be encouraged to share learning experiences by participating in forums with relevant postings, like answering posted questions, or contributing with clarification to some ambiguous issues.
- They should be trained in learning in self-instructional situations, by helping them to develop autonomy-enhancing skills and strategies through an appropriate use of Moodle tools, and pertinent activities.

Such suggestions do not seem difficult to realize. However, taking them into consideration would probably contribute to improving the teaching/learning situation in universities in particular, in crowded ones. This is also relevant to the teaching of languages in our country, in general.

Finally, as our research questions have been answered through the investigation carried out for the purposes of our current research, that our informants' feedback was in favour of the development of an online course for which the platform Moodle has been adopted, that our students' learning objectives have been checked and completed, that we have been informed of our research topic related literature, we shall use all those elements to construct the online course design. The latter will be tackled in the coming section.

### **CHAPTER 3 The rationale for the design of the online course**

Having reviewed the basic learning theories and the models which have been built on them, mainly those dedicated to online teaching/learning, we retain that the student's learning needs and objectives, as well as the use of appropriate CALL applications are catered for in most learning models. We have also reached the conclusion that it is not sufficient to adopt a sole approach-based learning model to build instruction on, and create the ideal design. A richer model may be built on an eclectic approach that would encompass aspects from various learning theories and models of learning, in accordance with the online course objectives based themselves on the students' learning needs. This implies a flexible model which is more likely to promote learning in an efficient way. In this work, the online course objectives will be specified, then converted into learning activities according to Grave's framework (1996) and Trimble's rhetorical levels (1985). They will also be classified following Bloom's revised taxonomy (Anderson and Krathwohl, 2001) and adapted from CELT (1995-2017). For the general design of the online course, we have chosen as a reference Hubbard's (1996, 2011) framework concerning the development, the evaluation and implementation modules, inspired itself from Richards and Rodgers' categories of approach, design and procedure (1982). In Hubbard's framework the 'development' component or module (used here interchangeably) includes **approach** (learning and linguistic assumptions), **design** (elements which interact with the learner's profile and the syllabus' objectives, for instance language difficulty, program content etc.) and **procedure**. The latter is related to considerations dealing with the actual program that presents the materials like activity type, the presentation scheme

involving such modalities as text, graphics, video, and elements comparable to the screen layout, help as well as control options, in addition to the feedback to responses etc.. Thus, while tackling all those course design components, we should have in mind the other framework's module related to evaluation. The latter focuses on the operational description of the software that is, consistency should be met at all levels: the software generated interactions, learner fit (whether design components meet learner's needs) and teacher fit (the compatibility of the software with the teacher's assumptions about the nature of language and the way it is learned). Hubbard's framework indeed, embodies a template for course design and evaluation criteria that guides that design, implying constant evaluation. The framework's component 'implementation' deals with how best to use the software, how to realize the course content and pilot it as well. We shall cater for these phases in this work, in the light of the affordances of the platform MOODLE, of the students' learning needs and course objectives, in addition to our adopted eclectic approach.

Concerning the latter, it is subscribed within e-learning, and it subsumes principles from ESP/EST, social constructivism, as well as TBLT with a compromise (see 1.4.1) borrowed from Swan (2005) in that, target-like accuracy should be promoted by offering opportunities for focus on the form. So, using aspects from such diverse learning theories and approaches for the design of the online course is likely to make it more flexible, which is one of the characteristics of online design. The latter's further steps consist in setting the course objectives, and then into converting them into learning content, according to Grave's (1996) framework and Trimble's (1985)

rhetorical levels, caring at the same time for evaluation criteria, as presented later on in this work.

### **3.1. The development of the course objectives**

The course objectives based on the students' needs, were initially identified from our previous research (magister thesis, 2002; summary pp.3-5). They had been used then as guidelines for the current classroom-based course, and subsequently enriched with some colleagues' contributions in form of collected and adapted materials. That contribution helped in improving the content of the different syllabi of English in that, they constituted an attempt to better meet the objective needs of the students and the requirements of English for Specific Purposes (ESP), or more precisely English for Science and Technology (EST). Nevertheless, continuous updated and adapted authentic materials are needed to meet the constant progress in the Scientific/Technical fields, particularly in Computer Sciences. The investigation carried out through our current research however, allowed us to check the students' learning needs and update their learning objectives. It has been found out that their objectives needs are globally still relevant, except that oral and listening skills are no longer to be considered as subjective needs, and they should be catered for in the online course.

We thus thought of developing an interactive, online course that is likely to meet the students' learning needs. This specificity, we hope, will make our interactive course different from the other e-courses, such as those described in the studies we have dealt with earlier (chapter 1), bringing therefore some originality to our research work.

To call the latter a 'course', we have first distinguished between 'Curriculum', 'programme', or 'syllabus', terms that are often confused and may mean the same thing, i.e., course. According to Dubin and Olstain (1986), the term 'syllabus' concerns a restricted audience, compared to 'curriculum' or 'programme'. The present research work is aimed at exploring the need for the design of an interactive, common-core course (sharing the study of the scientific discourse grammatical aspects, as in summary pp.3-5) for the students of the university USTHB which may be called a 'programme' or a 'curriculum'. On the other hand, some disciplines are concerned with related reading materials like computer sciences or biology, which appeals therefore to the label 'syllabus'. However, as this programme is not intended to be an official one but to be put online for our learners' self-instruction, we are going to call it here a 'course'.

This course is to be built according to the students' needs as identified in the investigation related to our current research. The learning objectives we have identified will be the basis of this online course, like reading subject-related texts and synthesizing information, a rehearsal of the tasks they carry out during their studies. Features related to the scientific/technical discourse (like Trimble's rhetorical levels, 1985) and needed by the students will therefore constitute the basis of the online course objectives, to meet the requirements of meaningful as well as relevant learning (learner fit, in Hubbard's framework). For instance, learners need training in some rhetorical functions related to scientific/technical discourse such as:

- exploring and recognizing the discourse organization;
- describing processes, objects;

- comparing and contrasting them;
- classifying and synthesizing information;
- reducing and summarizing content.

Accordingly, as teaching is a result of a rigorous process based here on the needs analysis results, the identified skills and sub-skills or ‘activities’ will be converted into language items. These are to be sequenced and arranged coherently with appropriate strategies as well as techniques.

For convenience, the word ‘skill’ is used here interchangeably to refer to the four skills i.e., ‘listening’, ‘writing’, ‘reading’, and ‘speaking’. However, the words ‘task’, ‘activity’, and ‘sub-skill’ are used to mean the same thing as the examples given by Graves (1996, pp. 21-22) when she states:

However, because becoming proficient in each of these skills entails mastery of a set of sub-skills and processes, many teachers choose to emphasize certain skills or find ways to integrate them. For example, to become proficient in writing, a student must learn how to structure paragraphs, how to use cohesive devices, the rhetorical styles of written English, editing techniques and so on.

For this, we have chosen to use Grave’s (1996) framework (as in our previous study) because it helps in specifying objectives and organizing a course, taking however into consideration (for the current research) the online environment. We have used as a reference Stern’s (1992 cited in Graves, 1996, p. 17) four types of goals:

***Proficiency goals:*** developing a general competency in the four skills (reading, speaking, listening and writing) and of specific language behaviours.

***Cognitive goals:*** include mastery of both linguistic and cultural knowledge.

***Transfer goals:*** use the learning skills acquired in one situation to cope with the learning requirements of another situation.

***Affective goals:*** aim at achieving confidence both as a learner and user of the language.

We have first specified our students' **proficiency goals** as the reading abilities and related strategies inherent to scientific and technical English written literature. Since most tasks involve more than one 'macro-skill' (Nunan, 1989) to mean skill, other skills may be developed simultaneously, though with less emphasis. Thus, skills may be integrated while carrying out different activities to build up oral, aural and particularly, reading/ writing abilities. According to our findings, these may be needed in the target situation to attend conferences, or publish scientific as well as technical articles.

Then, **cognitive goals** have been translated into building knowledge of the linguistic features and rhetorical cues specific to EST discourse.

Next, we have converted **transfer goals** to training learners in learning how to learn, which means learning to adapt the different skills and sub-skills they learn (like describing experiments, reading and summarizing, guessing meaning from context, predicting etc....) to different situations, like students reading their subject-related documents and summarizing important information.

Finally, **affective goals** have been assigned to training students to achieve confidence both as learners and users of the language since the course we aim to develop is intended to reinforce their abilities in the above cited aspects, as identified in the investigation results. As there are no time or place constraints related to an online course, the learners can progress throughout the various activities at their own pace, according to their abilities.

Once set up, we have broken down those goals into objectives according to Graves' specification (1996, p. 18):

Content as knowledge might be stated as ‘students will know...,’ ‘students will learn that...’ Content as skill might be stated as ‘students will be able to...,’ ‘students will develop the ability to...’;...content as attitude and awareness would be stated as ‘students will be aware that...,’ ‘students will develop an awareness of...,’ or ‘students will explore their attitudes towards...’ objectives stated in this way can help teachers address affective aspects of learning.

We have therefore converted proficiency goals into **content as knowledge**, cognitive goals and transfer goals into **content as skills**, and affective goals into **content as attitude and awareness**, like students being aware of their learning objectives. These last goals however, are not likely to be described in a precise way since the online interactive course will be self-instructional and computer-mediated, although such goals may be catered for while examining Moodle’s tracking system to know about students’ participation and feedback. Then, those who do not participate, for instance, may be contacted to know the reason and present any needed help. Moreover, while making their way through the different parts of the online course, it is hoped that learners may learn how to manage their learning and become autonomous learners, which may be achieved through promoting their autonomy with the different strategies and activities tackled in this work. As described below, we have developed a framework of objectives and principles to be referred to when specifying the e-course content, since objectives are but a way of formulating content activities (Nunan, 1988b).

First, in **content as knowledge**, reading and writing are seen as the students’ major target activities. Their content is likely to be related to the learners’ subject-matter. In this context, Graves (1996, p. 23) states that such a course:

...may teach the subject matter directly or use subject matter as the basis for language learning lesson. Thus the target language can be both a means for and a by-product of learning the subject-matter.

In the case of the online course, subject matter may be adapted to teach the English language. However, to take into consideration all the different disciplines existing in the university USTHB is beyond the scope of this research work. Hence, we intend to opt for texts related to only two disciplines, i.e., computer sciences, and biology, with varied instructional purposes related to scientific/technical discourse. The objective is to reinforce the students' abilities in those domains, which does not exclude dealing with the other disciplines in the future. Reading materials can be in a linguistic form e.g. written language or a non-linguistic form (Nunan, 1989) e.g. recordings. They may be extracted from a textbook or retrieved from the internet, adapted and/or synthesized. They may as well be videos-based. Reading tasks and activities should also be related to the materials in hands.

Second, **content as skills and strategies** should help learners to familiarize themselves with the organization of scientific texts, and to recognize the inter/intra-sentential relations, through inferences/references. Indeed, students will be trained to use the different discourse clues to make predictions on the following events in texts, and to guess meaning from context of unknown relevant words, mainly 'sub-technical' vocabulary and noun-compounds. Accordingly, skills and activities should be context-related, with activities such as transformation exercises, transferring information from texts into tables or from tables to texts, 'information gap', 'reasoning gap', and 'opinion gap', or reading and writing down summaries. While dealing with such tasks, students learn to cope with grammatical features inherent to scientific/technical discourse, such as the modal use in the rhetoric of instruction. Thus, grammar instruction will be meaningful since it rises from context.

Finally, we reach the last step in our framework of objectives expressed in terms of content, which is **content as attitudes and awareness**, since the learner is an important actor, with a central role in learning. Learners will indeed be informed of the different tasks' objectives, and will be guided through the course content with clear instructions and various links. Accordingly, they will learn how to navigate within the course towards the areas where they meet difficulties, how to manage their time since they work at their own pace, and how to become autonomous learners (as described in this work). They will also choose to review parts of the course they have not understood, to make new attempts on tests, and/or browse the net for more information on topics dealt with in the course. However, as already stated, it would be difficult to know precisely about the learner's needs, wants, motivation and attitude since this course will be self-instructional and computer-mediated. Nevertheless, we may say that they are to some extent catered for through materials and activities developed according to the student's learning needs. Moreover, being informed of the learners' feedback on forums and from the activity report Moodle tool, may help in finding appropriate remedies. Accordingly, we may state that the e-course learning objectives consist in improving English for science and technology language learning in general, notably (i) building comprehension skills related to reading and listening; (ii) increasing background and subject-related knowledge, like discursive features inherent to scientific/technical English (mentioned earlier), in addition to the associated terminology; (iii) as well as training in writing skills, using the strategies acquired from the former knowledge. Those objectives are summed up below (table 10),

followed by the specification of our students' learning objectives (table 11), classified following Bloom's revised taxonomy (1.4.2.).

<b>Content as knowledge</b>	<b>Content as skills and strategies</b>
<p><b>i) Reading/Listening</b></p> <p>Materials for science and technology with an authentic scientific and technical knowledge.</p> <p>Listening materials related to the reading materials, therefore with the same didactic features.</p>	<p><b>ii) Develop reading and writing skills, as well as strategies</b></p> <ul style="list-style-type: none"> <li>• Predicting the topic of discourse (description, compare/contrast, cause/effect...)</li> <li>• Referencing/inferencing through grammatical and lexical cohesion (pronouns, articles, demonstratives...), in addition to word formation use (affixes, compound – nouns, conversion).</li> <li>• Integrate skills (e.g. reading/answering comprehension questions, through writing (summaries), or listening then taking notes.</li> <li>• Teaching meaningful grammar from context (e.g. through clozes, problem solving activities).</li> <li>• Direct the teaching of grammar towards the areas where students meet difficulties, according to the results of the needs analysis (use of tenses, compound-nouns).</li> <li>• Teach Trimble's grammatical items causing difficulty for reading comprehension (like the passive/stative, the use of modal verbs.).</li> </ul> <p><b>iii) Train students in identifying and organising EST texts following Trimble's rhetorical levels (Trimble: 1985):</b></p> <ul style="list-style-type: none"> <li>• Identifying the topic of discourse (e.g., experiment, hypothesis), through predicting from the title, and skimming.</li> <li>• Identifying the main idea (s) e.g. reporting past research, giving examples on experimental procedures (through multiple choice questions, true/false statements...).</li> <li>• Identifying the specific rhetorical functions that develop the general rhetorical functions (like description, definition, classification), by scanning for specific information (through transfer exercises, information gap, cloze test, and matching activities).</li> <li>• Identifying the rhetorical techniques that generate relationships between rhetorical functions, like orders (e.g. movement and location prepositions, time prepositions) and patterns (e.g. time sequence, how to compare/contrast, how to define, how to describe).</li> <li>• Study and research skills (note taking, organizing and structuring information in writing).</li> </ul>

**Table 10:** Specification of our students' learning objectives based on Grave's framework and Trimble's rhetorical levels. (1996)

The cognitive processes dimension			The Knowledge Dimension			
Categories			Major types and subtypes			
			Factual	Conceptual	Procedural	Metacognitive
<b>recognizing</b> (identifying)	<b>inferring</b> (concluding, extrapolating, interpolating, predicting)	<b>differentiating</b> (discriminating, distinguishing, focusing, selecting)	Knowledge of terminology	knowledge of classifications and categories	knowledge of subject-specific skills and algorithms	strategic knowledge
<b>recalling</b> (retrieving)	<b>comparing</b> (contrasting, mapping, matching)	<b>organizing</b> (finding, coherence, integrating, outlining, parsing, structuring)	knowledge of specific details and elements		knowledge of subject-specific techniques and methods	knowledge about cognitive tasks, including appropriate contextual and conditional knowledge
<b>exemplifying</b> (illustrating, instantiating)	<b>explaining</b>	<b>checking</b> (coordinating, detecting, monitoring, testing)	knowledge of principles and generalizations		knowledge of criteria for determining when to use appropriate procedures	self-knowledge
<b>classifying</b> (categorizing, subsuming)	<b>executing</b> (carrying out)	<b>planning</b> (designing)				
<b>Summarizing</b> (abstracting, generalizing)	<b>Implementing</b> (using)	<b>producing</b> (construct)				

**Table 11:** The classification of our students' learning objectives based on Bloom's revised taxonomy (adapted from CELT, 1995-2017).

This specification of the learning objectives will orientate us towards the design of relevant learning resources and activities. The learning activities are described hereinafter.

### **3.1.1. Learning activities and pedagogy**

Now that the online course objectives are set, we shall deal with the translation of those objectives into content or learning items, such as activities. These are defined (ACU, 2008, p. 6) as follows: “*Learning activities are the tasks and exercises which assist students in making meaning from the content of a course. They are the vehicle through which learning occurs*”. Here we may cite some types of activities (ACU, 2008) such as, note taking [from online materials], group discussions, debates, surveys, accessing and completing exercises on the Web or from a CD-ROM, gathering information from community sources, participating in applied practical sessions, in addition to teleconferencing and videoconferencing.

We can already say that some of those activities cited above are to be present in our online course, like note taking from online materials, accessing and completing exercises on the Web or from a video, and gathering information from community sources. Thus, some pertinent reading, writing, and listening activities have been retained from our set of objectives. Writing is sometimes presented separately and other times embedded within the reading and listening activities, as illustrated in the following table (table 12):

<b>Reading and writing activities</b>	<b>Listening and writing activities</b>
Read and infer the topic and function of the reading passage (experiment, hypothesis...).	Watch a video on a lecture and infer answers for true/false statements.
Read and identify the main idea by selecting from a list of alternatives after skimming, then identify true/false statements.	Listen to a recording and transfer information into tables, or complete a cloze.
Read and identify antecedents of anaphoric references, working at articles, pronouns and their corresponding subjects, nouns, nominal phrases, e.g., through matching activities.	Listen to a recording and identify the topic of discourse.
Read and identify relationships within discourse like main idea, generalization, supporting details, through transfer of information into tables, or vice versa.	Watch a video on a lecture and note down the different rhetorical techniques (e.g. conjunctions) related to the respective rhetorical functions of the topic at hand, like definition, classification, cause/effect...
Read and scan for specific information, like supporting details, through answering open questions, multiple choice or matching.	Listen to a recording, take notes, and then write down summaries from the written notes.
Read and identify logical relationships, working at logical connectors (first, then, therefore...etc.) and other cohesive devices (like punctuation), through ordering steps of a process.	Integrate the mini-tasks (how to define, present arguments/counter arguments, compare/contrast) in carrying out problem-solving activities.
Read and infer meaning of the relevant vocabulary, through matching for instance sub-technical vocabulary with corresponding meaning, scientific and technical words with functions or characteristics.	Integrate different time relaters (first, before, after, then...) to illustrate sequential relationships, e.g. classify, describe different steps of a process, or translate in writing, a PowerPoint presentation with its different phases.
Read and then write down main idea (e.g. selecting from a set of suggested statements).	
Read and identify anaphoric links and relative clauses.	
Reading and writing skills integrated, e.g.: reading and completing a text; ordering steps, reading and then writing short answers to comprehension questions.	
Read and complete tables, or diagrams, then build up summaries from the set of information in tables.	
Write short linked sentences about a diagram, or a PowerPoint presentation using logical connectors; then practise the use of appropriate tenses e.g., use of present or present perfect in the time clause when the time clause is used as a sequencer (in: when you have corrected all the errors, the program will run correctly).	
Guess meaning of relevant scientific/technical words like sub-technical vocabulary as well as noun-compounds from context, and word-formation forms like affixes, conversion.	
Practise the word-formation forms (above) in different activities like cloze test.	
Infer topic of discourse in different reading sessions e.g. classification, argumentation, cause/effect... and identify each time the rhetorical techniques that establish relationships between rhetorical units like: comparison/contrast and their related expressions as well as forms; description and its principles (from general to particular, whole to part, outside to inside); how arguments/ counter-arguments are presented.	
Carry out mini-tasks after reading sessions to work at, each time, the respective rhetorical techniques mentioned above, such as comparing/contrasting methods, describing different steps of a process, or comparing/contrasting programming errors, using appropriate collocations (in contrast, by way of contrast, in comparison with/to...), and grammatical forms like use of the passive/stative in descriptions.	

**Table 12:** Learning activities based on our course objectives.

After this presentation of the major learning activities, we may turn to the other course-related elements such as pedagogy. The latter has been defined in various ways, and its definition has been adapted over time following the evolution of learning/teaching approaches as well as theories particularly ELT. We have opted however for a definition which seems appropriate in that it subsumes concepts related to online teaching/learning such as interactivity. It states that pedagogy embodies the tools, activities, strategies, and decisions engaged for a more interactive, collaborative and motivational learning environment (Bonk, 2005).

Pedagogy relates then to the choice, use, and management of the tools, together with the course content, like learning resources as well as activities. In addition to this, it is worthwhile to underline those various strategies followed to optimize learning, reflect on learning and transfer the skills having been trained in to construct additional expertise.

Having such a definition in mind and concerning tools, the learning management system we have adopted i.e., Moodle seems to be of a great support to promote learning, as described in this work. Moreover, it may be used to organize our online course in syllabi grouping learners in their different subjects will lead them to exchange ideas, links, documents, and build new expertise as stated in the following (Lombardi, 2007, p.2):

With access to online research communities, learners are able to gain a deeper sense of a discipline as a special “culture” shaped by specific ways of seeing and interpreting the world. They begin to grasp the subtle, interpersonal, and unwritten knowledge that members in a community of practice use (often unconsciously) on a daily basis.

Such technology facilitates then not only the grouping of such communities, but the process of interaction towards the building of additional knowledge as well, in addition to the relevant know-how. Such features constitute elements of the general criteria of course evaluation that we shall develop below.

### **3.2. The criteria for the evaluation of the online course**

Evaluation criteria generally hint to quality. What we mean by quality is basically measuring the degree of excellence of something as matched against other things belonging to the same type (Oxford Dictionaries, 2016). Consistent with this, we may mention high qualities courses. These are supposed to encompass some principles like those (twelve) recommended by the American Association for Higher Education (AAHE) and grouped into three categories (Cole and Foster, 2007, pp. 213-214):

#### **Culture:**

- ✓ High expectations
- ✓ Respect for diverse talents and learning styles
- ✓ Emphasis on early undergraduate years

#### **Curriculum:**

- ✓ Coherence in learning
- ✓ Synthesizing experience
- ✓ Ongoing practice of learned skills
- ✓ Integration of education with experience

#### **Instruction:**

- ✓ Active learning
- ✓ Assessment and prompt feedback
- ✓ Collaboration
- ✓ Adequate time on task
- ✓ Out-of-class contact with faculty

We are aware that those categories are used in learning English in immersion, but some aspects may be useful in our context. Regarding this, not all principles are likely to be present in our online course. For instance, a principle like ‘Adequate time on task’ is not to be catered for. The reason is that the course is self-instructional as well as an adjunct to the official course, so there is no time constraint as for task completion and learners work at their own pace. However, it is useful to consider such checklists for one’s course evaluation and remediation, particularly that the more principles are integrated, the better the course (Cole and Foster, 2007). We shall deal therefore only with the principles which are likely to be catered for in our online course.

Concerning the category ‘culture’, the principle ‘respect for diverse talents and learning styles’ is already subsumed in our online course since the latter is self-instructional. Such a teaching/learning mode, on the opposite of the face-to-face one, seems to better fit introverted students for instance (Palloff and Pratt, 2007). Learners are thus likely to study at ease and at their own pace, focusing more on some aspects than on others according to their abilities.

Regarding the category ‘curriculum’, we may say that all its categories are present in our e-course since it has been built according to our learners’ needs, and is in accordance with their target objectives.

As far as the category ‘instruction’, we may retain the two first principles respectively, ‘active learning’ in that our e-course is interactive with our adoption of the Moodle tools ‘lesson’; and ‘assessment and prompt feedback’ whereby immediate feedback is provided to our learners while doing their quizzes, for instance.

Among the other evaluation criteria to be considered, we may cite the five principles Cotterall (2000, pp. 111-112) suggests:

- The course reflects learners' goals in its language tasks, and strategies.
- Course tasks are explicitly linked to a simplified model of the language learning process.
- Course tasks either replicate real-world communicative tasks or provide rehearsal for such tasks.
- The course incorporates discussion and practice with strategies known to facilitate task performance.
- The course promotes reflection on learning

We shall bear those principles in mind when analyzing our online course components throughout this work, mainly in this chapter. For instance, the course objectives are based on our science and technology learners' needs, which implies relevant tasks related to scientific/discourse features (like Trimble's rhetorical levels), as described earlier (tables 10, 11, 12). Also, the last principle about reflection on learning joins the quality principles cited earlier i.e., 'active learning' and 'respect for diverse talents and learning styles'. These principles are considered in the online course since the latter is interactive and allows learners to interact with the learning tasks as well as materials, using Moodle's different tools. Learners may as well interact with peers through the forum, or the chat, regardless of talents and learning styles, like some learners who seem to be more active in online settings, as to be described later on in this work. Such principles should consequently be catered for since they are likely to promote learning and reinforce learner's autonomy. In this regard, research indicates many synonyms for autonomy such as 'independence' (Sheerin, 1991), 'language awareness' (Lier, 1996; James and Garrett, 1991), 'self-direction' (Candy, 1991), and 'andragogy'

(Knowles, 1980; 1983.). This leads us to consider Thanasoulas's (2000, p. 2) description of autonomy definition (by Dam, 1990, p. 16, drawing upon Holec, 1981):

Dam ...defines autonomy in terms of the learner's willingness and capacity to control or oversee her own learning. More specifically, she like Holec, holds that someone qualifies as an autonomous learner when he independently chooses aims and purposes and sets goals; chooses materials, methods and tasks; exercises choice and purpose in organising and carrying out the chosen tasks; and chooses criteria for evaluation.

Such learners' investment in their learning, and their self-initiated interaction with the learning tasks at hand, on the way of knowledge construction put forward the role of constructivism, considered as enhancing self-directed learning. This is a necessary condition for learner autonomy (Thanasoulas, 2000).

Through our online course we hope to develop our student's autonomy as a learner, and as a communicator (see Littlewood's model in 1.4.2). Thus, learners are guided by some links, for instance to do a comprehension quiz after reading a text. However, they are not expected to study all the language items extracted from the reading passages and worked out. They are responsible therefore for dealing with whatever aspects in which they meet difficulties, and making more attempts on quizzes or not. Autonomous learners will take the initiative of carrying out such tasks, and may even initiate interaction on forums, to ask for clarification or make related comments. This will promote their learning and foster their autonomy as well as their motivation, as "*...increased learner involvement in course management can improve depth of learning, motivation, and attitude toward studying*" (Littlejohn, 1983, p. 607). For this, various strategies and skills are to be worked out and catered for, such as those previously cited (in 1.5), or to be dealt throughout this work.

Developing such learning strategies implies, in the case of our self-instructional online course, a well-structured course, a clear page layout, explicit course objectives, and comprehensible instructions (managing the learning environment). Moreover, it is important to provide availability for help via topic-related guiding questions on forums, private help on the messaging tool, explanations in pop-up windows, or in a menu pull-down, summaries of objectives, and glossaries. The various course activities encompass reading/listening, understanding/reflecting/analyzing before and while tackling quizzes (critical thinking), ordering steps of a process, in addition to summarizing (organizing ideas, notes). In doing so, learners direct their learning (monitoring learning), focusing more on some activities rather than on others, and choosing to reattempt or not quizzes.

Catering for those aspects is likely to enhance learners take responsibility for their learning as believed by Holec (1981, p. 3):

...that the autonomous language learner takes responsibility for the totality of his learning situation. He does this by determining his own objectives, defining the contents to be learned and the progression of the course, Objectives are specific to the learner, ... Learning thus proceeds from ideas to correct grammatical, lexical, and phonological form. The self-directed learner chooses the methods of instruction through trial-and-error. His selection is based on the objectives set .... The student evaluates his attainment through his objectives, and this evaluation helps him to plan subsequent learning... For teachers, it means new objectives which help the learner define his personal objectives and help him acquire autonomy.

Accordingly, in a self-instructional course like ours, students are given opportunities to exercise their autonomy. They will learn to navigate throughout the course web pages, and use the available resources as well as help tools to carry out the

tasks. They will take the initiative to initiate interaction through posting questions or comments on forums, looking up explanation of words, or concepts in glossaries, and reading the provided supplementary documents, in addition to browsing the web for further topic- related information. In this context and concerning the learner, Thanasoulas (2000) considers Learning as the result of his own self-initiated interaction with the world.

Ways of promoting learner autonomy may be summed up in the following table:

Level	Learner Action	Content	Process
1	<b>Awareness</b>	Learners are made aware of the pedagogical goals and content of the materials they are using.	Learners identify strategy implications of pedagogical tasks and identify their own preferred learning styles/strategies.
2	<b>Involvement</b>	Learners are involved in selecting their own goals from a range of alternatives on offer.	Learners make choices among a range of options.
3	<b>Intervention</b>	Learners are involved in modifying and adapting the goals and contents of the learning programme.	Learners modify/adapt tasks.
4	<b>Creation</b>	Learners create their own goals and objectives.	Learners create their own tasks.
5	<b>Transcendence</b>	Learners go beyond the classroom and make links between the content of classroom learning and the world beyond.	Learners become teachers and researchers.

**Table 13:** Levels for Promoting Learners ‘Autonomy (Nunan, 1997).

Accordingly and in regard to ‘**awareness**’, its levels are to be taken into consideration in our self-instructional interactive course. Thus, the objectives related to each topic are set up for students. In addition, the instructions related to each activity are clearly put. Consequently, learners realize the requirements of each activity, and choose the strategies to adopt in order to carry out the different tasks.

Concerning **'involvement'**, learners choose their path while navigating in the course web pages, using the various imbedded links. They may focus more on some aspects of the course than on others. They may choose for instance to reattempt quizzes or not. They move on indeed according to their own ongoing learning needs, adapted from the goals and contents of the learning programme. They are therefore involved in the course.

As for **'intervention'**, the learners may choose to deal more with the videos included in the course than with the reading tasks, which is their major target. They may spend more time in trying to imitate the lecturer's pronunciation which we have synchronized with the transcript in the video, than in dealing with the comprehension questions. In doing so, they adapt the goals of the content.

Regarding **'creation'**, the learners are free to manage their time and learning. They may post for instance on the forum, to which they are automatically enrolled as we set it in the course parameters, comments related to some aspects of the course; or they may try to contribute with some clarifications to peers' comprehension, carrying out in this way voluntary tasks.

Referring to **'transcendence'**, the learners may browse the web in search for more information, consulting online data bases for updated knowledge, and trying to keep in touch with experts in their related domain to deepen their learning. They may as well use the chat option included in the course to chat with the teacher, or with colearners for further information.

This brings us to consider in the next sections Moodle's characteristics and its uses in the online course to find out whether the requirements of high-quality courses are fulfilled.

### **3.2.1. Moodle and quality requirements**

Knowing about the various technological means is thus important before engaging in the implementation of an online course. In this respect, one has to evaluate MOODLE's appropriateness to run our e-course as not all what technology offers is suitable for pedagogy, and one should use tools which meet the requirements of the course in order to achieve sound pedagogical processes and outcomes (Felix, 2005).

Consistent with this, we may cite Taylor (2004, p. 3) who points out that *“Understanding the reasons for success or failure depends on deep knowledge of the appropriate relationship of tasks to technology – an area of knowledge that spans both the pedagogic/educational and the technical fields”*.

To understand therefore the relationships of technology to pedagogy/education, we have to be aware of the various functionalities CALL systems provide in order to promote the teaching/learning process.

Here, we may examine the dichotomy 'non-dedicated / dedicated' learning systems, a distinction that Colpaert (2006) made, indicating that the former do not provide some functionalities, like feedback or tracking. However, the latter (dedicated systems) contain such functionalities, since they were developed themselves for language learning, teaching and testing. As already stated, the online system or platform MOODLE has been adopted, and according to such researchers (Colpaert, 2006) who experimented such systems, the latter enhance the efficiency of our

language method or approach, provided they offer a series of functionalities. These are groups of software functions allowing systems to carry out particular tasks like printing documents over a network, or tracking users' information and logging it. In short, they are referred to as functionalities intended for language learning and teaching, and classified (Colpaert, 2004, p 63) into six groups:

1. Data-related functionalities include routines for data selection, retrieval, updating, presentation, and interaction.
2. Linguistic routines include routines for generation (verb conjugation, sentences, etc.) or parsing, translation, speech analysis, etc.
3. Multimedia routines include routines for string manipulation and matching (for dictation and answer evaluation purposes), audio recording and playback, video, graphics and animation, etc.
4. Didactic routines include answer analysis, feedback, help, scenarios, tutoring, evaluation, tracking, etc.
5. Administrative routines include printing, saving, logging, and reporting.
6. Networking routines include downloading, sending, connecting, mailing reports, chatting with colearners and teachers, etc.

However, Linguistic and didactic routines (referred to as linguistic-didactic routines) which constitute according to Colpaert (2004) the core—the specificity—of language courseware, entail an exhaustive knowledge of computational, linguistic or didactic aspects, which is not likely to be found in the same developer. This is why it is difficult to develop such linguistic-didactic routines; hence the necessity to improve (Colpaert, 2004) the fields of Intelligent Tutoring (IT) and Natural Language Processing (NLP). Research in IT is concerned with developing computer tutoring, while NLP is rather related to the automated processing of human language (Meurers, 2009).

Those functionalities (cited earlier) are thus designed to cope with the requirements of language learning and teaching, and are encompassed in dedicated

CALL systems, developed themselves for language learning, teaching and testing. This specification, considered as a ‘useful dichotomy in CALL’ (dedicated systems versus non-dedicated systems) is important in that it distinguishes such dedicated systems from non-dedicated ones as follows (Colpaert, 2006, p. 488):

Nondedicated systems (tools or CMC [Computer-Mediated Communication]) can play a role in language learning and teaching but, by definition, will never offer appropriate guidance, feedback, tracking, or reporting functionalities.

To classify our adopted learning environment Moodle, we can say that it is a dedicated system and is likely to meet the requirements of our e-course, as it encompasses different tools and is flexible.

In this context, some questions may be asked like: What is MOODLE? And, why MOODLE? Using ‘Talk and Chalk’ (Cole & Foster, 2008) that is traditional, classroom-based teaching is normally sufficient to run classes, so why is this interest in the computer and the web fast growing? One may think of various reasons like those related to time management and efficiency. Indeed, why not deliver content on an online environment and reserve the course time for debates, questions, or explanations to promote interaction and communication? Moreover, why not remedy temporal and spatial constraints and study whenever available, wherever convenient, and at one’s own pace?

We thought of adopting a web application, the course management system (CMS) ‘MOODLE’ (Modular Object-Oriented Dynamic Learning Environment) because it is a free open source (the source code of its software is available), and because of its appropriateness for teaching/learning languages (Cole & Foster, 2008).

Moreover, it is continuously updated since a whole community of developers is working on it. It can be freely downloaded and installed on an infinite number of servers. As a reminder, Moodle was originally developed by a computer scientist and educator Martin Dougiamas who was already working with a CMS constructed by engineers. He realized that a system built by someone who started with the educational process rather than an engineering process would be noticeably better. Moodle has indeed a sound theoretical basis which is social constructionism, and is therefore learning-centered while most commercial CMS systems are tool-centered (elaborated on in chapter 1). Moodle is a web-based tool accessible via a web browser and an Internet connection, although we have succeeded with some help to install an offline version of it on our laptop. The tools it provides allow educators to enroll learners with their individual university accounts and a simple subscription key, after the creation of their own course websites. The needed software is therefore integrated in the platform Moodle, allowing educators to focus only on the writing and teaching of their courses. Moreover, when a difficulty is encountered as to the use of some functionality, a simple click on a question mark in a yellow circle will display the help file needed, and this extensive help system is presented throughout Moodle (Cole & Foster, 2008).

To know however about any platform and assess its relevancy to our course's objectives some teaching and learning related questions should be born in mind, such as those stated by Salmon (2002, p. 204):

- Ask not, “What can the platform do for me?” but “What can I do with it?”
- Does this platform emphasize the delivery of learning resources, or interaction between participants? If both, what is the balance?
- What are its special affordances, characteristics and limitations?
- Can I learn to e-moderate online through the platform itself? (If not, why not?)
- How can I easily adapt the platform to suit my current and planned teaching and learning practices?
- How will this platform help me to create active and interactive learning?
- What special features does this platform offer to help promote group participation, deal with the emotional aspects of learning in groups and save and manage time?
- What provision does the platform make for participants with disabilities?

Such questions are indeed worth considering in our exploration of the platform Moodle, and some answers to them have already been anticipated. In addition, we shall subsequently try to highlight its assets that contribute to making the teaching/learning process more effective. For this, we shall first consider Moodle in terms of tools. The advantage to be noted with Moodle is that more tools can be imported into it, like the authoring tool HotPotatoes to build quizzes. It also includes reporting functionalities, such as the tracking system. Moreover, its “*educational philosophy guides how those tools are designed and can influence how you structure your learning environment*” (Cole and Foster, 2007, p. 212). For instance, there are options for the general format of the course to be opted for according to one’s course objectives, i.e. the social format, the weekly format or the topic format that we have adopted.

Our experience of working on it helped us also discover a variety of uses that are available thanks to its components. Some of the latter, among which those to be exploited for our e-course, are to be considered here are as follows:

- a. **The Front Page:** It may contain the course’s description with a number of links referring to the different site pages.
- b. **Roles and Enrolment:** A role is a collection of permissions defined for the whole system that we can assign to specific users in specific contexts. Thus, as a teacher creator (a teacher allowed to create, edit courses and assign roles), we assigned roles to our students who can access the course using a subscription key.
- c. **Course format settings:** There are options for the general format of the course to be chosen. We may cite some formats like the social format (organized around a single, big forum), the weekly format (ordered chronologically), or the topic format (arranged conceptually) that we adopted for our course.
- d. **Course settings editing:** From the same page of course format settings in the administration block, course options are to be set, like course category, full name of the course, or a course summary. We have chosen for instance to enable completion tracking in order to know about the activity completion by the learner.
- e. **The ‘Add a Resource’ and ‘Add an Activity’ menus:** In addition to the different icons, a course page displays two drop-down menus in the middle: the ‘Add a resource’ and the ‘Add an Activity’ to add content into the course. In the “**Add a Resource**” menu we are likely to use:
- Compose a text page
  - Compose a web page
  - Link to a file or web site
  - Display a directory.

From the “**Add an activity**” menu however, we are likely to use:

- Assignment
- Chat
- Forum Activity
- Glossary Module
- Lesson Module
- Quiz Activity
- Wiki Module

So far we have explained, in the light of some evaluation criteria, our choice of the platform Moodle and made a selection of some of its tools to be adopted for our online course. We shall now carry on with matching Moodle's assets against quality requirements by examining the pedagogical implication of Moodle use in the coming section.

### **3.2.1.1. The Pedagogical implications of MOODLE use**

MOODLE is based on a sound pedagogical theory which enhances reasoning, collaborative work and interactivity. Its tools may be adapted to the purposes of our e-course, which is important to know if we have to integrate technology in an effective way, as stated by Hubbard and Levy "*...in ways that are technically smooth and pedagogically sound, ..*" (2006, p. 206).

The specificity of Moodle indeed is this focus on pedagogy, learning and sharing as illustrated by its interface and described by Cole and Foster (2008, p.5):

The first indication is in the interface. While tool centric CMSs give you a list of tools as the interface, Moodle builds the tools into an interface that makes the learning task central. You can organize your Moodle course by week, topic, or social arrangement. Additionally, while other CMSs support a content model that encourages instructors to upload a lot of static content, Moodle focuses on tools for discussion and sharing artifacts. The focus isn't on delivering information; it's on sharing ideas and engaging in the construction of knowledge.

Learning may accordingly be constructed, negotiated and shared in groups. This is allowed by forums, chats, and e-mails. A forum may be designed for each topic to discuss the related issues, by posting a subject of interest to guide discussions and channel the participants' interactions into knowledge building/ sharing.

Moreover, through this variety of learning tools and activities learning is both attractive, and maximized. Consistent with this, it is stated in Hutchinson and Waters (1987, p. 75) that:

If an image gets into the brain through a number of different pathways- by hearing, reading, writing and speaking- that image is likely to be a richer image than if it gets in through only one pathway- the image... will have more connections in the network.

Learning using different sources is likely therefore to be better anchored. Moreover, the activities are enjoyable since they may be in form of video viewing, web sites browsing for more reading for instance, or interactive quiz taking (i.e., with immediate feedback), and not simply presented in the traditional written form. In addition to all this, we hope to learn more about teaching/learning processes since such Moodle tools like 'activity report' will allow us to observe some of the learners' interactions and negotiation of meaning like attempts of answers, the nature of their mistakes, and the

ongoing activities. Here, it is interesting to examine some strategies related to the use of some Moodle tools and consider their pedagogical implication.

Some strategies are thus suggested (Cole and Foster, 2008) to take the best from learning via technology indeed. For brainstorming for instance, it is suggested to create an online version of this process by using a wiki for the whole class, or for student groups, and elicit their feedback around a brainstorming topic.

There is also a suggestion of providing access to a lecture outline before a class session to allow learners prepare for class and structure their class notes. Indeed, when they know about topics considered as important to be included in a lecture, students are more likely to focus on those aspects. They can use the lecture notes as a basic outline and concentrate on expanding the main ideas with examples.

Another strategy consists in exploiting forums as a useful tool for stimulating students' participation and promoting interaction. Indeed, as forums are asynchronous, students can take their time composing suggestions, questions and replies. They do not work under pressure since they can rewrite and submit only the version that satisfies them.

Examples of forums' use for pedagogical purposes are varied. For instance, divided in groups of three to five, students will be assigned the task to discuss a reading before class work, and then answer all the questions asked by the rest of the class. This strategy of collective responsibility is likely to encourage them in reading the assignment and deepening their understanding of it through the question-and-answer process.

Students can also be assigned to groups on different sides of an issue, and each group must post on the forum a consistent argument to defend their view, supported by evidence. They can then be graded on how well they reason and sustain their argument.

Learning styles are catered for as well since technology comes to the aid of learners who do not dare ask questions in a public forum. It provides indeed a private communication channel, a useful way of sending to their teacher private questions through the messaging system. In this regard, Palloff and Pratt (2007, p.233) state that *“the introverted student who may not feel comfortable speaking out or asking help in a face to face setting may flourish in the online setting”*.

The chat may also be used to this end, particularly before exams to discuss any ambiguous aspect of the course.

To measure students' progress, Moodle provides powerful and flexible tools with rapid feedback that paper based testing is unable to fulfill. As a matter of fact, it is almost impossible to score a set of quizzes as many times as the number of attempts students are allowed to make. With a computer however, students can be given the possibility to practise taking a test for an indefinite number of times, and have frequent small quizzes related to different aspects of knowledge. In this context, Cole and Foster (2008, p. 118) assert that:

...the Moodle quiz engine is a powerful, flexible tool for monitoring and diagnosing a student's understanding of certain types of knowledge. Using this tool effectively can boost your course's effectiveness and promote student performance. While a computer-scored quiz is a different evaluation than more open-ended assessments, it does give valuable insight into student thinking, especially when you use good strategies and a little creativity.

To obtain important information about students' learning difficulties and allow them evaluate their own performance, rapid feedback is crucial. Some strategies related to quiz design (Cole & Foster, 2008, p. 118) are also suggested for an effective use of this tool, among which we may cite:

- Relating each question to a course goal in order to check whether course goals have been achieved.
- Trying to ask multiple questions about each important idea in the class to yield more data points about a student's understanding.
- When writing a multiple-choice question, it is more careful to make a wrong answer represent a common misconception to eliminate easy guessing.
- Write questions that elicit thinking at different levels like recall questions, comprehension questions, and application and analysis questions. This will help locating problems in students' thinking, like finding out they can recall the material but not apply it.
- Test the questions to determine which questions are not useful to assign them a lower point value and write new questions. It is also important to use the quiz reports and statistics to supervise learners' performance and measure their understanding of the material.

To sum up the criteria concerning quiz development, it is important to retain that quizzes must be designed in a way that prevents easy guessing, and that meets course objectives. This is to check whether the latter have been achieved. Moreover, they should be varied in content as well as in degree of difficulty to target different levels of thinking. Finally, they should be appropriately graded to assess as fairly as possible students' performance.

Assignments also constitute a useful tool that yields authentic responses from students, who are asked to put their knowledge into practice, like summarizing steps of a process or giving their opinion about a given issue. They can carefully prepare their text and input it directly in Moodle (Online Text), perform the assignment outside of Moodle (Offline Activity), prepare it as a single file and upload it in any format

(Upload a Single File), and upload one or more files in any format (Advanced Uploading of Files). Assignments appeal therefore, for students' reasoning as well as thinking and arouse their acquired knowledge.

Moodle's glossary is another interesting tool which allows creating one main glossary and an infinite number of secondary glossaries in a course. It enables students to learn new words illustrating new ideas and concepts. In relation to this, a strategy is suggested (Cole and Foster, 2008) to assign students to contribute unfamiliar encountered terms and definitions. This will make them more likely to remember words as well as definitions, and be more engaged in the process of learning.

Students' involvement in learning is also appealed for through certain online activities whereby, they are asked to browse the net in search of expanded knowledge about a given topic, and then recapitulating it for group peers (in forums, assignments or through the chat). This illustrates constructing and sharing knowledge, embodied in social constructivism. Here, scales are more appropriate for assessment, as they constitute a nonnumeric way of evaluating students' performance. Words that are meaningful and evocative of ways of improving one's performance are used instead of numbers, and the feedback is qualitative rather than quantitative.

In that respect, one may highlight Moodle's default scale "Separate and Connected ways of knowing" which encompasses three options: 'Mostly Separate Knowing', 'Separate and Connected', and 'Mostly Connected Knowing' which all relate to a theory indicating our approach to the world.

Thus, 'Separate knowers' remain rather objective and are more likely to favour debates; while 'Connected knowers' learn in a socially connected, empathetic way, avoiding confrontation and rather opting for consensus (Cole and Foster, 2008)

Finally, the tip to have information on one's course with a view of improving it is to use Moodle's 'Surveys' and 'Choices' which are two supplementary tools for gathering feedback data from one's students.

The most fabulous tool however in Moodle is the tracking system which stores information on students' logs and participation in course activities.

A regular analysis of course reports will inform the teacher of the number of times each student accessed the course, and the type of course materials as well as activities dealt with since the logs report the time of access. A log to another activity can be a hint to the time spent by a student on a given activity or resource, and all this tracking is listed on an 'Activity report'.

Moreover, the participants' list reveals the participation state of each student and the time she/he has been inactive. A good suggestion is to combine the participants' list with the message system to contact the non-participating students in order to find out about the reason, and may be try to stimulate their engagement in the course and remedy the blocked situation.

The appropriate use of Moodle's features therefore may contribute to an effective and authentic learning. A technological support however is needed for today's authentic learning environments as Lombardi (2007, p. 7) states, explaining that such support subsumes:

- High-speed Internet connectivity for provision of multimedia information, including dynamic data and practical visualizations of complex phenomena and access to remote instrumentation in conjunction with expert advice.
- Asynchronous and synchronous communication and social networking tools for the support of teamwork, including collaborative online investigation, resource sharing, and knowledge construction.
- Intelligent tutoring systems, virtual laboratories, and feedback mechanisms that capture rich information about student performance and help students transfer their learning to new situations.
- Mobile devices for accessing and inputting data during field-based investigations.

Here, we may underline the crucial problem of internet connectivity in our institutions in general, which is rather slow. This condition may hinder the teaching/learning process, and slacken learners' motivation.

In the light of this description of the various Moodle tools, of their use and some of the resulting pedagogical implications, we may say that Moodle answers most of the quality principles discussed so far. Indeed, by using Moodle tools creatively while bearing in mind our course's objectives and an appropriate pedagogy, we can take advantage of all the benefits of technology without losing sight of effective teaching/learning processes. This last point will be tackled hereinafter through examples of Moodle use in some higher education courses.

### **3.2.1.2. Illustrating Moodle use in some higher education courses**

To illustrate Moodle use in tackling some difficulties, we may cite four basic course types in higher education (Cole and Foster, 2007), 'Introductory survey course', 'Skills development course', 'Theory/discussion course', and 'Capstone course'.

1. Introductory survey course, a large lecture course, is intended to provide learners with foundational notions, basic concepts and vocabulary.

Two problems are encountered in such courses: the difficulty to evaluate the open-ended assignments such as projects due to the large size of the lectures, which is another difficulty in itself in that, learners are less likely to engage in the subject matter.

In order to solve such problems, solutions like group projects are appropriate. For this, Moodle collaboration tools like forums and wikis constitute pertinent ways of communication, particularly wikis whereby they can type their texts, modify them and even review previous writings. The final version may eventually be submitted for grading. Class forums and group forums constitute excellent tools of interaction in that they allow teachers to plan questions for discussion, either to expand on the subject at hand, or start new topics and guide discussion. Even learners with difficulties to communicate in face-to-face modes may be encouraged to take part in discussions and ask for clarification.

Other strategies to keep learners engaged in such long lectures imply that teachers post the outlines and the lecture notes in advance. The objective is to prepare learners for the subject to be studied and allow them to take notes, in addition to writing down questions to ask for clarification or make comments. The Moodle tool 'Resources' allow teachers to post any documents, even videos or MP3 attachments. This is important mainly in case of hybrid courses, where part of the course is online while the other part takes place in a classroom (face to face). This last part will thus be

devoted to clarification, application and expansion of information, which will promote active learning, prompt feedback, in addition to ongoing practice of learned skills.

Testing students' understanding of the given material and of the topic at hand through quizzes as well as prompt feedback is enabled through the tool 'Quiz'. Short quizzes related to the different parts of the course allow a gradual assessment of students' learning as they work out the 'long lecture'. This will also help teachers assess their course, adjust it, add more activities or resources and enrich discussions on forums. This process will keep learners engaged in the course and encouraged to expand their knowledge by reading, in addition to browsing for further information.

Building students' vocabulary while advancing in the course is necessary, particularly in the case of our science and technology learners who have to learn their subject-related terminology. This is enabled through the tool 'Glossary' which may be enriched with learners' contribution, by looking for new definitions and adding them to the glossary, through auto-linking. This may even be graded, which will increase learners' motivation.

The tool 'Lesson' is also used to create lessons on important topics, followed by prompt feedback to facilitate rapid understanding of the topic at hand.

Such long lectures may be exploited to create important resources for study. Students may be asked to collect information for the course projects as they study, which will constitute rich databases. This is possible through the use of the Moodle tool 'Database'.

Finally, some students may have difficulties with such large courses' materials and may lose motivation. Getting in touch with such learners and others that have not

accessed the course for long is possible by filtering them by last login, and sending them regular messages through the Moodle tool 'Messaging'. This may lead them to describe their difficulties and obtain solutions to catch up on the course activities.

2. Skills development course, like labs or workshops, is designed to allow the ideas presented in beginning courses to be applied. Such a course then encompasses discussion of theory, but mainly its application to problems.

Developing automaticity in some skills, flexibility in skill application and refining skill performances required in such a course implies continuous feedback as well as assessment. Moreover, learners need feedback to know whether they are performing the skills correctly. Resources are also needed to help them find answers to their difficulties. For all this, Moodle provides an effective practice environment for skills development for instance, demonstrations in addition to step-by-step instructions will help students practise on their own, and avoid repetitive queries. For this, teachers have to use the 'Resource' tool.

Students may also help each other in realizing their tasks. They may even be graded for their help, which may motivate them and encourage collaboration. For this, the Moodle tool 'Forum' is quite appropriate.

The tool 'Lesson' is also useful in case of skill development. Indeed, each page in the lesson may be used to exercise in the skills being developed in the course, practise in a simulation type of environment, and obtain prompt feedback. In such a course (skill development course) an opportunity may be given to learners to create practice assignments for each other, and produce new materials. Such a growth of materials is allowed by the tool 'Database', as already mentioned.

3. Theory/discussion course focuses more on critical thinking and discussion of research as well as theory, while application is secondary.

Thus, such a process of critical thinking and reasoning backed up by evidence from the research literature, followed by private reflection along with public discussion, may be interrupted or disturbed by prompt feedback. To keep learners engaged in this process without disruption is possible with the tool 'Blog' which also allows the teacher to provide feedback on their entries.

There is another difficulty worth mentioning. In such courses indeed, large amounts of reading original research are required, and not always easy to grasp. As a solution, and to keep learners actively engaged with the reading, it will be useful to create a database where learners are instructed to deposit short summaries of their readings and the related references. Thus, at the end of the course, a rich database will be obtained constituted of abstracts that learners may review, in addition to an annotated bibliography.

On the other hand, particular points of discussion may need further debate and clarification. Such controversial points may be polled on via the tool 'Choice' whereby learners can expand on their explanation, and give more precision. This may even be reinforced with questions on forums for more details. In such a course, learners also need to exchange ideas and share notes. The tool 'Wiki' is appropriate for this activity in that, it constitutes a space where learners can type, modify, and add writings to their mates' without losing previous versions. Moreover, learners will obtain at the end of the course a summary of the whole class to keep with them.

4. Capstone course entails a kind of summative experience that brings learners to expound their learning from their course of study.

Various activities in such a course then are orientated towards a final project, generally a paper or dissertation, where learners apply skills they have learned and have not used since a long time. Teachers may facilitate the task by instructing learners to present part of the project, like an outline, an annotated bibliography, and some drafts to be delivered each time an assignment is deposited. This will keep learners working on their projects while dealing with their course activities. This is possible with the tool 'Assignment'.

Moreover, learners may discuss some issues of their project while working it out to obtain private feedback. This is possible through the tool 'Messaging'. As all messages are recorded, teachers can have an idea on their learners' progress and difficulties. Learners may as well keep notes on their project, reflect over particular points already studied using the tool 'Blog' which may be used as a 'diary', except that it may be accessed.

In the light of this analysis of different higher education courses, and the use of the learning management system Moodle, we may conclude that the LMS Moodle is likely to fulfill those requirements. Its affordances indeed facilitate, as exemplified so far, a wide range of activities and seems therefore relevant to our online course design. We shall attempt to cater for its appropriate use while figuring out the ways to integrate its tools in the teaching/learning process of our online course.

The other evaluation criterion worth analyzing however, concerns Moodle use in relation to learner's autonomy. Indeed, in a self-instructional course like ours, it is

essential to cater for such a parameter given the teacher's absence. The learner works alone and is supposed to navigate in the course, guided only by some signposts present in the course web pages. The bulk of responsibility of time management, decision-taking of reviewing or not the course study notes, or supplementary readings, resides with the learner himself and appeals to strategies related to autonomy in learning.

In this regard, Benson and Voller (1997), in agreement with Holec (1981), define autonomy as 'the ability to take charge of one's learning' for (pp. 1-2):

1. for situations in which learners study entirely on their own
2. for a set of skills which can be learned and applied in self-directed learning
3. for an inborn capacity which is suppressed by institutional education
4. for the exercise of learners' responsibility for their own learning
5. for the right of learners to determine the direction of their own learning.

Such assets may be developed in online learning according to Cole and Foster (2007) who made recommendations concerning the use of Moodle tools to promote learning. For instance, assigning a group of students each week the role of moderators of forums will enhance them to study harder in order to know the maximum about the subject when it is their turn to moderate. Similarly, they will be motivated when it is their turn to contribute to glossary entries or database entries, or when asked to develop a quiz, pulling questions from Moodle database. Learners may as well be solicited to develop learning materials for other students. In all such cases, some Moodle parameters concerning the role of students must first be set in order to enable them perform the different roles they are assigned each time, like in the examples given here. For this, the instructor/administrator can override the student role at the course level to enable the designated learners more permissions throughout the course. Then, when it is time

to restrict their access, role overrides are just to be set in the corresponding areas. Thus, adopting such strategies, taking advantage of Moodle various tools which lend themselves to such practices will enhance learners' motivation, develop their autonomy and promote learning.

According to all this information on Moodle tools, on their functions, their appropriateness to certain pedagogical tasks, and the implication of their different uses for the process of teaching/learning, we have chosen the 'topic format' to organize our content thematically. We have opted for the module 'lesson' to make our course interactive in that, learners can browse its content by a simple click on the different, created buttons. They can therefore work out the various tasks, from reading comprehension, to working language aspects, in addition to listening/viewing video lectures related to their subject. The related tools, like content page editing, uploading of files as well as power point presentations, quiz editing, and Moodle multimedia inserting have been chosen. Moreover, inserting in our online course a forum as well as a chat has been decided upon, to allow learners to communicate with each other, or even with the teacher. Finally, a wiki has been opted for in the final step of the learning process to be used for the project writing.

It seems therefore that Moodle's affordances are appropriate for the implementation of evaluation criteria (Cole and Foster, 2007) as most of its tools are likely to meet those quality principles, as described below.

We shall now carry on with the evaluation criteria regarding the other components of our online course design, as described below.

### **3.2.2. The criteria for the evaluation of the online course content**

In framing indeed all the design elements cited so far (like approach, learning objectives, learning resources and activities) that is in designing, we have to take into account the evaluation criteria of an online course's content. For instance, reflecting before elaborating on activity (used here interchangeably with task) design brings up the task criteria issue which has been discussed by a certain number of theoreticians. We may consider, as an example, the criteria of CALL tasks described by Chapelle (2001) and mentioned earlier (in 1.5).

In her evaluation of CALL software, teacher-planned activities and learners' performance on these, Chapelle followed not only experimental but qualitative analysis as well. She set three levels of analysis for CALL evaluation. The first level of analysis concerns the object CALL software (in our context Moodle), like the degree of its interactivity, the kinds of records it keeps, and whether the quality and degree of feedback are adequate. The appropriate method of evaluation here is the judgmental one.

The second level of analysis is related to the teacher-planned CALL activities which depend to a great extent on the way the teacher introduces and structures it, since not all software or web-based materials are intended for language learning. This can be evaluated again through the judgmental method.

As for the third level of analysis for CALL evaluation, it deals with learners' performance. Therefore, data related to learners' use of CALL and their learning outcomes should be empirically examined (Chapelle, 2001).

Sometimes however, according to Chapelle, both judgmental and empirical methods may contribute to the evaluation, each dealing with specific considerations. As for criteria for CALL task quality, she asserts they should be drawn from theory and research on instructed SLA, and should have clear objectives. Such criteria have been set as follows (Chapelle, 2001):

**Judgmental analysis:** This deals, as explained above, with task quality such as:

- Task conditions are examined to consider whether possibilities are sufficient to focus on form.
- The difficulty level of a task as well as its appropriateness is considered (e.g. an adult beginner and a child beginner will not have the same task).
- A task is analyzed to find out whether a need to focus on meaning arises during its completion (e.g. in a text with missing words, a focus on meaning is necessary to guess the meaning of the missing words).
- Correspondence of a task to target use of language. For this, an investigation of the learners' target needs for instance, will reveal whether a task meets the target requirements.
- Impact of technology use on learning. One may examine whether learners using technology to perform a task will have a positive experience which will enhance them for instance, to use language beyond the classroom (e.g. to use the concepts acquired through a task to expand one's knowledge on the web).
- An investigation may be carried out to evaluate the relevance of the hardware, the software and so on.

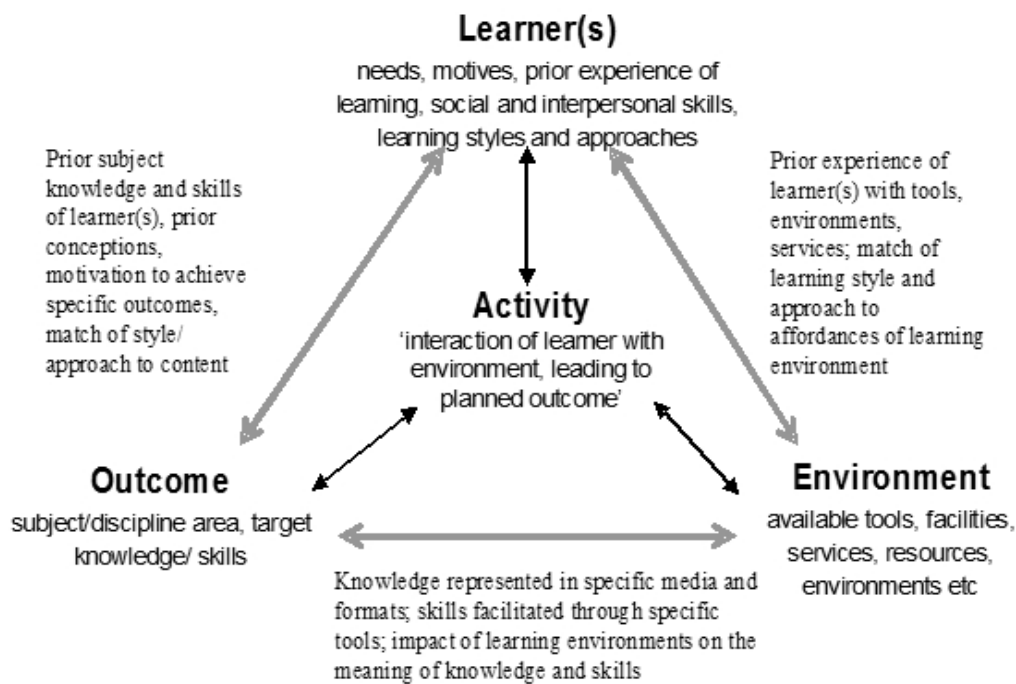
**Empirical analysis:** As explained earlier, this deals with examining learners' performance, in that learning outcomes should be empirically considered, as explicated below:

- Empirical data or evidence can show that target forms have been acquired by learners, and that the latter's attention was focused on form during task completion.
- Evidence may be collected on learners' fit through for instance, whether or not they asked questions on meaning of words, structures, the frequency of their requests, and so on. All these data will give an idea on the parameters within the learner fit criterion during task completion, which depends not only on language learning potential but also on the learners' characteristics (level, learning style...).
- Evidence about learners' answers on a task will show whether they focused on meaning while learning the target language.
- Empirical data will reveal whether the CALL task performed by learners corresponds to their target use of language, and that those learners are conscious of that (e.g. a computer science student needs to understand the terminology related to this subject).
- Empirical evidence will show whether learning through technology has a positive impact on learners through, for instance, an increase of their knowledge.
- Here again evidence will reveal how appropriate and available are the hardware, or the software by experimenting them.

Such criteria are to be catered for while designing tasks for our online course, and adjusting the latter to better meet our learners' needs. In addition and hopefully,

Moodle provides tools that help in keeping track of their progress and performance across all types of training activities.

Accordingly, this analysis and all the information dealt with so far about the learner, the learning environment, the outcomes, and the appropriate activities (relevant to the students' subject of study, promoting their autonomy and critical thinking) contribute in fact to activity design as illustrated in the following figure (Beetham, 2004, p.7):



**Figure 7:** A framework for planning e-learning (activity and approach). (Beetham, 2004).

In designing an online course activity, there are indeed many parameters that have to be taken into consideration. There is the learner's profile, like field of study, learning needs, prior learning experience, motivation and learning style to be catered for. This

is what we tried to know through our needs analysis' outcomes either through direct questions, or by inferring information from matching the different answers of the informants as well as their suggestions. The information about ICT state of the art at the CEIL in the university USTHB obtained through our investigation also informed us of the learners' prior experience with tools, learning environments, their overall computing skills, and more important their readiness to have an online course. Such data showed the pertinence to develop an online course of English as an adjunct to the existing official course. That interactive, self-instructional course will help them study at their own pace and without time or space constraints, which is likely to reinforce their knowledge of this language.

All such information then documents the aspects related to the students' learning as well as target needs, and contribute to designing relevant activities, which we shall examine in what follows.

### **3.2.2.1. The criteria for authentic learning and authentic activities**

'Authentic learning' is an ideal situation to consider, particularly that: "*...the value of authentic activity is not constrained to learning in real-life locations and practice, but that the benefits of authentic activity can be realized through careful design of Web-based learning environments.*" (Lombardi, 2007, p.6). Authentic learning is in fact considered as 'learning by doing', like students following a native English speaking lecturer in a video, trying to understand and then be able to complete a task such as answering a question, is a real- world like activity which is feasible in the learning environment Moodle. Thus, such rehearsals to authentic activities should be allowed by what technology offers as sophisticated tools to simulate, and virtually

experience what may be hardly feasible in reality because technically unrealizable, or not available. It is believed (Lombardi, 2007, p.2) that:

With the help of the Internet and a variety of communication, visualization, and simulation technologies, large numbers of undergraduates can begin to reconstruct the past, observe phenomena using remote instruments, and make valuable connections with mentors around the world. Isolated facts and formulae do not take on meaning and relevance until learners discover what these tools can *do* for them. As George Siemens suggests, learning to be a physicist, a chemist, or an historian is all about forging concrete connections—interpersonal connections between apprentices and mentors, intellectual connections between the familiar and the novel, personal connections between the learner’s own goals and the broader concerns of the discipline.

According to such view of authentic learning, we may retain for our e-course that we have to bring our learners to work on real-world like tasks like checking key words in the provided online dictionary while reading subject- related texts, note taking from a native lecturer explaining in a video the ways to test programs, or participating in virtual communities of practice to clarify a concept for instance. All such activities which are authentic, or provide rehearsal (Coterall, 2000) for authentic tasks, as explained previously, should be backed up by ten design elements (Lombardi, 2007, pp. 3-4) which are:

1. *Real-world relevance*: Authentic activities match the real-world tasks of professionals in practice as nearly as possible. Learning rises to the level of authenticity when it asks students to work actively with abstract concepts, facts, and formulae inside a realistic—and highly social—context mimicking “the ordinary practices of the [disciplinary] culture.”
2. *Ill-defined problem*: Challenges cannot be solved easily by the application of an existing algorithm; instead, authentic activities are relatively undefined and open to multiple interpretations, requiring students to identify for themselves the tasks and subtasks needed to complete the major task.
3. *Sustained investigation*: Problems cannot be solved in a matter of minutes or even hours. Instead, authentic activities comprise complex tasks to be investigated by students over a sustained period of time, requiring significant investment of time and intellectual resources.
4. *Multiple sources and perspectives*: Learners are not given a list of resources. Authentic activities provide the opportunity for students to examine the task... using a variety of resources, and requires students to distinguish relevant from irrelevant information in the process.
5. *Collaboration*: Success is not achievable by an individual learner working alone. Authentic activities make collaboration integral to the task, both within the course and in the real world.
6. *Reflection (metacognition)*: Authentic activities enable learners to make choices and reflect on their learning, both individually and as a team or community.
7. *Interdisciplinary perspective*: Relevance is not confined to a single domain or subject matter specialization. Instead, authentic activities have consequences that extend beyond a particular discipline, ....
8. *Integrated assessment*: Assessment is not merely summative in authentic activities but is woven seamlessly into the major task in a manner that reflects real-world evaluation processes.
9. *Polished products*: Conclusions are not merely exercises or substeps in preparation for something else. Authentic activities culminate in the creation of a whole product, valuable in its own right.
10. *Multiple interpretations and outcomes*: Rather than yielding a single correct answer obtained by the application of rules and procedures, authentic activities allow for diverse interpretations and competing solutions.

Concerning our online course, not all of those design elements cited above may be present. However, five items have been retained as relevant to our course design as explained below:

- Real-world relevance: we may mention the included videos which are about authentic lectures given on subject-related content by native lecturers. We have adapted and followed them with questions to assess our learners' comprehension.
- Collaboration: since students are encouraged to expand for instance on definitions and share them with their peers on the forum.
- Reflection (metacognition): particularly needed in a self-instructional, online course like ours, where learners are trained through clear instructions and various tasks (like multiple-choice questions) to reflect over their choice. They are also trained, through the layout of the lessons and the various imbedded interactive links, in other strategies (O'Malley and Chamot's, 1990) like self-monitoring (metacognitive), deducing, note-taking, and inferencing (cognitive), as well as in paraphrasing, summarizing, creating analogies, and question/answering (cognitive/rehearsal strategies, in Filcher and Miller, 2000).
- Integrated assessment: as each of our e-course lessons include formative (quizzes) and summative (project) types of assessment.
- Polished products: since the different e-course activities are not only to teach the English language, but to train our learners in understanding (reading/listening comprehension), and in writing pieces of subject-related discourse which culminate in a project.

Now, to sum up the features characterizing authentic tasks and that we shall take into account, we may point up:

- their closeness to real-world activities;
- their liability to enhance reflection, theoretical as well as practical consideration and interpretation;
- the opportunities they offer for collaboration along with information-sharing with peers, or experts;
- their relevance to one's domain of study;
- in addition to their integration of continuous assessment leading to a project eliciting competition and creativity.

Such authentic-learning activities seem to be ideal patterns to inspire us in our design, in addition to developing thinking skills. The ultimate goal indeed is to attempt to design activities that would meet the requirements of our learners' target activities, like reading and summarizing subject related literature, listening to lectures and taking notes, describing some phenomena or processes, writing reports, in addition to publishing scientific as well as technical articles. Consistent with this, the following quotation (Lombardi, 2007, p.10):

Authentic learning may be more important than ever in a rapidly changing world... According to Frank Levy and Richard Murnane, expert thinking and complex communication will differentiate those with career-transcending skills from those who have little opportunity for advancement. Expert thinking involves the ability to identify and solve problems for which there is no routine solution. This requires pattern recognition and metacognition. Another differentiator is complex communication, such as persuading, explaining, negotiating, gaining trust, and building understanding. Although foundational skills (reading, writing, mathematics, history, language) remain essential, a more complex set of competencies are required today. ...critical thinking/reasoning, assembling/organizing information, and innovative thinking/creativity.

Young researchers like the students at the university USTHB, need therefore to be trained in such a way as to develop their thinking skills and be able to tackle problems which require novel as well as specific solutions. In addition to the traditional skills therefore (reading, writing, listening and speaking), critical thinking and creativity need to be enhanced. In this respect, it is claimed (ACU, 2008, adapted from Dufresne, Leonard and Gerace 1995) that tertiary students need involvement in ways which challenge them intellectually, which may be relevant in our context. For this, some activities to promote thinking skills are suggested, such as exploring extended contexts; comparing and contrasting; categorising and classifying; predicting, explaining [summarising, describing, discussing, defining]; generating multiple solutions; planning; justifying and strategizing; reflecting [evaluating, integrating, extending, generalising]; and meta-communication about the learning process.

Such tasks are compatible with the rhetorical functions which we previously (sections 3.1, 3.1.1) identified as needed by USTHB learners to be trained in, and are therefore in favor of the online interactive course objectives which have been set earlier. Apart from the last cited activity (meta-communication), the others are to be present in that e-course. We shall now examine material design in the next section.

### **3.3. The online course's learning resources and design templates**

When we think of material design we generally associate it with learning resources which may be defined (ACU, 2008, p. 6) as:

Learning resources are the many things that contain unit content and that help learners to acquire skills or knowledge. They include textbooks, journals, CD-ROMs, videos, audio tapes, learning guides, broadcast television and radio segments, selected websites, images and PowerPoint slides. Resources may simply contain unit content. If so, academic staff will still need to assist students to construct meaning from them by means of well designed, interactive learning activities.

Concerning our online course, learning resources include visual (videos), auditory (recordings) as well as textual resources (subject-related texts), in addition to PowerPoint slides and selected website links. All these are referred to in Hubbard's framework (1996, 2011) as modalities within the presentation scheme which, in addition to activity type as well as screen layout (described below), is among the considerations related to the operational description of the software, an evaluation criterion within that framework. Moreover, each lesson in our online course focuses on the integrated skills of reading-listening- video viewing comprehension, involving training in rhetorical functions related to scientific/technical discourse as stated previously.

Regarding sequencing, the unit content follows either a cyclic or linear learning approach, guided by the unit objectives and outcomes. It is thus linear in terms of objective since the units' tasks are built up to lead to a final project (report writing); and it is cyclic in terms of content as the learning items are sometimes reviewed for the sake of reinforcement. Accordingly, we may say that in our online course content sequencing is rather eclectic. On the other hand, our course being self-instructional, sequencing also depends on the order determined by the learners who may decide to focus on certain items and skip others. They learn indeed at their own

pace, so they may choose to review former topics or certain aspects of the unit content, and then view a video from another unit.

The other important aspect to consider however in relation to content is its layout. It is crucial indeed to make it easily accessible, and readable. For this, some strategies have been suggested (ACU, 2008) such as chunking information into small paragraphs, providing links to journal articles or PDF files for detailed information, using coloured headings to break up content, or even plenty of white space. Most of those strategies are to be adopted in our online course,

To carry on with online course materials, we may say that they are concerned with how to express various concepts, and on training learners in the different skills they would need to perform the target tasks. As our learners are science and technology students, materials will be related to science and technology knowledge, following the fundamentals of ESP/EST. Also, the use of authentic and/or adapted materials, in agreement with the task-based approach from which some principles have been adopted for our online course, is relevant as stated in the following (Colpaert, 2006, p. 486) :

The use of authentic materials fits in a task-based approach, either collaborative or autonomous; but it is also helpful in providing up-to-date information on current issues and cultural topics either collaborative or autonomous.

Moreover, the adopted approach for this online course, as already described, also draws from constructivism which is a learning theory that promotes student-centered learning. Added to this, there is the social dimension which characterizes the

‘social constructivist methodology’ (Vygotsky's sociocultural theory, 1978). The latter as previously stated considers knowledge as fundamentally social. This implies that learning occurs in communities (our course is intended for computer science and biology students) of practice and in interaction through cognitive apprenticeship in related contexts, in authentic-like learning tasks. In addition to this, it is interesting to bear in mind the scaffolding teaching strategy, known as scaffold or support (Van Der Stuyf, 2002, p.2) which facilitates:

...a learner's ability to build on prior knowledge and internalize new information. The activities provided in scaffolding instruction are just beyond the level of what the learner can do alone. The more capable other provides the scaffolds so that the learner can accomplish (with assistance) the tasks that he or she could otherwise not complete, thus helping the learner through the ZPD.

In our online course this scaffolding will be provided to learners in form of resources, various tasks, to convey new concepts and additional knowledge related to scientific/technical discourse features.

Accordingly, our online course materials are to be semi-authentic, adapted and based on updated information. They are to be worked out mainly in an autonomous way since our course is aimed to be self-instructional and partly collaborative in that, learners can discuss related issues on forums or on the chat. Our online course materials (sources to be provided at the end of this chapter) can thus be presented as follows:

Reading passages:

- General science and technology materials, encompassing an up-to-date, semi-authentic scientific and technical knowledge. We may cite:
- Experiments, scientific reports, instructions, tabular representations, subject-related articles, lectures given by natives on videos, PowerPoint presentations, and webpage texts describing processes.

Listening materials:

- These are related to the reading materials, therefore with the same didactic features. They are embodied in recordings and in videos.

Finally, we may say that even if they are self-instructional, the online course materials should embody quality measures, or what Dickinson (1987) describes as good materials, with “*all the features good language teaching materials have - interest, variety, clarity and so on*” (p.80). Among those features he suggested a clear statement of objectives; meaningful language input; exercise materials and activities; flexibility of materials; learning instructions; language learning advice; feedback and tests; reference materials; motivational factors; and advice about progression.

Concerning ‘interest’, we attempt through our interactive, self-instructional course to cater for such criteria, like providing learners materials related to their subject of study. As for ‘variety’, those materials are presented in varied formats, such as texts and videos. Regarding ‘clarity, meaningful language input, exercise materials and activities, motivational factors, feedback and tests as well as reference materials’, glossaries, links to web-based related documents, and quizzes are supplied to facilitate

comprehension and broaden learners' knowledge. Moreover, with respect to 'a clear statement of objectives, learning instructions, and language learning advice' comprehensible instructions and objectives are disseminated throughout the online course to make learners aware of what is conveyed in the course, how they should tackle the various activities, and what is expected to develop as knowledge, in addition to learning skills and strategies.

The online interactive course also includes visual cues, like links bearing the same labels through the different lesson (e.g. 'view and Listen' to indicate the videos) which facilitates the learners' browsing throughout the course components, and contributes to rendering the interface more user-friendly.

As for images, the more there are the longer the download times. This is why the number of images in our online course has been restricted.

This is indeed important to bear in mind especially that our internet connectivity is slow, which we hope will soon be improved. Too many website links may also divert learners from their learning targets, much as when a great deal of animation is provided, though amusing. For this reason, we have limited the number of website links and animation in our course.

Highlighted keywords, subheadings, lists and pop-up windows are useful in that they constitute signposts that would inform learners about the important aspects to deal with, in accordance with the course objectives. We have therefore taken such features into account in our online course.

In addition, announcing course related events, one's institution particular news, related for instance to the course of English, or simply relaying some news that

is of interest to the learners may render one's online course more cheerful, and reduce that feeling of loneliness that may be associated with distant teaching/learning. This is not yet available in the online course, since we have not examined whether permissions should be requested at the administrative level. Reducing this physical distance is also obtained through answering emails, and participating in chats, to be practised in a restricted way (because the course is self-instructional). Similarly, posting sometimes guiding, topic-related questions on forums, intervening whenever necessary, as to redirect the focus on a particular aspect of interest, may be possible in the online course.

Giving feedback on the other hand is important for learners to know about their progress, to take decisions about the subsequent path to follow, whether to carry on studying the following content items, search more information on the web from other resources, or solicit advice from peers, teachers, and experts. They may simply opt for reviewing previous aspects of the course, or use the glossary. Therefore, prompt feedback has been included in our course.

Feedback is also significant for the teacher, in that its tracking made possible by Moodle tools, will help in adjusting the course either by changing some aspects of it, fleshing it out, or simply modifying its flow of execution that is sequencing. Moreover, information on the learners' progress and work is provided through Moodle tracking system.

Once all the ingredients of a course are ready, a canvas should be developed to include the course information. To be exhaustive, there is a checklist (Beetham, 2004,

p.24) which encompasses the areas that should be informed. Some may be relevant to our online course, such as:

- A. Describe the context in which you are working**
  - 1. Learners (Typical age, stage and level of study; pre-requisite achievements;
  - 2. Curriculum (Subject area or discipline; course/module/unit title; ... learning aims and outcomes; assessment ...; other relevant information)
  - 3. Environment (Physical location; ...; available virtual environments, ...; available content-based resources; other relevant information)
  
- B. Describe the learning activity or approach**
  - 1. Specific learning outcomes (skills, knowledge etc., )
  - 2. Nature of activity/ies or task(s)...
  - 3. Content-based resources used
  
- C. Evaluate the outcomes for learners**
  - 1. (If available) Assessment scores (relative to other cohorts if available and relevant)
  - 2. (If available) Student feedback
  
- D. Other information**
  - 1. Would you recommend this approach to other practitioners working in a similar context?

The above checklist may consequently be considered as well, as a summary of some of the stages we have gone through so far in the development of our interactive course rationale.

Hence, we have first summed up the approach and design related to our online course. The approach to course design adopted in our research work is related to ESP/EST, grounded in social constructivism and is also task-based.

Second, 'design' subsumes elements which interact with the intended learner's profile (level, specialty), and the syllabus' objectives. We may therefore retain aspects like program content (or syllabi), language focus (also called program focus), and skill focus (also called learner focus).

Syllabi are to be developed for two disciplines which are biology, and computer sciences. Since the syllabus in our context stands for content, the roles of both the learner and the teacher should be clearly distinguished, and the types of appropriate materials identified. Concerning the materials selected for the computer science course, the texts are from an online book, Think Python: How to Think Like a Computer Scientist by Downey (2008). The videos however have been retrieved from MITOpen CourseWare (2010). Being online, those materials respective links may be provided to the students.

Concerning the biology course, the texts are also from an online book, Introduction: The Nature of Science and biology by Farabee (2006), while the videos have been retrieved and adapted from MIT Open CourseWare (2013). Their respective links may as well be made available to our students.

As for the grammar notes we have developed, they have been compiled from a variety of sources both in print and online. They have been enriched, and adapted over time to facilitate their learning by the students. So, not all sources can be identified. However, we may mention some distinct ones like ‘English for Computer Science’, by Brown and Mullen (1984) and the site <http://www.EnglishClub.com>, (2010) from which we requested permission. Other notes, examples and tasks have been specifically developed to suit the online course objectives. In general, however, we have chosen free materials (duly referenced within course content) that we may adapt, modify and reuse to meet tasks’ requirements. Also, different skills are integrated while practising meaningful and authentic activities, or rehearsals to these.

Finally, the third component of Hubbard's framework based on Richards and Rodgers' categories (1982), is 'procedure' whose considerations such as the concept of 'activity type', which refers to 'the general form of the exercise' like a text with comprehension questions, or text reconstruction, have been taken into account.

Likewise, the 'presentation scheme' which shapes the language presentation, involving the modalities such as text, graphics, video and 'what the general interaction sequence will be' (Hubbard, 1996, 2011) have been considered. Concerning the presentation scheme therefore, we may mention elements such as the learning environment's tools (screen layout, help and control options), the form of input judging, and the feedback in response to the input. It is to be reminded here that we have opted for the platform Moodle which is a free, open source available in our university.

Regarding the interaction sequence, the navigation path within the course for instance is illustrated by the way the different buttons/links within a lesson are arranged, in a way to suggest to learners the resources that correspond to particular activities. Such buttons may, as well, guide them towards an activity that is likely to reinforce their comprehension of certain aspects of language.

Accordingly, the USTHB learners' objective needs which are the target major activities 'reading and writing for science and technology' have been catered for. In addition to this, their needs of building aural and, indirectly, oral skills have also been taken into consideration because they may be required indeed at a certain level of their career (taking part in conferences), or simply intervening in some settings like virtual communities. In this context, we may mention some metacognitive strategies such as 'centering learning' (Khosravi, 2012) which involves a strategy that relates to

speaking. It is that of 'delaying speech production to focus on listening' which learners do naturally before speaking (Yu, 2013), hence the necessity of building solid listening comprehension skills. Thus, subject-related, video conveyed lectures have been retained for our online course to enhance our learners' aural skills. Their oral skills may therefore be indirectly developed, since they may train themselves in imitating the lecturer's pronunciation which is native particularly that we have succeeded to synchronize it with the transcript. Moreover, dealing with the various rhetorical techniques that establish relationships between the rhetorical functions like comparing/contrasting and their related expressions as well as forms, such as using appropriate collocations (in contrast, by way of contrast, in comparison with/to...) helps learners in understanding the mechanics of language learning. Knowing about these mechanics according to Yu (2013) makes students become effective learners, and enhances speaking. The planned tasks in our online course will help them to build up knowledge as well as strategies, during their progress towards realizing a final project, which is that of writing a report.

Consequently, we may say that the learning materials are compatible both in terms of content (course content, learner focus) and design with the eclectic approach we have adopted (teacher fit), with the learners' needs and the course objectives (learner fit), along with procedure (like activity type). This attempt to cater for consistency at the different levels of the design components and for rigor during the course development process, have been inspired from Hubbard's framework (1996, 2011) in particular, Grave's framework (1996), Trimble's classification of rhetorical levels (1985), and from the reviewed literature related to online teaching/learning, in

addition to course evaluation principles. All those elements guided us in developing and organizing our interactive, online course design templates. The latter, and for the sake of practicality and a better comprehension, are presented in separate tables, labeled as follows:

- Table 14→ Course design, part 1: learning activities, learning resources & modalities.
- Table 15→ Course design, part 2: learning environment, instructor's role and learner's role.
- Table 16→ Course design, part 3: assessment, feedback and modes

<b>Course design (1)</b>		
<b>Course Objectives</b>	<b>Learning activities</b>	<b>Learning Resources &amp; Modalities</b>
<ul style="list-style-type: none"> <li>• An interactive, self-instructional course.</li> <li>• An adjunct to official course;</li> </ul> <p>a course to reinforce learners' practice of English according to their specific needs, through:</p> <ul style="list-style-type: none"> <li>• Training in rhetorical Functions related to scientific/technical discourse;</li> <li>• exploring&amp; recognizing discourse organization);</li> <li>• describing processes, objects;</li> <li>• comparing and contrasting them;</li> <li>• classifying and synthesizing information;</li> <li>• reducing&amp; summarizing content;</li> <li>• collaborative: discussing issues on forums, arguing, agreeing/disagreeing.</li> <li>• Using the rhetorical functions having been trained in, and the sub-technical and technical vocabulary worked out through the different topics to write a report (the project).</li> </ul>	<ul style="list-style-type: none"> <li>• Start pre-reading and identifying keywords.</li> <li>• Read and identify the main idea by selecting from a list of alternatives, after skimming.</li> <li>• Read and identify antecedents of anaphoric references through matching activities.</li> <li>• Read and scan for specific information through transfer exercises from texts to tables, &amp; vice versa.</li> <li>• Read and identify logical relationships, working at logical connectors &amp;word ordering.</li> <li>• Read and infer meaning of relevant vocabulary, through matching sub-technical vocabulary with corresponding meaning, and scientific/ technical words with functions or characteristics.</li> <li>• Guess the meaning of relevant scientific/technical words like sub-technical vocabulary, word-formation forms, from context.</li> <li>• Practise the word-formation forms (above) in different activities like cloze test.</li> <li>• Infer topic of discourse in different reading sessions e.g. classification, argumentation, identifying rhetorical techniques that establish relationships between rhetorical units like: time order and its respective time relaters.</li> <li>• Carry out mini-tasks after reading sessions to work the respective rhetorical techniques such as comparing/contrasting, using appropriate collocations (in contrast, by way of contrast, in comparison with/to...), and grammatical forms like use of the passive/stative in descriptions.</li> <li>• Listen to a recording and identify the topic of discourse.</li> <li>• Listen to a lecture and note down the different rhetorical techniques (e.g. conjunctions) related to the respective rhetorical functions of the topic at hand, like definition, classification, cause/effect...</li> <li>• Listen and write down summaries from written notes.</li> <li>• Integrate the mini-tasks (how to define, present arguments/counter arguments, compare/contrast) in carrying out problem-solving activities.</li> <li>• Integrate different time relaters (first, before, after, then...) to illustrate sequential relationships, e.g. classify, describe different steps of a process, or translate in writing, a flowchart, or an algorithm with its different phases towards problem-solving.</li> </ul>	<ul style="list-style-type: none"> <li>• Use of online free, adapted science and technology materials:</li> <li>• MIT OpenCourseWare: Massachusetts Institute of Technology.</li> <li>• EnglishClub.com website.</li> <li>• Science and technology courses 'scaffolded' with progressive development of new scientific/technical concepts.</li> <li>• Browsing the net for in-time learning: use of recent information.</li> <li>• Inquiry learning through online sources of knowledge (databases, books, peers' exchange of links, share knowledge).</li> <li>• Use of texts created on web pages.</li> <li>• Documents in PDF Format.</li> <li>• Use of PowerPoint tool.</li> <li>• Use of free online videos.</li> <li>• Use of the forum</li> <li>• Use of the chat</li> <li>• Use of content related glossaries</li> <li>• Use of a free, online, science and technology- related dictionary.</li> </ul>

**Table 14:** Course design, part 1: Learning activities, learning resources & modalities.

<b>Course design (2)</b>		
<b>Learning Environment</b>	<b>Learner's Profile &amp; Role</b>	<b>Instructor's Role</b>
Site of USTHB: <a href="http://www.usthb.dz">http://www.usthb.dz</a>  Virtual Campus at: <a href="http://campusvirtuel.usthb.dz">http://campusvirtuel.usthb.dz</a>	<ul style="list-style-type: none"> <li>• Under-graduate (Master) learners;</li> <li>• Learners in computer sciences, and biology;</li> <li>• Learners with different levels in English instruction.</li> </ul>	<ul style="list-style-type: none"> <li>• Teacher/Instructor as Course creator/designer/implementer</li> </ul>
Course on the Platform MOODLE.  Moodle includes: <ul style="list-style-type: none"> <li>• a system of content management;</li> <li>• a course management system;</li> <li>• functions to create an online learning environment.</li> <li>• Moodle provides various stimuli to promote interaction &amp; learning with tools &amp; applications (2.4) like: activity modules, resources, user management, learner monitoring, &amp; enrolment.</li> <li>• Through networks, Moodle creates interactions between teachers, learners &amp; pedagogical resources.</li> </ul>	<b>Learner's role</b> <ul style="list-style-type: none"> <li>• The learner is actively engaged in the learning process;</li> <li>• The learner interacts with resources, activities, peers and the teacher (through e-mails, forums, chat); negotiates meanings, asks for clarifications, and contributes to debates on issues with supplementary information (arguments, counter-arguments);</li> <li>• he/she responds to stimuli by reading/listening &amp; viewing provided materials, and trying to understand words, concepts by checking them in the glossary and making associations to subject and/or background acquired knowledge;</li> <li>• the learner examines the language relevant to the topic under study, processes information (analyses its context of use and its different patterns) and stores it;</li> <li>• the learner tackles the tasks given by the instructor, by analyzing them and trying to predict expectancies (recognizing studied rhetorical functions and related micro-skills);</li> <li>• the learner retrieves stored information, and makes associations with similar activities from authentic situations like building a flowchart from existing information by applying acquired, logical reasoning, and patterns of flowcharting practised and learned from subject study; or reading subject literature, taking notes and then summarizing.</li> <li>• the learner analyzes the topic suggested for discussion and tries to understand it and predict what is expected from it; he/she recalls stored information related to the topic, and prepares the feedback to the suggested question (writes down ideas, organizes them, uses matured concepts);</li> <li>• he/she makes use of tools and applications available in Moodle to edit the writing and post it on the forum, once satisfied with the completed version;</li> <li>• the learner searches additional sources of knowledge other than the teacher (databases, books, peers' exchange of links, share knowledge).</li> </ul>	<ul style="list-style-type: none"> <li>• Teacher/.. structures content, and suggests meaningful tasks;</li> <li>• Instructor provides stimuli to enhance continuity in building unknown words, subject related concepts;</li> <li>• Instructor supplies appropriate micro-skills(language of comparison &amp; contrast); principles of organization of information from general to specific, ways of linking ideas and making transitions;</li> <li>• Instructor mentors peer interaction &amp; suggests topics for debates, which he/she guides by feedback, and channels to stay within the topic at hand;</li> <li>• Instructor guides &amp; facilitates learning through structured course layout and content, setting up clear objectives and instructions. He/She may:</li> <li>• Answer emails</li> <li>• Post questions on forums</li> <li>• Guide discussions on forums</li> </ul>

**Table 15:** Course design, part 2: Learning environment, instructor's role & learner's role.

<b>Course design (3)</b>		
<b>Types of assessment</b>	<b>Feedback</b>	<b>Instructional mode</b>
Formative type (self-assessment): <ul style="list-style-type: none"> <li>• Self-controlled assignments.</li> <li>• Self-controlled quizzes.</li> <li>• Open assessment (unlimited attempts, cyclic).</li> </ul>	<ul style="list-style-type: none"> <li>• Feedback integrated within quiz items.</li> <li>• Overall feedback to each attempt at quizzes.</li> </ul>	<ul style="list-style-type: none"> <li>• CMC integrated in the platform 'MOODLE'.</li> <li>• A two-way synchronous and asynchronous CMC tools:</li> <li>• Asynchronous (email, forum);</li> <li>• synchronous (chat)</li> </ul>
Summative type (final assignment, project): <ul style="list-style-type: none"> <li>• Individual project.</li> </ul>		Number and patterning of participants via (email, forum): <ul style="list-style-type: none"> <li>• One to one (teacher-student, student-student);</li> <li>• one to many (a student to the group, or the teacher to the students)</li> </ul>

**Table 16:** Course design, part 3: Assessment, feedback and modes.

The above tables represent therefore our online course's canvas. The realization, the implementation of our course on the platform Moodle, and the course description will be tackled in the coming chapter.

## **CHAPTER 4 The online course design review, piloting and feedback**

As mentioned earlier, we have adopted for the online course design Hubbard's (1996, 2011) framework concerning the development, the evaluation and implementation modules. So far, we have dealt with the development module which resulted in the design of the interactive, self-instructional course templates. The evaluation module is not to be dealt with here separately since it is omnipresent and used as a reference both in course development and implementation. The latter is related, according to Hubbard, to how content is to be integrated into a course, prepared for, delivered (here through Moodle), and reviewed with students online. All this procedure will be tackled in this chapter through a description of the online course structure design as a whole, of the topics (units) in detail, of the content flow and sequencing of the learning materials, in addition to the types of assessment. The piloting and the feedback analysis will be examined subsequently. Those elements cited so far will be considered in terms of the evaluation criteria subsumed within the adopted framework (Hubbard's), in addition to the other quality requirements previously examined (particularly in chapter 3). In doing so, we attempt to assess whether our course content has been realized correctly according to the developed course design as well as objectives, and how well it meets the evaluation criteria examined in this research work, starting in the next section.

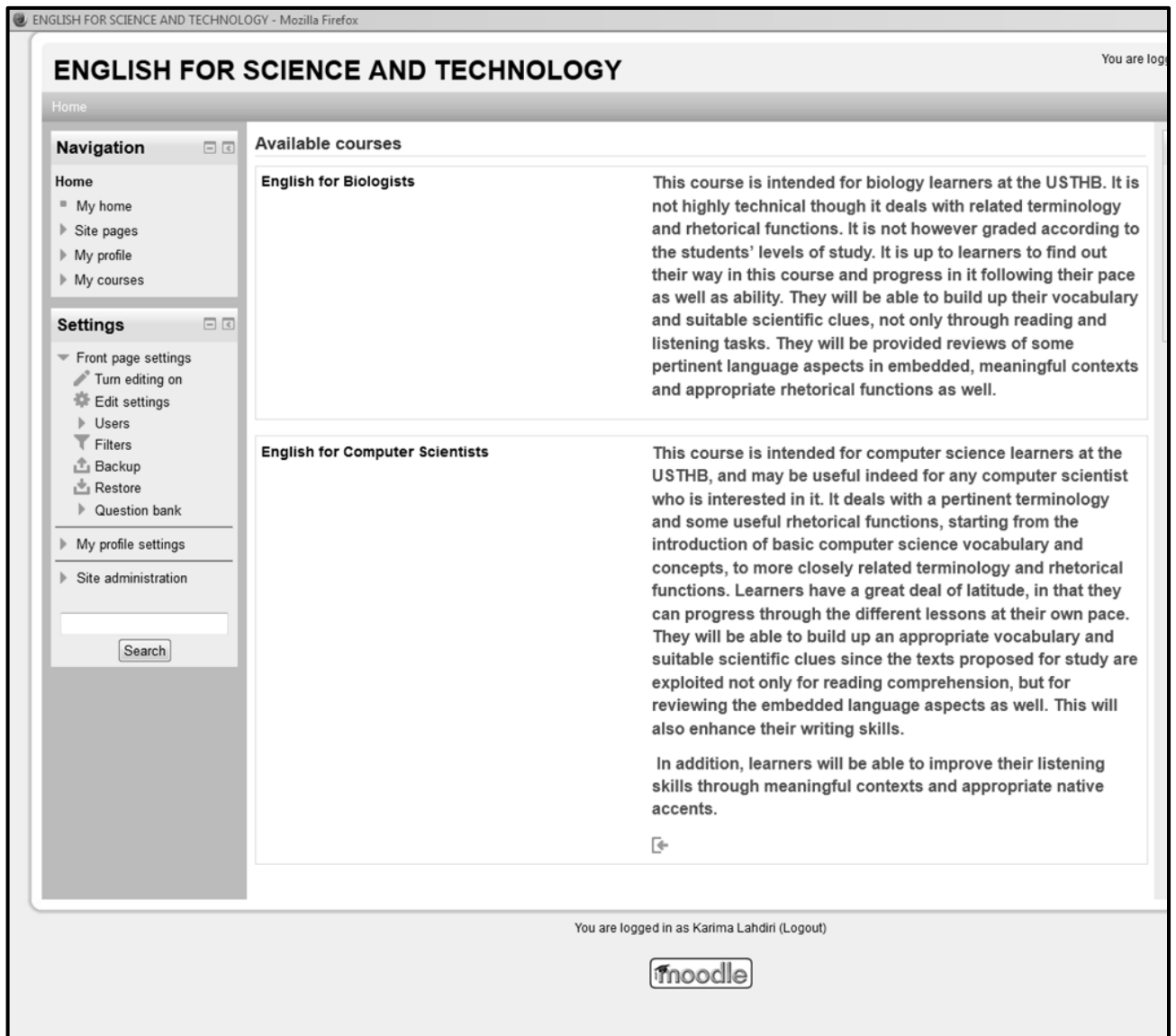
### **4.1. The online course implementation on MOODLE**

The academic subjects which have been concerned by the teaching of the module of English on a regular basis from the second year of graduate studies up to the third semester of master studies in the university USTHB are Computer Sciences and

Biology (this last from the third graduate year). We may gradually, we hope, deal with the other specialties in the future. The course related to Computer Sciences will be thoroughly described and illustrated, since some of its units have been piloted on the university's platform MOODLE (at <http://campusvirtuel.usthb.dz>). We limited the number of lessons hosted on the university's site for piloting, to better tackle the probable weaknesses that could be encountered, and try to find appropriate remedies.

The course structure design we have worked out has been adopted for both courses related to computer and biology sciences, respectively. Here it may be useful to recall that the online course content is based on the objectives inferred from the needs analysis we carried out. We have developed those objectives according to Grave's framework (1996) and Trimble's rhetorical levels (1985), summed them up (table 10), translated them into learning activities (table 12) and then, guided by Hubbard's comprehensive framework (1996, 2011) for the development, implementation and evaluation, caring for consistency at all levels (teacher fit, learner fit, and operational description), we have designed the online course templates that we represented into three tables (Learning activities, learning resources and modalities; Learning environment, instructor's role and learner's role; Assessment, feedback and modes) 14, 15, and 16, respectively. Thus, the structure design is common to both courses for computer and biology sciences students. So, it is not necessary to describe both of them but only the piloted one that is, the course for computer science students. The biology-related course will only be illustrated through a figure and not described in detail. However, a unit (topic 1) will be concerned by an exhaustive illustrated description in the appendices (appendix A4). The front page of the course, showing the

summaries of the two courses will also be illustrated. Hereinafter are respectively, the screenshots of the front page, and of the biology- related course.



**Screenshot 1** The Course front page.

 News forum


 USTHB Learners' Chat Room

### Topic 1

This topic introduces some ideas about the field of biology and its relation to science. In addition to exploiting the text for enhancing your comprehension of the included ideas, some involved grammatical features are put forward. They are particularly related to the way words are formed in English, which may contribute to raising your consciousness about the rules of word formation, like affixation and compounds.

 The Nature of Science and Biology

 Understanding 'The nature of science and biology'

 The nature of science and biology

### Topic 2

This topic tackles some distinctions between concepts like a theory, a hypothesis, or a law. Reflecting over the various questions of the quiz will enable you to understand the main ideas of the text, and improve your comprehension. Some vocabulary and structures will help you understand how ideas are linked, in addition to the focus on the use of the passive rather than other tenses. Some discourse features like the difference between an adjective and a gerund, and some uses of the latter in reducing sentences for instance are also highlighted.

 The scientific method

 Understanding the scientific method

 The Scientific Method

### Topic 3

The following topic will help you acquire or review some of your subject-related vocabulary and concepts. The quiz questions will enable you to work out again some language aspects like word-formation features, and to distinguish between such different patterns. Other important aspects in scientific/technical style are highlighted in the text and elaborated on like quantifiers, comparison constructions, and contrast. To improve your listening and oral abilities, a video has been included.

 Theories Contributing to Modern Biology

 Understanding 'Theories Contributing to Modern Biology'

 Theories Contributing to Modern Biology

### Topic 4

Describing **the diversity of life** is the objective of this topic. The quiz questions will enable you to understand the main ideas and enrich your terminology in relation to this topic. Different structures and writing aspects conveyed in the text about classifying like 'to be composed of' or 'to be part of', and defining are put forward, which is likely to make you reflect over them and improve your writing skills. A video is also embedded within this lesson to develop your listening comprehension and oral skills

 The Diversity of Life

 Understanding 'The Diversity of Life'


 The diversity of Life


Screenshot 2: English for Biology students Part 1.

### Topic 5

This topic depicts the characteristics of the living things. The latter's common aspects are indeed put forward, which will enable you to broaden your knowledge in the field and enrich your terminology. The quiz questions will help you understand some reference/inference features existing in the text, in addition to a number of notes reviewing some aspects related to scientific discourse like the use of modals and some types of conditionals. A video is also encompassed to enhance your aural and oral skills.

 Characteristics of living things

 Characteristics of living things

 Characteristics of living things

### Topic 6

This topic describes some **trends in animal evolution**. The text encompasses not only a rich terminology, but also discourse features related to describing and some techniques related to summarizing. In addition to this, some other language aspects included in the text are exploited for review, through the quiz questions. Such activities will help you understand such discourse features related to scientific discourse, and enhance your comprehension as well as your writing skills.

 Trends in Animal Evolution

 Understanding 'Trends in animal evolution'

 Distinguishing 'Trends in Animal Evolution'

 Trends in Animal Evolution

### Topic 7

Some trends in the plant evolution are described in this topic. The ideas and rich terminology included in the text are likely to deepen your knowledge, and enrich your vocabulary. The quiz questions are intended to help you work out the various discourse features encompassed in the text, like classifying, describing, contrasting and distinguishing between the active and passive voice which is frequently used in scientific discourse. All these activities will enable you review and understand such aspects, which is likely to enhance your writing skills. Some notes on how to write a report, along with the knowledge you have developed so far through the various topics on scientific/technical discourse are likely to help you in your final project.

 Trends in Plant Evolution

 Understanding 'Trends in Plant Evolution'

 Trends in Plant Evolution

### Topic 8

This topic is a synthesis of the knowledge and skills you have built so far through the various topics of this course, in addition to the background knowledge you have developed both from your subject study and quest for learning. **Your project**, below, allows you to put this knowledge into practice.

 Scientific and Discourse-Related Aspects

 Your Project

 Glossary

 Checking your words

Screenshot 3: English for Biology students Part 2.

The course for biology students (unit or lesson 1 is described in detail in appendix A4) represented in the above screenshot has the same design as well as structure of the course for computer science students (illustrated hereinafter in screenshot 1) as already stated. It encompasses the same number of topics, and the same type of activities. Objectives are globally alike, drawing from the same needs analysis results. However, the content differs since it is specific to biology science, in general. This course includes indeed related texts and embedded videos adapted and re-used (all sources acknowledged in 3.3 and in the bibliography). This course for biologists deals with such topics as ‘The Cell Theory’, ‘The Theory of Evolution by Natural Selection’, ‘The Gene Theory’, ‘Homeostasis’, and a description of some general trends in the evolution of animals and plants. Other texts however embody some issues of common interest, like the relationship between ‘Science’ and ‘Biology’, and the distinction between ‘a theory’, ‘a hypothesis’ and ‘a law’.

The texts we have selected represent varied themes, vocabulary, and discourse features related to science and technology. They encompass the terminology which may contribute to building up the learners’ subject-related vocabulary. To allow them to check the imbedded key words, we have included in our course two glossaries and an online dictionary.

The lessons’ content is exploited for the comprehension section to help the learners better understand the various ideas, vocabulary, as well as the reference/inference relationships existing in the texts.

The content of the reading passages is also used as a backdrop to work out the comprised specific aspects that meet the learning objectives set in the previous

chapter. We may cite the rhetorical functions that allow the identification of general rhetorical functions (like description, definition, classification) by scanning for specific information through multiple choice questions, true/false statements, transfer exercises and matching activities.

Some activities are also designed in order to identify the rhetorical techniques that generate relationships between rhetorical functions like how to compare/contrast. Other grammatical features inherent to scientific/technical discourse and included in the texts are also exploited to raise the learner's awareness as to their use. The gerund may be used for instance for reducing sentences when summarizing. Some activities however help the learner understand how rules are formed (like the use of affixes, compounds) and distinguish between the different parts of speech (like the difference between an adjective and an adverb), which is likely to enhance the learner's comprehension and develop her writing ability at the same time.

Therefore, to avoid somewhat any form of redundancy since the structure design is common to both subjects, only the course for computer science students will be described as it appears (entirely) in our offline version of the platform MOODLE in the coming section. In doing so, we shall put forward the various activities. These have been developed according to the objectives yielded from the needs analysis of the USTHB learners' needs, and in agreement with our eclectic approach. This last concern related to objectives as well as approach, will also be taken into consideration in the implementation and evaluation procedure. Before this, we shall deal with the course structure design as a whole in the following section.

## **4.2. An overview of the course structure design**

First, concerning the layout, the main page in our online course includes the titles of the topics. These have been developed with the MOODLE tool ‘lesson’, equivalent of unit. To sum up the approach we have adopted, we may say that this course which is grounded in e-learning for its interactivity and online mode of teaching/learning, embodies the principles of the ESP/EST approach in that, objectives have been developed according to our learners’ needs. Our approach also draws from TBLT since the learners’ identified target language objectives constitute the basis of the course content. It is also rooted in social constructivism as it encompasses some of its principles like ‘scaffolding’, providing learners with materials related to their subject of study and progressive development of appropriate terminology. To better understand the design of the online course structure, it may be useful to examine the following screenshot (number 1) related to the outline of the interactive course of English for computer science students. This first illustrated page consists of topics preceded by their respective summaries and expected outcomes, in addition to the forum and the chat components placed at the top. A detailed description of each topic will be dealt with later in this chapter.

Turn editing on

News forum

USTHB Learners' Chat Room

**Topic 1**

This topic is an introductory course in computer science. It introduces some terminology, and conveys some constructions for giving instructions. The latter will be reviewed because it is frequently used in scientific discourse. A video related to the topic will introduce you to getting used to listening to lectures in English.

What is a program

Your Glossary

**Topic 2**

This topic deals with some types of programming languages. It conveys some technical words related to the field. Some grammatical notes on the word order patterns are also reviewed to prepare you for writing.

An example of programming languages

**Topic 3**

This topic is related to programming and the different related problems. New ideas and technical words related to the field are conveyed. Some notes are reviewed to help you distinguish between the use of the different ING forms, and to know when to use the gerund or the infinitive. This will reinforce your writing skills.

Programming errors and debugging

**Topic 4**

This topic tackles the process of a program execution. It introduces some ideas relevant to the field. You may look up difficult words in your glossary. A video on a lecture in English will contribute to improving your listening skills. Your writing skills will also be reinforced as some expressions are provided to you to help you link your ideas. In addition to this, notes on subject-verb agreement are provided to help you know how to tally a subject with the right verb form, which will bring coherence into your writings.

Flow of Execution

**Search forums**

[Advanced search ?](#)

**Latest news**

Add a new topic...

*Sakina Lahdiri* 30 Aug, 20:01

Suggestions

[Older topics ...](#)

**Upcoming events**

There are no upcoming events

**Recent activity**

Activity since Thursday, 4 December 2014, 5:43 PM

[Full report of recent activity...](#)

Nothing new since your last login

**Calendar**

◀ December 2014 ▶


Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

**Events key**

- Hide global events
- Hide course events
- Hide group events
- Hide user events


**Screenshot 4:** The outline of the course for computer science students (part 1)


**Topic 5**  
 This topic deals with the distinction between formal and natural languages. It conveys relevant technical words and constructions inherent to scientific style. Some notes on word formation will help form words and understand how words, like compounds, are formed. This will facilitate your reading comprehension and contribute to improving your future writings.


 Knowing about Formal and Natural languages 1

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**Topic 6**  
 This topic carries on with other features that distinguish formal and natural languages. The other distinction tackled here is the distinction in use of different constructions to compare/contrast. This will help you in further understanding the scientific style, and will reinforce your reading and writing styles.


 Knowing about Formal and Natural languages 2


 Glossary topic 6


 Summarizing differences

---

**Topic 7**  
 This topic encompasses a powerpoint presentation about the major crises which have occurred during the process of software development. This will allow you to broaden your background knowledge, and reinforce your vocabulary, by looking up incomprehensible words in the dictionary at the end of the course. An activity follows, requiring you to summarise the main information and transfer it into the table provided to you for this purpose. This will help you develop your ability to read and synthesize information.


 Multicore Programming Primer and Programming Competition


 Understanding 'Multicore Programming Primer and Programming Competition'


 Synthesizing information


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**Topic 8**  
 Now that you are about to deal with your project, notes on how to describe and define are provided to you, since you may need them to carry on your assignment. Some basic tenses are also reviewed, mainly the passive to complete your understanding of the scientific/technical style in particular, and the English language system in general, in order to write correctly.

 Describing a process in DVD construction

 Writing the paragraph

 Your project

 Checking your vocabulary

**Screenshot 5:** The outline of the course for computer science students (part 2).

**News forum:** It is a space intended to enhance interaction. Its objective is to encourage learners ask for clarification about the topics at hand, and share information as well experiences with peers. This embodies one of the social constructivist principles which is collaboration. The mode of communication is one to all. It is mainly asynchronous, but may be synchronous as well since learners can react to the postings immediately.

**USTHB Learners' Chat Room:** This mode of communication is one to one and is rather synchronous since it requires being connected during that activity. The

latter is likely to encourage introverted learners to get involved in course interaction as previously stated, caring therefore for the different learning styles. The aim is to meet the requirements of affective factors, one of the four types of goals (Stern, 1992, in Graves, 1996) we have taken into consideration in the development of our course rationale (Ch.3). Indeed, it is agreed upon that in modern course goals and objectives, cognitive as well as affective learning interact (Ch.1, table 5).

### **Topic 1 What is a program?**

This topic is an introductory course in computer science. It introduces some basic terminology, and conveys some constructions for giving instructions. Some notes on how to give instructions and their use are provided because this rhetorical function is frequently used in scientific discourse. A video and an audio recording related to the topic may enable learners to getting used to listening to lectures in English.

### **Topic 2 An example of programming languages**

This topic deals with some types of programming languages. It conveys some technical words related to the field. Some grammatical notes on the word order patterns are also reviewed to prepare learners for carrying out their various activities, namely those requiring writing. A video is also included within the lesson, and illustrates an example of programming languages, which may enhance our learners' listening skills.

### **Topic 3 Programming errors and debugging**

This topic is related to programming and the different related problems. New ideas and technical words related to the field are conveyed. Some notes are reviewed to help learners distinguish between the uses of the different ING forms, and to know when to

use the gerund or the infinitive. This is likely to reinforce their writing skills. A video related to the topic is embedded to reinforce our learners' listening comprehension

#### **Topic 4 Flow of Execution**

This topic tackles the process of a program execution. It introduces some ideas relevant to the field. It also encompasses a glossary with relevant technical words. A video on a lecture in English may contribute to improving the learners' listening skills, and also their pronunciation. Their writing skills will also, we hope, be reinforced as some expressions are provided to help them link their ideas, and bring coherence into their writings.

#### **Topic 5 Knowing about Formal and Natural languages 1**

This topic deals with the distinction between formal and natural languages. It conveys relevant technical words and constructions inherent to scientific style. Some notes on word formation may help the learners form words and understand how words, like compounds, are formed. This is likely to facilitate their reading comprehension and contribute to improving their writing skills. A video is embedded within the lesson to reinforce the learners' listening and comprehension skills, in addition to improving their pronunciation.

#### **Topic 6 Knowing about Formal and Natural languages 2**

This topic carries on with other features that distinguish formal and natural languages. The other distinction tackled here is the distinction in the use of different constructions to compare/contrast. This may help learners in further understanding such features inherent to scientific/technical style, in addition to reinforcing their reading and

writing skills. To enhance their listening abilities, a video related to the topic is included.

### **Topic 7 Multicore Programming Primer and Programming Competition**

This topic encompasses a PowerPoint presentation about the major crises which have occurred during the process of software development. This is likely to allow learners to broaden their background knowledge, and reinforce their vocabulary by looking up incomprehensible words in the glossary, or the dictionary. An activity follows, requiring them to summarize the main information and transfer it into the table provided for this purpose. This will help them to develop their ability to read and synthesize information.

### **Topic 8 Describing a process in DVD construction**

As our online, interactive course culminates into a project, its content is designed so as to prepare learners to deal with that task. Thus, notes on how to describe and define are provided in this lesson since learners may need them to carry out their assignments. Some basic tenses are also reviewed, mainly the passive to complete their understanding of the scientific/technical style in particular, and the English language system in general, in order to produce correct as well as coherent writings.

Moreover, through the section checking your vocabulary we have made use of the ‘meaning technologies’ that promote comprehension and learning (Hubbard, 2000).

We have provided a link to a glossary specific to computer sciences, placed after the chat and the forum components. Another link, to an online dictionary (<http://www.thefreedictionary.com/>), has been given at the bottom of the main page.

So, learners can not only check the vocabulary encountered within the course, but

expand as well on the different concepts or words. The social-constructivist principle of ‘scaffolding’ is therefore encompassed in that, learning is supported with progressive development of new scientific/technical concepts and definitions. In relation with that progressive, constructed knowledge, it is interesting to describe and evaluate the course content in what follows.

### **4.3. Review of the course content and its evaluation**

It is useful to recall that this online course was thought of as a complementary solution to the face-to-face course, given the fact that the latter has shown limitations in the Algerian context and that new needs for change are necessary. This course is also intended to reinforce our learners’ practice of English outside office hours, and help the students who do not benefit from the classroom-based course. Most importantly, we have developed this online course according to the students’ specific needs, in compliance with their learning objectives yielded from the needs analysis assessment carried out within the current research. The online course design has been developed according to Hubbard’s three dimensional process ‘development↔ evaluation ↔ implementation’. As elaborated on earlier, this framework was itself inspired from Richards and Rodgers' categories of approach, design, and procedure (1982). These last three elements represent the parameters of evaluation that correspond to what Hubbard (1996, 2011) calls respectively:

- ‘Teacher fit’ that can be inferred from such concerns as the language teaching approach and assumptions about the way languages should be taught, which the software reflects, and we have to consider whether all those elements fit together;

- ‘Learner fit’ is concerned with considerations like ‘how well’ the content, skills, as well as the language level match the learners’ needs as specified in the objectives, and ‘how well’ the software corresponds to the learners’ interests;

- Finally, ‘operational description’ or ‘procedure’ is related to such issues as the flow of lessons and items within them, and sequencing.

Such criteria complete and feed each other, therefore they have already been subsumed within the online course design which has also been enriched with all the literature studied and reviewed such as course quality principles. We shall therefore consider the online course components and their interrelated interactions to examine how they meet such evaluation criteria. We shall try to find out for instance, about the quality software or the learning delivery environment, namely the learning management system MOODLE that we have selected and described as relevant in various aspects. We shall thus examine how it fits the learners’ needs and learning objectives (learner fit), which may also be dependent on the language teaching approach like the way language is learned (teacher fit), in terms of materials and interactions. These interactions encompass also data on the ‘operational description’ or ‘procedure’ as it will be shown in the next section.

To begin with, reading is our science and technology learners’ major target activity followed by writing, needed to prepare abstracts for conference proceedings, or publish scientific/technical articles. In addition to this, developing the learners’ aural and indirectly oral skills has been considered since they may be needed to give talks in conferences, and also to interact within virtual communities of practice, or simply to socialize, using English in conversations. Thus, we have developed those

objectives according to Grave's framework and Trimble's rhetorical levels, taking into consideration the social-constructivist dimension. As presented in the above introduction to the different topics forming the online, interactive self-instructional course for computer science students, learners are informed through the summaries preceding each topic and activity of the expected outcomes, in addition to the learning skills as well as strategies embodied in the various activities. This has been thought of with the view of enhancing their motivation, and developing their autonomy since one of the latter's incentives is to make learners aware of course goals as well as objectives. The course content has been retained to be related to the learners' subject-matter, from general scientific/technical knowledge to authentic subject-related literature, such as the lectures embodied in the videos imbedded within the lessons. We have then translated those objectives into learning activities likely to meet the requirements of authentic activities, and are intellectually challenging. We may mention some of the activities developed for this e-course below:

- Training in some rhetorical functions related to scientific/technical discourse like defining concepts (e.g. topic 1: "what is a program?");
- exploring and recognizing discourse organization as in identifying the topic of a text, like presenting a survey (e.g. topic 7, a presentation on the major crises encountered in the course of software development);
- describing objects, processes such as the DVD construction process (topic 8);
- comparing and contrasting processes, or other (s) like formal and natural languages (topic 6);

- classifying and synthesizing information like listening to, or reading on different programming errors, and then categorizing them according to their features (topic 3: “Programming errors and debugging”);

- reducing and summarizing content, such as listening to a recording, taking notes, organizing and structuring the information (study and research skills) and then, summarizing the various steps, to be subsequently transformed into a written paragraph (topic 8: summarizing steps of the computational thinking process);

- enhancing collaborative work: discussing issues on forums, arguing, agreeing/disagreeing, exchanging information such as expanded definitions;

- using the rhetorical functions having been trained in, and the sub-technical as well as technical vocabulary worked out through the different topics, to write a report (the project).

We therefore tried to turn these objectives into learning items, to be shown subsequently in screenshots illustrating each lesson’s content and flow. Also, since we have adopted for the online course the topic format, as explained in the course rationale, the content is organized thematically. For instance, in topic one the text defines a program as a set of instructions with some details which differ according to the various programming languages. An example of these, ‘Python’ constitutes the text of topic two. In this way, we have tried to maintain coherence throughout the different topics of the course.

Moreover, since the adopted approach also draws from TBLT, the language aspects that are pertinent to the course objectives and are encountered in the reading passages, are exploited for study at the end of the reading task (illustrated in 5.4),

leading therefore to the integration of skills. Thus, the learners not only develop different skills and sub-skills; they are also trained in learning how to learn, which means learning to adapt what they learn to different situations, creating therefore further learning opportunities (Baralt et al., 2014). We may give examples of reading and predicting the topic of discourse (e.g. describing a process), guessing meaning from context, reading and summarizing, or listening to audio extracts and completing clozes. Such activities are designed indeed to promote thinking skills, in accordance with authentic-learning, and are related to the learners' subject of study to meet the requirements of the other orientation, ESP/EST based, of our adopted approach. We may say therefore that those activities have been built in compliance with the eclectic approach we have chosen, and seem to meet both the teacher's and learner's fit. But what about the interactions involved and that inform us on the 'operational description' or 'procedure'? This will be the concern of the next section.

#### **4.3.1. Content flow and sequencing within the course**

Concerning the content flow, information in the 'Jump' column indicates the interaction sequence of activities, represented in the unit (lesson) by buttons. These suggest to the learner how to reach the main points to study, in order to meet the objectives set for each topic. Those interactive links are generally located under the reading passage which constitutes the basis of the lesson, in that we use context-oriented activities and activities-included grammar (Levy and Stockwell, 2006). Besides, comprehensible instructions and objectives are disseminated throughout the course to inform learners of the different course components, and suggest to them (via

some tools like interactive buttons) the path to follow while moving within the course. The objective aimed at is to help them reach the activities that would reinforce certain aspects of language, and the way to tackle them.

Thus, although the online course is intended to be self-instructional, learners are helped in their surfing within the lessons. For this, they are not only given prompt feedback. Advancement in their study is also facilitated as already stated, by the set of interactive buttons, links and clear instructions we have disseminated throughout the course items. This is to meet the requirements of clear and comprehensible layout of course content described earlier.

The sequencing of the online course content however, and in line with the process of navigation throughout the course components, may be described as eclectic. It is indeed eclectic in that, it may be both cyclic and linear. It may be considered as linear since the topics' tasks are built up to lead to a final project (report writing). Also some activities feed each other, like studying the rhetorical technique of how to compare/contrast using specific constructions and patterns, in order to be able in a subsequent task to produce a rhetorical function such as comparing/contrasting two processes or objects. We may find such notes in topic six, followed by an assignment requiring the learners to re-read the two texts (respectively, in topics 5 and 6) on natural and formal languages, with a view of comparing/contrasting them, and then summarizing the differences between the two types of languages. This is in addition to using the information and the terminology that have been progressively built in through the various topics ('scaffolding').

The sequencing of the course content may as well be seen as cyclical, since learners are allowed to look back on some course aspects not yet understood, such as re-read a text, or review a language point. This is made possible through the different parameters we set, like the possibility to reattempt quizzes, in addition to the buttons and links we created to send learners to different parts of the course, as already stated. We may cite the button ‘Return to text’ present on most pages to allow the learners to re-read the text. Moreover, some aspects already dealt with in earlier lessons may be questioned on, to refresh the learner’s knowledge. For instance, in the activity of reading comprehension, some language aspects already dealt with may be present in the text of another topic; so, a question may be given to refresh that point to the learner. All such activities have been conveyed in materials relevant to the learners’ subject of study. Those materials will be examined below.

#### **4.3.2. Course materials and the free content issue**

The major obstacle we met when we started to develop this course was the unavailability of free educational science and technology language teaching materials, ready for use. We had therefore to use authentic literature such as articles or chapters of books, to extract chunks of text, organize them in a coherent, meaningful way, and then use them as teaching items. Thus, the texts used in the computer science course have been adapted (selected, shortened and thematically ordered) from a free, online book and the videos likewise (sources cited in 3.3). In our choice of materials we tried to care for the criteria required for self-instructional materials (Dickinson, 1987). Hence, our concern was to present materials in varied formats, such as texts and

videos, including glossaries, links to some web-based sites, in addition to quizzes to facilitate comprehension and broaden our learners' knowledge.

As for the grammar notes included in our course, they have been compiled from a variety of sources both in print and online, as already stated. They have been adapted and enriched over time with features as well as examples related to the scientific/technical style, in order to suit different syllabi. We may mention however some distinct sources like Brown and Mullen's book (1984) and the site ([englishclub.com](http://englishclub.com)) of Essberger (2010) from whom we had previously requested permission to use their materials for pedagogical purposes.

We have also faced a major issue, probably like a lot of researchers, which consists in the difficulty of finding educational materials for use without impeding on authors' copy rights. The other difficulty which has been met is wading through the important number of existing licenses, and their unintelligible jargon. We have indeed encountered this problem when we began looking for educational science and technology teaching/learning materials for our e-course. We requested a certain number of times for permission to use such materials so as not to worry about the legal rights, or copy rights of authors, but most of them have been refused. Fortunately, the chosen site (MITOPENCOURSEWARE) is 'open', under the Creative Commons license, meaning that it is free, which justifies our choice. By free is meant to use and /or re-use materials, and even exploit the derived uses for educational purposes, provided the site and authors are cited.

We thus developed materials for our interactive, self-instructional course according to the objectives set previously.

For the reading passages we used:

- Science and technology related materials, encompassing an up- to date authentic scientific and technical knowledge. We may cite from the materials we used in the course (sources in 3.3) scientific articles, reports, lectures, and texts describing components (like the text in topic eight of the computer science course).
- Texts have been adapted and created in web pages, while supplementary literature is presented as PDF, or PowerPoint slides intended for further reading (as in topic seven, in the computer science course).
- The listening materials have been chosen and developed according to the set objectives, as has been the case for the reading materials. Therefore, they have the same didactic features, related to science and technology. They are embodied in audio recordings (as in topic one, and topic eight in the computer science course), and also in videos. The latter are always followed by a question to check their comprehension, and be consistent with the principle of continuous assessment, one of the types of evaluation examined hereinafter.

### **4.3.3. Types of assessment**

The ultimate task in the online course is that of realizing a project which consists in writing a report, taking into consideration the skills and strategies that the learners have been trained in, throughout the different topics. Besides, they will make use of their subject, background knowledge.

This brings us therefore to deal with the issue of assessment and prompt feedback in our online course. The feedback is integrated within quiz items to inform

learners on their performance and guide them to the decision to take, whether to carry on with the quiz, review certain language aspects where they still meet difficulties, or tackle the task of reading again. Expressions such as ‘Correct. Well done!’ or ‘Incorrect! Re-read your text’, or again ‘Incorrect! Try again’ have been used. Concerning the assessment of the learners’ knowledge, it is of two types. One is of a formative type, including quizzes and assignments with an unlimited number of attempts admitted in order to allow our learners to have more practice. The other type is summative, consisting of a report writing project. This is to give them an opportunity to put into practice the skills and sub-skills they developed during their interaction with the various course activities.

In dealing with their project, learners will indeed make use of the acquired knowledge, in accordance with the course objectives, and the expected outcomes. Therefore, they endorse their role of autonomous learners, interacting with the course content as well as with their learning environment (Moodle), and managing their learning by carrying out the different activities. Among these, we may mention the practice of the rhetorical techniques (like how to compare/contrast using specific constructions and patterns) that generate relationships between rhetorical functions (comparing/contrasting methods or objects, defining concepts, etc.). This is in addition to using the information and terminology that have been built up while studying the different components of the course. Assessment and prompt feedback, important principles of high qualities courses have therefore been cared for in the online course.

Accordingly, we may say that this general review of our course structure design and content in terms of Hubbard’s evaluation criteria ‘teacher fit’, ‘learner fit’,

and 'operational description', has put forward a mutual correspondence between the different components, and highlighted the prevalence of consistency. This is in compliance with the adopted framework, along with the related reviewed literature and as advocated by a great number of researchers like those mentioned so far (Richards and Rodgers, 1982, Graves, 1996, Hubbard, 2009). Thus, and in the light of this review it may be appropriate to carry on with our evaluation of the course by examining each topic separately. The detailed description of each topic's items, supported with their respective screenshots taken from Moodle's interface to facilitate the comprehension of the description, will reveal indeed whether the online course design has been realized correctly, in accordance with the examined evaluation criteria.

#### **4.4. A detailed review of the topics**

In this section we shall present the different screenshots that illustrate the content of the topics mounted on MOODLE and included in our online course. We shall therefore examine this course by separately reviewing each of its topics. In doing so, we shall examine the lessons included in each topic with the view of assessing their correspondence to the objectives, learning activities, along with the learning resources and modalities, as described in the online course design. The screenshots illustrating the course content are presented hereinafter, as they appear on the platform interface.

## What is a program ?

Preview

Edit

Reports

Grade essays

Collapsed Expanded

Page title	Page type	Jumps
What is a program?	Content	Understanding aspects of language Understanding what is a program View and Listen Part 1 Next page
Listen and complete	Content	What is a program?
Understanding what is a program	Content	Comprehension question 1 What is a program?
Understanding aspects of language	Content	Ways of giving instructions Understanding types of questions What is a program?
Comprehension question 1	Short answer	Comprehension question 2 What is a program?
Comprehension question 2	True/false	Comprehension question 3 What is a program?
Comprehension question 3	Short answer	Comprehension question 4 What is a program?
Comprehension question 4	Short answer	Comprehension question 5 What is a program?

**Screenshot 6:** Topic 1 What is a program? (part 1)

Comprehension question 5	Short answer	Comprehension question 6 This page
Comprehension question 6	True/false	Comprehension question 7 This page
Comprehension question 7	Multichoice	What is a program? This page This page This page
Ways of giving instructions	Content	Understanding ways of giving instructions What is a program?
Understanding ways of giving instructions	Matching	Understanding types of questions This page
Understanding types of questions	Content	Using different types of questions What is a program?
Using different types of questions	Matching	What is a program? Understanding types of questions
View and Listen Part 1	Multichoice	This page This page What is a program?

**Screenshot 7:** Topic 1 What is a program? (part2)

Topic one includes a web page text, a quiz, in addition to lecture notes on ‘ways of giving instructions’ and on ‘understanding types of questions’. These are followed by two related activities respectively, ‘understanding ways of giving instructions’ and ‘using different types of questions’. The topic also includes a video with the title ‘what do computer scientists do’, an assignment (a webquest), and an MP3 recording (<http://ocw.mit.edu>: 2008) followed by a cloze, based on the recording. The reading text ‘what is a program’ has been adapted from an online book by Downey (2008). It is a simple text which describes the basic set of instructions that a program in computer science may consist of, and which are aimed at carrying out a computation. They are written by a programmer to be executed by the computer, with a view of performing a task, like calculating the best path to reach a place.

Learners are asked to read the text and then answer questions to check their comprehension by clicking on the button (link) ‘**Understanding what is a program**’ created on that same web page. Various questions (true/false, matching, short answer, multiple choice) have been developed to allow learners to assess their comprehension of the different rhetorical levels governing that piece of discourse without getting bored. The feature variety indeed is cared for, for an effective learning. Moreover, integrating assessment within tasks, such as that of reading then checking learners’ comprehension, is likely to enhance the learning of other involved skills, like developing a critical thinking, or reinforcing reflection. This context of “a program being a set of instructions” constituted an opportunity to review some constructions for giving instructions and examples of their use, in order to better explain this feature inherent to scientific discourse.

Knowing then that some of our learners meet difficulties in formulating correct questions, we made of the text title a point of interest to which we directed their attention, to ponder the different types of questions. Those two language aspects, ‘ways of giving instructions’, and ‘understanding types of questions’, are sent to via the button ‘**understanding aspects of language**’. Within the latter, and in addition to the lecture notes related to the cited language aspects, there are two supplementary buttons ‘understanding ways of giving instructions’, and ‘using different types of questions’. They are aimed to make learners work out those two aspects, allowing them therefore more practice.

A third button ‘**view and listen**’, is created on the same web page to send learners to a video ‘what does a computer do? Part 1’ (MIT OpenCourseWare, 2008), related to the topic and representing an authentic lecture. The aim is to enable learners to get used to listening to native lecturers, which may help them when attending conferences, or later for further studies/work in English speaking environments. A question is embedded within the same page of the video to assess learners’ comprehension.

We have thus described the major components of the first lesson where we tried to care for some of the features of good language teaching materials, required for self-instructional materials (Dickinson, 1987).

Page title	Page type	Jumps
<a href="#">The Python programming language</a>	Content	Understanding aspects of language Comprehension question 1 View and Listen part 2: The Python Language
<a href="#">Understanding aspects of language</a>	Content	Understanding the order of words Knowing about Compounds The Python programming language
<a href="#">Understanding the order of words</a>	Content	Distinguishing the order of words The Python programming language
<a href="#">Distinguishing the order of words</a>	Content	Checking the right word order Understanding aspects of language
<a href="#">Checking the right word order</a>	Content	Distinguishing the order of words
<a href="#">Knowing about Compounds</a>	Content	Understanding Compounds Understanding aspects of language
<a href="#">Understanding Compounds</a>	<a href="#">Multichoice</a>	Next page This page
<a href="#">Understanding the Python Language</a>	Content	Comprehension question 1 The Python programming language
<a href="#">Comprehension question 1</a>	True/false	Comprehension question 2 This page
<a href="#">Comprehension question 2</a>	True/false	Comprehension question 3 This page
<a href="#">Comprehension question 3</a>	True/false	Comprehension question 4 This page
<a href="#">Comprehension question 4</a>	<a href="#">Multichoice</a>	Comprehension question 5 The Python programming language
<a href="#">Comprehension question 5</a>	<a href="#">Multichoice</a>	Comprehension question 6 This page
<a href="#">Comprehension question 6</a>	Short answer	Comprehension question 7 The Python programming language
<a href="#">Comprehension question 7</a>	<a href="#">Multichoice</a>	View and Listen part 2: The Python Language This page The Python programming language
<a href="#">View and Listen part 2: The Python Language</a>	<a href="#">Multichoice</a>	The Python programming language View and Listen part 2: The Python Language

**Screenshot 8:** Topic 2 An example of programming languages: The Python programming language.

Topic two includes a web page text on ‘The Python programming language’, a quiz, as well as lecture notes on the order of words, and compounds. These are followed by two related activities designed with the objective of providing further practice to our learners. The topic also encompasses a video entitled ‘an example of programming languages’.

The text has been adapted from the same book cited in topic one. For the sake of consistency, as we gave the definition of a program in topic one, we gave an example of programming languages in this second topic.

Learners are asked to read the text and work it out through a series of comprehension questions that deal with the different relationships within the text, and that are related to the topic of that piece of discourse, including the use of technical as well as sub - technical vocabulary. Those comprehension questions may be accessed by clicking on the button ‘**understanding the Python Language**’.

In addition to this, two language aspects, to be reached by clicking on the button ‘**understanding aspects of language**’ have been exploited from the text, i.e., ‘understanding the order of words’, and ‘knowing about compounds’. The latter is inherent to scientific/technical discourse, requiring more focus. Thus, related lecture notes have been included, in addition to practice activities respectively, ‘understanding compounds’ and ‘distinguishing the order of words’. This last aspect is aimed to prepare the learners to write in a correct way, which constitutes a further step towards their project of report writing.

‘**View and listen**’ is another button which sends the learner to another video ‘what does a computer do? Part 2’, (MIT OpenCourseWare, 2008), related to the topic.

It represents a native lecturer dealing with the programming language Python. A multichoice or multiple choice questions is put under the video to allow learners to check their listening comprehension, followed by a prompt feedback to help them decide whether to review the video or not.

Page title	Page type	Jumps
What is debugging?	Content	Understanding errors and debugging Understanding aspects of language View and Listen Part3
Understanding errors and debugging	Content	Comprehension question1 What is debugging?
Comprehension question1	True/false	Comprehension question2 This page
Comprehension question2	Matching	Comprehension question3 This page
Comprehension question3	True/false	View and Listen Part3 Understanding errors and debugging
Understanding aspects of language	Content	Distinguishing the gerund in words with ING forms Gerund or Infinitive Distinguishing different quantifiers
Distinguishing the gerund in words with ING forms	Content	Gerund or Infinitive
Gerund or Infinitive	Content	Using the gerund or the Infinitive Understanding aspects of language
Using the gerund or the Infinitive	Content	Gerund or Infinitive What is debugging?
Distinguishing different quantifiers	Content	Using quantifiers 1 What is debugging?
Using quantifiers 1	<u>Multichoice</u>	Using quantifiers 2 This page This page
Using quantifiers 2	Matching	Understanding aspects of language This page
View and Listen Part3	<u>Multichoice</u>	What is debugging? This page This page

**Screenshot 9:** Topic 3 Programming errors and debugging.

Topic three is also related to programs' issues. It includes a web page text entitled 'Programming errors and debugging: What is debugging?', a quiz, as well as lecture notes related to discourse features from the text namely, 'distinguishing the gerund in words with ING forms', 'gerund or infinitive', and 'distinguishing the different quantifiers'. These are followed by two related activities respectively, 'using the gerund or the infinitive', and 'understanding quantifiers'. Providing the learners with such practice is likely indeed to reinforce their writing skills, and enhance their progress towards the final task, or project. In addition to this, the topic encompasses a video (MIT OpenCourseWare, 2008) entitled 'Programming: Part 1' at the bottom of which, a multi choice question is asked to enable learners to check their comprehension.

Concerning the text, also adapted from Downey (2008), it is about the different errors that may occur during the process of programming, and their tracking or debugging.

Learners are asked to read the text and then answer questions to check their comprehension by clicking on the button '**understanding Programming errors and debugging**', created on that same web page. Various questions (true/false, matching, multiple choice) have been developed. The aim is to allow learners to assess their comprehension and work out the prevailing rhetorical levels in the text, through varied activities, in order to enhance their learning.

Skills have been integrated in this topic as well, and additional discourse features dealt with through relevant activities to reinforce our learners' reflection and practice. Prompt feedback has also been embedded within the lesson to allow learners

to assess their performance while studying. This is in accordance with the principle of 'ongoing practice of learned skills', related to course quality requirements.

Page title	Page type	Jumps
<a href="#">What is a Flow of Execution</a>	Content	Understanding the flow of execution Understanding aspects of language View and Listen Part 4
<a href="#">Understanding the flow of execution</a>	Content	Comprehension question 1 What is a Flow of Execution
<a href="#">Comprehension question 1</a>	<a href="#">Multichoice</a>	Comprehension question 2 This page This page
<a href="#">Comprehension question 2</a>	<a href="#">Multichoice</a>	Comprehension question 3 This page This page
<a href="#">Comprehension question 3</a>	True/false	Comprehension question 4 This page
<a href="#">Comprehension question 4</a>	True/false	Comprehension question 5 This page
<a href="#">Comprehension question 5</a>	Short answer	Next page
<a href="#">Comprehension question 6</a>	<a href="#">Multichoice</a>	What is a Flow of Execution This page This page
<a href="#">Understanding aspects of language</a>	Content	Ways of linking ideas Knowing about subject-verb agreement
<a href="#">Ways of linking ideas</a>	Content	Understanding aspects of language
<a href="#">Knowing about subject-verb agreement</a>	Content	Understanding Subject-verb-agreement Understanding aspects of language
<a href="#">Understanding Subject-verb-agreement</a>	Content	Understanding aspects of language View and Listen Part 4
<a href="#">View and Listen Part 4</a>	<a href="#">Multichoice</a>	What is a Flow of Execution This page

Screenshot 10: Topic 4 What is a Flow of Execution?

Topic four includes a web page text, a quiz, in addition to lecture notes on ‘ways of linking ideas’, and ‘knowing about subject-verb agreement’. The latter is followed by a practice activity ‘Understanding Subject-verb-agreement’ to put into practice the learner’s understanding of that aspect.

The topic also includes a video (MIT OpenCourseWare, 2008) entitled ‘Programming: Part 2’. It is followed by a multiple choice question to allow learners to assess their comprehension.

As for the text, it has also been adapted from the book of Downey (2008). It tackles the process of a program execution and encompasses new concepts that may be looked up in the provided glossary or in the online dictionary, the link of which is provided at the bottom of the course. This will allow them to check broader definitions, and related terminology as well.

Learners are asked to check their comprehension by clicking on the button ‘**Understanding the flow of Execution**’ created on that same web page. Various questions (true/false, matching, short answer, multiple choice) have been developed to allow learners to assess their comprehension of the different rhetorical levels regulating that piece of discourse, and at the same time caring for variety.

On that account, we provided the learners with varied activities to work out integrated skills after reading a subject-related piece of discourse, in accordance with the TBLT and ESP/EST approaches. In addition to this, assessment and prompt feedback are subsumed within tasks, in agreement with the social-constructive approach, which is likely to enhance the learners’ motivation and reinforce their reflection, making learning therefore more effective.

Page title	Page type	Jump
<a href="#">Formal and natural languages</a>	Content	Understanding formal and natural lang Understanding aspects of language View and Listen Part 5
<a href="#">Understanding formal and natural languages 1</a>	Content	Comprehension question 1
<a href="#">Comprehension question 1</a>	True/false	Comprehension question 2 This page
<a href="#">Comprehension question 2</a>	Multiple choice	Comprehension question 3 This page This page
<a href="#">Comprehension question 3</a>	Short answer	Comprehension question 4
<a href="#">Comprehension question 4</a>	Short answer	Comprehension question 5
<a href="#">Comprehension question 5</a>	Short answer	Comprehension question 6
<a href="#">Comprehension question 6</a>	True/false	Comprehension question 7 Formal and natural languages
<a href="#">Comprehension question 7</a>	True/false	Comprehension question 8 Formal and natural languages
<a href="#">Comprehension question 8</a>	Short answer	Formal and natural languages
<a href="#">Understanding aspects of language</a>	Content	Forming Words 1
<a href="#">Forming Words 1</a>	Multiple choice	Forming Words 2 This page This page This page This page
<a href="#">Forming Words 2</a>	Multiple choice	Forming Words 3 This page This page This page This page
<a href="#">Forming Words 3</a>	Multiple choice	Forming Words 4 This page This page This page
<a href="#">Forming Words 4</a>	Matching	View and Listen Part 5 This page
<a href="#">View and Listen Part 5</a>	Matching	Formal and natural languages

Screenshot 11: Topic 5 Formal and natural languages 1.

Topic five is composed of a web page text, a video (MIT OpenCourseWare, 2008) with the title ‘Programming-semantic: Part 2’, a quiz, in addition to lecture notes presented in a PowerPoint format on ‘word forming’, followed by a practice activity ‘Forming and understanding words’. The latter consists of a series of varied questions (matching, multiple choice) to allow learners to check their understanding of this aspect by doing that task without getting bored. This will facilitate their reading of the scientific/technical discourse which is compact and encompasses a lot of combined forms (prefixes, suffixes, compounds). Moreover, it will train the learners in writing in a meaningful, concise way, in agreement with the technical style features. Ultimately, this will prepare them for their target objective of understanding scientific/technical documents, and writing subject-related articles, or reports.

The topic also includes a text ‘Formal and natural languages 1’ which is again an adaptation of a section from the book of Downey (2008). It describes formal and natural languages, giving examples from each. This is related therefore to their field of study and even constitutes an important topic of research in Computer Sciences, which meets the learners’ target objective of reading authentic, subject-related literature.

They are then asked to check their understanding of the topic by clicking on the button **‘Understanding formal and natural languages** ‘created on that same web page, to answer questions related to comprehension. Those questions are characterised by their diversity (true/false, short answer, multiple choice), designed with the aim of developing the learners’ critical thinking, and enhancing their motivation while assessing their comprehension of the different discourse relationships.

Accordingly, assessment is incorporated within the various activities, which is likely to enhance the learning of other involved skills, like learning how to form words, then using appropriate forms to complete a cloze. The integrated feedback will also help the learners in their self-assessment, but will as well orientate them as to the decision to take, whether the answer is correct, then they will carry on with their study, or it is false and they decide then to re-attempt the quiz, or again to review some aspects of the lesson. This is a way to help them to develop their autonomy, and be responsible for their learning in such a distant environment of self-instructional learning, as mentioned in Thanasoulas' description (2000) of autonomous learner.

## Knowing about Formal and Natural languages 2 ?

Preview

Edit

Reports

Grade essays

Collapsed Expanded

Page title	Page type	Jumps
Formal and natural languages 2	Content	Understanding Formal and Natural Languages Understanding aspects of language View and Listen Part 6
Understanding Formal and Natural Languages 2	Content	Comprehension question 1 Formal and natural languages 2
Understanding comparing/contrasting	Content	Understanding aspects of language Formal and natural languages 2
Understanding aspects of language	Content	Understanding comparing/contrasting Ways of summarizing Formal and natural languages 2
Ways of summarizing	Content	Understanding aspects of language Formal and natural languages 2
Comprehension question 1	Multichoice	Comprehension question 2 This page This page

**Screenshot 12:** Topic 6 Formal and natural languages 2 (part 1).

Comprehension question 2	Matching	Comprehension question 3 Comprehension question 3
Comprehension question 3	True/false	Comprehension question 4 This page
Comprehension question 4	True/false	Comprehension question 5 This page
Comprehension question 5	Short answer	Comprehension question 6
Comprehension question 6	Short answer	Comprehension question 7
Comprehension question 7	Short answer	View and Listen Part 6
View and Listen Part 6	Matching	Formal and natural languages 2 This page

**Screenshot 13:** Topic 6 Formal and natural languages 2 (part 2).

Topic six (see the lesson’s detailed screenshots in appendix A4) includes a web page text, a quiz, a glossary, an assignment, lecture notes, and a video.

On the main page, the reading passage in this topic ‘**Knowing about formal and natural languages 2**’ (A 4, screenshot 24) has been adapted from the same book

(Downey, 2008). It completes the text in topic five in that, it puts forward other features that distinguish the two types of languages, in a progressive way, following the social constructive principle of ‘scaffolding’, and in agreement with the web design of giving small chunks of information to allow easy access and understanding as suggested by some specialists (ACU, 2008). This is likely to broaden the learners’ knowledge, and gradually enrich their vocabulary with the included terminology, which may be looked up in the glossary provided within the lesson on the left side menu, or in the dictionary linked at the bottom of the course. Drawing from some principles of the TBLT approach that we adopted, a pre-reading task is first provided, aimed at directing the learners’ interest to the imbedded vocabulary to equip the learners with the necessary topic-related vocabulary and target sentences that may be needed for further tasks (Izadpanah, 2010)

A button ‘**Understanding Formal and Natural Languages 2**’ created on that same web page (A 4, screenshot 25) sends learners, when clicked on, to a set of varied questions (true/false, matching, short answer, multiple choice). These have been developed to allow learners to assess their comprehension of the different ideas and discourse rhetorical features embedded within the text.

Such integrated assessment and immediate feedback conveyed through varied tasks are challenging, and likely to enhance our learners’ motivation.

In addition to this, in ‘**Understanding aspects of language**’ (A 4, screenshot 26) lecture notes are provided on ‘ways of summarizing’ and on ‘Comparing/Contrasting’. Examples of those rhetorical functions present in the text have first been highlighted, and a related task followed requiring the learners to

consider their use within the context. The aim is to raise their consciousness (Ellis, 2003) as to the relationships they establish within discourse (Trimble, 1985) and the meaning they create, before providing them as already stated with the corresponding notes. The latter are followed by a practice activity ‘Understanding comparing and contrasting’ to assess our learners’ understanding of how the different related constructions are used; while the other activity, an assignment at the end of the notes, bridges the rhetorical functions of comparing/contrasting and summarizing. This last activity is presented in a form of an assignment which requires the learners to re-read the two texts ‘formal and natural languages’ respectively, one and two, and synthesize the differences between the two types of languages following the given summarizing techniques, and using relevant comparing/ contrasting constructions. This will help in raising our learners’ consciousness as to the use of those rhetorical functions of summarizing, comparing, and contrasting which are inherent to scientific/technical discourse. This also constitutes a way of training the learners in strategies such as deducing, inferencing (O’Malley & Chamot’s, 1990), summarizing, creating analogies (Filcher & Miller: 2000) and other learning strategies such as organizing and planning. Moreover, such integrated activities are likely to promote thinking skills (ACU, 2008, adapted from Dufresne, Leonard and Gerace 1995, cited earlier). This is in accordance with the set objectives (inferred from the needs analysis of the students’ learning needs and summed up in table 10) of training the learners in identifying and organizing EST texts following Trimble’s rhetorical levels (1985).

The last component to be described in this lesson is ‘**Listen and view: Part 6**’ (A 4, screenshot 27). It includes an adapted video entitled ‘Testing and debugging’

(MIT OpenCourseWare, 2008), related to the topic's content as well as to the learners' subject, meeting therefore their specific needs and illustrating the translation of objectives into learning activities. This is likely to promote the learners' autonomy (Coterall, 2000, cited earlier). Such videos then, present throughout the course are aimed to reinforce the learners' listening skills before speaking (Yu, 2013), a strategy which relates to speaking, as stated previously, and which is involved in the strategy of 'centering learning' (Khosravi, 2012). Moreover, we associated each adapted transcript with its corresponding video frame so as to allow learners to read the transcript while following the lecturer's native speaking. This may indirectly help improve the learners' oral skills in trying to imitate the pronunciation and associate the sound to the words. Moreover, they may freeze the image to read the text freely and start again as many times as desired.



#### Multicore Programming Primer and Programming Competition File

- Understanding 'Multicore Programming Primer and Programming Competition' Quiz
- Synthesizing information

**Screenshot 14:** Topic 7 Understanding 'Multicore Programming Primer and Programming Competition'

Topic seven, presented above as figured in the layout of our offline version course, is not in a form of a lesson. We have chosen a different layout, which is visible, to show MOODLE's varied ways of presenting courses. This topic encompasses a PowerPoint presentation, a quiz, and an assignment.

The presentation (Amarasinghe, 2007) is about the major crises which have occurred during the process of software development. It is followed by a quiz related to the comprehension of the presentation content, and encompassing varied types of questions (matching, multiple choice, true/false). An assignment has been included to train the learners in synthesizing information, which simulates one of their subject, ongoing academic duties. They are supposed indeed to read and synthesize subject related literature in order to prepare presentations, backup their reports, or to prepare their research proposals. We thus added that assignment which requires them to summarize information from the PowerPoint presentation on major software crises, and then transferring it into a table. In addition to developing the learners' ability to read and synthesize information, this activity is likely to enrich their background knowledge and vocabulary.

<b>Page title</b>	<b>Page type</b>	<b>Jumps</b>
<a href="#"><u>The DVD construction process</u></a>	Content	Understanding aspects of language Putting your knowledge into practice Next page
<a href="#"><u>Writing the steps and the paragraph</u></a>	Content	End of lesson
<a href="#"><u>Listening and taking notes</u></a>	Content	This page Computational thinking process This page
<a href="#"><u>Writing the steps of the process and the paragraph</u></a>	Content	This page
<a href="#"><u>Computational thinking process</u></a>	Content	Listening and taking notes
<a href="#"><u>Putting your knowledge into practice</u></a>	Content	Writing a report The DVD construction process End of lesson
<a href="#"><u>Writing a report</u></a>	Content	This page End of lesson
<a href="#"><u>Understanding aspects of language</u></a>	Content	Ways of describing Ways of defining Knowing about the use of the passive
<a href="#"><u>Ways of describing</u></a>	Content	Understanding aspects of language The DVD construction process
<a href="#"><u>Ways of defining</u></a>	Content	Understanding aspects of language The DVD construction process
<a href="#"><u>Knowing about the use of the passive</u></a>	Content	Recognizing the use of the passive Understanding aspects of language
<a href="#"><u>Recognizing the use of the passive</u></a>	Content	Understanding aspects of language The DVD construction process

**Screenshot 15:** Topic 8 Describing a process in DVD construction.

Topic eight consists of a text (<http://www.io.com>, 2010) entitled ‘Describing a process in DVD construction’, an mp3 attachment (<http://ocw.mit.edu>, 2008), and two wikis. One of these is aimed to enable the learners to write the steps, listened to on the

mp3 recording, and the related paragraph; while the other is reserved for the project, which is the report writing.

The text has been exploited after the activity of reading, to complete the learners' knowledge of the necessary rhetorical techniques present in that piece of discourse. They are related to 'Ways of describing', 'Ways of defining', and 'Knowing about the use of the passive', which may all be needed for the writing of their project. In addition to this, practice activities such as 'Recognizing the use of the passive', and listening to an audio recording about 'Computational thinking process' are provided. Learners are required indeed to listen in order to write down that process steps (note taking), and then use them to develop a paragraph. This constitutes a preparatory activity to the ultimate one which is the project of report writing. In relation to this, notes on how to write a report are encompassed within the lesson. Such activities may be subscribed within social constructivism of learning by doing, which is also one of the principles of authentic learning (tackled Ch.3).

Hence, the text 'Describing a process in DVD construction' and the recording 'computational thinking process' have been chosen as models of the rhetorical function of describing, in regard to their type of discourse. The latter's inherent features like its structure, organisation, in addition to the use of appropriate ways of linking ideas, and relevant tenses, have been put forward. This is to make the learners aware of this type of discourse, and help them progress a step further towards their project of report writing. The latter comes indeed in the last part of the course, as a summative type of assessment in that, it appeals to the learners' knowledge which has been constructed throughout the different topics of the course. They are required

indeed via this project to put into practice whatever they have learned, and is relevant to that ultimate activity. The Moodle tool wiki has been used to allow them a space to write, and edit the version which seems the most satisfactory to them.

According to this detailed description of the course content, we may say that the topics' learning items, their structure, the flow of activities within them, and the interactions they subsume between the learner, the content and the learning environment or software, seem to imply consistency at all levels, in agreement with Hubbard's framework adopted in this research. Four topics have thus been implemented on the university's site, in addition to the chat and forum components. The feedback yielded from piloting those units is examined in the following section.

#### **4.5. Analysis of the feedback on the piloted units and evaluation**

MOODLE's tracking system provides us with various types of feedback. We may cite the activity report of the overall course participation (screenshot 16) which allows us to have information about the course in general, like the number of times the different components of the course have been accessed. Other examples of tracking may also be given like a report for each learners' actions in a given topic or activity, in addition to the number of times they worked each topic. We may as well obtain from MOODLE's tracking system a report which represents the grader report of each learner. Hereinafter are some examples of records that have been selected during the piloting of four topics from the online course for computer science students.

**An Interactive Self-Instructional Course of English for USTHB Students**  
 Computed from logs since Saturday, 15 September 2012, 7:37 AM.

Activity	Views	Related blog entries	Last access
Your forum	69	-	Friday, 5 December 2014, 11:51 AM (4 hours 40 mins)
Let's communicate in English	39	-	Friday, 5 December 2014, 11:48 AM (4 hours 43 mins)
<b>Topic 1</b>			
What is a program	427	-	Friday, 5 December 2014, 4:17 PM (14 mins 30 secs)
<b>Topic 2</b>			
An example of programming languages	130	-	Thursday, 4 December 2014, 11:21 PM (17 hours 10 mins)
<b>Topic 3</b>			
Programming errors and debugging	145	-	Friday, 5 December 2014, 12:00 PM (4 hours 31 mins)
<b>Topic 4</b>			
Describing a process in DVD construction	222	-	Friday, 5 December 2014, 12:06 PM (4 hours 25 mins)
writing the steps and the paragraph	-	-	
Your project	6	-	Wednesday, 26 November 2014, 5:56 PM (8 days 22 hours)
Checking your vocabulary	-	-	

**Screenshot 16:** Activity report of the overall course participation.

The activity report in the above screenshot shows the number of times each topic (activity) of the course has been accessed. This may inform us on the frequency the different topics have been dealt with, which may be a hint to their learning difficulties. This report may then be matched with the learners' individual reports related to their participation in each topic and activity, which may yield information on the learners' work on each task.

An Interactive Self-Instructional Course of English for USTHB Students: All participants, All days (Server's local ti...

An Interactive Self-Instructional Course of English for USTHB Students ▾ All participants ▾ All days  
 What is a program ▾ All actions ▾ Display on page ▾ [Get these logs](#)

Displaying 432 records

Page: 1 2 3 4 5 (Next)

Time	IP address	User full name	Action	Information
Mon 24 November 2014, 12:16 AM		mohamed.	lesson view	What is a program?
Mon 24 November 2014, 12:15 AM		mohamed.	lesson view	Listen and complete
Mon 24 November 2014, 12:15 AM		mohamed.	lesson start	What is a program
Mon 24 November 2014, 12:12 AM		mohamed.	lesson view	What is a program?
Mon 24 November 2014, 12:07 AM		mohamed.	lesson view	Listen and complete
Mon 24 November 2014, 12:07 AM		mohamed.	lesson view	View and Listen Part 1
Mon 24 November 2014, 12:06 AM		mohamed.	lesson view	What is a program?
Mon 24 November 2014, 12:06 AM		mohamed.	lesson view	Comprehension question 7
Mon 24 November 2014, 12:06 AM		mohamed.	lesson view	Comprehension question 7
Mon 24 November 2014, 12:06 AM		mohamed.	lesson view	Comprehension question 7
Mon 24 November 2014, 12:05 AM		mohamed.	lesson view	Comprehension question 6
Mon 24 November 2014, 12:01 AM		mohamed	lesson view	Understanding what is a program
Mon 24 November 2014, 12:00 AM		mohamed	lesson view	What is a program?
Mon 24 November 2014, 12:00 AM		mohamed	lesson view	View and Listen Part 1
Sun 23 November 2014, 11:59 PM		mohamed	lesson view	View and Listen Part 1
Sun 23 November 2014, 11:58 PM		mohamed	lesson view	Using different types of questions
Sun 23 November 2014, 11:54 PM		mohamed	lesson view	Understanding types of questions
Sun 23 November 2014, 11:53 PM		mohamed	lesson view	Understanding ways of giving instructions
Sun 23 November 2014, 11:52 PM		mohamed	lesson view	Ways of giving instructions
Sun 23 November 2014, 7:52 PM		elkhalil.	lesson view	Listen and complete
Sun 23 November 2014, 7:52 PM		elkhalil.	lesson start	What is a program
Sun 23 November 2014, 10:09 AM		salima.	lesson view	View and Listen Part 1
Sun 23 November 2014, 10:08 AM		salima.	lesson start	What is a program
Sun 23 November 2014, 10:08 AM		salima.	lesson view	What is a program?
Sun 23 November 2014, 10:06 AM		salima.	lesson start	What is a program
Sun 23 November 2014, 10:06 AM		salima.	lesson view	What is a program?
Wed 19 November 2014, 10:14 PM		imene.	lesson view	Understanding ways of giving instructions
Wed 19 November 2014, 10:14 PM		imene.	lesson view	Ways of giving instructions
Wed 19 November 2014, 10:10 PM		imene.	lesson view	Understanding aspects of language
Wed 19 November 2014, 10:08 PM		imene.	lesson start	What is a program

**Screenshot 17:** Learners' actions in topic 1 activities

In the above screenshot however, the activity tackled by each learner in topic one (taken as an example) is tracked. Moreover, not only the different activities and

the names of the students are mentioned. Their access dates are also recorded. Being informed of the last time the learner logged in may help the tutor identify the learners by accessing their individual reports and contact them, for example, to inquire about their lack of participation.

ISICE: Participation report

campusvirtuel.usthb.dz/report/participation/index.php?id=60&instanceid=1342&timefrom=&roleid=5&action=

### An Interactive Self-Instructional Course of English for USTHB Students

Home ▶ My courses ▶ Master ▶ Première Année ▶ ISICE ▶ Reports ▶ Course participation

Activity module: What is a program

Look back: Choose... Show only: Student

Lesson Views: view, view all  
Lesson Posts: end, start

17

First name / Surname	All actions	Select
wafa.	No	<input type="checkbox"/>
salima.	Yes (5)	<input type="checkbox"/>
ramzi.	Yes (32)	<input type="checkbox"/>
oussama.	Yes (4)	<input type="checkbox"/>
nourelhouda.	Yes (2)	<input type="checkbox"/>
nour.	Yes (48)	<input type="checkbox"/>
moussa.	Yes (2)	<input type="checkbox"/>
mohamed.	Yes (7)	<input type="checkbox"/>
mohamed.	Yes (32)	<input type="checkbox"/>
meriem	Yes (48)	<input type="checkbox"/>
lokmane	Yes (6)	<input type="checkbox"/>
imene.	Yes (5)	<input type="checkbox"/>
lokmane.	Yes (6)	<input type="checkbox"/>
imene	Yes (5)	<input type="checkbox"/>
honain.	Yes (2)	<input type="checkbox"/>
hadjer.	Yes (2)	<input type="checkbox"/>
elkhalil.	Yes (24)	<input type="checkbox"/>
amine.	Yes (35)	<input type="checkbox"/>

**Screenshot 18:** Learners' participation in topic one.

As for the screenshot above, it represents the recorded participation of every learner in the first topic ‘what is a computer’, taken as example. It is noted that some learners have accessed the lesson more than others, which may imply that they met more difficulties in tackling the different activities encompassed in that topic.

The screenshot shows a Moodle Grader report for user 'wafa'. The table displays the following data:

Grade Item	Calculated weight	Grade	Range	Percentage	Feedback	Contribution to course total
<b>An Interactive Self-Instructional Course of English for USTHB Students</b>						
What is a program	100.00 %	10.71	0.00–25.00	42.86 %		42.86 %
An example of programming languages	0.00 % ( Empty )	-	0.00–100.00	-		0.00 %
Programming errors and debugging	0.00 % ( Empty )	-	0.00–100.00	-		0.00 %
Describing a process in DVD construction	0.00 % ( Empty )	-	0.00–100.00	-		0.00 %
Checking your vocabulary	0.00 % ( Empty )	-	0.00–100.00	-		0.00 %
Checking Technical Vocabulary	0.00 % ( Empty )	-	0.00–100.00	-		0.00 %
<b>Course total</b> Simple weighted mean of grades.	-	<b>42.86</b>	<b>0.00–100.00</b>	<b>42.86 %</b>		-

**Screenshot 19:** Grader report.

Concerning grading, it does not yet constitute an area of emphasis in our course, since the latter is now but an adjunct to the official course, aimed just to reinforce our learners’ practice. We have rather focused on prompt feedback to help the learners in their decision taking, of whether to re-attempt a quiz, for instance, or carry on with the other activities. However, MOODLE’s tracking system records learners’ grades if this parameter is settled in the course settings. As an example, the

grader report in the above screenshot represents a selected learner's individual performance of on each of the topics constituting the course. An average follows at the end of the report.

Hence, we have successfully implemented on MOODLE four units from our online course for computer science students. We deployed them on the university's site, more precisely on its platform where we are hosted. We first met difficulties in uploading our course files, particularly the videos, to the site. We found out, after reading the settings set for our online course by the university's site administrator, that the space size assigned for the course was 100 MB. We therefore requested a larger capacity, which has hopefully been doubled. Thus, taking advantage of a good internet connection, we succeeded in easily deploying our lessons. We later provided some of our Master-level students a subscription key, and we allowed them self-enrolment, in the online course settings. They have been able therefore to access the course via their university's account (USTHB's), using their passwords and the subscription key.

Learners mentioned that some features, namely links to a recording and a cloze test in topic 1 failed to function, which we corrected by repeating the operation of inserting the links. Apart from that, all the tools, buttons and links are operational. Learners expressed however the wish to have more attractive features on the site, like links to sites, images, and animation. This is one of our objectives indeed, to make our site more cheerful, but downloading times would be longer, which is already the case with a simple web page design.

This brings us to mention the acute problem of the slow (sometimes non-existent) internet connection. This matter of fact discourages learners, and prevents

them from completing all the course activities. This explains partly the poor participation of the learners (not all activities are completed) in the online course, particularly that they are overloaded with subject study requirements.

In the light of this attempt of designing, developing, and implementing an interactive, self-instructional course of English for science and technology, particularly for the students at USTHB, we may say that it is quite feasible to expand such a mode of teaching/learning. It may be self-instructional, or under the tutoring of monitors. The latter may guide the learners by answering messages on whatever issue is raised by them, particularly the introverted ones. They may post on the forum questions related to the various topics, and then direct learners' discussions to maintain attention to the required learning objectives.

Monitors may as well contact the learners with a weak participation to enquire about it, and then suggest solutions in case help is needed. They can also contribute with creating resources if registered as course creators. Such a mode of instruction delivery may indeed be envisaged in the light of the difficulties encountered regarding learning in large classes. However, appropriate conditions should be met to prepare a favourable learning/teaching situation.

## **Conclusion**

This research was aimed at examining the need for the design of an online course of English for science and technology, namely at the university USTHB. Online or distance teaching/learning is indeed well underway in Algeria, in institutions like the university for continuing education (UFC). Some universities like the USTHB also use learning environments such as Moodle, but most of them do not host full courses. Having visited a few sites of Algerian universities in the course of the current study, we found out in terms of teaching that only resources in form of Word or PDF files were deposited on the platforms. The latter therefore, are not thoroughly exploited since not all of their tools are used. An appropriate training of how to integrate technology in pedagogy and not only in knowing about technology seems to be lacking, in addition to an enhanced infrastructure, as well as a high connectivity. These prerequisites are essential if e-learning is to be thought of as a complementary solution or an alternative in some subjects which might not be provided via the face-to-face mode of teaching, in crowded educational settings or to overcome difficulties related to time constraints. In this context, our first research question is whether an online course would be a complementary solution to the conventional, face-to-face course, given the fact that the latter has shown limitations in the Algerian context and that new needs for change are necessary.

This was one of our concerns when we started our investigation within the framework of our action- research oriented work. Our research is therefore basically action-research oriented, but is also qualitative. We wanted to explore the need for the

design of a relevant online course of English for science and technology students, as in the case of the university USTHB, particularly those who do not benefit from the classroom-based course. The online course is aimed to help them, we hope, to study out of office hours at their own pace and without place or time constraints, in addition to increasing their practice of English which is a mandatory component in their curricular. For this purpose, we first proceeded to a needs analysis assessment of the situation into which the classroom-based course of English is run. To generate the maximum of relevant data and ensure reliability we catered for triangulation. We adopted the research tools questionnaires and unstructured interviews. The former were distributed to first year master students and teachers of English at the CEIL, with almost the same questions in order to match answers, for the sake of clarity. The latter however concerned only the teachers at the CEIL to obtain additional data that might not have been targeted by the questionnaires, and to complete or check ambiguous answers. The areas of investigation involved the present teaching tools in terms of didactic materials and equipment used in the course, the teachers' experience in the educational field, in addition to the issue of teaching/learning in large classes and whether it has any impact on the teaching/learning process. The investigation also targeted the students' learning needs. The latter were already researched in our previous study (magister thesis, 2002, summary pp. 3-5), which led to developing guidelines that support the present classroom-based course built in accordance with the students' learning objectives. We had therefore to investigate whether any change has occurred in those learning objectives. This lied behind the second research question of what would the online course objectives be compared to the classroom-based ones. We

wanted to find out whether the latter were still relevant for the online course, which brought us to ask a third research question of what would the online course content be compared to the classroom-based one. The results of the enquiry, amongst others, pointed out the insufficiency and inappropriateness of the present teaching tools, namely appropriate textbooks, the lack of didactic tools and of ICT use in teaching, the difficulty of coping in crowded classes with the LMD system regulations of continuous assessment, in addition to the lack of practice in aural/ oral skills. Such findings put forward the difficulties encountered in teaching/learning in large classes the module of English, in a face-to-face mode of instruction delivery. They also showed that the respondents were in favour of putting a course of English, or learning resources online, which constituted a positive answer to our first research question. Moreover, the results indicated that no major change has occurred since our previous study (magister thesis, 2002, pp. 3-5) concerning the students' learning objectives, answering therefore the second research question. Thus, reading and writing scientific/technical literature still constitute the students' target objectives. However, the objectives related to the development of aural and oral skills considered beforehand as subjective (see p. 112) have recently become rather objective, in the light of the expansion of learning to other open, online sources like online experts, or groups of interest using mainly English to communicate. In addition, English may be used for research like giving talks in conferences, which brought the students to suggest their inclusion in the online course. Since no significant change has occurred in the students' learning objectives that support the current classroom-based course, they have been updated and considered as relevant, to be adapted to the online course.

This led us to consider whether the current face-to-face course content could be used in the online course since there has been no major change in the learning objectives, which generated the third research question of what would the online course content be compared to the classroom-based one. The latter's answer was already provided (results of the current research) in the students' suggestions of reinforcing their practice of English outside office hours, and of developing their aural/oral skills through the online course. We therefore reached the conclusion that the interactive, self-instructional online course should be different in content from the current, classroom-based course. This is to meet the expectancies of the students who already attend the face-to-face course, and to allow those who do not benefit from it (from the classroom-based course) to study English.

Once the research questions were answered, we started to reflect on how to tackle the design of this technology-mediated course. We started by documenting ourselves on appropriate literature, from browsing through the historical evolution of CALL or e-learning, to trying to know its different tools as well as applications in order to be informed of some of their uses in teaching practices. We carried on with reviewing some representative models of learning inspired from traditional approaches as well as theories, and adapted to online instruction delivery. Such readings helped us in being aware of e-learning principles related to teaching/learning as well as to course evaluation criteria; in understanding the characteristics of online course design, and in making sure that consistency is to be respected at all levels of a course development. The literature review also allowed us to infer pedagogical implications/applications for the e-course rationale (table 9), and to refine our approach which is eclectic. It

subsumes principles from ESP/EST, social constructivism with its principle of scaffolding, as well as TBLT with a compromise borrowed from Swan (2005), offering opportunities for focus on the form. All this knowledge helped us to identify and set the students' updated learning objectives. We specified them (table 10) according to Grave's framework (1996) along with Trimble's classification of rhetorical levels (1985), and matched them (table 11) against Bloom's revised taxonomy (adapted from CELT, 1995-2017), for a complete coverage. We next converted them into learning activities (table 12) and carried on with the course design, caring for evaluation criteria. In this respect, we catered for Coterall's suggested principles (2000), Lombardi's ten design elements (2007), in addition to Cole and Foster's (2007) criteria of high quality courses. All such criteria highlighted the relevance of the course content to learners' goals, in terms of language tasks and strategies like those pointed out by O'Maley and Chamot (1987), and the levels of promoting learners' autonomy by Nunan's (1997). Real-world relevance and reflection (metacognition), coherence in learning, ongoing practice of learned skills, assessment and prompt feedback, also constitute some of the evaluation criteria referred to during the online course development. We have taken as well into account the evaluation criteria in choosing the relevant virtual learning environment, with tools that are flexible to allow the practice of all the identified language skills and areas needed by the targeted students. After trying out some platforms (like Sakai, Accolade), we have chosen Moodle which, in addition to being available on our university's platform, is a free open source. It is a dedicated system as distinguished by Colpaert (2006). Indeed, it contains such functionalities as feedback or tracking, developed themselves for

language learning, teaching and testing which is enabled with its quiz tool. For the overall design of the course, we have adopted Hubbard's (1996, 2011) framework concerning the development, the evaluation and implementation modules, inspired itself from Richards and Rodgers' categories of approach, design and procedure (1982). This sound theoretical framework, more exhaustive than a simple checklist, as already stated, helped us in observing consistency in the general design of the online course (as in the development component). This consistency has been considered in terms of content (course content, learner focus) and design with our eclectic approach (teacher fit), with the learners' needs as well as the course objectives (learner fit), along with the affordances of the platform Moodle, considered as procedure, but also referred to as operational description within the framework's omnipresent evaluation component. This helped us in designing the online course templates. These have been illustrated into three tables (i.) learning activities, learning resources and modalities; (ii.) learning environment, instructor's role and learner's role; (iii.) assessment, feedback and modes. Those templates have then been translated into the content of the online course, with regard to the implementation component. The latter, as explained by Hubbard and stated earlier, includes considering how that content is to be integrated into a course, prepared for, delivered, and reviewed with students in the classroom (or online).

We have thus mounted our interactive course on an offline version of the platform Moodle that we set up on our laptop, to avoid the problems related to Internet connection disruptions. The screenshots of this course have been provided in this research work to facilitate the reviewing of its content, and illustrate its structure and

sequencing. We have later restored four units, in addition to the forum and chat components into the space allocated for us on the university's platform, and we have piloted them with some of our first-year master students to whom we provided subscription keys. The piloting feedback that we have analysed (4.5) has been made possible with Moodle's tracking system, some screenshots of which have been included to indicate the feasibility of providing such an interactive, online mode of teaching/learning as a complementary solution.

Hence, in carrying out this research work of designing, developing, and then putting a course on a platform to be delivered online, we hope that we have somewhat contributed to further paving the way of this type of instruction delivery in our country. This interactive, self-instructional online course of English we have designed for science and technology students, as is the case in the university USTHB, could be used by other institutions having the same subject. It could also be used by other people in business English as a model to be followed and refined. This experience of developing an online course according to students' needs that we are sharing suggests indeed, the possibility of teaching online some academic subjects, like English for science and technology, in crowded universities and in situations affected by time constraints. For this, as suggested in the recommendations made in relation to the weaknesses identified during our research, teachers' knowledge should be fostered in not only the field of pertinent, related theory. It should also be extended to that of technology use, putting the skills being trained in into practice in order to experience the integration of technology in teaching practices.

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## Appendix A1: Teachers' Questionnaire

This questionnaire is related to a doctoral research on the teaching/learning situation of English at the University of Sciences and Technology Houari Boumediene (USTHB). The collected information is anonymous and will serve only the purposes of this research, with a view of further improving the teaching/learning situation of English in our institution. We thank you in advance for your contribution.

1. Your position at CEIL:

Part-timer       Permanent

2. Your students' academic subject:.....

3. What is the size of the groups of students you teach?

.....

4. Does it constitute a problem in your teaching of the English language? Yes  No

5. If yes, why?

.....

.....

6. Which skill (s) and areas(s) of language do you think your students need to reinforce?

Langue skills and areas	Scientific/technical English
a. Listening comprehension	<input type="checkbox"/>
b. Reading texts/comprehension	<input type="checkbox"/>
c. Speaking	<input type="checkbox"/>
d. Study of texts (inferencing/referencing, grammatical structures, vocabulary, ...)	<input type="checkbox"/>
e. Study of grammar.	<input type="checkbox"/>
f. Teaching. learning of scientific/technical terminology.	<input type="checkbox"/>

g. Other(s): .....

7. Do you use any multi-media means in your teaching?

Yes

No

8. If yes, what do you use?.....

9. Do you think that the integration of multi-media tools in the course of English will make its teaching/learning more efficient:

Yes

No

10. The multi-media tools available at the CEIL (USTHB)are:

a. Language laboratories with: Audio Headsets

Video Players

Teaching Platforms

b. Computers with: CDs

Connected to Intranet

Connected to Internet

c. Overhead-projectors

d. Data show projectors

11. You think that the multi-media tools available at the CEIL are:

a. Sufficient and appropriate

b. Sufficient but inappropriate

c. Insufficient but appropriate

d. Insufficient and inappropriate

e. Other .....



12. Do your students need more practice in English? yes

no

13. Why do you use the computer?

.....  
.....  
.....

14. What is the average time per week you devote to computer work?.....hour(s)

15. Do you use the Internet? Yes  No

16. If yes, for which sake?

- a. To write e-mails
- b. To look for general information
- c. To search documents for the course of English

Other: .....

17. Which multi-media tool (s) would you like to use for the course of English?

a- View question 10.....  
.....

b- Other:.....

18. In which way would you integrate those multi-media tools in your course?

<b>Language skills and areas</b>	<b>Scientific/Technical English</b>
a. Listening comprehension	<input type="checkbox"/>
b. Reading texts/comprehension	<input type="checkbox"/>
c. Speaking	<input type="checkbox"/>
d. Study of texts (inferencing/referencing, grammatical structures, vocabulary, ...)	<input type="checkbox"/>

e. Study of grammar.

f. Teaching scientific/technical terminology.

g. Other:.....

19. Do you think that an online course is necessary? No  Yes

20. If yes, which aspects of language would be reinforced through this online course, according to you?

**Scientific/technical**

**English**

a. Listening comprehension

b. Reading texts/comprehension

c. Speaking

d. Study of texts (inferencing/referencing, grammatical structures, vocabulary, ...)

e. Study of grammar.

f. Teaching/learning of scientific/technical terminology

g. Other: .....

21. Other suggestions (either yes or no): .....

.....  
.....  
.....  
.....

## Appendix A2: Students' Questionnaire.

This questionnaire is related to a doctoral research on the teaching/learning situation of English at the University of Sciences and Technology Houari Boumediene (USTHB). The collected information is anonymous and will serve only the purposes of this research, with a view of further improving the teaching/learning situation of English in our institution. We thank you in advance for your contribution.

1 Academic subject:.....

2 What is the size of your class?

.....  
.....

3 Does it constitute a problem in your learning of the English language? Yes  No

4 If yes, why? .....

.....  
.....

5 In which aspect (s) of language do you meet difficulties?

Langue skills and areas	Scientific/technical English
a. Listening comprehension	<input type="checkbox"/>
b. Reading texts/comprehension	<input type="checkbox"/>
c. Speaking	<input type="checkbox"/>
d. Study of texts (inferencing/referencing, grammatical structures, vocabulary, ...)	<input type="checkbox"/>
e. Study of grammar.	<input type="checkbox"/>
f. Teaching. learning of scientific/technical terminology.	<input type="checkbox"/>

g. Other(s) .....

6. Which aspect (s) of language from the list above, and other(s) would you like to reinforce?

.....  
.....  
.....  
.....  
.....

7. If you use multi-media tools in the course of English, tick them off in the list below :

- |                                |                       |                          |
|--------------------------------|-----------------------|--------------------------|
| a. Language laboratories with: | Audio Headsets        | <input type="checkbox"/> |
|                                | Video Players         | <input type="checkbox"/> |
|                                | Teaching Platforms    | <input type="checkbox"/> |
| b. Computers with:             | CDs                   | <input type="checkbox"/> |
|                                | Connected to Intranet | <input type="checkbox"/> |
|                                | Connected to Internet | <input type="checkbox"/> |
| c. Overhead-projectors         |                       | <input type="checkbox"/> |
| d. Data show projectors        |                       | <input type="checkbox"/> |

8. You think that the multi-media tools used in the course of English are:

- |                                   |                          |
|-----------------------------------|--------------------------|
| a. Sufficient and appropriate     | <input type="checkbox"/> |
| b. Sufficient but inappropriate   | <input type="checkbox"/> |
| c. Insufficient but appropriate   | <input type="checkbox"/> |
| d. Insufficient and inappropriate | <input type="checkbox"/> |
| e. Other .....                    |                          |

9. Do you need more practice in English? yes  No

10. What is the average time per week that you devote to computer work? ... hour(s)

11. For which sake do you use the Internet?

a. To write e-mails

b. To look for general information

c. To search for study-related documents

d. Other:.....  
.....

12. Do you think that the integration of multi-media tools in the course of English will make its teaching/learning more efficient:

Yes

No

13. Which multi-media tools would you like to use in the course of English? (View question7)

.....  
.....  
.....  
.....

Other(s):.....

14. Do you think that an online course is necessary?

No  Yes  If yes why?

.....  
.....

.....

15. If more practice of English is offered to you, do you prefer to have it online during office hours  or after office hours ?

16. Which aspects of language would be reinforced through this online course, according to you?

**Scientific/technical  
English**

- a. Listening comprehension
- b. Reading texts/comprehension
- c. Speaking
- d. Study of texts (inferencing/referencing, grammatical structures, vocabulary, ...)
- e. Study of grammar.
- h. Teaching/learning of scientific/technical terminology

h. Other: .....

.....

17. Other suggestions concerning the course of English.

.....  
.....  
.....  
.....  
.....  
.....  
.....

**Appendix A3: Rubric for assessing interactive qualities of distance learning courses**  
(Roblyer and Ekhaml: 2000)

Scale (see points below)	Element #1 Social Rapport-building Activities Created by the Instructor	Element #2 Instructional Designs for Learning Created by the Instructor	Element #3 Levels of Interactivity of Technology Resources	Element #4 Impact of Interactive Qualities as Reflected in Learner Response
Few interactive qualities  (1 point)	The instructor does not encourage students to get to know one another on a personal basis. No activities require social interaction, or are limited to brief introductions at the beginning of the course.	Instructional activities do not require two-way interaction between instructor and students; they call for one-way delivery of information (e. g., instructor lectures, text delivery).	Fax, web, or other technology resource allows one-way (instructor to student) delivery of information (text and/or graphics).	By the end of the course, all students in the class are interacting with instructor and other students <i>only</i> when required.
Minimum interactive qualities  (2 points each)	In addition to brief introductions, the instructor provides for one other exchange of personal information among students, e.g., written bio of personal background and experiences.	Instructional activities require students to communicate with the instructor on an individual basis only (e. g., asking/responding to instructor questions).	E-mail, listserv, bulletin board or other technology resource allows two-way, asynchronous exchanges of information (text and/or graphics).	By the end of the course, between 20-25% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).
Moderate interactive qualities  (3 points each)	In addition to providing for exchanges of personal information among students, the instructor provides at least one other in-class activity designed to increase social rapport among students.	In addition to the requiring students to communicate with the instructor, instructional activities require students to work with one another (e. g., in pairs or small groups) and share results within their pairs/groups.	In addition to technologies used for two-way asynchronous exchanges of text information, chatroom or other technology allows synchronous exchanges of written information.	By the end of the course, between 25-50% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).
Above average interactive qualities  (4 points each)	In addition to providing for exchanges of personal information among students, the instructor provides several other in-class activities designed to increase social rapport among students.	In addition to the requiring students to communicate with the instructor, instructional activities require students to work with one another (e. g., in pairs or small groups) and share results with one another and the rest of the class.	In addition to technologies used for two-way, asynchronous exchanges of text information, additional technologies (e. g., teleconferencing) allow one-way visual and two-way voice communications between instructor and students.	By the end of the course, between 50-75% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).
High level of interactive qualities  (5 points each)	In addition to providing for exchanges of personal information among students, the instructor provides a variety of in-class and outside-class activities designed to increase social rapport among students.	In addition to the requiring students to communicate with the instructor, instructional activities require students to work with one another (e. g., in pairs or small groups) and outside experts and share results with one another and the rest of the class.	In addition to technologies to allow two-way exchanges of text information, visual technologies such as two-way video or videoconferencing technologies allow synchronous voice & visual communications between instructor and students and among students.	By the end of the course, over 75% of students in the class are initiating interaction with the instructor and other students on a voluntary basis (i.e., other than when required).
Total for each:	_____ pts.	_____ pts.	_____ pts.	_____ pts.
Total overall:	_____ pts.			

## **Appendix A4: Description of lessons for biology and computer science students.**

### **A lesson description from the course of English for biology students:**

#### **1- The lesson's components**

The following description concerns a lesson representing topic one from the course for biology students. It encompasses a reading passage '**The nature of science and biology**' an introductory course to biology, a section '**Understanding aspects of language**' which deals with the discourse features imbedded in the text, and another section '**Understanding the nature of science and biology**' related to the reading comprehension. The last component '**Listen and View Part 1**' however includes a video. The main page of this lesson is illustrated in the screenshot below:

Fichier Edition Affichage Historique Marque-pages Outils ?

Université des Sciences et ... x EB: The nature of science a... x +

localhost/mod/lesson/view.php?id=55

Rechercher

## English for Biology students

Home > EB > Topic 1 > The nature of science and biology

### The nature of science and biology ?

Preview Edit Reports Grade essays

### The nature of science and biology

**First read the text, choose some key words and then, try to guess their meanings.**

Biology literally means "the study of life". Biology is such a broad field, covering the minute workings of chemical machines inside our cells, to broad scale concepts of ecosystems and global climate change. Biologists study intimate details of the human brain, the composition of our genes, and even the functioning of our **reproductive** system. Biologists recently all but completed the deciphering of the human genome, the sequence of deoxyribonucleic acid (DNA) bases that may determine much of our innate capabilities and predispositions to certain forms of behavior and **illnesses**.

DNA sequences have played major roles in criminal cases (the reversal of death penalties for many **wrongfully** convicted individuals). We are bombarded with headlines about possible health risks from favorite foods as well as the potential benefits of eating other foods such as cooked tomatoes. Infomercials tout the benefits of **metabolism-adjusting drugs** for weight loss. Many Americans are turning to herbal remedies to ease arthritis pain, improve memory, as well as improve our moods.

Can a biology book give you the answers to these questions? No, but it will enable you learn how to sift through the biases of investigators, the press, and others in a quest to critically evaluate the question. To be honest, five years after you are through with this class it is doubtful you would remember all the details of metabolism. However, you will know where to look and maybe a little about the process of science that will allow you to make an informed decision. Will you be a scientist? Yes, in a way. You may not be formally trained as a science major, but you can think critically, solve problems, and have some idea about what science can and cannot do.

Science is an objective, logical, and **repeatable** attempt to understand the principles and forces operating in the natural universe. Science is from the Latin word, scientia, to know. Good science is not dogmatic, but should be viewed as an ongoing process of testing and evaluation. One of the hoped-for benefits of students taking a biology course is that they will become more familiar with the process of science.

Adapted from <http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookintro.html> accessed September 2011

**Discourse work:**

- 1- Examine how the words in **red** in the text are formed. Try to identify for instance, the different parts of the word '**Reproductive**'.
- 2- Examine the group of words '**metabolism-adjusting drugs**' and then, try to identify the word which is described.

To know more about 1 and 2 click on **Understanding aspects of language**

To test your understanding of the text click on **Understanding the nature of science and biology**

To develop your listening skills, click on **View and Listen Part 1**

At the end of your lesson, you can check your vocabulary in the **glossary** or in your **online dictionary**

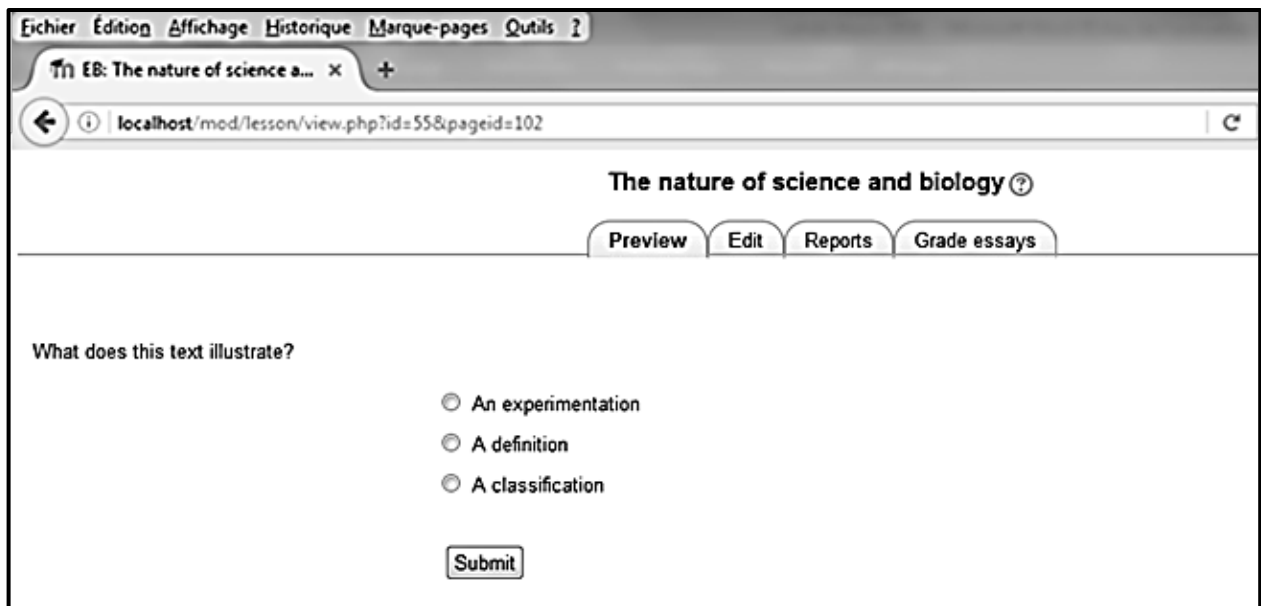
Understanding the nature of science and biology    Understanding aspects of language    View and Listen Part 1

FR 10:32 21/06/2016

**Screenshot 20:** Lesson one main page from the course for biology students.

## 2- The lesson's tasks

Tasks are at the core of learning in TBLT in that, they constitute "... a central component of TBLT in language classrooms because they provide a context that activates learning processes and promotes L2 learning" (Izadpanah: 2010, p 47). Concerning this lesson being described the text is rather general, about the relationship between 'Science' and 'Biology', and begins with a definition of biology, knowing that 'defining' is one of the rhetorical functions inherent to scientific/technical style (Trimble: 1985). A pre-reading task is first provided, aimed at directing the learners' interest to the imbedded vocabulary, which is globally sub-technical. Here, it may be useful to bring to attention the functions of the pre-task stage which are: " (1) To introduce and create interest in doing a task on the chosen topic; (2) To activate topic-related words, phrases and target sentences that will be useful in carrying out the task and in the real world" (Izadpanah: 2010, p.51, cited p. 235). Thus, while skimming and trying to locate key words and in guessing their meaning from context as indicated in the instruction, the learners' focus will be on meaning. Besides, their reading constitutes one of their target objectives and it is purposeful, principles that all match TBLT. In trying to understand keywords, they interact with that piece of discourse with which they further deal when guided in the subsequent task '**Understanding the nature of science and biology**' to test their understanding of the text. They are thus led to a quiz composed of a series of questions (multiple choice, true/false) to work out the different relationships within the text and identify the existing rhetorical functions. An example of such questions is illustrated hereinafter:

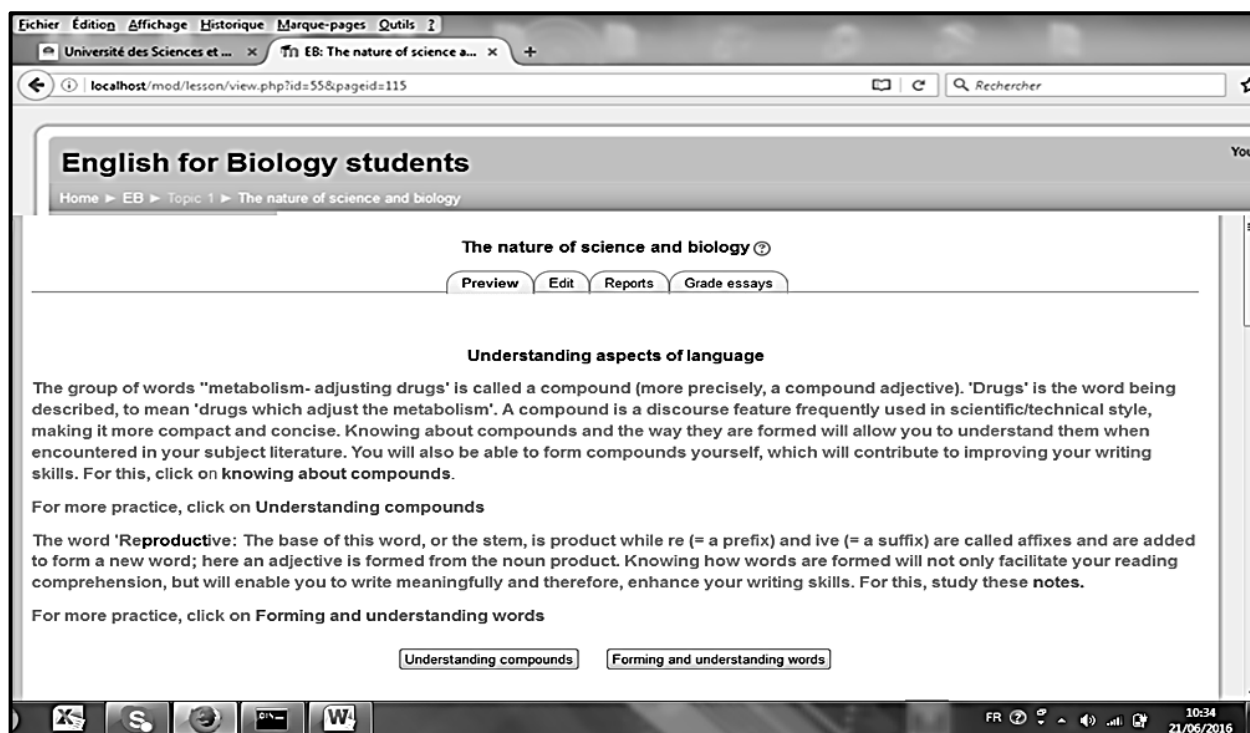


**Screenshot 21:** Understanding science and biology.

The next task however, aims at eliciting learners to reflect over some discourse features, examples of which are present in the text. They are instructed (see screenshot 14) to ponder over the scientific/technical inherent discursive features of word forming and compounding then try to understand them, which may help in promoting their thinking skills.

After considering those discourse features' use in context, they are provided corresponding notes in '**Understanding aspects of language**'(i.e., '**Knowing about compounds**' and '**notes**' related to word formation), followed by corresponding tasks ('**Understanding compounds**' and '**Forming and understanding words**') to allow the learners an opportunity to put into practice what they have learned implicitly, then explicitly on those aspects. This is in compliance with TBLT learning, where it is believed that 'output helps intake' (Willis: 2011). The purpose of giving such tasks in the post-task phase of putting into practice the deductive and inductive intake is "... to

convey meaning rather than to [simply] manipulate form” (Nunan: 2005, p.4). The instructions related to tackling compounds and word formation tasks are illustrated in the following screenshot:



**Screenshot 22:** Understanding aspects of language.

We may state therefore that in addition to TBLT, the socio-constructive principle of ‘scaffolding’ is also subsumed in that, learners are given an opportunity to look up incomprehensible vocabulary in the provided glossary and dictionary (see bottom of screenshot 14). In addition to this, the learners have also been provided notes related to word formation and compounds, being thus ‘scaffolded’ with both additional vocabulary and appropriate linguistic input.

The last task encompassed in this lesson is the video watching. That video we have entitled 'Basic Principles Part 1' is part of a longer one which we adapted (MIT OpenCourseWare: Fall 2004) and cut to form independent meaningful contexts. We

also synchronized the corresponding transcript so as to match the lecturer's utterances, which may help our learners improve their pronunciation, and in imitating the lecturer's, their oral skills indirectly. While viewing that video, they are likely to focus on its content since they are informed in the beginning that a question is to be answered subsequently. The screenshot related to this last task is presented hereinafter:

Fichier Edition Affichage Historique Marque-pages Outils ?

Université des Sciences et ... x EB: The nature of science a... x +

localhost/mod/lesson/view.php?id=55&pageid=114 x Rechercher ☆

## English for Biology students

Home ► EB ► Topic 1 ► The nature of science and biology

### The nature of science and biology ⓘ

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The following video 'Basic Principles Part 1' is a lecture given by a native, which will allow you, in addition to the transcript, to improve your listening and comprehension skills. View the video, then answer the question at the bottom.

lecture1-biology-part1-pres.flv

The discovery the lecturer describes as an enormous revolution is:

- biochemistry
- the structure of the DNA double helix
- evolutionary phylogenies

Submit

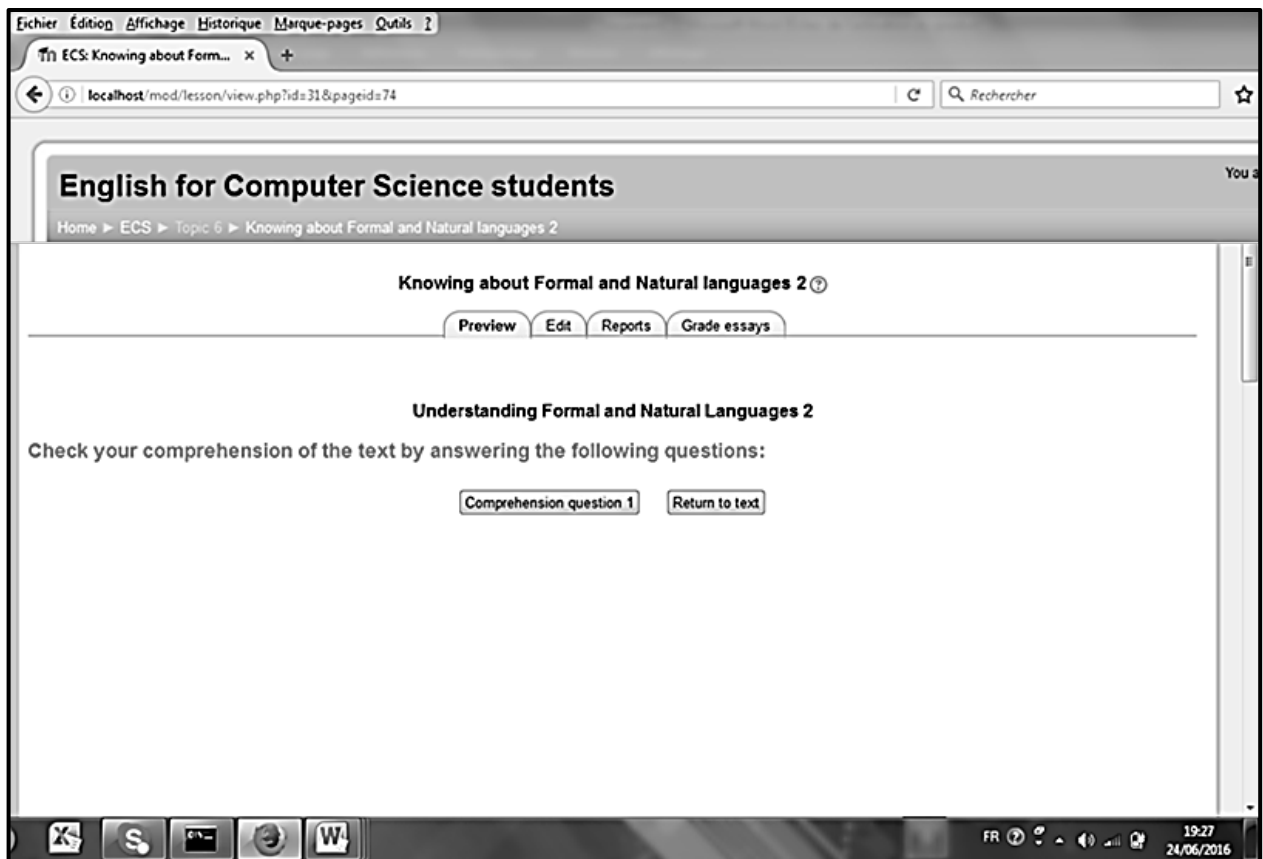
**Screenshot 23:** View and listen part1.

## The screenshots related to the course for computer science students, lesson 6.

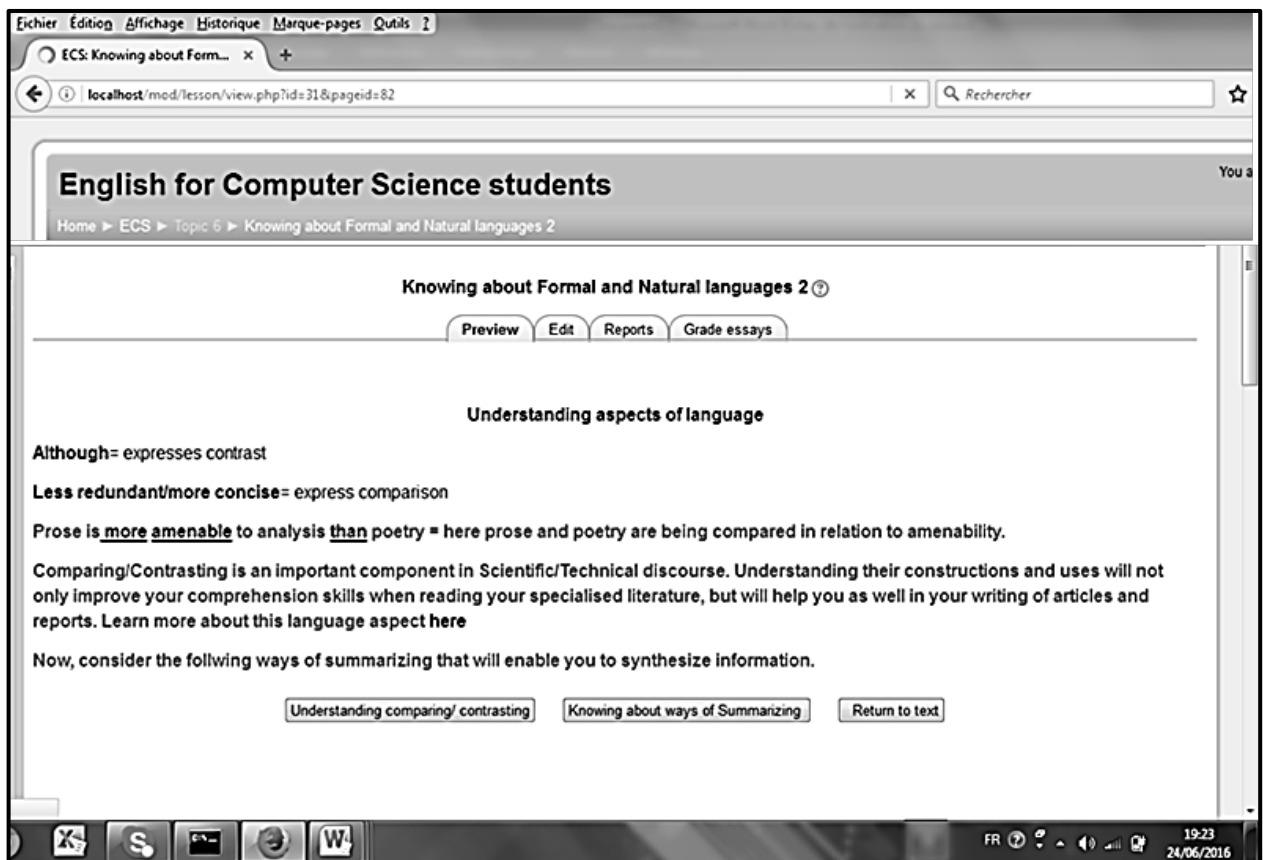
The screenshot shows a web browser window with the following content:

- Browser tabs: "ECS: Knowing about Form..."
- Address bar: "localhost/mod/lesson/view.php?id=31&pageids=73"
- Page title: "English for Computer Science students"
- Breadcrumbs: "Home > ECS > Topic 6 > Knowing about Formal and Natural languages 2"
- Section title: "Knowing about Formal and Natural languages 2"
- Navigation buttons: "Preview", "Edit", "Reports", "Grade essays"
- Section title: "Formal and natural languages 2"
- Instruction: "First read the text, choose some key words and then, try to guess their meanings."
- Text: "Although formal and natural languages have many features in common tokens, structure, syntax, and semantics there are many differences:"
- Section: "Ambiguity" - "Natural languages are full of ambiguity, which people deal with by using contextual clues and other information. Formal languages are designed to be nearly or completely unambiguous, which means that any statement has exactly one meaning, regardless of context."
- Section: "redundancy" - "In order to make up for ambiguity and reduce misunderstandings, natural languages employ lots of redundancy. As a result, they are often verbose. Formal languages are less redundant and more concise."
- Section: "literalness" - "Natural languages are full of idioms and metaphors. If I say, 'The other shoe fell,' there is probably no shoe and nothing falling. Formal languages mean exactly what they say. People who grow up speaking a natural language often have a hard time adjusting to formal languages. In some ways, the difference between formal and natural language is like the difference between poetry and prose, but more so:"
- Section: "Poetry" - "Words are used for their sounds as well as for their meaning, and the whole poem together creates an effect or emotional response. Ambiguity is not only common but often deliberate."
- Section: "Prose" - "The literal meaning of words is more important, and the structure contributes more meaning. Prose is more amenable to analysis than poetry but still often ambiguous."
- Section: "Programs" - "The meaning of a computer program is unambiguous and literal, and can be understood entirely by analysis of the tokens and structure. Here are some suggestions for reading programs (and other formal languages). First, remember that formal languages are much more dense than natural languages, so it takes longer to read them. Also, the structure is very important, so it is usually not a good idea to read from top to bottom, left to right. Instead, learn to parse the program in your head, identifying the tokens and interpreting the structure. Finally, the details matter. Little things like spelling errors and bad punctuation, which you can get away with in natural languages, can make a big difference in a formal language."
- Text: "The text is adapted from: Grimson, E., John Guttag, G. Introduction to computer science and programming, Fall 2008. MIT OpenCourseWare, Massachusetts Institute of Technology. http://ocw.mit.edu/courses/6.034-introduction-to-computer-science-and-programming/ (Accessed September 2010). License: Creative commons BY-NC-SA"
- Section: "Discourse work:" - "Consider what the underlined words and expressions in the text express:"
- Text: "'Although',  
'Less redundant/more concise',  
'Prose is more amenable to analysis than poetry'."
- List-Group:
  - 1- Those examples illustrate instances of 'Comparing/Contrasting' which are very common in scientific/technical style.
  - 2- You may use such constructions when summing up the differences between formal and natural languages from both the text above and that in topic 5. Knowing about how to summarize may be helpful.
- Text: "To know more about points 1 and 2 click on **Understanding aspects of language**."
- List-Group:
  - 3- To check your comprehension of the text click on the button **Understanding formal and natural languages 2**.
- Text: "At the end of your lesson, you can check your vocabulary in the [glossary](#) or in your [online dictionary](#)"
- Buttons: "Understanding formal and natural languages 2", "Understanding aspects of language", "View and Listen Part 6"

Screenshot 24: Lesson six main page from the course for computer science students.



Screenshot 25: Understanding formal and natural languages 2.



Screenshot 26: Understanding aspects of language.

Echier Edition Affichage Historique Marque-pages Outils ?

ECS: Knowing about Form... x +

localhost/mod/lesson/view.php?id=31&pageid=91 x Rechercher ☆


## English for Computer Science students

Home > ECS > Topic 6 > Knowing about Formal and Natural languages 2

### Knowing about Formal and Natural languages 2 ?

Preview Edit Reports Grade essays

View the following video, and then answer the question at the bottom:



00:00 06:14 Bloquer

**Match the concepts with their definitions:**

Testing is: Choose... ▾

Debugging is: Choose... ▾

Submit

**Screenshot 27:** View and listen part 6.

## ملخص البحث

يتعلق هذا البحث بالتعليم الإلكتروني و البحث الميداني. وفي هذا السياق كنا معنيين بالصعوبات المتصلة بوضع التدريس / التعلم الحالي للغة الإنجليزية في وضع وجهها لوجه لطلاب العلوم والتكنولوجيا، وتحديدًا في مؤسستنا جامعة هواري بومدين للعلوم والتكنولوجيا؛ وقد سبق أن سلط الضوء على بعض هذه الصعوبات في دراستنا السابقة (أطروحة ماجستير، 2002؛ ملخص ص 3،5) حول تطوير الأساس المنطقي لتصميم مناهج دراسية أساسية مشتركة مطابقة لتدريس اللغة الإنجليزية في هذه الجامعة . هذا يقودنا إلى أول سؤال لبحث عما إذا كان تصميم درس للغة الإنجليزية على الإنترنت سيكون حلاً مكملًا للدرس الحالي المقام في وضع وجهها لوجه والذي أظهر محدوديته في السياق الجزائري و أن الحاجة للتغيير أصبحت ضرورية . لهذا فإن هدفنا من البحث الحالي هو التحقيق في الحاجة لتصميم درس تفاعلي على الإنترنت للتعليم الذاتي للغة الإنجليزية للعلوم والتكنولوجيا . وقد يعتبر مثل هذا الاقتراح بوساطة التكنولوجيا كحل للأقسام المزدهمة ، و كوسيلة للتغلب على المعوقات المتعلقة بالوقت و المكان . و للإجابة على هذا السؤال كان علينا الإجابة على السؤال الثاني عن ما قد تكون احتياجات الطلاب التعليمية مقارنة بتلك المتعلقة بالدرس الحالي المقام في الأقسام ؛ وقد استنتجت أهداف التعلم للدرس الحالي بناء على نتائج الأطروحة السابقة الذكر، وذلك استنادًا إلى احتياجات الطلاب التعليمية والتي ينبغي التحقيق فيها لبحث إن كان قد حدث أي تغيير في هذه الأهداف و عن إمكانية استعمالها في الدرس على شبكة الإنترنت، مما يقودنا إلى سؤال البحث الثالث حول عما قد يكون محتوى المواد التعليمية للدرس على شبكة الإنترنت مقارنة بتلك المتعلقة بالدرس الحالي المقام في الأقسام . وللحصول على إجابات عن أسئلتنا هذه قمنا بتقييم الاحتياجات باستخدام استبيانات أدوات البحث والمقابلات غير المنظمة . وقد وزعت الاستبيانات على طلبة الماستر في السنة الأولى ومعلمي اللغة الإنكليزية على حد سواء، في حين أن المقابلات غير المهيكلة تتعلق فقط بالمعلمين العاملين في مركز التعليم المكثف للغات بنفس الجامعة . بعد جمع وتحليل ومناقشة البيانات التي تم جمعها، وفرت النتائج العناصر التي ساعدت في الإجابة على أسئلة البحث، وفي تقديم بعض التوصيات على أساس العديد من نقاط الضعف التي تم تحديدها خلال بحثنا . ووفقًا لهذه النتائج، فإن غالبية المستطلعين يؤيدون إحداث درس على شبكة الإنترنت. وعلاوة على ذلك فقد أبرزت النتائج احتياجات الطلاب التعليمية، بالإضافة للمهارات اللغوية والمجالات التي تحتاج إلى التعزيز . ونتيجة لذلك، خلصنا إلى اعتماد استخدام بيئة التعلم الافتراضية مودل ، على نهج انتقائي يستمد مبادئ من اللغة الإنجليزية لأغراض معينة ، و التعليم المبني على المهام، والبناء الاجتماعي، و الأسس التي تلبى معايير التقييم كتلك المحتويات في إطار هوبرد (1996،2011) من تطوير، و تقييم و تنفيذ . ثم قمنا بتصميم درسين إلكترونيين، واحد يتعلق بالبيولوجيا والآخر بعلوم الكمبيوتر . وقد تم تجريب بعض الوحدات من هذا الأخير على منصة جامعتنا . ويمكن استخدام هذين الدرسين من قبل المؤسسات الأخرى التي لها نفس التخصصات، و أيضا من قبل مستعملي اللغة الإنجليزية للأعمال كنموذج ليتم اتباعه وصقله، مما قد يوفر المزيد من التبصر في هذا المجال .

الكلمات الدالة :

تعلم اللغة بمساعدة الحاسوب، التعلم الإلكتروني، التعليم المبني على المهام، تعلم اللغة الإنجليزية لأغراض معينة، اللغة الإنجليزية للعلوم والتكنولوجيا.