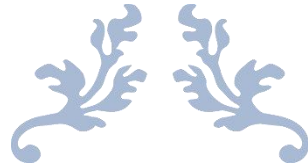People's Democratic Republic of Algeria

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THE IMPACT OF COMPUTER-ASSISTED LANGUAGE LEARNING ON MATERIALS DESIGN

A Thesis Submitted to the Department of English in Candidacy for the Degree of Doctorat és-Sciences in Applied Linguistics and Language Teaching

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Dedication

This work is dedicated to

The soul of my father who did not live long enough to see me stand where I am today

My beloved mother who has been a source of inspiration and strength throughout my learning journey

My beloved husband, who has been my support in the difficulties

My angles, Anes and Ayoub, whom I am genuinely grateful for having in my life

My sisters, Naziha, Nadia & Omayma, and brother, Abdel Malek

All my family and all my friends

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Acknowledgements

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Abstract

Framed in exploratory action research, this study investigates the impact of computer-assisted language learning (CALL) on teaching/learning materials designed by teachers and learners in a resource-scant context such as English for Science and Technology (EST). It reports on a collaborative CALL materials development project carried out at an initial engineering program in Algiers, which aims to develop teachers' critical knowledge of CALL materials design and students' 21st-century skills. On exploring the issue, it was found that teachers' basic digital literacy skills- finding, evaluating, using resources- combined with their positive perceptions of CALL materials utility, ease of use, and positive social impact, are promising signs of future CALL integration. The students, on the other hand, seize beefy skills in finding, sharing and creating digital content that may assist them in their learning pursuit, if offered proper pedagogical modelling. These conclusions were reached via a combination of quantitative and qualitative research tools as we employed questionnaires, interviews, and internet-use logs. In light of these findings, a practicum project is carried out, within the theoretical rationale, with collaborative action, coordinated via focus group discussions, of the English language teaching staff and second-year students to develop a digital support system to the EST course. To understand the effects of this experience on the participants, data were collected via reflection logs. Findings show that collaborative action through reflective practice, digital literacy strengths with interdisciplinary and technical assistance improve teacher agency and autonomy in selecting, designing, and developing their CALL teaching materials. The findings also reveal that experiential learning provided to students helps them perform better in their EST classes, achieve an enhancement in the various attributes that constitute 21st- century skills and overcome the impediments of traditional methods. To this end, all the participants engaged in motivational synergy triggered by a change in teaching/learning practices given the contributory nature of the intervention. Henceforth, contributing and action learning are recommended as a sound enterprise that conjoins the best of technology and pedagogy and combines professional growth and life-long learning.

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List of Abbreviations

CAI: Computer Assisted Instruction

CALL: Computer-Assisted Language Learning

CALICO: Computer-Assisted Language Instruction Consortium

CASLA: Computer Applications in Second Language Acquisition

CLT: Communicative Language Teaching

CMC: Computer-Mediated Instruction

DBR: Design-based Research

EAR: Exploratory Action Research

EdTech: Educational Technology

EFL: English as a Foreign Language

ELL: English Language Learning

ELT: English Language Teaching

EMP: English for Medical Purposes

ENS: Ecole Nationale Supérieur

ESP: English for Specific Purposes

EST: English for Science and Technology

EUROCALL: European Association for Computer-Assisted Language Learning

FL: Foreign Language

HE: Higher Education

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HOTS: Higher Order Thinking Skills

ICT: Information Communication Technologies

IT: Information Technologies

L2: Second Language

LOTS: Lower Order Thinking Skills

MALL: Mobile-Assisted Language Learning

MDD: Materials Design and Development

MMOG: Massively Multiplayer Online Games

MOO: MUD Object-Oriented

MUD: Multi-User Dungeon

NPSES: National Preparatory School of Engineering Studies

PBL: Project-based Learning

PDA: Personal Digital Assignment

PLATO: Programmed Logic for Automated Teaching Operations

P21: Partenership for 21st Century Skills

RP: Reflective Practice

SLA: Second Language Acquisition

TBLL: Task-based Language Learning

TBLT: Task-based Language Teaching

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TEFL: Teaching English as a Foreign Language

TICCIT: Time-Shared Computer-Controlled Information Television

U-Learning: Ubiquitous Learning

ULE: Ubiquitous Learning Experience

WELL: Web-Enhanced Language Learning

WWW: World Wide Web

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General introduction

1. Background of the Study

The extensive use of digital technology and the internet has dramatically revamped the educational scenery throughout the world, redefining traditional premises, altering roles and reshaping knowledge and competencies. Henceforth, education has pre-empted a new dimension, one that may be referred to as the digital dimension of instruction. A wide array of teaching/learning modalities is currently to hand for teachers/learners to maximise learning experiences. Information that was once enveloped within the pages of a book and immured in schools and libraries is now accessible at our fingertips with mobile gadgets. With such access, the materials, techniques, applications, methods of language teaching and teacher training methods have undergone radical changes. The skills that employers expect this digital generation of learners to hold have become the responsibility of teachers to inculcate in today's youth. As such, teachers should be aware of the technological, social, vocational, and contextual developments, as the teaching/learning classes represent different social and, or professional contexts that are affected by technological, social and vocational factors.

In this sense, the use of media and ICTs in language learning has turned into a popular research topic that tout what many perceive as invaluable benefits to both teachers and learners. However, despite its promising educational boons, the use of advanced technologies is not enough! Because they, interwoven with other social, cultural, political and economic changes, have led to the spring of new forms of knowledge, or literacy, new means of constructing experience and building identity. These changes have led researchers in the field of language teaching/learning to anticipate a future shift towards 21st –century skills, where learners do not rely solely on acquiring the "three Rs" (reading, writing and arithmetic) but they much more need to focus on developing the "four Cs",

namely communication, creativity, critical thinking and collaboration. These new skills act as a significant pillar in a learner's entire life (Lv, 2017). Meeting today's social challenges, hence, demands an awareness of the need to better respond and prepare learners for the rapidly altering skills of the 21st –century labour market.

Likewise, facing a world where the celerity of knowledge is booming, learners cannot acquire knowledge passively any longer, instead learn actively with a strong desire, high level of contribution, and many learning opportunities so as to construe and build new knowledge as possible as they can. In the 21st-century, learners should develop skills of global citizens, which require the integration of learning strategies, digital competencies and career abilities. These changes have led researchers in the field of language teaching/learning to anticipate a future shift towards contributing learning that advocates an ongoing, collaborative and participatory way of pursuing knowledge; and fosters user-generated wisdom among teachers and learners in the front line, surpassing their ability to consume information to creating it.

Thereof, the teacher's role and knowledge should be tailored to hook up physically, affectively and pedagogically to the flexible and changing nature of literacies that address areas as varied as technology, multimedia, relationships, content knowledge and culture. These spheres, in turn, call for a space, language classroom, capable of dealing with the escalating abundance and incorporation of diverse modes of meaning-making, where the textual connects to the visual, the audio, the spatial, and the behavioural. In other words, the demand being placed on teachers is to find out appropriate teaching/learning strategies, practices and materials to slot in the said skills into their lessons and curriculum so that learners are empowered to catch up with the increasingly technology-driven global workforce.

As part of that reconceptualisation of the language classroom and materials, teachers can resort to new and innovating approaches, frameworks, and methods that are more learner-centred, collaborative and technologically driven. As teachers, then, we need to analyse critically what the 21st-century drive offers to enrich our pedagogical processes and instructional materials and practices all while working collaboratively with others, be they teachers or students, in designing learning environments, addressing the needs of particular groups of learners, developing ourselves professionally and teaching with others in team approaches; hence, acknowledging the efficacy of collaborative/contributory learning as part of a professional continuum.

2. Statement of the Problem

While globally acknowledged as indispensable in current tertiary instruction, English for science and technology (EST), especially English for engineering is still regarded as a secondary or subsidiary course in many, not to say most, Algerian universities and colleges. This has, eventually, despised its status and dissuaded learners to seriously pursue its instruction. To most of these learners, English for general purposes is a challenging subject to deal with, not to mention EST. Teachers, on the other hand, were left alone without any pedagogical support; apparent in a total absence of any identified program, specified course content, underlined approach and whichever teaching/learning materials. As such, improving students' general English and EST competences has become a real challenge for English instructors at technical departments and institutions.

This agenda has sparked a burgeoning need for suitable instructional materials and a divagating interest in designing or developing teaching/learning English materials, which are relevant to learners' technical/vocational specialisations. There is also a rising concern over learner-centred materials that allow students to become literate in today's knowledge

society. In such cases, new technologies have spawned new forms of materials and tools that can be exploited by teachers and students alike to provide rich resources for EST. However, these authentic tools still go unnoticed and are rarely brought into classrooms or deployed as pedagogical resources and, or instruments; commercial textbooks, in best scenarios, still dominate the scene and are, mostly, the primary source of content.

The advantages of using educational technologies could be especially relevant in EST courses, where learners are expected to gain knowledge, understanding, and abilities connected to this content area while developing their English language skills, mostly used for communication. To such courses, multimedia can endow learners with a sense of not merely acquiring but also experiencing content, which may lead to improved understanding and retention, stimulating learners' attention and involving them fully in the learning process, among other aspects. However, the hybrid nature of these courses, which implies, amongst other things, that students need to master and draw on concepts in a foreign language using discipline-specific terminology, can pose certain difficulties for language teachers, who are not usually experts in the content, and learners, who often portray different cognitive and language levels. Harnessing the affordances of technology could help provide appropriate instructional/learning materials together with a responsive methodology can contribute to the successful achievement of the double objective of this type of courses. Likewise, the proper use of ICTs can have a positive effect on the process of language learning and teacher professional development.

Against the preceding background, this study undertakes the venture for the digital enrichment of an EST course. It sets out a project for the development of CALL materials in EST, which would more fully take account of an ecological view of both English and technology as they are seen, used and needed in a specific context- EST. It assumes that many language teachers have some basic skills of digital literacy and materials

development- finding, evaluating and using content- but are less adept at creating digital content for their language classes. Learners, on the other hand, seize beefy skills in certain aspects of digital literacy- finding, sharing, and creating content- but are less ace at evaluating and using content for their language learning. This research attempts to set up a CALL project that draws on teachers' and learners' digital literacy strengths for the development of EST digital materials, particularly for students of English at engineering departments, while providing them opportunities to hone their less-developed digital literacy, materials development and study skills.

3. Research Aims

Although CALL has gained a broad interest, most of the research in this area has centred around whether there is value in using technology in the classroom and, or the challenges in front of its normalisation, especially in Algerian education (e.g., Boucherfa, 2017; Boulmerka, 2016; Hamdy, 2007). Other initiatives in this respect focused mainly on the use of authentic web-based materials (e.g., Meddour, 2015), yet it does not filter down to teachers as actual practitioners in a way that draws on their own, even if limited, digital literacy strengths to inform their work. What is also lacking in the previous research is the students who are often positioned as outsiders and mere consumers in their learning. As we grapple with the analysis of the frequency of technology integration in classrooms, dynamically changing learners are equally dynamically shaping new skills and interests that need to be cultivated, allowing more room for their development and engagement. Therefore, through engaging teachers and learners in CALL materials development, this study aims at:

- Using problem-based CALL projects to develop learners' 21st-century skills

- Renewing teachers' vision about CALL and refurbishing their materials development skills and competences.

- Raising learners' awareness about the use of CALL materials to solve their learning problems and deepen their understanding.

- Encouraging learners to have more responsibility for their learning by actively engaging them in making decisions to solve their learning problems

- Encouraging teachers to embrace diversity with differentiated pedagogical practices

The findings from this research can contribute to the knowledge base in EST education in Algeria, educational technology in higher education, student engagement through contribution, and the importance of ongoing professional development.

4. Research Questions

The overarching research question in this study, as reflected in the title, is what is the impact of CALL on materials design and development? However, instructional materials, also language education in general, cannot be conceived without considering the factors and forces acting in the environment where they are employed. Hence, to gain a holistic view of the research problem and put it into its context, the research addresses the status of CALL materials in the Algerian educational scene through examining Algerian teachers' stance towards the issue. It tries to portray their attitudes, skills, challenges and recommendations as essential factors that determine whether such type of materials is to be adopted, developed or rejected. Second, while groping the reasons for the absence of these 21st-century tools from English language classrooms is essential, providing room for their use and development is supreme. For this end, it is quite necessary to investigate teachers and students' digital literacy to cultivate it. In this vein, understanding students' positioning towards these phenomena and their diurnal uses of them set trails that can be

explored for an innovative methodology of foreign language teaching/learning in general and EST in particular. Once enough data is gathered the research shifts to action towards something more diffuse and dynamic. A structured plan for actively involving teachers and students alike in CALL materials development is set out and executed in an attempt to renovate curricular content. Participants', be they teachers or students, reactions to this endeavour are sought to judge its effectiveness.

Lining up with the research objectives cited in the previous section, the following questions guide the present study:

1. How do EFL teachers perceive CALL materials in Algerian education in terms of use, attitudes, skills and challenges?

2. How do today's students use modern-day technologies, especially for their learning?

3. To what extent can the integration of a CALL experience address the different EST educational challenges to create a practical course that responds to the needs, wishes, interests, and character of the students?

4. What changes were observed in teachers' knowledge and practice in the design and use of CALL materials through collaborative action research?

5. To what extent does the CALL project designed for this study help EST learners develop their 21st-century skills?

5. Research Hypotheses

In light of the research questions, it is hypothesised that:

1) If teachers engaged in collective creation and use of CALL materials, they would improve their CALL knowledge and materials development skills, and unclog their professional development.

2) If teachers engaged learners in CALL materials development through problem-based CALL projects related in content to technical themes, they would meet the learners' needs and help them develop their 21st-century skills.

6. Methodology

To answer the said research questions and test the formulated hypotheses, the research resorts to an exploratory action research design, for which a combination of quantitative and qualitative data gathering procedures are employed, including questionnaires, interviews, focus groups, and logs. Each of which is utilised for a specific purpose. Questionnaires, semi-structured interviews and internet-use logs are used to answer the first and second research questions and inform the course of action to be taken towards testing the research hypotheses. Focus group discussions are used to guide the implementation, whereas reflection logs are intended to answer the last three research questions.

7. Operational Definitions

There are some key concepts and terms used throughout this doctoral research that, when defined, will aid the reader to understand and interpret the study. The definitions below are provided for this purpose.

21st Century Skills

The term 21st-century skills refer to core competencies deemed prerequisite for success in our increasingly globalised, technology-driven, and ever-changing world. The Partnership for 21st Century Skills (P21) has provided a framework to manifest the distinctive areas, with core skills, that individuals need to develop and improve to function appropriately in the modern workforce. This framework encompasses three main areas, a)

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learning and innovation skills, b) information, media and technology skills, and c) life and career skills (Fandino, 2013). Effective communication and collaboration, efficient technology use, critical thinking and problem-solving skills, and creative and innovative thinking abilities are taking centre stage within these core areas (Larson & Miller, 2011).

Communication skills

Refer to learners' ability to arrange their thoughts, data, and results to be able to share them viably via the use of a variety of media, as well as articulate them either orally or in writing.

Critical Thinking and Problem-solving Skills

Refer to learners being able to analyse complex problems, investigate questions without clear-cut answers, evaluate and judge information coming from different sources to make reasoned decisions and take purposeful action.

Creativity and Innovation Skills

Refer to learners' ability to bring about and refine solutions to problematic issues primarily based on synthesis and analysis, and then combining and displaying what they have found in new and original ways.

Collaboration Skills

Refer to students working together to resolve problems and answer questions, to work efficiently, dutifully, and respectfully in teams to achieve a common goal, and to assume mutual responsibility for accomplishing a task.

Information, Media and Technology Skills

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Refer to learners' using technology as a tool for learning, being able to handle their education and create products using ICTs.

8. Presentation of the Thesis

The thesis is presented in six chapters, which in succession deal with related and ensuing topics. As the title suggests, computer-assisted language learning (CALL) acts as the theoretical framework, which influences practical considerations in materials design and implementation. Hence, the first chapter- made up of three sections, CALL, Materials design and development and English for science and technology- demarcates the theoretical framework and subsequently leads to practical considerations and inferences of learning activities and project works that are demonstrated in CALL materials design. The methodology chapter, second chapter, describes the present study, showing the research approach, a detailed clarification of its phases including the exploratory phase, action project- design, rationale, participants, procedure and significance-, and the reflection phase of the cycle. Moreover, it details the research tools and data analysis procedures. The last four chapters do not ensue any theoretical discussions; chapters three, four, and five cover mainly the analysis of the status of CALL materials before the CALL project, design and implementation of the CALL project itself, and provide its qualitative evaluation. Chapter six provides a discussion of the main findings in an attempt to answer the research questions, from which some implications and recommendations are drawn to wrap up the whole study.

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Chapter One: A Critical Review of Literature

> *Although some have fretted that CALL programs might one day supplant the teacher, the staggering advances in digital technology have actually intensified the need for talented and well-trained instructors [...] far from being rendered obsolete by the computer; the teacher remains a vital and crucial element of the learning process*

> (Donaldson & Haggstrom, 2006, viii-ix)

Introduction

Over the past few decades, technology has undergone rapid changes from just a computer to smartphones and other wireless devices. Within this rapid development of information technologies (IT), ubiquitous computing devices and their global interconnection via the internet has permeated through every aspect of our life, including learning. In the landscape of these technologies, the internet has evolved from a source of information, within web 1.0, into social environments within web 2.0, leading to new types of learning that transcend the classroom. Acknowledging a marked difference in the ever-changing scenery of education that is emerging; as a result, the effects brought by the revolution of digital technologies need to be examined. As such, the development and impact of Computer Assisted Language Learning (CALL) on language learning need to be considered. In the classroom, technology is merely a medium, and pedagogy is still the most crucial factor in language teaching and learning (ELT). It is essential, however, to study the link between technology and pedagogy. As the uptake of networked digital gadgets is renovating the global learning scenery, calls for new educational approaches and pedagogies that line up with these changes to foster lifelong learning has been raised. This renders an all-inclusive contemplation of the tenets of already existent methods and their application for technology-mediated language teaching and learning, inescapable. In light of this, the teacher and learner are main decisive factors that ensure instructional technology is used with specific ends in mind, and not just as a novel diversion if it is to

help facilitate language learning. For this end, an analysis of the subsequent change in the traditional classroom hierarchy is necessary, at first, to set the new roles assigned to the teacher and learners, and second to help illuminate the dynamic processes at play.

In the classroom, instructional materials are the mainstay of most language learning/teaching programs; they largely shape classroom dynamics and language instruction. Their definition requires clear, concise terms and more appropriately, a 'working definition' for the purposes of the study at hand. A noteworthy change in the nature of instructional materials, because of technologisation, along with the new emerging types needs to be considered together with their distinctive features. This change has urged educators, mainly teachers; to come out with new content delivery options and new activity/task types to meet the rapidly changing needs of the modern learner. This requires them to act as designers and developers as well. To achieve this, a knack to analyse, evaluate and enrich already available materials, is a must.

The application and integration of technology in English for Science and Technology (EST) contexts may pose challenges and create opportunities, which might be different from the ones in English as Foreign Language (EFL) contexts. A clear distinction between the two fields is, thus necessary. We should first try to define English for Science and Technology and track its development and origins and highlight the importance of materials and materials development within the field. Then, light is to be shed on the effectiveness and quantity of previous research studies on the use of technology in EST instruction.

This chapter attempts to review the relationship between instructional materials development as the chief pedagogical aspect of the instructional act and CALL as a modern pedagogical approach in EST classrooms. It aims at setting the fundamentals of

materials development by teachers at the intersection of two significant areas of contemporary education. The most crucial of these is the practical demands of the subject matter (EST) and the needs of the 'net generation' students. The second is the educational potential of the evolving social Web and digital technology, incarnating the socio-cultural factors (Vygotsky, 1978) involved in modern learning. It includes three sections; the first gives insights into the use of CALL-in foreign language teaching/learning and highlights the contributions it can bring to the language classroom and language instruction. The second one sheds some light on materials development from different perspectives and the way the field has evolved along with technological developments. The last section provides a review of EST as the new context where the other two factors are at play.

Section One: Computer-Assisted Language Learning

Considering the potential usefulness that CALL as a new pedagogical approach has to offer to language instruction and materials design, this section attempts to put its somewhat fuzzy picture into some sort of perspective. It begins by looking at the basic terminology, the frequently conflicting use of which does nothing to aid consensus on a unitary definition. It then tracks the pedagogical evolution of the field and goes on from there to examine its impact on language pedagogy and synergy with other teaching/learning trends before reviewing ubiquitous learning (U-Learning) as the new emerging trend. Teachers and learner's changing profiles are clarified, and the skills and roles required of both are detailed.

1.1.1. Terminology and Definition

With a considerable history that dates back to the 1960s, the invention of the computer, Computer Assisted Language Learning (CALL) covers more than 60 years where language education has been a central issue. Over this period, a mass of terms has been associated with computer use in language learning and teaching. For instance,

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'Computer-mediated Instruction' or CMC (Belz, 2005; Levy & Stockwell, 2006; Lomicka, 2006), Computer Applications in Second Language Acquisition or CASLA (Chapelle, 2001), Computer-mediated Human Communication or CMHC (Tella, 1996), 'Computer-assisted Language Learning' or CALL (Bax, 2003, Blin, 2004, Chapelle, 1998),computer-assisted instruction CAI (Dunkel, 1991, Levy, 1997), Web-enhanced Language Learning or WELL and more recently 'Web 2.0 tools', or 'Social Media' (Anderson, 2007; Lee, 2009; Surowiecki, 2004). These appellations were fine-tuned with the advancement of technology (Levy, 1997) and the ever-changing pedagogy focus (Warschauer& Healy, 1998).

In parallel with this abundance of acronyms, each one indicating a different focus, one notices a difficulty to produce a unitary definition for this sector. Given the wide range of activities that CALL as a field of inquiry and action has, various perspectives of analysis are offered. As a result, a consensus regarding a univocal and shared definition of this subject has not still been reached. Indeed, the proliferation of the more or less explicit proposed definitions seems to centre on somewhat broader facts with elusive individual features. However, each of these definitions reveals some characteristics of the field.

There are two widely quoted definitions of CALL. The first describes it as "the search for and study of applications of the computer in language teaching and learning" (Levy, 1997, p.1). This is a broad view of CALL in that it extends its applications to all facets of pedagogy, and so admits its multidisciplinary nature. This view can be found in the seminal work of Levy and Stockwell (2006), focusing on CALL materials that can take various forms, be it "tasks, software, courseware, Web sites, online courses, programs, packages, and learning environments" (p. 3). The other widespread view sees CALL as "any process in which a learner uses a computer and, as a result, improves his or her

language" (Beatty, 2003, p.7), a narrower definition that considers those activities with direct impact on a learner's linguistic system.

The first view then focuses on technology application, while the focus of the second is the learning-process taking place via technology. Accordingly, various uses of the computer in teaching can be undertaken in light of the first definition such as linguistic activities, testing tools, tools for research on learning, applications for the creation and organisation of contents, as well as access to resources. The second perspective, however, is tightly related to learning and mainly to linguistic activities and tasks; having a more circumscribed viewpoint.

This latter view was severely criticised for being too constricted to capture the nature of the field better. Hubbard (2009) raised two subsequent questions as what is meant by 'improve' and 'computer' respectively; in criticism of Beatty's definition mentioned above. In answer to the first, improve, surpasses learning to include learning efficiency, learning effectiveness, access, motivation, convenience, and institutional efficiency, among others (Ibid). As such, CALL can be called for to improve any of the already mentioned areas via any technological device. In view of that, teacher productivity, teacher development, materials development, and methods of language assessment are other areas that CALL can improve; which makes it a broad, well-developed and diversified field.

The discrepancy between these two definitions leads us back to another feature of CALL; that is, the different insinuations that the word 'computer' has. Even though the name includes 'computer', the term embraces any application of Information and Communication Technologies (ICTs) to language teaching and learning. As such, the computer goes well beyond the canonical desktop and laptop to include, "the networks connecting them, peripheral devices associated with them and several other technological innovations such as PDAs (personal digital assignments), mp3 players, mobile phones,

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electronic whiteboards and even DVD players, which have a computer of sorts embedded in them" (Hubbard, 2009, pp. 1-2). This way, this nomenclature is not restricted to computer per see, but it encompasses all the range of digital technologies that can be applied to language teaching and learning.

Acknowledging the fast-growing advance of ICTs, the examples given by Hubbard may no longer hold true at this time; a time of large-scale, global internet access, with constant developments of interactive, creative web 2.0 tools and platforms, with interactive whiteboards, widespread social networks, mobile technologies and online games (Dudeney & Hockly, 2012). His sweeping view remains valid, in view of the ever more diverse and significant impacts these changes have brought within to language teaching and learning.

Overall, though, the phrase CALL entails making use of computers in language learning, it covers all areas associated with the use of resources and tools in language learning, teaching, and testing. Henceforth, CALL is an umbrella term that covers a vast array of areas such as teacher education, teacher productivity, materials development, learner training, language testing, assessment, and evaluation. As such, it is a complex, dynamic multidisciplinary field that engrosses various contexts and methods, and covers various activities related to learning a language using computer technologies. In light of this, with the advent of more technological choices in educational settings, including the internet, web 2.0 and digital gadgets, CALL can be defined as the interactive use of technology to foster language acquisition by providing significant opportunities to practice a language in environments beyond that, which is available within the confines of a classroom.

1.1.2. The Pedagogical Evolution of CALL

Tracking the development of CALL since the 1960s, one notices how it emulates not only technological development but also developments of how learning takes place. In

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line of that, CALL's focus has moved from the old drilling practice and stimulus-response patterns, ensured by cassettes, microphones, and headphones mostly used in language laboratories within behaviourist methods; through using the computer to structure and organise knowledge along with cognitive models. It, then, turned out to the more interactive and collaborative forms of learning even beyond the physical confines of the classroom thanks to the ever-changing digital technologies of the modern era in line with socio-constructivist models. CALL designs have then evolved from the computer as a tutor or tool, to social media.

It is common to present the historical and technological developments of CALL in decades that influence or accompany new language pedagogical approaches. However, this approach has been criticised for the pedagogical focus do not always concur to decade-defined historical periods (Bax, 2003). Because of that, Bax (2003) proposed a new typology in terms of three different approaches to CALL, Restricted CALL, Open CALL, and Integrative CALL. He suggests that we are at present using Open CALL, but we should try to get to Integrated CALL; the phase where CALL is 'invisible' as it turns out to be an integral part of everyday life; a state he calls 'normalisation'. Table 1below provides a summary of Bax's proposal of the three approaches.

Table 01

Bax phases of CALL

Approach	Restricted CALL Language system	Open CALL System & skills	Integrated CALL Integrated language skills work Mixed skills & system
Types of task	Closed drills Quizzes	Simulations Games CMC	CMC WP (Web presence/internet) e-mail & others, according to needs
Types of student activity	Text reconstruction Answering closed questions Minimal interaction with other students	Interacting with the computer Occasional interaction with other students	Frequent interaction with other students Some interaction with a computer through the lesson
Type of feedback	Correct/incorrect	The focus on linguistic skill development Open, flexible	Interpreting, evaluating, commenting, stimulating thought
Position in curriculum	Not integrated- optional extra Technology precedes syllabus and learner needs	Toy Not integrated-optional extra Technology precedes syllabus and learner needs	Tool for learning Normalised integrated into the syllabus, adapted to learner needs Needs and context analysis precedes technology decisions

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Source. Deutchmann & Trang Vu 2015, p. 46

Inspired by publications in the field, one can identify four main stages, named Behaviourist CALL, Communicative CALL, Integrative CALL (Bax, 2003; Warschauer& Healy, 1998), and Web2.0 and social media. These authors argue that these four stages better represent the synthetic analogue of the overarching pedagogical shifts and the evolution of technology regardless of the fact that these stages "do not fall into neatly contained timelines. As each new stage has emerged, previous stages continue. Current uses of computers in the language classroom correspond to all of the paradigms mentioned" (Warschauer& Healy 1998, p. 58). The next four coming sections will trace the development of CALL along with this classification.

1.1.2.1.   Behaviourist/Structural CALL

Early uses of the computer in language education line up with the behaviourist framework based on stimulus/response/feedback patterns with simple computer game-like, drill-and-practice tasks, mainly focusing on vocabulary and grammar, where the learner was rewarded for correct answers (Davies et al., 2011). This phase was first known as 'Behaviourist CALL' and later as 'Structural CALL' by Warschauer (1996), (Warschauer, 1996; Warschauer & Healey, 1998, Lee, 2000, Fotos & Browne, 2004). Skinner's Operant Conditioning (1957) provided a firm footing for structural CALL; a view that leaned excessively on positive reinforcement and sees language learning as habit formation with a major focus on vocabulary items, grammar rules, and phrases established by drills and repetition. This model corresponds to the CALL tutor period, where the computer was viewed as a mechanical tutor that provides feedback at learner's pace.

Many CALL tutoring systems were elaborated following this premise, such as the well-known PLATO (Programmed Logic for Automated Teaching Operations) first introduced at Illinois University, the USA in 1960. PLATO "featured extensive drills,

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grammatical explanations, and translation tests at various intervals" (Warschauer& Healy, 1998, p. 57). Although it was a breakthrough in CALL, it was limited in that it failed to fulfil language learners' basic needs as it overlooked oral production. This period is also illustrated by another major system TICCIT (Time-shared Computer Controlled Information Television) originating as well from another American University (Brigham Young University, Utah). TICCIT is considered the first system to combine text, audio, and video multimedia. In the early days of computing, authoring programmes were difficult to use and necessitate scrupulous precision from developers for them to work smoothly. For instance, foreign characters were always problematic; a missing punctuation mark could endanger the desired running of the program (Levy, 1997). This being said, the multimedia features that PLATO and TICCIT possess gave them precedence and prominence over most of the programs from the 1970s that have long disappeared. Of course, their longevity for the next decades is due to sustained upgrading to comply with ensuing technological developments.

1.1.2.2. Communicative CALL

By the end of the 1970s, the structural and behaviourist approaches to language learning and teaching were unsound. The learner's role in knowledge creation was a significant concern for most learners in the era. At this time, the blazing flame of the communicative approach (also known as Communicative Language Teaching CLT) reduced the role of habit formation in language learning in favour of the functional use of language in an attempt to foster learners' communicative competence. This paradigm shift in second language teaching was accompanied by the advent of the first affordable microcomputers, also known as personal computers, which spread in educational institutions in increasing numbers from the late 1970s onwards. This has increased the need for more "interactive and communicative uses of the computer for language teaching"

in the second language-teaching scene (Egbert et al., 2011, p. 22). Hereafter, the term Communicative CALL is used to refer to this phase in the history of CALL by many researchers (e.g., Warschauer, 1996; Warschauer& Healy, 1998; Fotos & Browne, 2004; Ahmed, 2004).

This phase of CALL marked a movement away from the previous drill and practice method within structural CALL due to its failure to foster authentic communication. Proponents of Communicative CALL argued that language is better acquired through communication and focus has been placed on the use of language forms rather than the forms themselves, and learner's role in meaning negotiation, encouraging his production of original utterances instead of manipulating prefabricated language forms; along with employing the target language as the main medium of instruction and interaction. Because of that, it was believed that "all CALL courseware and activities should build on intrinsic motivation and should foster interactivity- both learner-computer and learner-learner" (Han, 2009, p. 41). Computer games were the dominant and most significant programs of the different programs that were developed during this period. The first CALL research journals emerged at that time such as the CALICO Journal first launched in 1983 (Leavy, 1997), and Computers in Schools in 1984, together with many key professional organisations within the field like the Computer Assisted Language Instruction Consortium (CALICO) in the United States (USA), and the European Association for Computer-Assisted Language Learning (EuroCALL).

This phase of CALL adheres to the cognitive approach that considers language learning as "a process of discovery, expression, and development" (Warschauer& Healy, 1998, p. 57) and sees the learner as an active creator of knowledge using cognition to learn a language. This vision saw the computer as a stimulus whose primary function is to foster discussion, writing, analytical, and critical thinking (Warschauer, 1996), offering skill

practice but in a non-drill format. During this period, authoring systems with text-reconstruction programs (e.g., Storyboard, Masker, Textbag) together with cultural awareness found their way into foreign language learning curricula (Le Baron, 2013). In this vein, the computer functioned both as a tutor and tool (Leavy, 1997) that presents vocabulary, structures and simulations, meanwhile correcting, and monitoring learner progress (Davies, 1992). Examples of the computer as tool programs include word processors, spelling and grammar checkers, and concordances.

The advent of digital technology together with web 2.0 and Computer-Mediated Communication (CMC) has shifted focus from "learners' interaction with computers to interact with other humans via the computer" (Kern & Warschauer, 2000, p. 11). As a result, the computer was considered as a medium of interaction that assisted the work of the human teacher in flexibly exploiting authentic resources and exposing learners to authentic tasks. Trends such as task-based, project-based, and content-based approaches gradually found their match in these technologies. In light of that, social interaction via internet communication tools became a significant contributor to learning. CALL then enters a different dimension that accentuates authentic social contexts and learner's language skill integration via the use of internet and CMC. This has led to a new perspective based on the socio-cognitive view of language learning, which is named Integrative CALL.

1.1.2.3. Integrative CALL

Communicative CALL came into disfavour by the late 1980s and early 1990s. This approach was criticised for contributing to marginal rather than central elements of the language teaching process because of the computer disconnected use. The dissatisfaction with the artificial communicative situations, which were proven in-authentic within the previous approach, has urged the need for more actual authentic and social contexts. This

has raised calls for a better-integrated technology and initiated the third phase of CALL, namely 'integrative CALL'. Within this socio-cognitive perspective, different language skills –listening, speaking, reading and writing, were integrated into language learning in order to overcome the shortcomings of previous approaches and optimise the opportunities for integrating new technologies. As such, "students learn to use a variety of technological tools as an ongoing process of language learning and use, rather than visiting the computer lab on a once-a-week basis for isolated exercises" (Warschauer& Healy, 1998, p. 58).

Two main innovations shaped CALL practices within this period, namely multimedia computing and the Internet or World Wide Web (WWW), both of which had become prominent by the mid-1990s. Multimedia computing has allowed different styles of presentation (sound, graphics, text, and video) be put together in one computerised program designed to leverage CALL from its individualistic use to an assistive medium to support student-to-student communication initiating what became known as Computer-Mediated Communication (CMC). The internet, though still expensive for most schools and universities but CALL applications were much more accessible. This has made the development of expensive purpose-built systems such as PLATO (mentioned above) superfluous and made the first move towards more user-friendly applications, which reconciled teachers with computers.

This stage witnessed a shift from the previous cognitive approach towards a more socio-cognitive perspective, which gives greater importance to language use in authentic social contexts and considers learning as "a process of apprenticeship or socialisation into particular discourse communities" (Warschauer & Meskill, 2000, p. 306). Along with this, comprehensible input is no longer sufficient and providing maximum opportunities for authentic social interaction that match the kinds of communication that may happen in the real world, became a major responsibility of the language teacher. For this end, even

though integrating technology into language instruction depends heavily on teachers' readiness amongst other things, it is no longer a luxury, it is a must. To achieve this "technology should be adapted to our needs, not the reverse" (Levy, 1997, p.69).

The internet revolution has opened new horizons to learners and teachers to the entire world. More specifically, in addition to multimedia input, it has provided opportunities to work efficiently across boundaries with others with different cultures, values, and interests all around the globe. This dynamic multimedia network epitomises CALL (Warschauer & Healy, 1998):

> *The multimedia networked computer-with a range of informal, communicative, and publishing tools now potentially at the fingertips of every student- provides not only the possibilities for much more integrated uses of technology but also the imperative for such use as learning to read, write, and communicate via computer has become an essential feature of modern life in the developed world* (p. 58)

During this period, language teachers and researchers made ever more use of internet tools and applications that were not designed for language instruction in the first place. Examples of these include MUDs (multi-user dungeon), MOOs (MUD Object Oriented), and e-mail. MUD, for instance, was used in language learning/teaching because of its conferencing option (Levy, 1997), through which students can play heroes against "Dungeons and Dragons", which were the basis for the game. MOO is a more refined "virtual environment in which participants can meet together and interact" (Svensson, 2003, p. 125). In addition to multimedia features, it offers a range of synchronous tools like conferences, chat rooms, and even email (Moomail), together with hyperlinks to web pages (Levy & Stockwell, 2006). These platforms were very attractive at the time, mainly to foster intercultural exchanges- for they ensure authentic communication in the target language, encourage autonomous learning, and support learner's initiative as he acts as the hero (Von der et al., 2001). SchMOOZE (English), Le MOO Français and Le MOOlin

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Rouge (French), Mundo Hispano (Spanish) are but examples of MOOs for the teaching and learning of languages with intercultural exchanges (Shield, 2003).

1.1.2.4. The Noughties: Web 2.0 and Social Media

The internet revolution continued during the first decade of the twenty-first century, which became known as the 'Noughties' (Le Baron-Earle, 2013), up to date. With the democratisation of the web- the increase in internet speed and the price's decrease- the internet has pervaded almost every aspect of everyday life. In this landscape, it has evolved from a source of information within the first generation -web 1.0-into "a network of virtual spaces built on the dynamics of social communities" (Sturm, Kennel, McBride, & Kelly, 2009, p. 370). It has, henceforth, entered a new generation that is called 'Web 2.0'; a term first coined by Dale Dougherty, vice-president of O'Reilly Media Inc., in 2004.

In this new CALL era, the World Wide Web is led by two main concepts; the "read/write web" dimension (Richardson, 2006, p. 1), and the "collective intelligence of the crowd" (O'Reilly, 2005, p. 2). Web 2.0 has initiated an authoring revolution open to the general people; an unattained opening within earlier paradigms, which in hindsight are referred to now as 'Web 1.0'. In sharp contrast with web 1.0 applications, non-specialist users could not contribute as easily to the Net; their Net activities were restricted to browsing, searching, reading and downloading operations. Web 2.0, on the other hand, permits users to contribute and, specifically to construct, that is to write to the web. As a result, now billions of individual internet users can "add to and edit the information space" (Anderson, 2007, p. 195-6) via uploading, constructing, and sharing texts, photos, audio and video podcasts. For example, in June 2013, about 300 million photos were uploaded on Facebook every day, and 100 hours of videos were uploaded to YouTube (Le Baron, 2013). This phenomenon befell to be known as the "the two-way web [...] information age" (McLaughlin & Lee, 2007, p. 664).

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Along with this, the World Wide Web has developed from a tool of passive reference to one of collaboration that has magnified the opportunities for users to mix and match as never before; allowing more active exciting prospects for individuals in a variety of ways (table 2 below illustrates the chief differences between web 1.0 and web 2.0). This social participatory nature of web 2.0 has created a sort of collective intelligence-the 'wisdom of the crowds' (Surowiecki, 2004) or the 'wisdom of the masses' (Wheeler et al., 2008, p. 989)- that operates on the premise that when working and sharing ideas collaboratively, "communities can be significantly more productive than individuals working in isolation" (McLaughlin & Lee, 2007, p. 666-7). Web 2.0 applications can generate an explosive growth of content through social experience using a variety of tools that support interaction between users.

Table 2

Some schematic differences between web 1.0 and web 2.0

Dimensions of difference	Web 1.0 (1993-2003)	Web 2.0 (2004- beyond)
Mode…	Read	Write and contribute
Primary unit of content	Page	Post/record
State…	Static	Dynamic
Viewed through	Web browser	Anything
Content created by …	Web coder	Everyone
Domain of…	web designers and geeks	A new culture of public research

Source. Beer & Burrows, 2007

The social web, interchangeably web 2.0, has allowed the creation of a wide range of services in no time (see table 2 below). Accordingly, CALL has also evolved from the previous generation tools (e-mail, chat rooms, and discussion forums) to the second-generation applications (blog, wiki, vodcasting, podcasting). These latter applications foster the building of communities where user-generated content, peer dialogue and co-construction of knowledge are key features of learning. Indeed, with these technologies, users are no longer passive recipients of knowledge, but rather active creators of content who are much more engaged in the learning process and have built a sense of communal

belonging to their networked community. Like earlier CALL, this leaning practice aligns with constructivism or socio-cultural theory (Lave & Wenger, 1991; Vygotsky, 1978) - concepts further discussed in the next section.

Just as educationists recognise the opportunities and challenges that social networks afford; the field has also been inspired by other Internet-based resources to enhance the learning environment. For example, open social virtualities (e.g., Second life), modern online gaming, which are upgraded versions of MOOs explained above and known as massively multiplayer online games (MMOGs) (e.g., Warcraft), besides synthetic immersive environments (SIEs) (e.g., Croqueland) to name but a few (Sykes et al., 2008; Thorne, 2008, Le Baron, 2013). Recent research projects in this area (e.g., Dell'Aria & Nocchi, 2010; Panichi et al., 2010) have proven that these current online virtual spaces are of assistance to learning, and more than ever to communicative and intercultural competence. This is made possible because, within these spaces, learners are frequently in the face of new situations where they have to adapt or question their communicative skills and codes. According to Sykes et al. (2008, p. 534): "Mediated experiences in different online social and gaming worlds allow users to experiment and interact with a wide variety of norms of communication and social interaction".

Table 3

Web 2.0 services

Mature social software applications	Media sharing services	Social networking services	Social bookmarking	Open social virtualities	Massively multiplayer online games	Synthetic immersive environments
Blog (1999) Blogger.com (1999)	Picasa (2002)	linkdIn (2002)	Del.icio.us (2003)	Second life (2003)	Everquest (1999)	Croquelandia (2008)
Wiki Wikipedia (2001)	Photo bucket (2003)	My Space (2003)	Stumbleupon (2004)	There (2003)	Eve Online (2003)	ZON (2008)
Podcasting	Flickr (2004)	Hi5 (2003)	Citeulike (2004)	Edusim (2007)	World of Warcraft (2004)	
	Dig (2004)	Facebook (2004)	Ma.gnolia (2006)			
	You Tube (2005)	Bebo (2005)	Re-edit (2006)			
	Daily motion (2005)	Twitter (2006)	Pinterest (2010)			
	Dropbox (2007)	Google + (2011)				
	Instagram (2010)					

Source. Le Baron, 2013, p. 60

Overall, the pedagogical development of CALL mirrors not only technological innovations but also developments in the view of how learning takes place. The status of the computer has moved from an autotelic innovation towards a more naturalised, normalised situation, where the advance of digital technology is transforming not only the language learning scenery but the language itself as well. Thus far, it is yet to come the day when technology will be taken for granted and becomes second after pedagogy and learners' needs. In the meantime, the need for research studies involving these new attributes (digital technologies, internet, and web 2.0) such as the bottom-up development of CALL materials by teachers and learners is urgent.

1.1.3. Pedagogy 2.0

As discussed above, the internet has evolved from a source of information, within web 1.0, into a two-way network build on the dynamics of social communities, bringing within new pedagogical openings that magnified their effect in EFL settings. This new generation of the World Wide Web or web 2.0, interchangeably named social web, embraces interactive, social and collaborative features that can fuel new types of learning experiences through new task types. These significantly new social affordances have opened new interactive web spaces for learners, where user-generated content, peer dialogue, and co-construction of knowledge are key components of a newly emerging learning paradigm (Brown, 2010). This brings the learner to the foreground as a creator instead of a receiver, while the teacher steps into the background to fulfil the roles of guide, coach, and facilitator. As a result, three fundamental shifts in technology-enhanced learning have emerged as a result of the web 2.0 technological revolution (Conole, 2007). These include:

- A shift from a focus on content to communication

- A shift from a passive to a more interactive engagement of students in the educational process

- A shift from a focus on individual learners to more socially-situated learning

This noticeable swing of the pendulum in ELT methodology from the traditional "sage on the stage to the guide by the side" (Rahim, 2009, p. 3) model of learning has given shape for a new networked, collaborative and interactive method of learning known as 'Pedagogy 2.0'- first coined by Mcloughlin & Lee in 2007. The concept of Pedagogy 2.0signifies a distinct step-change in language learning methodology, from teacher-centred didactic pedagogy, where learners are consumers of content created for them, to a more learner-centred one that encourages learner's voice and production ensured by technology.

In addition to learner's empowerment, interactivity, and collaboration; web 2.0 serves as an open environment for learners to explore and practice their skills, an inventory of a wide array of multimodal content originating from a variety of authentic resources, and a means for more responsive assessment and feedback systems. Podcasting and vodcasting tools allow learners to move beyond handwriting and allow them to represent their meanings independently and simultaneously in different modes by creating their audio or video productions at no cost.   Blogs, Facebook, and youtube sites have opened classroom walls and served as platforms where learners can display their works to the outside world, thus creating small learning communities. As such, language learning becomes fun and incredibly motivating (Rahim, 2009). Hence, learning via web 2.0 implies active participation, sharing ideas, and the co-construction of knowledge in communal networks of peers, experts, and artefacts (Mcloughlin et al., 2008).

In this vein, web 2.0 technologies inherently echo core aspects of learner-centred approaches that are more in line with recent social constructivist theorising and learners'

need to create meaning, deeply rooted in the sociocultural theory of Vygotsky (1978). With the social constructivist perspective, social interaction has become the first and major contributor to learning, and learning is a process of interpretation and meaning-making. In this vein, Luo (2013, p. 9-10) enumerates five educational benefits of using web 2.0 attributes:

- **Promoting Affective Learning**

Web 2.0 technologies have a massive potential to add discernible value to the learning process by stressing the inner world of the learner, i.e. the learner's thoughts, feelings, emotions, and motivation. The central tenet is that the affective aspects of learning can add an asset to learners' learning. Accordingly, activities and tasks realised and channelled through web 2.0 tools have proven to leverage students' motivation, enjoyment, interest, and keenness to utilise technology in learning contexts.

- **Enhancing Collaborative Learning**

Collaborative learning is another boon of the social nature of web 2.0 tools. Wikis and blogs, for instance, used as platforms to sharpen learners' writing skills, offer students collaborative spaces to understand or see from the new perspective of others (teachers and/or peers); meaning that they are likely to engage in the deep processing in learning and to discover the ideas of others. Also, they provide a means to connect with the language outside the classroom and a challenge to test classroom knowledge in the real-life world.

- **Fostering Learning Community**

Educational Web 2.0 implementations can produce learning communities that contribute to students' feeling of communal belonging and engagement through social interaction, which help increase participation levels and reduce student isolation.

- **Augmenting Learning Performance**

Web 2.0 tools empower learners in different ways as they help improve their writing skills along with their speaking and public presentation skills. Besides, they develop their language awareness and promote their confidence and motivation. Moreover, they have an impact on students' understanding of learning content, provide a means of collective knowledge creation, and support the development of their cultural and intercultural ways.

- **Supporting Metacognitive Learning**

Metacognition is cognition about cognition in a critical productive way; it refers to higher-order thinking. Learners' metacognitive regulation enables them to regulate their learning, and they can consciously assess the effectiveness of their employed strategies and think of possible ways to higher learning and better performance and achievement. The collaborative, dialogical platforms offered by web 2.0 tools have allowed a greater sense of governance and self-direction to be exerted by the learners regarding how and what they learn, and therefore, rendering them a space to reflect upon, self-regulate and automate their learning.

Learning then is "a social dialectic process of meaning" (Sturn et al. 2009, p. 371) that moves the locus of knowledge from the teacher to the learner and decentralises the learning and teaching concepts; reshaping the teacher, the learner, and the materials in light of these emerging web technologies.

1.1.4. New Ways of Learning

In the present landscape of technological and societal variation, significant refinements and transformations in the way we live, work and even learn are underway. The global learning scenery is being renovated by the uptake of digital communication tools and ubiquitous networked devices and applications, and the increasing demands for

new educational approaches and pedagogies that line up with these changes to foster lifelong learning. Consequently, as discussed above, a gradual and delicate synergy between the field of CALL and other trends such as task-based, project-based, and experience-based approaches arose. However, for new technologies to be integrated into these approaches and for these pedagogies to benefit from the revolutionary nature of new technologies, there must be an all-inclusive contemplation of each approach tenets and its application for technology-mediated language teaching and learning.

For the same reason, with the web 2.0 era and the growing handling of mobile gadgets, their mounting computational power together with their improving network infrastructure, the concept of ubiquitous computing is prevailing in every aspect of modern life. Accordingly, there is an increasing demand for mobile applications to sustain daily activities and to offer various forms of entertainment, and even to assist learning in and outside classrooms, bringing within ample opportunities for a corresponding 'new learning' known as 'ubiquitous learning'.

1.1.4.1.   Task-based Language Learning

Another aspect of technology uptake today to many leading CALL researchers is that for the field to progress; it is necessary to look to Second Language Acquisition (SLA) principles that make language-teaching effective (Chappelle, 1998; Levy 1999). As a result, several SLA scholars have been on familiar terms with the potential of task-based learning as a framework for designing and organising technology-mediated activities (e.g. Chapelle, 2003; Doughty & Long, 2003; Long, 2009; Robison 2001; & Skehan, 1998).

Task-based language learning is an approach that considers the learning process as a set of communicative tasks directly connected to curricular goals. Accordingly, tasks

that learners undertake are pivotal to the learning process. Nunan (1991, p. 279) outlined five characteristics of a task-based approach to language learning:

1. An emphasis on learning to communicate through interaction in the target language

2. The introduction of authentic texts (teaching materials) into the learning situation

3. The provision of opportunities for learners to focus not only on language but also on the learning process itself

4. An enhancement of the learner's personal experiences as important contributing elements to classroom learning

5. An attempt to link classroom language learning with language activation outside the classroom

In his view, the task is a piece of meaning-focused work, which engages the learner in comprehending, manipulating, producing, and interacting in the target language (Ibid, 2007). Grammatical knowledge is acquired while involved in a task, and for meaning expression, conveying meaning is preferred to manipulation. Following this line of thought, tasks can be analysed according to goals, input data, the activities generated from the input, the settings, and roles assigned for teacher and learners. This has been graphically represented by Nunan (1989, p.11) as a way to analyse the various components of tasks (see Figure 1 below).

Figure 1

A framework for analysing communicative tasks
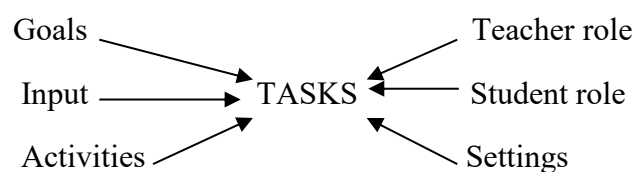
Two task-related issues inspired CALL researchers and guided CALL practices within the framework of task-based language teaching/learning. The first is related to the range of roles that tasks can play in synchronous and asynchronous computer-mediated interaction meant to facilitate language learning (e.g., Collentine, 2011; Kitade, 2008; Yilmaz & Granena, 2010). The second is related to the significance of task design in successful telecollaboration principally aimed at intercultural communication and learning (e.g. Dooley, 2011; O'Dowd & Ware, 2009). Researchers have argued that language learning tasks mediated by technology provide "transformative exposure to authentic language environments and cultural enactments, along with tremendous additional sources of input" (Gónzalez-Lloret & Ortega, 2014, p.4). This encourages taking risks, and creativity while using the language to make meaning; minimises the fear of failure, shyness, or losing face; and crucially, allows interaction with other speakers distantly. However, for new technologies to be amalgamated within TBLL and for pedagogic tasks to take advantage of the revolutionary nature of these technologies, there must be an all-inclusive deliberation of the principles of TBLL and its application in technology-mediated language learning. Research has also proven that CMC:

- Fosters negotiation of meaning, and provides linguistic modification and corrective feedback (Blake, 2003; Pallietieri, 2000)

- Enhances perceptual salience of forms, provides processing and planning time and enhances visual trace (Lin, Huang & Liou, 2013)

These research-grounded benefits can provide a basis for integrating TBLT/L in CALL, mainly in CMC.

Another important consideration in the same regard is the need for TBLL-informed definition of tasks in CALL. There are many different interpretations in the CALL literature of what a 'task' actually is. In this respect, Gónzalez-Lloret & Ortega (2014) provided a continuum of task definitions from the most general one that sees it as "an event that has coherence and unity, with a clear beginning and an end, in which learners take an active role" (Cameron, 1997, p.346). Then, they moved to a well-accepted definition of a task as a "goal-oriented communicative activity with a specific outcome, where the emphasis is on exchanging meaning, not producing specific language forms" (Willis, 1996, p.36). Moreover, ends with a more holistic view of the task as "an activity in which a person engages in order to attain an objective, and which necessitates the use of language" (Van den Branden, 2006, p.4). Indeed, the inconsistent conceptualisation of a given 'task' seems to hinder any generalisation of research findings and even replication, which raises doubts about the validity and reliability of such studies. However, the abundance of the more or less explicit research on CMC seems to centre on two recurrent features common in most discussions on tasks in the second language (L2) pedagogy, namely goals and activity; first put forward by Pica, Kanagy, and Falodun (1993). Building upon Pica et al.'s proposal, Gónzalez-Lloret& Ortega (2014) identifies five elusive features of technology-mediated tasks: (1) primary focus on meaning, (2) goal orientation, (3) learner-centeredness, (4) holism, and (5) reflective learning.

Digital literacy is another aspect almost present in all debates about technology integration into language learning; the synergy between TBLT and technology is no exception. Research in this direction argues that technology uptake in language learning promotes digital literacy, which is a crucial requirement for learning in the 21st century (Murray, 2005; Warschauer, 2006). Besides, learning via technology has a different cultural and epistemic logic that triggers and necessitates different cognitive, attitudinal,

social, and even behavioural mechanisms from learning a language through face-to-face interaction (Chun, 2008). In short, the intersection of technology with TBLT informs the use of technology in language learning, and at the same time improves and drives further development in TBLT.

Technical English course designers (Bingham, 2008; Bonamy, 2008 and Jacques, 2011) adopt a task-based approach- in the terms presented in this section- which attempts to help students make a compromise between knowing a foreign language and using it purposefully in problem-solving situations much similar to those they encounter in their vocational world outside the classroom setting. Some of these tasks are technology-mediated such as sending a progress report to a supervisor via e-mail, responding to a complaint e-mail, writing a specifications table using e-mail, making presentations, etc.

1.1.4.2.   Project-based Language Learning

Project-based learning (PBL) is a pedagogical technique that put students, often working together, in the active role of solving an authentic, real-life problem. The idea behind such an approach dates back to Dewey's 1916 call for "experience and thinking" and "learning by doing" as useful ways of improving learning, retention and application. This approach gained prominence with the advance of socio-constructivist theories first led by the seminal work of Vygotsky (1978). Within this vein, practising teachers at different levels of education (primary, secondary, and even tertiary) joined the curve and adopted a project-based methodology as a way to emphasise learning instead of recall of information (Fried-Booth, 2002; Stroller, 2006).

The central tenet underlying PBL is the notion of 'authenticity', displayed in different forms in the learning tasks and projects that the learners engage in, as in purposeful project topics, purposeful contexts, project output, classroom extramural collaboration, project extended audience to the community, oral presentations, and written

reports. For that reason, project-based instruction is defined as "an authentic instructional model or strategy in which students plan, implement, and evaluate projects that have real-world applications beyond the classroom" (Railsback, 2002, p. 6). The focus is, then, placed on learning activities that are interdisciplinary, multi-skilled, long term and learner-centred. This way, constructivism, deeply rooted in the works of Vygotsky (1978) and Dewy (1916), provided a firm footing for PBL. The central premise behind such an approach is that learning is the result of mental construction and that learning occurs through constructing new ideas based on one's previous knowledge. With PBL, the focus, thus, is placed on authentic, real-life projects as the primary vehicle to steer the learners' learning experience who are encouraged to reflect the purposefulness and the authenticity of the target language use (Beckett & Miller, 2006, Campbell, 2014, Stoller, 2006).

Notwithstanding, this general understanding of what project-based learning, there remains the question of what makes an educational project, for instance, the form, time-span and its coverage. Over the years, as stated by Buck Institute for Education (BIE) (2003), a mass of competing definitions of what PBL has been developed. To them (Ibid, p. 4) PBL is: "[A]systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks."

Project work, it can be inferred, is an effort and time-consuming task for both the teacher and learners. It is a productive work that requires due attention and follows up coming out to the intended goals and outcomes of education.

Technology, it was approved, is a key supportive component to TBL. It can be used to research topics and, then, to present the project outcome in the form of a creative product or digital artefact such as videos, blogs, wikis, and podcasts with the results of their findings. This allows students to embrace a topic and utilise technology in a way,

much similar to everyday uses outside the classroom. This provides a connection to authentic communicative situations outside the classroom walls. Moreover, collaborative work with fellows and teacher assistance is more consistent outside the classroom.

Additionally, technology allows teachers the ability to supervise students' progress more willingly and to offer individualised, instant feedback (Darling-Hammond et al., 2017). Henceforth, technology-mediated projects effectively "flip the classroom" via allowing the teachers a more facilitative role in students' learning, providing guidance when students are stuck, and giving oversight to ensure students are on track (Campbell, 2014). As such, technology can change the tone of the classroom in powerful ways and endows teachers with a construct or scaffolding for doing project work.

It is common in technology-mediated project-based learning when conceptualising a project and designing its components to follow a task-based pedagogy (e.g. Stoller, 2002; Kaliampos & Schmidt, 2014). In line with TBL principles projects are presented in the form of task cycles that, on a macro level, constitute a sequence of activities, which can easily exceed the boundaries of a single task, forming a learning arrangement called a 'project' (Legutke, 2010; Kaliampos & Schmidt, 2014; Stoller, 2002). Project work is, then defined as:

> *A theme and task-centred mode of teaching and learning, which results from a joint piece of negotiation between all participants. It allows for a wide scope of self-determined action for both the individual and the small group of learners within the general framework of a plan, which defines goals and procedures. Project learning realizes a dynamic balance between a process and a product orientation. Finally, it is experiential and holistic because it bridges the dualism between body and mind, theory and practice* (Legutke& Thomas, 1991, p. 160)

This marriage of conveniences between TBL and PBL provides a principle of meaningful sequencing of projects that consider it as a learning arrangement that directs

learners through a sequence of task cycles that enables them to master a comprehensive target task. Technology, within this marriage, is either a research tool or medium to present the outcome in the form of an innovative product. Accordingly, the learner is seen as an idiosyncratic individual with unique ways of learning and, at the same time, a social being who learns best via collaboration. Moreover, he is perceived as a conscious person who is responsible for his learning, an autonomous individual capable of making independent decisions, and as able of developing didactic expertise and growing to be a practitioner of learning (Allwright & Hanks, 2009, p. 4-7).

Technical English textbook series allows students the opportunity to engage in projects to do simple research into topics linked to the core units, in which they are encouraged to use the internet or the library to carry out the research and present the results to the class individually or a group class.

1.1.4.3.   Experiential Learning

Experiential learning is a learning approach where experience is transformed into or used to acquire knowledge. Experience is drawn on as a language content by reliving that experience either orally or via reflecting on learning intensely through writing. Experiencing what is being studied through active, hands-on engagement and focused reflection allows students to increase their knowledge, develop their skills, and clarify their values (Smith, 2001). This offers teachers a better view of how students think and learn, which enables them to further help students in learning and understanding the subject under study (Reilly, 2009).

The experiences that students engage in can be artificially designed by allowing them to do different tasks, which themselves will promote language learning. These tasks can be approached in diverse ways that fall under four categories of experiential learning

styles as detailed by Atherton 2009. These include activist, someone who prefers to experience learning by doing; a reflector, who reflects on his learning through observation; theorist, someone who wants to understand concepts, reasons and relationships; and pragmatist, someone who experiments things to see if they work. Learning by experience is seen as one of the most fundamental means of learning. It approaches learners as active knowledge constructors who link action, reflection and transfer of knowledge and experience. To use Kolb's (1984, p.41)words "[learning] is the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" and equally important from the reflective practice (individual and collective) of that process (see figure 3 below for Kolb's Model of Experience).

Figure 2

Kolb's Experiential Learning Cycle
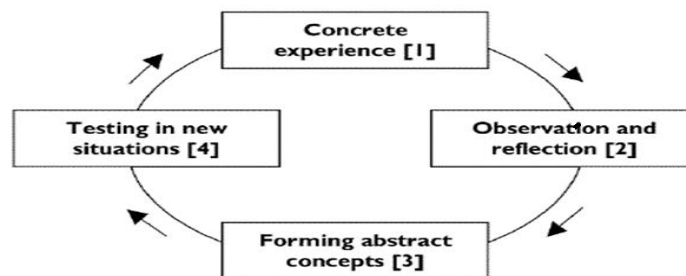
Following this line of thought, Silberman (2007) advocates that experiential learning refers to:

> *(a) The involvement of learners in concrete activities that enable them to experience what they are learning about and (b) the opportunity to reflect on those activities. Experiential learning can be based on both real work/life experiences (e.g. working on a current project) and structured experiences that stimulate or approximate real work/life.* (p. 7)

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Another experiential learning theorist, Kohonen (cited in Nunan, 2007, p. 12), enumerates the following maxims for action for experiential learning:

- Encourage the transmission of knowledge within the learner rather than the transmission of knowledge from the teacher to the learners

- Encourage learners to participate actively in small, collaborative groups

- Embrace a holistic attitude towards subject matter rather than a static, atomistic and hierarchical attitude

- Emphasise process rather than products, learning how to learn, self-enquiring, social and communication skills

- Encourage self-directed rather than teacher-directed learning

- Promote intrinsic rather than extrinsic motivation

This way, it is a learner-centred approach driven by action, reflection and transfer of knowledge and experience.

Digitization (including web 2.0) provides a ripe context for the emergence of experience as an essential factor in active knowledge-making. It presents language learners with new challenges and opportunities to tackle a wide range of human experience when used as a tool for inquiry, communication, and construction. This way, they facilitate a pedagogical movement away from vicarious experiences presented through old drill and practice media and materials; allowing them to learn by doing things themselves. Within this scope, non-linearity of information, active knowledge creation, negotiation of content and what to explore, all contribute to developing more flexible thinking skills among learners.

In this vein, experience (including mistakes) can provide the basis for most learning activities/tasks, and what we need to do, as teachers, is to expand our vision of the learning

process "from what technology can do for the student to what the student can do with technology" (Godwin- Jones, 1999, p. 49). Hence, teachers should be actively involved in empowering students in that direction through a clear vision of possible activities that can be undertaken along with ways to assist and assess the learning that could evolve out of this endeavour by the learners. Like so, with well-planned learning tasks, we can help ensure that any technological uptake can be met hassle-free.

1.1.4.4. Ubiquitous Language Learning

With the swift development of information technology, ubiquitous computing devices (e.g., mobiles, iPods, Laptops, etc.) and their global interconnection via the internet has pervaded almost every aspect of our life including learning; language learning is no exception. These have different cultural and epistemic logic from the old drilling practice and stimulus-response patterns ensured by cassettes, microphones, and headphones mostly used in language laboratories in the previous decades. Eventually, the linear presentation of materials has been displaced by "authentic multimodal content, simultaneous interactions for everyone, and more responsive feedback and assessment systems" (Kalantis & Cope, 2016), bringing within abundant opportunities for a corresponding 'new learning'.

The concept of ubiquitous learning has gradually emerged over the years to become one of the key terms of 21st-century education. It indicates an extension of previous learning paradigms (traditional learning and e-learning). It represents a new approach to learning with a new delivery model for activities beyond the physical confines of the classroom via the use of ubiquitous computing devices. In that sense, ubiquity sketches the opportunity for learning to take place everywhere and heralds greater chances for more varied, inspiring and learner-centred experiences (Dahlstrom et al., 2011). One major methodological challenge for instructors, then, is to harness these technologies fully to

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engage learners not only as "informants but also in the creation of the information used to study their ways of learning" (Buhl, 2012, p. 242). According to Stanly (2013),

The proliferation of hand-held devices, such as mobile phones, digital cameras, tablets, mp3 players and voice recorders, has led to what, for some teachers, is sometimes the bewildering choice of potential activities and resources. The use of mobile devices is expected to lead language learning, becoming more informal and personal (...). This revolution in mobile learning is happening both inside and outside the classroom. (p. 3)

As such, these networked digital devices brought with them the promise of exciting new venues for language learners. They are seen to involve them in more interactive learning scenarios that have significant potential to change language-learning practices in and outside the classroom.

1.1.5. The Learner: Change in Role and Profile

The transition from the computer as a tool to computer as a medium has had an impact on learner roles as well as his profile. Following this change, today's learners are born in a world where everyone and everything is connected; social media, computers, video games and the Internet are part of everyday life. Technology, as a result, mainly digital gadgets and social media are part of the culture in which these learners are engulfed. It is such an invasive aspect of their life that they are not only impressed by digitization and web 2.0 revolution (mobiles, social networks, gaming, texting, smartphones, programming), but such media is a part of the language of this generation of learners.

Different names were used to refer to this generation of learners. We have had Generation Y (Lancaster & Stillman 2002; Wessels & Steenkamp 2009), the Millenials (McCrindle Research 2006), digital youth (Hockly, 2011), and digital natives (Prensky, 2001). Arguably, the term that has caught on most in English Language Teaching (ELT) is

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'Digital Natives', originally coined by Prensky (2001), and refers to a generation that is defined by the internet and an increasingly globally connected world. Digital natives are perceived as being tech-savvy and, as a result, think, behave, and even process information differently than those from previous generations. The background of this generation then calls for some changes in the teaching/learning process; the least of which would be to " take our cues from our students' 21st-century innovations and behaviours, abandoning, in many cases, our pre-digital instincts and comfort zones" (Prensky, 2007, p. 2). Said differently, educators need to come out with new content delivery options and new task/activity types, which will most benefit today's learners.

Continuing to examine the impact of Information technologies and the changed context of English language learning, one can notice a significant role change for learners; surpassing their ability to consume information to creating it. This fact necessitates a decentralization of the teaching/learning concepts, providing greater chances for increased bottom-up control and horizontal learning contexts, where the learner is a negotiator of learning content and modes of learning, more responsible of his learning, and has the opportunity to develop his learning strategies and study skills. This way, the more students do for themselves, the more they will learn.

One significant advantage that web 2.0 tools have blessed EFL learners with is time, as they provide extra opportunities to engage in meaningful language learning tasks- all after the school has closed down for the day. Learners use these tools in diverse contexts. An example of such uses include blogging that permits the learners to develop, create, and share their work online wherever they are, at any time; they discuss, negotiate meaning, and get feedback from a worldwide audience all while 'just browsing the net'. This way, they become more active, more creative and more self-directed.

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The increased importance of online communication through these collaborative dialogical platforms is also contributing to new, safer and anonymous English practice spaces. Through which, reticent, shy and uncomfortable students in 'on the spot' class discussions can develop self-confidence in their English communication abilities, thus maximizing their participation and engagement rates. Learners' inhibition decreases notably when they are in control of their learning once given a chance to produce their works in a controlled setting (Ramirez, 2010). The setting up of a video or audio file will allow learners to practice and polish their work until they are satisfied with the final product. They also provide a means of getting feedback in an error forgiving environment wherein students express a keenness to practice the language and collaborate with other peers in cyberspaces.

Table 4

CALL Stages and the Potential for Learner Autonomy

Stage (Warschauer & Healy, 1998)	CALL applications and technologies	The potential for learner autonomy (Benson, 2001)
Behaviouristic CALL	Drills, vocabulary and grammar	Control over the pace of learning Control over mode (e.g., instruction, testing, the practice of testing)
Communicative CALL	Text reconstruction, games, simulations (problem-solving, cognitive engagement, spoken communication with peers) Word-processors, desktop packages, concordancers and databases	Control over path took Control over text creation and interpretation Control over the process of learning: development of metacognitive skills and metalinguistic awareness (i.e. cognitive and metacognitive autonomy)
Integrative CALL	Multimedia, Hypermedia and interactive technologies promoting the integration of skills (CD-ROMS) (Rich linguistic and non-linguistic input, new language presented through a variety of media, branching options) Internet: e-mail, online discussion, web authoring Large collaborative projects (opportunities for collaborative learning)	Control over the selection of materials and strategies of interpretation Control over access Control over learning content; Control over interaction

Source. Blin, 2004, p. 380

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By virtue of its user-centric nature and focus upon active engagement of learners, web 2.0 supports the development of their problem-solving skills since they are required not just to find information but to judge its efficacy as well. Besides, its open features that focus on the user and collaborative content generation through peer review and communal feedback has increased creativity and led to the evolution of collective intelligence within learning groups (Jimoyiannis et al., 2013, Ramirez, Ibid); intensifying the legacy processes of knowledge production. There is, thus, a strong emphasis on the traces of knowledge production processes which are as important as the final product; as Kantalis & Cope has noted, within this collective intelligence "the knowledge of the working group is greater than the sum of individual members" (2015). For instance, the setting up of a wiki will allow learners to look for appropriate sources, get peer feedback during the making, and produce collaboratively created works.

One pivotal pedagogical advantage that is often underestimated is that social networks are fun! A considerable base of research espouses the positive link between technology and learners' motivation, learning styles, and/or improvement in certain skill areas. It has been discovered that web 2.0 tools use in the classroom increases learners' motivation (Goodwin-Jones, 2005), raises their interest (Stanley, 2006), improves their writing (Thorne & Payne, 2005), and caters for multiple learning styles, as the material is presented in different formats (text, graphical, audio, and video) all at the same time on the same digital device. Related to this, Svedkauskaite, Reza-Hernandez, and Clifford (2003, "Frameworks for Successful LEP Learners" section, para.4) have also found that:

> *Technology has evolved from its support function to play a role in initiating learning processes. It can provide a flexible learning environment where students can really explore and be engaged. Hypermedia, for example, individually addresses levels of fluency, content knowledge, student motivation, and interest, allowing the inclusion of LEP [limited English proficient] students, who can thus monitor their comprehension, language production, and behaviour.*

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Additionally, the projected inherent features of web 2.0 have a profound impact on students' cultural awareness. Mainly because of the increased and easy contact with their worldwide online partners, there will be an open window-channel to discuss and reflect on their own as well as others' cultures. Within these intercultural exchanges, students will have the chance to look at how others look at their culture, can themselves expand and refine their views of others' cultures, and reflect on and criticize some aspects of these cultures. The juxtaposition of these different views illustrates how students' concepts and their cultural and intercultural awareness are evolving and will change in the future.

On the whole, Web 2.0 ubiquity, its various services, and its penetrating in the social, economic, and cultural life have a conspicuous observable impact on today's learners and their needs. Seeing that they hold great potential to benefit language learning/teaching through multiple means, the demand to cultivate these benefits has increased proportionately. This implies a fresh look at 'what students learn', 'how they learn' and 'where and with whom they learn'.

1.1.6. The Teacher: Change in Role and Knowledge

Above, mention has already been made of the change in the traditional classroom hierarchy. As more voice and responsibility are being attributed to learners, the lines that once demarcate traditional student/ teacher roles blurred; subverting the primacy of the teacher as the primary fountain of knowledge. Conole (2010, p. 402) makes the point that " [In] an information-rich web 2.0 world where the focus is on user-generated content, peer dialogue, and co-construction of knowledge, the notion of teacher as 'expert' and learner as 'receiver' makes little sense". The result of such a change is a more balanced relationship, where students are no longer empty vessels to be filled with knowledge but rather active producers of content. The instructor then moves away from the classroom's limelight, leaving the centre-stage for the new protagonist, 'the learner'.

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This shift from the teacher-centred classroom to the learner-centred one has its bearing on the teacher's role. Within this paradigm shift of the process of learning, he acts as a guide, facilitator; negotiator of content and process and encourager of learner self-expression and autonomy. Behind this role change, looms the larger issue of technology integration and teacher responsibility. Sawhill (2008, last para) claims that "our emerging role as teachers and technologists in the 21st century is to prepare ourselves, our colleagues, our schools and our classrooms for the linguistic and cultural realities of the teaching in a world where everyone and everything is connected, or 'intertwined'".

Technology on its own is not a magic wound, nor marvellous its affordances for themselves. Students, more often than not, get excited with the wow and apprehension surrounding new technologies at the expense of their learning, which leads to a bleak effect on their learning and development. To overcome this gap between the promising potential of these technologies and learners' actual practice, teachers need to help them make the most out of using them; the issue is how to promote and support this use. For this end, the teacher is burdened with the additional roles of designer, integrator, organizer, and coordinator within this learner-centred environment.

In order to embody the said roles, the need to acquire and sustain quality skills and knowledge grows steadier. Within this demand, CALL knowledge is taking centre stage, compared to other teacher knowledge domains, in many research studies that hype for the preparation and education of language teachers, pre-and in-service alike, to develop computer-assisted language teaching/learning skills (e.g., Liu & Kleinsasser, 2015; Hong,

2010; Hubbard, 2008; Hubbard& Levy, 2006). As agents of change, there is no time for complacency, but rather active learning and training to better encounter the

idiosyncrasies of teaching in the 21st-century; a century of changing educational standards and workforce mandate alternations.

In crafting teacher education and professional development programs, the areas of content/discipline, pedagogy and context has been emphasised as critical to ensure that the experience is as transformative as possible (e.g., Kumaravadivelu, 2012; Li, 2017). Adopting this view, Li (Ibid) imparts three types of knowledge that teachers need to develop most when learning to teach; (1) disciplinary content knowledge, (2) pedagogical knowledge and (3) contextual knowledge. Although the interrelatedness of the specific domains is widely acknowledged, the suggested framework provides a well-defined distinction of content/ discipline focus, pedagogy focus and context focus. This model is valid for this study, as it can be beneficial in addressing professional development since it integrates technology with the domains of content/discipline, pedagogy and context instead of teaching technology in isolation.

In support of this view, Harris et al. (2009, p. 402) articulate:

...typical approaches to technology-related professional development are based on the assumptions that it may be enough to just expose teachers to particular educational technologies and possible curriculum-based uses of those tools and resources. Approaches that teach only skills (technology or otherwise) are insufficient. Learning about technology is different in that learning what to do with it instructionally.

This lens provides a point of departure for looking at how these domains are presently tackled within teacher education and professional development programs, and find out ways they can be adjusted to meet the needs of teachers entering 21st-century classrooms.

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In truth, successful teacher professional development is dependent on several interconnected factors, the most important of which are teachers' readiness and willingness to take risks. Nevertheless, this still requires a substantial investment of time and effort. Some hindrances may emerge along the way, and cause frustration and undesirable results, such as hardware and software playing up, dependence on computer lab schedules, etc. To surmount this, teachers need to adopt effective professional development frameworks, such as Li's 2017 framework and set smooth well-planned steps to leverage their technology uptake to most effectively teach their course. To this end, faculty can use web 2.0 affordances to help students move beyond the acquisition of foundational knowledge to a depth that smoothes implementation in teaching and learning. Such type of knowledge is socially situated and requires the active participation of the kind that ties participants communally in meaningful and useful ways (Vygotsky, 1978; Wenger, 1998).

All too often, within the decentralization of authority in the learner-centred classroom, the univocal transmission of knowledge has been replaced by recursive participation that values learners' voice and own operations. Even so, this does not signify a passive role for teachers. On the contrary, digitization (including the internet) has further burdened teachers with new pedagogic tasks such as planning, coordinating, improving learning strategies, and leveraging students' metalinguistic awareness of CALL genres (Warschauer, 1996). This entails reconsidering teaching practices and may even call for training to cultivate the necessary skills to gear up with technological advances, to cater to the various changing needs of their learners.

Section Two: Materials Design and Development

Language teaching/learning materials has been notoriously difficult to define. This section, then, tries to achieve a working definition of what materials are, so that a clear understanding of the subject of the study is established. Before proceeding towards this, however, it is essential to reach an understanding of the theoretical underpinnings of instructional materials design and development and of where they are situated in the pedagogical literature. Since the study concerns the dual concepts of CALL and materials design, the question of how the field has developed along with technological developments is addressed. It focuses on one of the CALL key artefacts available to foreign language (FL) educators, CALL (also known as digital) materials. The section provides their definition, their advantages, disadvantages with some suggested solutions to overcome these latter. The digital enrichment of materials is clarified together with their evaluation.

1.2.1. Overview

Materials are the heart of the teaching/learning process; they, more often than not, shape classroom practices and dictate what goes on inside of it. Like so, they are fundamental to language learning and teaching. Language materials, thereby, are mainstay resources, which arbitrate student learning and promote teacher development and form the backbone of most language learning programs (Mcgrath, 2013). Seen this way, they represent a challenge and place greater responsibility on the teachers who must seriously consider what materials to use in their classrooms. For this end, they either choose the most suitable ones for their context from the overflowing array available on the market, adapt already existing materials to their situation, or create their materials to meet the needs and wants of their learners, if that available fall short of fulfilling these needs. This process is called materials development.

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A fundamental underpinning of the act of teaching, hence, is materials development and/or adaptation. As first defined by Tomlinson (1998), it refers to the provision of comprehensible input as the main vehicle to boost language learning since materials act as the pivot provider of social and educational experiences mutually created by the teacher and learners in the classroom (Richards, 2001). Notwithstanding, most of these teaching/learning processes happen in the classroom, they may go on outside of it thanks to today's technology (e.g. home, virtual classrooms, social media, etc.). Tomlinson (Ibid) defines it as:

> *Anything, which is done by writers, teachers or learners to provide sources of language input and to exploit those sources in ways, which maximize the likelihood of intake: In other words, the supplying of information about and/or experience of the language in ways designed to promote language learning* (p.2)

To that definition, one can further suggest that materials development encompasses any sort of exercise, task and project (games, problem-solving situations, group discussions, project works, real-life situations, telecollaboration tasks, etc.) developed from authentic resources with pedagogical purposes (be it a text, video, audio, picture, etc.). Besides, they are chiefly created to address a particular need, or a section of the course content, that looks weak, insufficient, or lack further development or practice. It ranges from creating a short, simple grammar exercise to writing a whole coursebook, creating a website, or even designing an online language course.

In his accounts of materials development in language learning, Tomlinson (2012, 2016) describes the field as both practical and a field of academic study with the practitioners in each field interacting and informing each other via publications, conferences and shared endeavours. It is practical in that "it involves the production, evaluation, adaptation and exploitation of materials" (Ibid, 2016, p. 2), while as an object

of study, the focus is on "the principles and procedures of the design, writing, implementation, evaluation and analysis of learning materials" (Ibid). This view was severely criticised for being too narrow to overlook materials' use (Garton& Graves, 2014). An important feature to be counted in the process of creating materials, hereafter, is their actual use by teachers and learners; a view that has long been neglected or partially mentioned in publications in the field (e.g., Cunningsworth, 1995; Jolly & Bolitho, 2011; Littlejohn, 2011; McGrath, 2002; McDonough & Shaw, 1993, 2003, 2013; Tomlinson, 1998, 2008). It only recently got significant consideration (e.g., Gaton & Graves, 2014). Eventhough Tomlinson (2012) has asserted that research into materials should supremely inform and be informed by their use.

Some teachers may question the need and value of materials development because it is time and effort consuming, especially if everything they want is available on the market in a textbook designed by people who are said to know better. Even though teachers have long been relying on course books, these materials often fail to reflect the reality of the classroom and remote from the learners' proficiency level, needs, wants and interests. It is at this time that the teacher has to define what change, delete, add or extend and may even reshape his plans in the middle of a lecture in response to the interaction taking place at that moment. This signifies that "every teacher is a materials developer" (English Language Centre 1997, cited in Tomlinson 2016, p. 2) who is relentlessly seeking ways to bridge this gap between what these course books offer and their students' needs in their learning environment. This is truer today regarding the plethora of English textbooks available on the market and written, to use Gray's (2002, p. 166) words, in "a one size fits all" philosophy, whereas English learners around the globe are learning English in distinctive contexts for specific purposes, which makes it quite impossible to cater to all these needs and interests. This renders materials design and development indispensable and

urges the need to train teachers (both pre-and in-service) and prepare them to the realities of the classroom, which can also be tremendously helpful as a "way of helping teachers to understand and apply theories of language learning- and to achieve personal and professional development" (Tomlinson, 2001, p. 67).

As discussed above, the 21st century has seen rapid societal and educational changes because of globalisation and 'technologization' (Blin & Jalkanen, 2014). A noteworthy change in the way people access, process, and produce information and in how learning transpires across networks, multiple sites and time scales has occurred. Along with this, digital technology has revolutionised language learning materials that have opened up to other types contrasting to the decades-long idea that materials (both teaching and learning) are but coursebooks, and has placed the learner squarely at the centre of materials and the teaching/learning process, in a way unattainable with traditional materials. This has magnified "the possibilities of the adaptation and creation of a broad range of language learning materials into the hands of the teacher, but also into the hands of the learners" (Motteram, 2011, p. 304). Nevertheless, despite the affordances that digital technology, particularly web 2.0 attributes, has brought to language teachers and learners, it has also amplified the complexity of language teaching/learning as it presents new educational challenges (see section II.3 below for a detailed analysis of the impact of technologization on language learning materials and materials development).

1.2.2. Materials Defined

Before an analysis of the impact of today's technology on language learning/teaching materials and, jointly, materials development, a definition of what materials are in language learning/teaching, especially in EFL, is necessary for at-hand study purposes.

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It is commonly held that materials play a central role in language learning/teaching. They make the core of a language course and, more often than not, make its 'content' (Nunan, 1988, p. 4-7, and Celce-Murcia & Olshtain, 2000, p. 187-195). Hence, they represent the execution of a language course and refer to texts (authentic aural or written) and tasks alike (Mishan, 2005; Harwood, 2010). These texts can take the form of "any artefacts that prompt the learning and use of language" (Guerrettaz & Johnston, 2013, p. 779) in or outside the language classroom.

Defining the term materials is problematic, for it is often confused with the term media. While the former refers to all aspects of language usage and use, the latter are mere containers of the materials (Hamada, 2007). Hence, media are means of presenting materials and include any equipment that teachers use inside or outside the classroom, be it a coursebook, a cassette, a CD-ROM, a video, etc., (Ibid). According to the above distinction, materials are all the artefacts that learners use in or outside the classroom in terms of speech, writing and visual-paralinguistic-meaning to work (in various tasks) on to advance their proficiency level in a given language. They, thereby, comprise all the "forms of language usage and use and the various tasks designed for teaching and learning" (Ibid). These materials can be presented in print, audio, or video form, on a coursebook, on a CD-ROM, on the internet or through live performance or display; tools of the presentation referred to as media.

Two types of materials are usually at the service of the teacher, locally produced (in-house) or teacher-created and expert commercial materials. These are variously presented through course books, worksheets, workbooks, lesson units. While many authors prefer ready-made commercial materials to locally produced ones for some reasons, others highlight the need for teacher's created materials because they better reflect the classroom reality. Many differences exist between these types and are summed up in table 4 below as

discussed in the literature by Hutchinson & Waters (1987), Tomlinson (2008, 2012, and 2016), Widodo & Savova (2010), and Widodo (2015).

Table 5

Differences between Locally Produced and Commercial Materials

Locally produced Materials	Commercial Materials
• Attempt to meet a group of learners' specific needs. • Are grounded in these needs, which provide the basis for selecting, designing, and using texts • Are not designed based on the basis of "the profit imperative", but are driven by "considerations of the needs and wants of their target learners and by the principles of language acquisition) Tomlinson (2008, p.9) • Are tailored to current pedagogical needs. The texts may respond to immediate constraints and resources. • May not be based on a sound theory of language learning and teaching because of teacher lack of training in language materials development. • Suit learners' local cultures and contexts • Allow teachers to create their own syllabus • May not carefully be edited and contain mistakes. • Challenge teachers to find other texts, which supplement core materials • May accommodate the expectations of school-level policymakers, teachers and students.	• Are great for learners with diverse backgrounds and different needs • Serve as a guide, which provides activities, language resources, & topics, which may not relevant to a specific group of learners • Put more emphasis on marketability (largely driven by commercial factors than pedagogical concerns or values) • Are not designed based on classroom research and do not take into account actual classroom concerns. • Fill this need because they are mostly written by experienced writers or experts, but these may also not be based on sound theory. • Maybe culturally and contextually inappropriate in content • Offer a ready-made and structure syllabus, which teachers can follow. • Have pleasing visual features such as full-colour illustrations, and they are carefully designed and edited for content and readability and regularly updated. • Offer a variety of additional materials such as teachers' worksheets, ready-to-administer tests, and CDs. • Represent the third voice (materials writers), so teachers' and students' voices are underrepresented.

Although most of the claims of anti-commercial materials view seem logical, they can still be useful if appropriated or adapted to a given context. These can serve as an initial point for teachers while developing their materials and, hence, act as a stimulant for teacher thinking and creativity if not seen as "expert endorsed products to which they have to stick slavishly" (Widodo, 2015, p. 25). For this end, teachers must have adequate

knowledge and understanding of the process of materials design and development and not merely rely on their instincts and beliefs. The prominence, then, should be on how to make these commercial materials more accessible to all learners in order to maximize learning potential. This implies that selection, evaluation and adaptation of teaching materials are a necessity and a significant responsibility of teachers and learners alike.

Materials are also classified according to their pedagogical use. According to Tomlinson (2012, p. 143), they can be:

- Informative: informing the learner about the target language. Examples of these include glossaries, picture dictionaries, info-graphics, videos, PowerPoint lectures, etc.

- Instructional: guiding the learning in practising the language such as edugames, self-assessment tests, etc.

- Experiential materials: providing the learner with experience of the language in use like virtual tours, interactive maps, etc.

- Eliciting: encouraging the learner to use the language: eg.

- Exploratory: helping the learner to make discoveries about the language such as English quests, project works, mystery and lost stories.

In this study, language materials are defined as in-house produced/used authentic artefacts and tasks informed by theoretical orientations presented through different media. In the design and use of these materials, teachers and learners together navigate, select, adapt, negotiate, create, and use them through a process of negotiation and collaboration (further explained in chapter IV). These in-house materials are based on the premise that "the perfect book does not exist" (Grant, 1987, p. 8), which makes it impossible to cater to all EST-specific language learning needs. To overcome this, both teachers and students

alike take part in an EST oriented language learning enterprise to bridge the mismatch between textbook materials and the learners' needs, interests and learning context.

1.2.3. Materials and Materials Development Revisited

As the internet makes its way into the hands of teachers, the daunting task of providing comprehensible input to their learners has become more comfortable. It has provided a myriad of authentic materials and tremendous search capabilities that allow instant access to up-to-the-minute information, on a variety of topics; from which they can select those most appropriate to fuel classroom discussions when exposing their learners to real-life tasks. It is also useful for those willing to mount their pedagogical material online both as a support for its creation and a means for content preparation.

This bounteous harvest of materials that the internet provides assists in the development of authentic material (both computer-based or not) as the selection of content is based on actual use of the language and correlation of different types of resources that echo those learners apply in everyday life. According to Bell (2005), cultural richness and reflection of real-life complexities, associated with authentic materials, seem to be undermining any potential de-motivating backwash effects. Most said, online materials are culturally richer, have more potential to echo real-life complexities and, hence, they are more effective, understandable, meaningful and more attractive to learners compared to traditional materials. However, with this plethora of material on the net, the problem seems to be one of the selection of appropriate materials, to weed out those poor in quality and linguistically inappropriate, thereby "allow a more thorough integration of language, content and culture than ever before and provide students with unprecedented opportunities for autonomous learning" (Warschauer & Meskill, 2000, p. 13).

In addition to the primordial role of internet technology as resource retrieval, multimodality and non-linear structure of information have brought interactivity and dynamism to the materials as well as to the teaching/learning environment. The old linear, static nature of materials has been replaced by hypermedia; different modes of representation (oral, written, visual, audio, and dataset) juxtaposed together in digital media, offering new types of activities and more learner engagement. Accordingly, web 2.0, allows learning content, aggregated from different sources using various tools, to be presented non-linearly in a text, graphical, audio, and video formats, in one place, on a digital device. This will breathe new life into the most inert material and increase comprehensibility through learner control and multimedia annotations.

Along with this, the interactive, social, and collaborative features of web 2.0 technologies are seen to be also inflicting their full impact on the ideas, topics and experiences that can be explored using digital technologies, and, hence, promoting new activity types and tasks hardly realised using other materials (Reinders & White, 2010). Multimedia annotations, video tutorials, communication and assessment tools can increase the array of learning scenarios in which learners engage. They offer open realistic contexts, not confined to the classroom, to generate and develop suitable activities/tasks that create opportunities to work smoothly across boundaries with others with different cultures, values, and interests. A case in point is telecollaboration tasks designed and channelled through synchronous web 2.0 communication technologies that were shown to mitigate attrition rates of students, contribute to students feeling a sense of communal belonging and engagement that result in intercultural exchanges and understanding unattainable with traditional methods. Moreover, these attributes include a novelty of features, which allow students to have a go with experimenting with the language in new and original ways that reflect their real-life needs. In light of this, experience provides the basis of activities,

readiness to learn is ensured via topics most relevant to learner's job or personal life, and learning is problem-based rather than content-oriented. Many of these tasks can culminate with student-developed output based on lesson objectives and the activity at hand.

The social participatory nature of web 2.0 has initiated an 'authoring revolution' that allows teachers and learners alike become content creators, thereby subverting the vertical top-down development of materials and opening out increased opportunities for the bottom-up and horizontal development frameworks. To this end, "ownership, autonomy, and contextualization will be core features of materials and materials-rich pedagogies" (Banegas, 2013, p. 12). This can enhance the quality of materials development and opens up new avenues of formative feedback to instructors and fertile environments for student's self-directed learning processes and strategy use, where the locus of knowledge creation, distribution, and the discussion became a shared commodity between the instructor and students that may occur inside and outside the classroom. Accordingly, ubiquitous learning, with varying degrees of constraints (e.g. access to the internet), represents a new dimension of learning promoted by and through materials and tasks.

1.2.4. The Textbook: Mainstay or Straightjacket

In the ephemeral world of the EFL classroom, textbooks often form the mainstay of many teachers' lessons. They provide the main course of action that can ensure reasonable interpretation and implementation of a designed course. According to Tomlinson (2011, p. xi), it: "provides the core materials for a language-learning course. It aims to provide as much as possible in one book and is designed so that it could serve as the only book which the learners necessarily use during a course". To Stray (1993, p. 73), it is a book "designed to offer a pedagogical and didactic presentation of a certain field of knowledge". Like so, textbook, commonly referred to as course book, is seen as an organised pre-packaged mean of presenting language/teaching-learning materials.

Despite their commonly held benefits, views over the roles EFL textbooks play in language teaching and learning fluctuate between two opposing points of view. First, those believing that textbooks have a positive and vital role in the teaching/learning process (e.g. Freebairn, 2000; Harmer, 2001; Hutchinson & Torres, 1994), arguing that they can "be a useful form of professional development for teachers, and foster autonomous learning strategies in students" (Crawford, 2002, p. 80). Second, the anti-textbook view regarding them as 'necessary evils' with no real role in activating learning. In the sense that they are a mean to 'deskill' (Shannon, 1987, cited in Richards, 1993, p. 48) teachers and, consequently, marginalise their role to mere "technician[s] whose primary function is to present materials prepared by others" (Richards, 2001c, p. 2).

1.2.4.1. Pro-textbook View

In the light of the first view, the pro-textbook view, it is believed that textbooks provide practical benefits, i.e., help save time and money in that they lessen the amount of time and energy required for lesson planning (Freebairn, 2000; Graves, 2000). As they may represent the 'core' of a language program (Richards, 1993; 2001b) and, thus, provide structure and syllabus. Cunnigsworth (1995, p. 7) summarised the roles of course books in the language classroom as follows:

• A resource for presentation materials (spoken and written)

• A source of activities for learner practise and communicative interaction

• A reference source for learners on grammar, vocabulary, pronunciation, etc.

• A source of stimulation and ideas for classroom activities

• A syllabus (where they reflect learning objectives that have already been determined)

- A support for less experienced teachers who have yet to gain confidence

In addition to the common belief that coursebooks "represent the visible heart of any ELT program" (Sheldon, 1988, p. 237), many theorists (e.g. Cunningsworth, 1995; O'Neil, 1982; Richards, 2001b; Ur, 1991) hold that they, also, offer advantages for both teachers and learners. They provide a constant source of ready-made activities and concrete samples of classroom progress. For less experienced teachers, they represent "a level of guidance on how to teach particular language structures or skills" (Dalby, 2009, p. 146) and, hence, help reduce many of the strains they feel. Further, they are a means for teachers' professional development (Cunningsworth, 1995; Littlejohn, 2011; Richards, 2001b). Moreover, course books help teachers "delve into deeper areas with their learners" (Dalby, 2009, p. 146) in the sense that they provide a starting point for further activities. The latter view is supported by Harmer (2001), who sees them as "…proposals for action, not instructions for use" (ibid, p. 8). Hence, course books are seen as a means to a deep understanding of the teaching/learning cycle (Shawer et al., 2009).

Students, on the other hand, often expect a coursebook because it gives them some control over their learning and an opportunity to prepare or review their lessons (Crawford, 2002; O'Neil, 1982). For Haycroft (1998), course books are psychologically crucial for students since they are a concrete source for their assessment and progress. They are, also, believed to be agents of self-directed learning in that they make learners self-centred. A learner, as evidenced by Ur (1996, p. 184), "without coursebook is more teacher-dependent". Textbooks, then, are "spurs to creativity (Harmer, 2001, p. 8) and "sources" rather than courses (Richards, 1993, p. 13). Hence, the necessity of the textbook in the language classroom cannot be neglected.

1.2.4.2. Anti-textbook View

Although most of the claims of the pro-textbook view seem logical; "the perfect book does not exist" (Grant, 1987, p. 8). Course books, whatever their virtues, may reveal some potential adverse effects on both teachers and learners while used in the classroom. Many of the opponents of coursebook use in the EFL/ESL classroom (e.g., Allwright, 1981; Thornbury, 2001; Tomlinson, 2003) have pointed out to their failure to provide independence and autonomy needed by teachers and learners alike to take responsibility of their teaching and learning. First, course books are a "straitjacket" (Dalby, 2009, p. 417) that limits the amount of creativity and freedom allowed for a class mainly when used as a source of assessment. This has been designated as a kind of "negative washback" (Tylor, 2005) that affects both teachers and learners. Second, this, in turn, may lead to a change in the role of the textbook from being at the service of teachers to being their boss and, consequently, degenerating their role to mere "transmitters" who slavishly follow instructions without questions (Richards, 2001b; Shawer et al., 2008). Third, most of the course books fail to help learners "exploit their capacity for learning through effective and relevant experience" (Tomlinson, 2003, p. 162). Such a kind of course books is described as "anti-humanistic" (ibid) in that they underestimate the learners' creative and cognitive capacities. Fourth, the fact that coursebooks are written for a large number may, in Gray's (2002, p. 166) words, create a "one-size-fits-all" philosophy which makes it quite impossible to cater for all learners' needs and interests. Fifth, as Richards (2001b, p. 255) has suggested, in coursebooks "an idealized white middle-class view of the world is portrayed as the norm", and this may result in their failure to relate to the learners. Sixth, other theorists (e.g., Sheldon, 1988; Swales, 2002) have pointed out to the mismatch between new developments regarding language learning and the rationale guiding the selection of the language to be taught as presented in coursebooks. The cause is that many

of their authors "do not admit the winds of change from research, methodological experimentation, or classroom feedback" (Sheldon, 1988, p. 239) and that 'marketability' rather than pedagogical considerations is the primary concern of most publishers. Finally, other reasons of scepticism with many course books can be summarised in the social and cultural biases that they may contain besides their failure to provide some authentic real-life examples of both spoken and written discourse (e.g. Alpetkin, 1993; Gilmore, 2007).

By considering the above analysis of the pro-and anti-textbook views, it became apparent that both autonomy and independence are critical for teachers and learners to take responsibility for their teaching and learning. However, it is far too optimistic to expect a textbook to help achieve this at present. Nevertheless, this does not mean, in any sense, that they should be immediately abandoned. The situation has shown that problems do exist with coursebooks; however, their necessity cannot be neglected. The emphasis, then, should be on how to make course books accessible to all learners in order to maximize learning potential. This implies that selection, evaluation and adaptation of teaching materials are a necessity.

1.2.5. CALL Materials

It has indeed become evident that technology nowadays plays a significant role in the development of materials, both as a means of their creation and a tool of content delivery. Increasingly, both learning and technologies have become ubiquitous, which has provided support for an individual's language learning processes and has extended language-learning opportunities outside the physical confines of the classroom. Materials development remained a practitioner-led practice and not always clearly informed by learning theories (Chappelle, 2001). It is, then, essential to identify the distinctive features of CALL materials compared to traditional non-CALL ones and how these features affect their development.

CALL and Materials Design and Development

CALL materials-artefacts produced for language teaching (Levy & Stockwell, 2006) - encompass tasks, websites, software, courseware, online courses and virtual learning environments. Conceptualised this way, they have the potential to allow for a more varied and more prosperous learning environment than traditional face-to-face classroom materials have to offer. Drawing on Breen, Candlin, and Waters (1979) distinction between content materials as sources of information and data and process materials as frameworks within which learners use their communicative abilities, CALL materials encompass both content and process dimensions (Reinders & White, 2010).

It is apparent that CALL materials inherit many of the features of traditional materials; both are considered as tools facilitating the development of foreign language acquisition and are, hence, subject to equal pedagogical affordances and limitations. Nevertheless, they do have some distinctive features that allow learners to draw upon potential affordances and cope with constraints in various ways (Reinders & White, 2010). Discussing the effectiveness and potential these has to offer in terms of 'new' technology software or CALL point out to their advantages and utility. In a study focusing on the use of 'new' technologies such as peer-to-peer networking, gaming and messaging, Godwin-Jones (2008) concludes that CALL materials help develop instructors' computer literacy and communicative skills. Zhao (2005), on the other hand, suggests other advantages with direct relation with language learning and teaching; these include facilitating access effectiveness via digital multimedia technologies, enhancing authenticity through videos and the internet, increasing comprehensibility through learner control and multimedia annotations, maximising opportunities for communication and providing instant feedback. Other advantages of CALL materials are summed up in the following sub-section.

From the illustrations given above, it is clear that CALL materials provide both technical (e.g., speech recognition) and pedagogical advantage (e.g., the authenticity of

materials and tasks). As such, there is a broad array of potential areas, where CALL materials can be of benefit. Below we propose a detailed analysis of this potential in terms of their organisational and pedagogical merits.

1.2.5.1.Organisational Merits of CALL Materials

Access

One of the often-cited virtues of CALL materials is accessibility as they can be offered to learners independent of time and space, particularly when referring to internet-based materials. This is valuable to learners who are otherwise unable to follow classes. Although this has offered many pragmatic opportunities, its benefits on second language acquisition are not yet clear (Reinders & White, 2010). Research (e.g. Reinders 2005; Ulitsky 2000) has shown the necessity of guidance and support where learners access materials without the immediate intervention of an instructor both in self-access contexts or in distance education (e.g. Hampel 2006; Wang 2007; White 2006). Without such help, students are left on their own to apply fewer or insufficient strategies, resulting in low motivation levels and high dropout rates.

Similarly, studies in Mobile Assisted Language Learning (MALL) (e.g., Levy & Kennedy, 2005; Thornton & Houser, 2005) seem to suggest the same results. They had found that students did not necessarily access the materials more than when they did not have mobile access. To this end, despite their promising attributes of the 'anytime/anywhere' materials, their effects on language acquisition are still blurred and hazy.

Storage and Retrieval of Learning Behaviour Records and Consequences

Another promising virtue of CALL materials, discussed by Reinders & White (2010), with potentially pedagogical benefits to learners in addition to its organisational

merits is that learners progress and test results can be stored electronically (and potentially automatically) and retrieved at any time.

Materials' Sharing and Recycling

CALL materials are easily created and shared. Learning objects with certain international standards are "interoperable" (Reinders & White 2010, p. 10) and versatile for materials developers. Besides, they can reduce development time since they can be used in different contexts.

Cost Efficiency

Cost efficiency has often been cited as both a virtue and a disadvantage. For example, Preparing students with CALL instead of print materials and allowing them to work independently without an instructor is said to reduce costs. Nevertheless, technology affordance (both hardware and software) and its maintenance have proven valuable. Moreover, this literature review has proven that students are always in need of teachers' guidance and a reduction in staff or their abundance has not always proven possible. A promising future venue that may help reduce the need for dedicated facilities and, consequently, their associated costs may be MALL. Increasing ubiquitous and interoperability of technologies together with open-source technologies and content can also help reduce the costs of developing language-learning materials (Reinders & White, 2010).

1.2.5.2.Pedagogical Advantages of CALL Materials

Authenticity

Back to square one, authenticity is a significant contribution and gift, with which internet technology has gifted teachers and learners. There are two parts to this gift: Call materials help in the development of authentic materials (both computer-based or not),

making the selection of content based on actual language use. Furthermore, they draw a parallel, particularly to resources young learners, use in everyday life. An excellent example of this are computer games designed to mimic learners' classroom extramural activities and proved to be potentially of assistance in learning and literacy development (Reinders & White, 2010). According to Gee (2003), computer games engage learners and get them involved in a task.

Interaction

One significant advantage of CALL materials is interaction, first defined by Chapelle (2005) as 'any two-way exchange' that can take place between two people, a person and a computer or within the person's mind. According to Swain'sOutput Hypothesis (1995), interaction assists learners in identifying the gaps in their interlanguage as well as their partners. In this vein, Ellis (1996) has argued that language production in various types of interaction acts as a form of practice that aids to strengthen existing mind connections. The sociocultural theory, on the other hand, has accentuated the significance of interaction in a meaningful context and various CALL programmes, especially social media, have made easy to create such possibilities for language use such as emails, telecollaboration. Other researchers, nevertheless, have pointed out to the fact that due attention to form is needed, for the comprehensible input of such interactions is insufficient on its own. Henceforth, in computer-mediated communication (CMC), some direction as to what learners are expected to perform and what features of the language they are expected to perform must be considered in materials and by instructors.

Situated Learning

Recognising that CALL materials enable social processes that can foster the application and use of language in a socioculturally meaningful context. Mobile technologies make it easier to prepare materials and support most suitable to particular

conditions. For instance, Ogata & Yano (2004 cited in Reinders & White, 2010) provide a system that applied PDAs to provide information on which Japanese forms of address to use in which situations. As learners moved from room (situation) to room, and from interlocutor (more status) to interlocutor (less status), the information changed. Designing materials that suit these situations necessitate an all-inclusive knowledge of the entire domain (participants, situations, the language used), which may be very demanding unless learners can actively tap into a more extensive database or access support from instructors when faced with difficulties in utilizing the language. Even though more research is required to find out how situated language learning can be planned and its effects on language acquisition (Reinders 2007, Reinders & White, 2010).

Multimedia

As discussed above, multimodality is a valuable improvement over traditional materials, which has created enriched learning environments. The different modes of representation (oral, written, visual, audio, and dataset) that multimedia offer, have been proven to result in varying processing on the part of the learner (Leow, 1995) and the teacher's ability to 'repackage' (Reinders & White, 2010) materials emphasising one modality over the others whenever needed to suit learners' differing learning styles, preferences and needs.

New Types of Activities

CALL materials comprise activities and tasks hardly realised using other learning materials, such as moving objects across the screen, recording and videotaping oneself. The effects of these activities must be examined in-depth for what aims to measure or teach, which has not always been the case (Reinders & White, 2010).

CALL and Materials Design and Development

Feedback

Immediate feedback is possible depending on several factors, such as user's input, past input, timing to name but a few, and in various forms like those using sound, movement, text or a combination of them. Also, other forms of feedback such as scaffolding, coaching, and modelling are possible to execute, which is difficult, if not possible, to achieve in traditional learning environments. According to Heift & Schulze (2007), natural language processing and paper-based CALL have the potential to give feedback based on participants' preceding language learning progress and their particular requirements.

Non-linearity

A significant advantage of hypermedia is the ability to display information non-linearly and for learners to access information wherever they want, whenever they need to, and not in a predetermined way. To Reinders & White (2010), this is only of benefit if students know where to find the information they need and possess the appropriate strategies to learn with hypermedia. Additionally, the quality of linked resources must be sufficiently high to come out to desirable outcomes.

Monitoring and Recording of Learning Behaviour and Progress

Reiders (2007) suggests that CALL programs, for instance, e-portfolio, can record and control learners' progress and alter input or make suggestions to the learners. They can also compare their progress to their aims or those of others. These records are at the hands of the learners to encourage reflection on the learning process. Many initiatives in this direction were undertaken, for instance, the European Union E-Portfolio Project, to encourage the keeping of personal records in support of ongoing learning and planning. These are chiefly run to develop metacognitive strategies and metacognitive awareness, better developed through self-monitor and self-access. Even though the practice has proven

that motivating participants to keep records or to plan their learning is challenging. Reinders (2006) has found that many of the participants in the study ignored computer promptly to produce or reconsider learning plans. Like so, more training and staff intervention are badly needed.

Empowerment

CALL materials have empowered learners in different ways. They have offered easier access to materials, greater control, more opportunities for the development of metacognitive skills, and better chances autonomy and self-direction.

On the whole, despite the promising virtues that CALL materials have over traditional ones, the translation of this potential into enhanced learning and teaching is mostly dependent on how technology is designed and implemented. It is also clear from the above analysis that more research is needed as regards how we better design and develop improved CALL and digital materials to better harness these advantages.

1.2.4.3.   Possible Problems and Suggested Solutions

Despite the auspicious potential that technology seems to offer, some obstacles may emerge along the way; causing frustration and undesirable results. These can be technical problems such as hardware and software playing up. The entire class may either not be able to access the internet at the same time or that downloading may be slow. Financial problems are the most significant barrier in many countries—for instance, the provision of equipment and its maintenance. While the internet is said to solve the problem of time and space; many believe that it can never be available to everyone in the world (Thorne, 2008; Warschauer, 2003). Other problems are mainly pedagogical and directly link to students learning.

CALL and Materials Design and Development

Firstly, learners' electronic literacy may cause teachers to spend most of the class time to show the learners how to apply the computer and software. This can be solved before designing the software or after doing so. Firstly, students' knowledge and literacy must be considered before any design trials, so that materials and technologies to be used are those with which students are acquainted. If not at this level, according to Harrison (1998), providing a course for amateur learners can be an excellent way to solve this problem. Secondly, Tortman (2000) believes that not that is on the net is suitable for learners' studies. This why supervision is a necessity if the internet is to be applied in the classroom. Besides, learners' attitudes, aptitudes, and motivation should be considered. Not all the students like working with technology, as some do not have a 'knack' for it (Nguyen, 2008). Some teachers as well may refrain from using CALL materials in their classrooms because they are faithful to their traditional approach and do not have the skills to develop or work with CALL materials. Conducting a computer or CALL materials attitude questionnaire before any undertaken to recognise if there are such students and teachers would be a solution to address this problem. This way, students and teachers with some apprehension could be given extra attention. Providing an adequate computer orientation in such cases would also be helpful.

Another fundamental problem with the internet, in general, and with learners, in particular, is copyright and plagiarism (Warschauer, 2004). The internet has granted learners with an excellent alternative to the library, making it easier to copy and paste with minimum effort and, therefore, to plagiarise. To surmount this, extra care must be directed to give the learners a precise clarification of what makes plagiarism, and how to avoid it. In this vein, there are also plagiarism checker programs such as Grammarly and Plagiarisma that helps teachers find out if this crime has been committed.

CALL and Materials Design and Development

In case of mismatch between the perceived and actual setting of a CALL program, its effectiveness may be limited. It has been made clear that technology effectiveness is primarily bound by its execution in the classroom. Hubbard (1996) points out the importance of the effective deployment of CALL programs. While most commercially designed CALL programs try to encompass as many different learning situations as possible, it is not possible to cater for every situation. As language instructors, we should consider the fact that like any other resources or teaching aids, the internet in general, multimedia texts, or even hypertexts cannot run a lesson and may remote from learners' needs, wants and interests.

No matter what wonders a program contains, the users will not make most of it unless they know how to use them appropriately. The teacher is an integral component in the success or failure of his class. It is the instructor who ensures the context for learning and chooses the materials used in his class to meet the learners' requirements. Accordingly, instructors must possess novel CALL integration strategies, which meet context particularities and better fit learners. In Nguyen (2008) terms, the WWW is only useful with precise selection and preparation of materials; so exact lesson planning, classroom management and training of both teachers and learners are necessary ingredients to best harness the educational opportunities that the internet has to offer.

The challenge for educational developers is to have this knowledge to design suitable curricula, which promote active learning, so what students learn is the result of a deep understanding of the subject matter, a knack to analyse and integrate data and information, and the development of critical thinking and good communication skills (Alexander, 1995). To achieve this, developers need to work hand in hand with instructors, either as consultants or as designers with adequate knowledge of how to reconceptualise technology and language tasks to provide the best opportunities for language learning.

CALL and Materials Design and Development

Instructors need to act as both syllabus designers and developers to ensure that the divide between CALL and non-CALL materials is disappearing. Equally important, there is the need to strengthen the links between theory, research and practice in order to consider to what extent the use of technology, including the internet, affects syllabus and materials design. Principally, our vision of technology must be reconsidered "from what the technology can do for the student to what the student can do with technology" (Godwin-Jones, 1999, p. 49).

1.2.6. Materials Evaluation

As a trip to any current English classroom may reveal, course books are the most common way of teaching. It is common knowledge that these latter are usually seen as an "almost universal element of ELT teaching" (Hutchinson &Torres, 1994, p. 315), and are often regarded as the core of many language teaching programs. Teachers, more often than not, are provided with a coursebook and told: "teach that" (Dalby, 2009). However, no matter how experienced or new a teacher is, it will soon become apparent that textbooks may have considerable disadvantages when used in the classroom. Therefore, increased attention should be paid to their quality. For this end, the process of evaluation is a necessity and a major responsibility of the EFL teacher. Such evaluation is critical for guiding the teacher's decisions when selecting a particular textbook that better suits the intended learners. It is, also, useful when deciding about what to adapt and change if the coursebook remotes from the learners' needs and interests.

Whether or not one admits the value of textbooks, it must surely be with water-tight evidence that they are useful and appropriate to the context and people with whom they are going to be used. Bearing that in mind and considering that a wrong choice may result not only in a waste of time and money but also in a rampant of passive effects on both teachers and learners, "teachers need to develop skills in evaluating and adapting published

materials" (Richards, 1993, p. 49). Such evaluation helps them move beyond their impressionistic assessments (Ellis, 1997) and provides valuable information for the future wellbeing of the classroom. Hence, it can be a valuable means for teachers' professional development. Further, textbook evaluation helps provide a baseline from which teachers' verdicts about making changes and adaptation to compensate "for the lack of match between the course aims and learner needs on the one hand, and what the textbook provides on the other hand" (McGrath, 2002, p. 79), can be made. It, further, helps depict the strengths and weaknesses of the book under question, which may ensure a reasonable interpretation and implementation. One additional reason for evaluation is the fact that it can be of benefit in teacher training programs for it helps teachers and learners alike delve into the textbook with an idea of what to look for while being familiarised with a wide range of published language instruction materials.

Materials evaluation, then, should be one of the main activities of teachers because it provides a wealth of information to use for the future direction of classroom practice, as it is valuable for the management of learning tasks and students. Hence, it influences what teachers teach and what learners learn. Evaluation, as evidenced by Brivon (1989), is a systematic and planned process undertaken to gather information necessary for making decisions regarding the improvement and development of language teaching programs. He (ibid, cited in Belouahem, 2008, p. 87) states that it is: "the systematic collection and analysis of all relevant information necessary to promote the improvement of a curriculum, and assess its effectiveness and efficiency, as well as the participants' attitudes within the context of the particular institutions involved."

Coursebook evaluation can take three forms, impressionistic versus in-depth, for potential versus for suitability, predictive versus retrospective.

1.2.5.1. Impressionistic versus In-depth Evaluation

According to McGrath (2002), the evaluation is impressionistic when based on the evaluator's general impression after a crash glance on the features mentioned in the coursebook such as the publisher's blurb and the contents' page. It is not time-consuming, though it is unreliable because it is based for the most part on intuition. The in-depth evaluation, on the other hand, is a penetrating examination of a unit or section to gain a deep understanding of the coursebook. One obvious disadvantage is that the selected section or unit may not be a good representative of the whole book.

1.2.5.2. For Potential versus for Suitability

When the evaluation is designed to examine the future or potential performance of a textbook, then it is an evaluation for potential. It is the most challenging kind of evaluation because the evaluator has no predetermined idea in terms of the learners' response towards the coursebook under question. When the evaluation is carried out against a set of criteria, then it is an evaluation for suitability.

1.2.5.3. Predictive versus Retrospective Evaluation

Predictive evaluation, as suggested by Ellis (1997), is carried out before using a textbook in the classroom to judge its suitability to the objectives of the program. Teachers may conduct the evaluation themselves relying as they do on several checklists and guidelines as helping tools or rely on evaluations conducted by experts. Retrospective evaluation is done after using a textbook to depict its strengths and weaknesses to decide on what to adapt and change. It, further, "serves as a means of testing the validity of a predictive evaluation, and may point to many ways, in which the predictive instruments can be improved for future use" (ibid, p. 37)

As such, a strategy of analysing and evaluating the material used must be adopted for a rewarding use of at-hand materials. In this research context, participants had to analyse the materials used in the ENPEI to teach Technical English according to some parameters of analysis and evaluation. They had to undertake a pre-use, whilst-use and after-use analysis to continually refine and adapt them to fit their learners better (see enrichment below). It is professionally necessary for in-service teachers to be able to think about, analyse and criticise commercial materials before attempting to use them in their classrooms. This is helpful when faced with a situation that relies on a chosen textbook, and they have to adopt or adapt it to learners' needs and objectives or even design their materials wherever necessary to compensate for what is missing within them. A common trend today is to supplement textbooks with digital materials, knowledge of which is then necessary for a better learning experience. This could be achieved through action research and collaboration with colleagues through development projects to enrich their contexts according to available technology and learners' needs and objectives such as the project of the research at hand.

The consequences of pre-use analysis of materials often lead teachers to either adopt or reject language teaching/learning materials. In the case of ENPEI, the use of a given commercial textbook package represents its use as the primary teaching/learning materials (Hutchinson & Torres, 1994). Before adopting them, teacher coordinators with teams are assigned the task to analyse and evaluate those materials before using them. According to McDonough and Shaw (2003, 2013), teachers confined to use already designed textbooks (in this case, commercial textbooks designed for a broad audience) can at least evaluate them using some "external and internal evaluation criteria" (pp. 62-70).

Accordingly, a brief 'external' stage examines criteria related to the organizational foundation of the coursebook "as stated explicitly by the author/publisher" (ibid, p. 62)

through the cover, introduction and table of content statements. After, an in-depth 'internal' stage investigates whether the author's claims are borne out in terms of their match to the aims and objectives of a given teaching program, through investigating the presentation, the sequencing and grading of materials, the suitability of the material for different learning styles, in addition to teacher/learner interaction and learner/learner relationship. Language teaching materials are, henceforth, adopted if they fit the criteria mentioned above. Teacher coordinators at ENPEI have often used this evaluation before adopting 'Technical English' package (in the three levels) as raw teaching/ learning material (See chapter 4).

1.2.7. The Digital Enrichment of Textbooks

No matter how good or bad a coursebook is found after a thorough analysis, it might still be needed to be used in the classroom. As no coursebook can "address any individual student or group of students directly" (White, 1988, p. 73), and that every teaching/learning situation is unique, teachers will, sometime, need to adapt materials to make them "more closely related to the reality of dealing with learners in the dynamic environment of the classroom" (McDonough & Shaw, 2003, p. 74). Effective teachers, then, are aware of the level of fit between the materials and their learners and, thus, strive to create a match between the two. One way of achieving this is enrichment that is supplementing the textbook with what seems to be missing in it. Nevertheless, this is not a prescribed recipe applied to all adopted textbooks. It is dependent on several factors, the least of which is the freedom allowed to teachers, the availability of time and means, to bring some changes to the materials, and the professional qualifications (knowledge and experience), which would help a teacher consider the quality of the materials at hand.

Many researchers and experts have defined enrichment from different points of view. Clendening& Davies (1983), for instance, see it as acceleration or curriculum

compaction for gifted students only. Piggot (2004) takes a different point of view in favour of the personal and social development of all students and emphasizes its role in giving greater fulfilment and intellectual satisfaction than the primary curriculum. For Feng (2005), it is a set of techniques used flexibly for students' educational needs. Along with this welter of overlapping definitions and varying views (refinement, enhancement, upgrading, or augmentation), enrichment has always been considered as an 'add-on' quality; something related to something else, be it a skill, a lesson, a textbook, or a curriculum.

This concept was first introduced to foreign language learning by one of the early researchers in this area, Peacock (1939), who gave it a cultural dimension when she talked about "enriching a basic textbook along broadly cultural lines" (ibid, p. 24). To her, it refers to realia; objects or activities used to relate classroom teaching to real life, especially of peoples studied such as maps, posters, photographs, newspapers, and magazines. She identified a set of principles, which may be relevant to other types of enrichment today like the one discussed in this research. According to these principles:

- Enrichment should not develop into ends themselves, but it should be kept 'subservient' to the aims of the textbook

- It should not overload an already crowded syllabus

- It should be taught not merely presented to students

- It should establish some kind of connection with students' lives

- It should be related to a specific textbook each time, not be decided definitely for all situations (Peacock, 1939, pp. 24-29).

A moment ago, Richards (1999, 2001) gave it a new meaning in ELT by relating it to materials adaptation, a process through which a teacher makes the material more

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accessible and suitable for his learners and in harmony with the goals and objectives of the course. It takes various forms including:

- Adding materials to address specific needs (e.g. an examination requirement)

- Extending materials to provide additional practice for a specific aspect of a textbook or to provide opportunities for more personalized practice

- Modifying materials to give them an additional or an alternative focus to address the needs of a particular group of students (e.g. because of their age, gender, occupation, social or cultural background)

- Localizing materials (by adapting or supplementing them) to make them relevant to a specific target group

Some ideas of adaptation are summed up in the table below, adapted from Spratt & Pulverness (2008, p. 111).

Table 6

Ways to Adapt Material that is not suitable for a Particular Teaching Situation

Strategies	Problems	Possible solutions
Extending material	-the task or exercise is too short. - learners need more practice.	-write extra items, following the same pattern
Shortening the material	-the task or exercise is too long -the learners need so much practice.	-use as much as you need but do not feel you have to use it all -give different parts of the text or the task to different learners
Changing the form of the task	-the task does not suit the learners' learning style. -you want a change of place. -the coursebook often repeats the same kind of task.	-change the interaction pattern, e.g. use a matching task as a mingling activity (i.e. one in which learners move around the class, in this case, to find their partners).
Changing the level of the material	-the texts or tasks are too easy or too difficult.	-make the material more challenging, e.g. learners try to answer comprehension questions before reading. -make the material less challenging, e.g. break up a long text onto shorter sections.
Reordering Material	-the activities in the units in the book always follow the same sequence. -the learners need to learn or practice things in a different order	-change the order of the material, e.g. ask learners to cover up a page or part of a page, so that they focus on what you want them to do first.
Making use of all the resources in the book	-there is not enough practice material in a particular unit. -the learners need to revise particular items. -you want to preview material in a future unit.	-use extra material from the book: grammar summaries, words list, lists of irregular verbs, etc. -give whole book tasks, e.g. searching through the book for texts, pictures, language examples, etc.

In ESP, enrichment has, more often than not, been aligned to editing, adapting, and supplementing a given textbook with discipline-appropriate additional materials, be it

authentic topics, needs-specific texts, exercises, activities and tasks carried out in, or outside classrooms to meet the realities of individual learning situations (e.g. Bouzidi, 2009). Adapting materials usually includes applying strategies such as, deleting irrelevant content, simplifying materials or activities, modifying materials or activities to make them either more demanding or more accessible to the target learners; to name but few (for more details see Hyland, 2006; Bocanegra-Valle, 2010). As ESP materials are mostly discipline-specific and goal-oriented, enrichment is, over and over again, bound with the need to equip the learners with the English Language Knowledge they will be using in their working environments. Accordingly, Ellis and Johnson (1994, p. 115) assert that learners need "tasks and activities that practise the target skills areas". As such, linkage with target-domain data, learning outcomes, grading level appropriateness, and prioritization of enrichment materials are critical considerations for any refinement or upgrading of a given ESP textbook.

With technology arrival in the language classroom, the notion of enrichment took on a new meaning. Quite often, it allies with the use of technology itself in the language classroom and accentuates the vast opportunities various media offers to students (e.g. Wang, Jaeger, Liu, Guo, & Xie, 2013). Other studies, (e.g. Wu, Marek, & Wu, 2009) focused on the potential of videos and blogging in enriching the teaching/learning experience. As such, any technological device, or software used to enhance the teaching/learning process goes under this umbrella. Other efforts centred on the enrichment of textbooks with digital content focused mostly on their hybridisation and the creation of an 'ecotone' (Horsley, 2001), where traditional learning environments meet with "new learning environments designed around student-centred interaction, and the internet and technology-based tools" (Ibid, p. 38); resulting, more often than not, in a digital textbook and, or an accompanying website. The same 'recreation' principle which assumes that a

genre, the textbook, in this case, maintains its "old practises" (Lemke, 1998, p. 287) when moved online, is applied to media. This view defies the modernist myth that advocates the split between digital technologies and earlier media for a new set of aesthetic and cultural principles, arguing that for a better cultural significance new media need to refashion and build upon earlier media (Bolter and Grusin, 1999). Following this line of thought, textbooks are to be enriched with multimedia content, mostly available on the net, and become much more than mere digital versions of print textbooks. This multimedia content can take various forms individually or all together; examples of these may include, built-in dictionaries, animated graphics, interactive simulations, videos, podcasts, and hyperlinks to other sites or different parts of a text.

In light of this flurry of overlapping material and conflicting ideas, coming out with a working definition of the notion of enrichment for this study purposes remains no easy task. However, despite all these differences in opinion, the notion of an 'add-on' quality seems reasonable. Hence, digital enrichment is not just a digital version of a print language learning textbook (pdf in most cases), but also a mean to adjoin it with multimedia content for a varied, stimulating input, greater flexibility, and a better teaching/learning situation. It transcends the conventional print textbook to include additional electronic resources such as built-in dictionaries, audio and video resources, pronunciation guides, hyperlinks. Defined this way, digital enrichment is any electronic resource a teacher/learner uses or designs for teaching/learning a language to meet the particularities of individual teaching/learning situations and the realities of domain-specific fields.

Section Three: English for Science and Technology

This last section reviews English for Science and Technology as the context, where CALL and materials design are into play. It first defines the field, details its perspectives and tracks its origins and development. It spots light on the use of materials in EST and focuses on how they fit into its hybrid nature framework, stating their distinctive features. It ends with highlighting the value of needs analysis within the field in general, and for EST materials development, in particular.

1.3.1. Definition and Perspectives

With the rate at which English is dominating every sphere of life worldwide, it has gained the status of the 'Lingua Franca' of international business, economy, science and technology. Due to its dynamic nature, it has gained precedence over other languages mainly in scientific and technological communication with all relevant and ground-breaking information being primarily published, distributed, and stored in English (Crystal, 1997). In this line, being the most prominent language in conveying knowledge and new inventions on the international scale, English has become as crucial as most major-related abilities in many fields, including engineering disciplines. As such, it is imperative for engineers, students and graduates of technical universities, amongst others, to acquire the language skills necessary to boost their career and professional development, to become active and creative contributors in this competitive world. Pedagogically, the idea of learning English for the needs of the profession and not just for the language per se becomes popular in the early 1960s. This has urged the need to design, implement and evaluate new English for Science and Technology (EST) courses to meet the burgeoning professional and academic communication needs.

EST, thus, came out as a learning approach to equip scientists and engineers with the English language competence needed in their professional fields. It is based on the

activities that are relevant and typical to their professions in an international context. According to Rao (2014):

> *EST is concerned with both the oral and written discourse of English for academic or professional, occupational or vocational purposes. It mainly deals with learners at tertiary level for whom the learning of English takes on a service role for their specific needs in study, work or research.* (pp. 3-4)

Seen this way, it is a language teaching approach designed to meet the particularities and specific needs of the learners via employing effective teaching methodologies and teaching activities. It accentuates purposeful and utilitarian learning of English. On the word of Ono & Morimura (2007), students in an EST course need to acquire:

- An English proficiency which will allow them to communicate with English-speaking specialists all over the world

- A cosmopolitan, global outlook

- Experiences which will enable them to communicate with other nations on equal terms outside their own country

- Creative skills and self-motivation for exploring solutions to problems related to their professional domains

- An appreciation of diverse cultures in the world.

As far as engineering disciplines are concerned, foremost with ENPEI students in mind, English plays a crucial role as in other similar fields. As already discussed, being relentlessly used in such a broad area, as engineering is, English competence is necessary for students (future engineers) for variety of reasons, the least of which is their career and professional development. Although even today, French had been and still is very important in Algeria; English holds the pole as the leading language of knowledge and documentation in the field, beating in some way French supremacy. Incidentally, English

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has been taught at the school since its inception, and has grown in stature and changed

focus from general English to EST. This is due to the reality that during the twenty years of

the school's working life, English has continuously evolved as the primary means of

communication in the engineering field and finally gained a colossal prominence over

other languages studied at the school (namely French and Spanish) when it comes to

academic and scientific correspondence.

With this stated, an EST course was developed (along the learning cycle), based on the

fundamental principle that we can highlight the most critical and adequate language needs

of our learners, adopt teaching/learning materials and practices that will help learners to

meet those needs. In this line, throughout the learning cycle, the students attend courses in

English that focus mainly on the development of language skills and a progressive

introduction of technical vocabulary and processes tightly related to their technical training.

It is usually the case; students attending the school are at many different levels, when it

comes to the English language knowledge, even though they have been studying English

for the same number of years prior to the course. Against this background, the bulk of the

pedagogical effort is directed towards the consolidation of former language acquisitions;

however, more communicative language patterns are gradually introduced. The main aim

is to achieve a level of homogeneity among students that guarantees a suave proceeding to

EST and advance practical communication for science and technology use, which allows a

smooth progression from one year of study to another. The course uses a multi-thread

syllabus consisting mainly of communicative functions, notions, grammar, vocabulary and

skills within a practical task-based approach that encourages students to use their technical

knowledge and problem-solving skills. Going in this direction, raising the proficiency of

language use, and often creating it leads to more specific aspects of English that are

essential for their academic studies and future careers

1.3.2. Origins and Development

EST is a subcategory of the larger field of English for Specific Purposes (ESP), often referred to as 'applied ELT', with which it shares some fundamental characteristics. ESP is the representative of an international movement known as Language for Specific Purposes (LSP), where the communicative needs of the learners are a primary consideration in course design and the teaching of it is for "a clearly utilitarian purpose" (Mackey & Mountford, 1978, p. 2). As defined by Hutchinson and Waters (1987),

> *ESP must be seen as an approach, not as a product. ESP is not a particular kind of language or methodology... ESP is an approach to language teaching in which all decisions as to content and method are based on the learner's reason for learning.* (p. 19)

On the same vein, Dudley-Evans (1997) identified some obsolete and variable characteristics of ESP:

Obsolete Characteristics

- ESP is defined to meet the specific needs of the learners

- ESP makes use of underlying methodology and activities of the discipline it serves

- ESP is centred on the language appropriate to these activities in terms of grammar, lexis, register, study skills, discourse and genre

Variable Characteristics

- ESP may be related to or designed for specific disciplines.

- ESP may use, in specific teaching situations, a different methodology from that in General English

- ESP is likely to be designed for adult learners, either at a tertiary level institution or in a professional work situation. It could, however, be for learners at the secondary school level.

- ESP is generally designed for intermediate or advanced students.

- Most ESP courses assume some basic knowledge of the language system.

In this respect, ESP is an approach to language teaching that accentuates learners' needs and reasons for learning English as a significant concern in course and materials design. Accordingly, the target of any ESP course should be twofold: to exploit and further develop learners' overall competence in their professional or academic fields, and to lay the foundation for further learning and refinement of the linguistic features, competencies, and language skills needed in these specific disciplines. Like so, the learning targets, choice of study materials, didactic methods and syllabuses must be germane to the learners' fields.

Three main reasons were behind the emergence of most ESP programmes, namely, the need for a Brave New World, a revolution in linguistics and a focus on learners (Hutchinson & Waters, 1987). First, the scientific, technical and economic changes brought by the end of the Second World War (WW II) has resulted in the growth of a world unified and dominated by two driving forces: technology and commerce. To cope with these forces demands, the need for an international language to ease the treatment between collaborates all over the world has become more urgent. Alongside this, English had decided its own destiny and "was at the right place at the right time" (Crystal, 1997), it now is fitted the needs, wishes, and demands of people other than language teachers. More pressure, as a result, was exerted on the language teaching profession to deliver the required goods.

Second, the linguistic revolution brought with it a new pragmatic perspective to language teaching/learning that lends support to language 'use' at the expense of its 'usage'. Revolutionary pioneers in linguistics (e.g., Hutchinson & Waters, 1987) agreed

that the use of language varies according to the context. Hence, there is a need to mould language courses as language use differs from one context to another. Accordingly, as the context changes, so does language use, which necessitates a different type of teaching for that particular context. On the same tenet, many language courses were developed for science and technology students, described as English for Science and Technology. As stated by Hutchinson and Waters (1987), Ever and Lattorre, Swales, Selinker and Trimble were among the first advocates of EST programmes.

The last reason behind the rise of ESP is the development of educational psychology, which focuses on learners and their attitudes to learning. In light of this, the varying needs and interests of learners have a direct impact on their motivation and their learning effectiveness. This has led to a focus on "the development of courses in which 'relevance' to the learners' needs and interests was paramount" (Hutchinson and Waters 1987, p. 8). Besides, the growing satisfaction with the principle that the learners determine learning has led to the emergence of language-centred and learning-centred approaches to course design as the logical outcome of this final reason.

Taking into consideration the acknowledged purposes for which English is required and learnt, we will divide its usage into those for general, specific and social purposes. English for General Purposes (EGP) is the kind of English acquired by youngsters without any specified need. English for Social Purposes (ESP), on the other hand, is often taught to adult learners and is mainly concerned with conversational purposes and communicative situations; with some of its aspects, such as letter writing and the knack to manoeuvre functionally in an English-speaking environment, are usually part of English for Academic Purposes (EAP) courses in most English-speaking countries. Whereas, ESP is an umbrella term utilized to cover different sorts of courses, which vary from one another in accord with the learners' needs. Since it is meant to suit diverse teaching/learning situations, it

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was broken into numerous types, amongst which English for Academic Purposes (see Figure 3 below).

Figure 3

The Purposes of Learning English
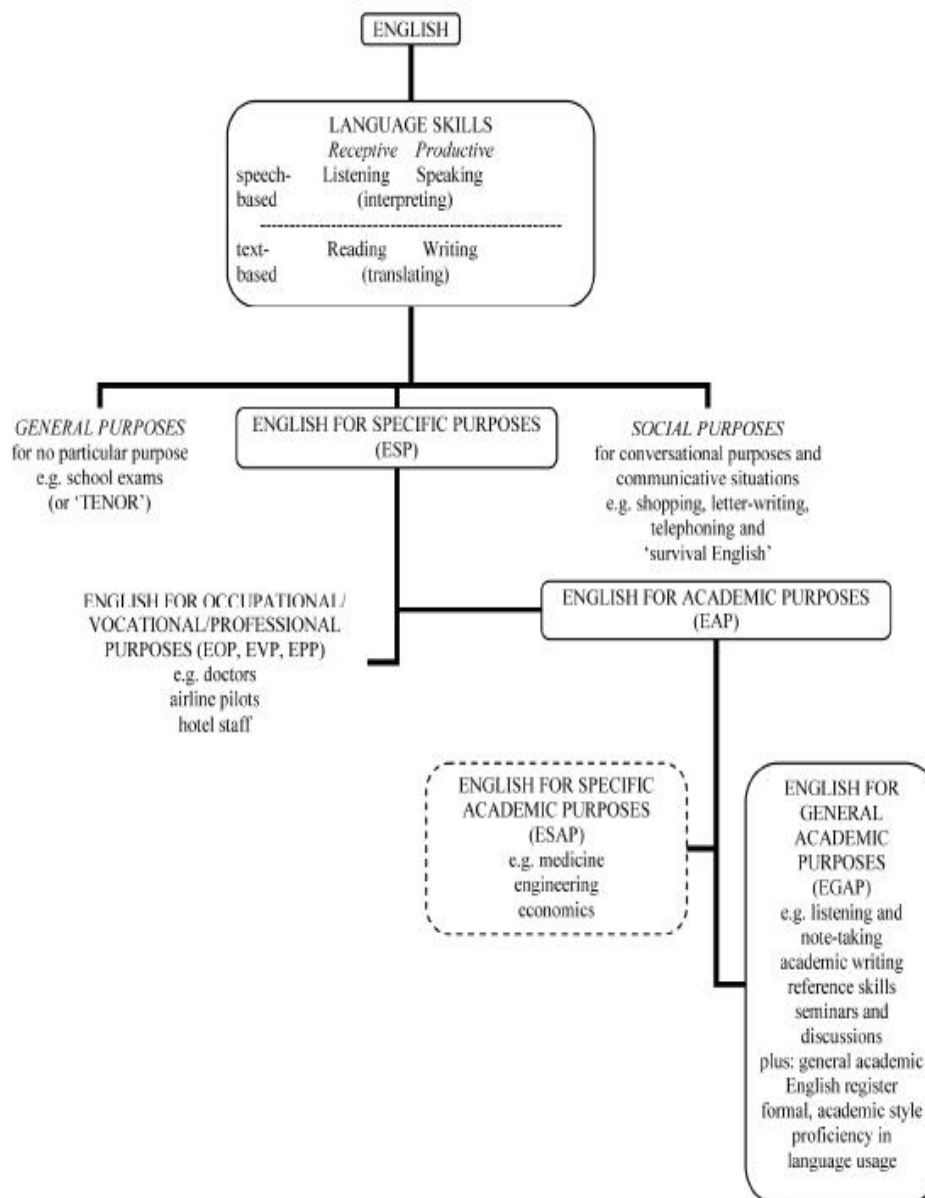
Source. Jordan (1997, p.3)

1.3.3. Materials in EST

An essential component of a practical ESP/EST course is instructional materials that cope up with the learners' particular needs and areas of interest within a particular instructional setting. They can be defined the same way as ELT materials with some variable characteristics in line with the overriding characteristics of EST. Materials play a vital role in exposing learners to "real language" input (Dudley-Evans & St. John, 1998, p. 171) that is particular to a given discipline.

ESP, first marked by the seminal work of John Swale (1985) *Episodes in ESP*, has gone through several stages since its inception in the early 1960s and has been influenced by various principles, which has had an impact on the design of course materials. The four phases outlined below follow the framework set by García Mayo (1998-1999).

The first phase, known as Register Analysis (1965-1974), is based on the identification of grammatical and lexical features archetypal of distinct scientific registers. In light of this, teaching materials gave priority to those forms that students might come across in their science studies in English. A good illustration of textbooks based on research into scientific texts and the selection of the most frequent grammatical patterns, structural words, and lexical items common in most scientific disciplines, is *A Course in Basic Scientific English* by J.R. Ewer and G. Latorre (1969). The second phase is rhetorical or discourse analysis, which accentuates the way sentences are used in different acts of communication, and how the choice of linguistic features affects the generated statements. *English in Focus* series by J.P. Allen and H.G. Widdowson (1973-1978) are among the textbook series developed on these principles and led by an inventory of rhetorical functions rather than grammatical and, or lexical items.

The 1980s gave considerable importance to what many believe to be the core of any ESP practice, Needs Analysis (NA). The concept has spread out from a focus on the target situation analysis, to include learners' needs, their various reasons for attending the course, resources available, amongst others. In view of that, ESP practitioners need to consider not only the surface forms of the language but to look below those features as well. Accordingly, learning strategies-thinking processes underlying language use, which help learners cope with these surface forms, are also considered. In this vein, receptive skills are acquired via the skills and strategies approach that put students in front of tasks, which require them to process and analyse authentic texts as they do in their subsequent work or study field. *Reading and Thinking in English* series by J. Moore and T. Munévar (1979-1980) is an excellent example of attempts to incorporate these concepts into language teaching pedagogy.

The last phase is genre analysis, which sees the text as a system of linguistic features and choices. It serves as a basis for the development of a wide variety of 'genre-driven' ESP materials, such as discussing the purpose of the genre, its communicative conventions and role in particular contexts, in addition to some other awareness-raising features (Lesiak-Bielawska, 2015). As such, there has been a wide drive towards developing materials for each of the areas and sub-areas of ESP (e.g., English for Medical Purposes EMP, English for Legal Purposes ELP and Business English). On top of these, EST, though senior in age, is "larger in volume of publications and greater in number of practitioners employed" (Swales, 1985, p. x). The landmark in EST materials development was Herbert's (1965) textbook *The Structure of Technical English,* which, on the word of Bocanegra-Valle (2010, p. 142), is so for two main reasons:

1. It was the first textbook focused on ESP and the learning of applied languages (engineering English)

2. Herbert followed a corpus-based approach to materials design, too popular nowadays, by researching the actual language of engineering publications and providing a fundamental corpus of expert language to be mastered by learners (then, future engineers)

From then onwards, the number of publications arose increasingly and generously, especially from the 1990s up to the present.

So far, providing ESP materials is a trade-off between learning needs, language content, and subject-matter content, which requires the consideration of several issues. However, suitable materials in ESP/EST are not generally easy to get as it is conditioned by marketing interests and sales, currency or import conditions, to name but a few. This renders materials writing a vital aspect of ESP practice. In this line, Hutchinson and Waters (2010) argue that there exists a previously established convention in keeping, with which ESP practitioners plan and deliver in-house teaching materials that are for the most part, though not always, tended to the learners of a given institution. However, the production of such materials and appropriate activities is no easy task since the ESP teacher is neither a materials writer nor a subject pro. According to Lesiak-Bielawska (2015, p. 1) "though ESP materials writing is an indispensable element of ESP practice, developing one's materials from scratch is time-consuming and impractical and is to be treated as the last resort". Henceforth, a shrewd ESP teacher can make a principled choice between materials design and the use of commercial materials.

It is quite impossible to use a commercial textbook that is entirely suitable for a given teaching/learning situation. There often is a mismatch between the ESP textbook content and actual classroom language demands. To rectify this mismatch, the need for updates and some supplementary materials appear to be increasingly critical. This usually

implies developing from scratch or abridging, extending, refining, rewriting-in short, adapting- the materials at hand to a particular situation. In other cases, extra materials are developed and, or provided for out-of-classroom work, self-study or the like.

At its most basic level, the process of materials development is illustrated in figure 4 below (Bocanegra-Valle, 2010, p. 145). First, teaching/learning materials are selected against different criteria and with reference to a particular ESP course via a thorough review, analysis and evaluation of available materials. Then, suppose any lacunas or mismatches are witnessed according to this evaluation. In that case, ESP practitioners are required to either develop their materials from scratch or adapt the chosen materials to suit their teaching situation, ESP area, the target group of learners, timing or set of resources. Since materials development is an ongoing process, it often entails the need to pilot, test, or perform evaluative reviews to adjust materials over time in response to implementation outcomes, recent trends or research findings. This last procedure is a desirable practice as "materials that undergo this evaluative review and revision process are likely to serve student and teachers audiences more effectively than materials that do not" (Stoller et al., 2006, p. 175).

Figure 4

Flowchart on the process of ESP materials development
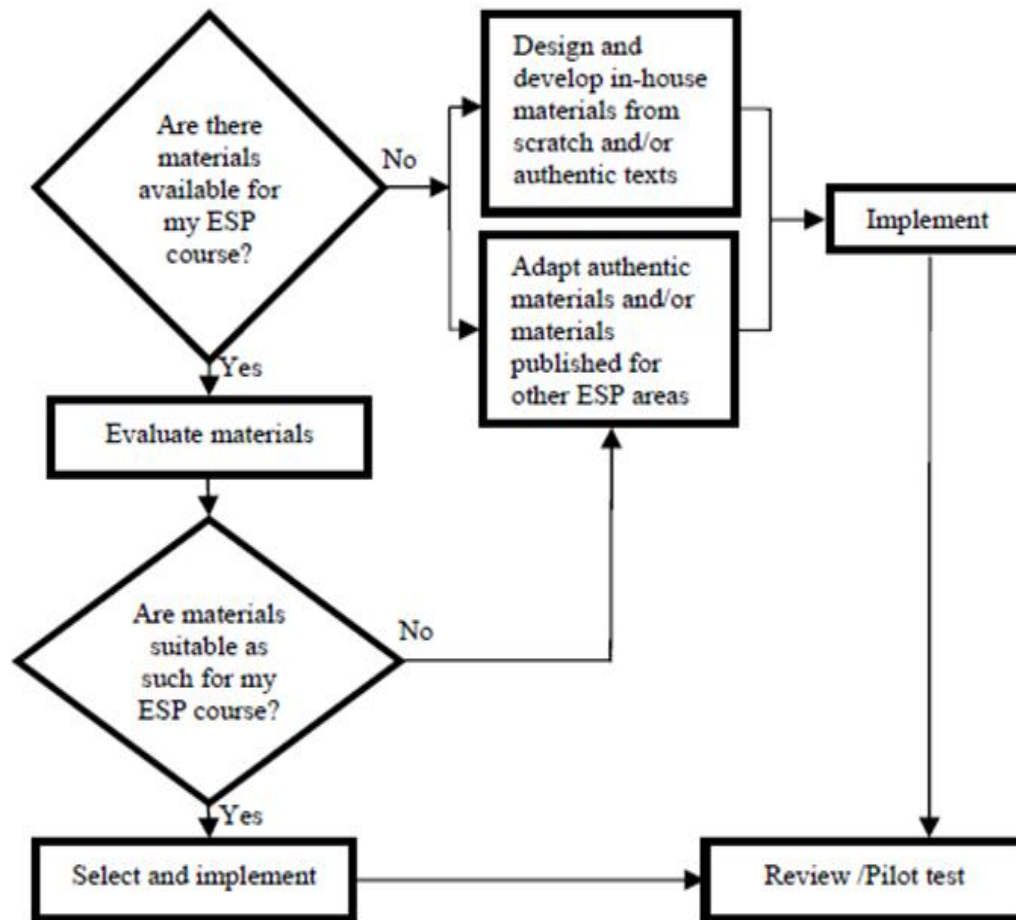
1.3.4. The Role of Materials in EST

Like in other teaching situations, materials play a vital role in EST instruction. They are tightly related to the adopted methodologies and form with them "the interface between teaching and learning, or the points at which the course needs, objectives, and syllabuses are made tangible to both learners and teachers" (Hyland, 2006, p. 89).

Predominantly script-based, EST materials are often used as a stimulus and support to language instruction. However, with the availability of technological supports in academic settings, they may also include audio and visual aids, computer-and, or internet-mediated resources, real objects, or performance (Hyland, 2006). Since, the EST learner

aims to develop the communicative competence related to their field of interests and to acquire the linguistic repertoire associated to that matter, the main objective of materials is to expose him to natural language as it is used in his field and is closely related to his target needs. In light of the preceding, Hyland (2006) specifies four basic functions of ESP materials.

First, materials act as a scaffold for learners' understanding of language use. This implies supporting their evolving control of different texts and engaging them in thinking about and using the language. Like so, well-designed and adequately selected materials offer the learners a chance to familiarize with a variety of language samples in a vivid format and the opportunity to discuss, write, analyse, and manipulate salient language structures and, or vocabulary. These materials can assist the teacher to get in-depth constructive feedback on learners' individual linguistic development, when graded according to their proficiency level and well-matched with their current learning needs.

As they afford illustrative samples of correct language as in various work and, or study contexts, materials also serve as models. Hence, they pictorialize particular language features, structures or functions. When exposed to them, learners can examine different possible examples of a genre with a view of identifying their structure and understanding how meanings are expressed in them. These materials must be authentic and relevant to the learners' target contexts since the exemplars of rhetorical forms and structure of target genres that they provide, help raise learners' awareness of how texts are organized and how their communicative intentions are reached. Only then, they can function as stimuli to be exploited as sources of ideas to promote writing, speaking or discussion, and even to support project work. The task is the best example of this model-stimulus use of materials in ESP. For instance, students are required to role-play various professional scenarios after practising a given interaction model. They are therefore engaged in a typical field-specific

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problem situation that offers stimuli for professional communication and necessitates their response to the emerging issues adequately.

Stimulus materials are not restricted to texts. Instead, they can take various forms of media such as audio materials, videos, graphics, items of realia, computer- or internet-mediated resources, lectures. In addition to providing content schemata and reason to communication, stimulus materials incite learners' creativity, planning and engagement with others. Explicit materials (e.g., lecture recording) can trigger language use in a relatively structured manner. However, implicit materials that are subject to various interpretations (e.g., logo bricks used are more likely to symbolize real objects), allow learners to give vent to their creativity and to produce divergent responses (Hyland, 2006).

ESP materials also comprise reference materials, which, unlike modelling and scaffolding materials, focus on knowledge rather than practice. A wide range of materials falls under this category, including texts or Web-based information, dictionaries, encyclopedias, explanations; examples of relevant grammatical, stylistic and rhetorical forms. These are most relevant to students engaged in self-study, or those who have little or no class contact. Moreover, a great deal of useful information can be found on university websites in the form of tips on academic writing, or in various ESP, EST or EAP textbooks (Lesiak-Bielawska, 2015).

1.3.5. Variable Characteristics of ESP materials

There are two important key characteristics of ESP materials, which are of great significance within the communicative approach, and which seem of specific relevance for ESP, namely authenticity and specificity.

1.3.5.1.Authenticity

Among the characteristic features of ESP that teachers and materials developers pay considerable attention to, is the use of authentic texts and tasks. This interest in authentic materials, according to Gilmore (2004), goes back to Henry Sweet (1899) with its contemporary reappearance associated with Vygotsky's (1965) notion of communicative competence further developed by Hymes (1966). Authentic materials are used to create and stimulate a realistic communication context in the classroom that is much similar to the communication possible in the real world outside (Richards, 2001a).

Though the notion of authenticity has been emphasized within the communicative approach, and its concept has been widely discussed in ESP literature, it is not without its controversy. Several competing terminologies are used by ESP practitioners such as *authentic, genuine, real, or natural* to refer to texts or materials, which are written explicitly for contexts other than language-learning but can be used in language-learning classrooms. As such, an authentic text is one "normally used in the students' specialist subject area, written by specialists for specialists" (Jordan, 1997, p. 113). The term is also used to describe language samples-oral or written- featuring naturally used language forms, which are adequately based on the cultural and situational context (Rogers & Medly, 1988). However, the presence of authentic materials in the classroom is no guarantee of authenticity; some scholars would still disagree with today's generally accepted definition of authenticity.

Henry Widdowson's distinction between authenticity and genuineness stirred up discussions on the belief that "what is real or authentic to users is not authentic to learners" (Widdowson, 1998, p. 19). Accordingly, the authenticity of materials pertains to text recipients, i.e., learners and their reaction. It must be understood according to their appropriateness, interaction, outcomes and efficiency, instead of their origin. It follows that

authenticity can only be reached if learners respond to the texts presented the same way natives do in the real world, or if authentic tasks are used in keeping with the field specificity. Thus, as suggested by Velazquez and Redmond (2007), the authentic uses of materials are emphasised instead of the authentic materials themselves.

In light of the previous discussion, it is apparent that the notion of authenticity is multi-facets. It transcends text authenticity, as cited MacDonald et al. (2006), to include authenticity of competence (Canale and Swain, 1980), learner authenticity (Widdowson, 1979) and authenticity of the classroom (Breen, 1985). According to MacDonal et al. (2006), classroom texts used as input can only be authentic if they correspond with the types of texts used outside the classroom. Canale and Swain's (1980) authenticity of competence embroils learner's performance, which closely matches that of native speakers. In accord, Breen (1985) observed that these two types of authenticity are often sought by learners who have the chance to share their knowledge with native speakers; mainly if provided with suitable materials and help in text interpretation.

Learner authenticity, on the other hand, refers to the learner's positive reaction towards a text and the pedagogical intent embedded in it (Lee, 1995). This interaction includes the language user, his/her purpose, the communicative situation in which the text is being used and the text sample itself (Ibid), and is not solely spawned by the text authenticity, but its communicative potential as well. However, classroom authenticity entails creating an appropriate classroom atmosphere in which "the participants can publicly share the problems, achievements and overall process of learning a language together as a socially motivated and socially situated activity" (Breen, 1985, p. 68). Various paths can be followed to enhance authenticity in the classroom, for instance, real-life communicative tasks, like when watching a video, and then students in an EST course engage in role-plays as mechanics and trainees (e.g., Hussin, 2002; Bosher and Smalkoski,

2002). Another approach is problem-based learning, where learners engage in collaborative solving of typical field-specific problems. This helps learners develop their language learning strategies and study skills, which prepare them for functioning in their target communities (Belcher, 2012).

Authentic texts, then, can range from anything (written, oral, visual) of the abundant harvest (especially on the net) available to EST teachers but written for an audience other than language teachers/ learners and generally used in the learners' future workplace or study field. Accordingly, developing an EST course- English for Technical engineering- for example, one might exploit texts written by journalists or encyclopaedias for presenting technical concepts and information. One might also use texts written by engineering specialists and related to the engineering or technical field (such as user survey forms, training instructions, documents used in the engineering domain, giving talks). Use of these materials can centre round tasks imitating assignments usually performed in the workplace like when completing a user survey form, using a design brief, or giving a talk about a new product), or tasks technical students might take part in during their studies.

The use of authentic materials is vital for revealing 'real' language use, and their selection generally happens after needs analysis (NA) (See section III. 6 below), which cogitates various factors like the content of the materials that must be appropriate to learners' age, interests, needs and goals, proficiency level. (Karpova, 1999). However, this utility is at times controversial since text selection is sometimes fuzzy, as they are not meant, "to contain the aspects of language the learner has encountered or learned until that point and so they may not be entirely accessible to the learner" (Graves, 2000, p. 156). Richards (2001b), for instance, argues that even though language learning cannot be accomplished without language use, authentic materials are not always necessary or even realistic, and in some cases – are a real "burden for teachers". From the same token,

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Swales (2009) contends that despite their utility, various problems may arise either during their selection, as the materials can be too complicated, linguistically or in terms of content. In such cases, text editing or 'skeletonizing' is a possible solution to the EST practitioner. In case of lack or absence of authentic materials, teachers are required to make occasional use of instructor-written materials.

In favour of tailor-made materials, Belcher (2012) argues that commercial materials are not always the cream of the crop. According to her, needs analysis is unworthy, if we opt for published materials, which, more often than not, fail to fulfil the specific target needs of our learners. Needs responsive instructional materials-collected at the stage of needs analysis, adapted and developed from the specific target situation- thus, are highly recommended and a major responsibility of the EST teacher. This way, expertise in language learning materials design, language instruction and the specific content area, is no longer a frill but a must.

1.3.5.2. Specificity

The other key feature of EST/ESP materials is specificity. All too often, EST courses, like most ESP courses, focus on utilitarian uses of language and, as a result, the materials in use within them are directly aimed at a particular learner group and, or related to their reality. Hence, it is essential that these materials echo the specific features of the target language particular to a given discipline and, or profession and needed by the target group of learners. Therefore, subject-matter content is fundamental to EST materials.

Carrier content, informative content, discipline-based knowledge, specific content, specialist knowledge (Bocanegra-Valle, 2010) are all terms used to refer to the information and knowledge particular to a given discipline and which students, specialists, and future experts possess in their mother tongue. This knowledge and an "interest in the disciplines

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or professional activities the students are involved in" (Dudley-Evans and St John, 1998, p. 14) are recommended to EST teachers to fulfil learners' needs better. The question, then, of how specific the course should be in terms of the target audience is pertinent to EST materials choice and their development.

Basturkmen (2010) distinguishes 'wide-angled' and 'narrow-angled' courses on a continuum that stretches from teaching EGAP at one end to the most focused and targeted language courses at the other end. The first set is aimed at more general language groups and focuses on generic skills with a given area (e.g., Technical English skills). However, the latter is designed for particular learner groups, i.e., homogenous learners in terms of their needs and, or who study English with a particular type of academic and, or work environment in mind, e.g. English for Engineering. It is also possible to design more focused courses for sub-areas within the broad fields of work or study, e.g., English for Mechanical Engineers, English for Information Engineers.

In practical terms, the core of the course is defined by the findings from a needs analysis. From a theoretical point of view, however, any EST/ESP course development needs to consider two additional issues (Basturkmen, 2010) carefully. The first of these is tightly related to the notion of the available varieties of language, while the second pertains to the notion of generic skills. In view of the former, Hyland (2008, p. 113) questions the assumption of "a single-core vocabulary for academic study irrespective of discipline". As for the latter, the existence of a set of generic academic skills appropriate to the needs of learners in a wide range of disciplines seems unreasonable. On the word of Hyland (2004, p. 151), different disciplines possess unique ways of "crafting arguments, reflecting ideas of what is of value and how it can be communicated." Otherwise, embracing wide-angled courses, more often than not, reflects universities reluctance to fund the design of particular narrow-angled courses (Hyland, 2002).

On the same issue, Belcher (2006, p.139) argues that the two-way distinction between 'wide-and-narrow angled' course designs is unsound for many EST/ESP practitioners as "instructional decisions should have more to do with the learners themselves than with instructor preference or beliefs". For instance, undergraduate or low proficiency students may benefit more from a wide-angled course, whereas postgraduate students-doctors- may favour a narrow-angled course. Besides, research (e.g., Murray and McPherson, 2004) has shown that teachers are not always aware of what will motivate their learners. It, henceforth, goes without saying that students are to be given a voice and a role in the selection and development of course content.

Alongside course specialization and authenticity of materials, there are other factors to be considered due to their influence on the design and use of most ESP/EST materials. These, according to Barnard & Zemach (2003), include:

- type of institution, e.g., enterprise or university;

- context, e.g., ESL or EFL educational context;

- classroom setting, e.g., traditional classroom or conference room;

- the use of information technology (IT);

- learner qualities, e.g., proficiency level;

- group make-up, e.g., heterogeneous/homogeneous proficiency levels

- teacher qualities, e.g., experience, expertise in the specific content area

All these variables need to be considered as part of needs analysis before the selection, design and use of any EST materials. As such, the course designer must consider time-allotment for regular classes and if there is a mix between traditional classes, self-study or reference materials. Other considerations include the suitability of the teaching approach,

technology uptake, the finest teaching strategies to cope with the heterogeneous group make-up.

As discussed above, judging the potential teaching/learning value of materials, be it texts, course books, is one of the EST practitioner's primary duties, especially at the tertiary level, in which unlike primary and secondary education where administrations, departments, or ministries usually impose course books, materials evaluation, selection, and development is very frequent. The subsequent –selected or designed- materials often reflect his/her beliefs about the nature of language and language learning. Thus, the premise that language instruction is better organized around language functions may result in an approach, which stresses the matching of selected language functions to various communicative purposes. Similarly, a firm conviction that language teaching is to focus on discourse and genre structures may direct learners to analyse discourse structure (e.g. contrasting relationships, transition words, collocations) and genre structures (e.g. discourse moves) and even understand the way these structures are used to create a coherent stretch of language with a specific function (Upton, 2011).

Over the past three decades, a mass of teaching methodologies has been employed in the foreign and second language classroom. The same methodologies have been adopted in ESP/EST instruction, as it does not seem to have a different approach (Basturkmen, 2006). Like so, the wide range of methodological choices available to ESP/EST suggests that there is very little difference between teaching ESP/EST and EGP. It is also difficult to judge whether general ELT has adopted methodological ideas from ESP, or ESP has appropriated ideas from general ELT (Robinson, 1991).

Robinson (1991) enumerates two characteristic features of ESP/EST methodology. The first is the possibility to base learning activities on learners' specialism. The second is ESP

activities' potential to carry (but not necessarily) a genuinely authentic purpose associated with the learners' target needs. Correspondingly, the objective of any ESP course and its content is fine-tuned to the needs of a target group of learners. However, as both methodologies adhere to the communicative approach, teaching English either for general or specific purposes is aimed at the development of linguistic, communicative, cultural, and intercultural competences, permitting learners to genuinely act in English in various professional and, or academic settings (Gajewska & Sowa, 2014 cited in Lesiak-Bielawska, 2015). Therefore, the EST/ESP teacher can make use of the methods and tools on hand in general ELT and which resort to one of the following approaches:

- activity-oriented approach, which stresses the interdependence of language and context;

- skill-oriented approach, the objective of which is the development of receptive and productive skills;

- genre-oriented approach, where language learning focuses on texts representing different genres;

- Task-oriented approach, in which learners perform tasks inspired by real-life communicative activities in professional settings (Ibid).

Consulting these approaches, EST teachers can set up their own individual, context-specific frameworks that allow them to select and blend well-suited procedures and materials in methodical ways for their local contexts. The resultant general methodological frameworks may benefit from the specialized knowledge that EST students bring to the classroom as well as the learning processes from their particular content areas. In view of these, teachers struggle to help learners develop their needs-specific competences

harnessing –along the way- such concepts as awareness-raising, socio-literacy, concordance, task-based or problem-based learning.

1.3.6. The Value of Needs Analysis

The notion that "if you define the need, you define the content of the course" (Senhadj, 1993 cited in Hemche 2007, p. 15) brought with it a learner-centred approach, which implies that one of the primordial duties of the EST practitioner is to examine the gap between the learners' present and future competencies. This diagnosis, known as needs analysis (NA), is the basis of the planned course and includes a thorough investigation into the objective and subjective needs of the target group of learners together with other factors related to the course like the context where it is run. In short, it provides core information for setting programmes, courses and the required teaching/learning materials.

Needs-identification is a systematic approach to detecting learning problems, determining their extent, and accurately defining the target population to be served and the nature of their service needs (Rossi, Freeman, & Lipsey, 1998). This usually implies the collection of relevant data from samples of written or transcribed texts, audio or video recordings from the target community (Belcher, 2012). It is followed by an analysis of discourse samples collected from target communities by looking at both macro- (rhetorical) and micro- (lexico-grammatical) level characteristics of both written and spoken genres. The subsequent routine communicative events embodied in memos, balance sheets, job interviews, to name but a few, are often infused in the contexts where they naturally function and interact with other genres (e.g., application letters in response to job advertisements) (Ibid).

The application and integration of technology in EST has significantly magnified the array of options available to the EST practitioner and has created opportunities for new

research activities, which cram linguistic phenomena through extensive collections of machine-readable texts, corpora. Despite the scathing criticism, the use of IT tools in the study of discourse has received (e.g., Swales, 2004) its significant impact on EST teachers' practices is undeniable. First, it allows entree to mega-databanks, comprising authentic spoken and written discourse. Second, thanks to the easy access to most concordancing software (e.g., AntConc (Scott, 2013); Wordsmith Tools, (Kamasa, 2014)) EST practitioners can effortlessly collect and examine specialized corpora, uncover the distribution of specific lexical and grammatical features, and given a chance to compare expert and learner texts (Belcher, 2012).

Back to square one, the content of any EST course is defined by a diagnosis of leaner's needs and objectives, which are dependent on the context of language use. This implies that a detailed target situation analysis (be it work or field of study) is a "condijo sine qua non" (Lesiak-Bielawska, 2015, p. 14) before any EST course development. An example of such an analysis is Candlin et al.'s field observations of language use on the job and developed EMP courses for training overseas or non-native English emergency room doctors.

As advocated by Robinson (1999), learners' NA is a continuous procedure to be conducted at regular intervals during the life span of a course. This is mostly true because the needs change regularly as the course progresses. As the course proceeds, the learners become more and more immersed in it, and so their attitudes and approach to it may change along. They may also recognise the needs that they were not aware of at the onset of the course. For that reason, ethnography plays a crucial role in NA. It helps researchers to gather in-depth data related to learners' needs, and it is often conceived as either deficiency analysis or ongoing ethnographic needs analysis. The first technique was first used by Jasso-Aguilar (1999), who employed observation and unstructured interviews and

questionnaires as her NA primary sources of information about employed hotel-maids. As a result, she was able to identify the gaps between the wanted performance and the current level of the target learner group. Bosher and Smalkoski (2002), on their own, armoured their ethnographic needs assessment - observations of nursing students performing concrete tasks in the laboratory- with interviews carried with the students themselves and the teaching staff.

Overall, though mostly delineated by the results of NA, the content of any EST course needs to take into consideration language issues and socio-cultural elements subject to language use in a professional and, or academic setting(s) (Gajewska& Sowa, 2014). Even so, setting the syllabus and determining the content is only one step towards the target course. The final form of the course is a trade-off between several factors, the least of which is the course designers' approach to syllabus and methodology, (in) availability of ESP teaching materials on the market. These variables are interceded by contextual confinements (e.g., the status of English, logistical and administrative matters, learners' motivation and expectations).

Conclusion

This literature review has shown that technology has always been used in EFL classes from the traditional tape recorder or CD player to ICT, interactive whiteboards, web 2.0 tools, mobile technologies, and 3D virtual environments; EST classrooms are no exception. However, the recent boom in information technology (web 2.0 and online technologies) has created unheard of before opportunities for learning and teaching foreign languages. The vast magnetism and prevalence of such technologies rests upon a convergence of new conditions and features such as ubiquitous and faster connectivity, upgraded and cut-rate software, and the move toward more communicative, creative, and convivial nature of the new web era, which has revolutionised the journey of learning.

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Along with this, language learners and teachers are morphing into matter-of-course language users, with instructional materials and language development a welcome by-product of online practices like social networking, emailing, and downloading. To this, it is noticeable that learners' profiles, teachers' roles and the nature of instructional materials are changing due to these social, cultural, and, above all, technological advances.

Significantly, it is a need of time, then, to produce an agile integration approach that gears up with the ever-changing technological advances to meet the demands of the 21stcentury. Hence, teachers should create their paths in the direction of updating their instructional practices to help the students be prepared for the challenges that a commitment to life-long learning will present. This often entails reconsidering instructional materials via modification and, or enrichment and having a clear vision for infiltrating web 2.0 tools-based activities and tasks into the curriculum.

In EST, the hybrid nature of the course-having to teach both the language and the 'field-specific' content- makes it challenging for practitioners to train students to gain practical knowledge of the concepts and also to imbibe the 21st-century skills, which would help them to face the complexities of the professional world. Like so, enrichment is badly needed to best suit students' content, and language needs together with the growing teaching needs. It is, to a great extent, dependent on teacher's creativity in designing or developing EST materials (be it texts, videos, pictures, diagrams, tasks, or projects) for their classrooms to aid students to become 'operational' in any learning situation.

So far, this literature review comes out with three main conclusions. First, it is essential to look at web 2.0 as an open, ubiquitous learning platform that goes well beyond the simple use of technology as an instructional asset. Teachers must support learners' initiatives with web 2.0 through promoting transformational interactive EST environments

that comprise reflection; ubiquitous knowledge building and experiential tools (materials), so that students engage in active learning scenarios. Third, to realize the former two, it is crucial to look beyond the classroom itself.

The need for student participation is a reflection of current developments in society, where all students are content creators and potential materials developers. This has placed the class into a phase, where the teacher is not the sole actor, but there is equal participation of the spectators, who are the students. Nevertheless, technology by itself does not bring about participation, but with the support, guidance, training, and scaffolding, it can help students to gradually become real contributors to their learning and potential co-designers of study materials for themselves and others. It is, thus, of the essence to adopt a realistic and objective perspective for a new recursive participation model that values learners' voice and own operations. This usually requires a massive paradigm shift in ideas about teaching, learning, assessment and self-responsibility.

In drawing together these observations, this chapter has led to articulating a framework to support learners' web 2.0 experiences and teacher's control and guidance over out of classroom practices and a contributing-student ULE conception that can be used to inform this thesis subsequent investigation of web 2.0 use in EST projects. This will be presented as a rationale for the CALL project in the next chapter. These issues, henceforth, will be brought forward into investigating the specific area of education that the remainder of this thesis shall be concerned with – i.e., EST textbook digital enrichment and materials design and development.

Chapter Two: Research Design and Procedure

Introduction

This chapter describes the methodology and inquiry process implied throughout the study. First, it gives a rationale for exploratory action research as the research approach and the way it lines up with its goals. It, then details how the approach was applied with a detailed explanation of data collection tools and data analysis procedures.

2.1. Research Approach

The study focuses on the impact of computer-assisted language learning on materials design. It seeks to explore how foreign language learners and teachers conceptualize a pedagogy-driven, task-based, authentic materials design activity/ project in an interactive technology-based learning environment in an attempt to refine and enrich traditional textbooks and best meet the learners' needs, expectations and leverage their motivation. In so doing, it refines teachers' existing design principles and skills and enhances learner's practice while providing opportunities for professional development and creativity.

One way of achieving this target is exploratory action research (EAR) (Bullock, Smith, & Rebolledo, 2016; Smith and Rebolledo, 2018), which occurs when exploratory research is followed by action research (as in figure 1 below). As such, the study happens in two subsequent phases: exploration and action. While the former seeks to answer one exploratory research question- what is the current situation; the latter is meant for the action research question- what are the effects of the subsequent change(s) we attempted. Altogether, the research tools and procedures are placed within a framework of exploratory, experimental, collaborative action research, which tracks and implements informants' abilities. The purpose is to advocate both quantitative and qualitative findings to track the improvement of teachers' CALL materials development abilities and learners' achievements and motivation achieved through the three hypotheses, cited above, and

experiential practice enhanced by focus group discussions, collaboration (group work), and coordination meetings.

Figure 5

1Steps of exploratory action research
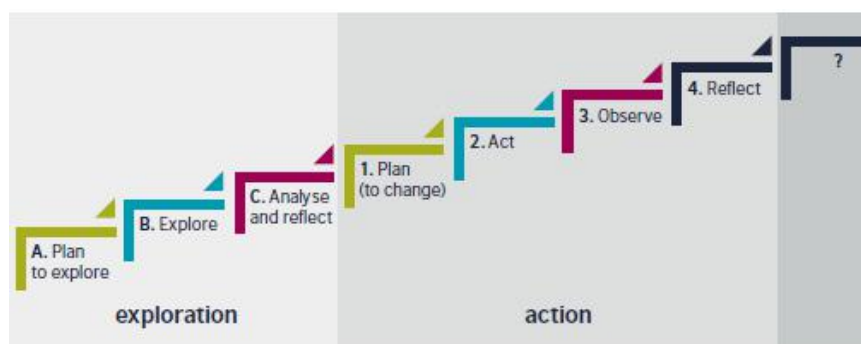
Source. Smith and Rebolledo, 2018

2.2. Methodology

As the research happens in three phases, it is carried out through data gathering and experimental practice of knowledge input and using that knowledge in developing the ability to design CALL materials for English learning in science and technology.

2.2.1. Phase 1: Exploration

In exploratory action research, "deep exploration of a particular area of concern precedes coming up with a plan for change and evaluating a new intervention" (Smith, 2015, p. 41). At this stage, data is collected to elucidate the identified situation to clarify its puzzling or challenging aspects to make an action plan later. As such, sufficient exploration is vital before any intervention to avoid taking the wrong action or even making things worse. To this end, before engaging in CALL materials development, it is imperative to explore teachers' views, skills and perceived challenges in addition to learners' technology and internet activities to help generate an action plan and provide a

bank of potentially appropriate ideas for the design, which are in harmony with students' needs and interests.

A mixed-method exploratory study fits well as the method for investigating the research questions in the first phase, sought to gain insight into learners' technology use and teachers' attitudes towards and skills in CALL materials design as a basis for further investigation (Action Research) in the second phase of the study. The research questions focus on exploring how learners use internet technologies and what tasks and activities interest them. Hence, survey data collection and internet use logs were used to answer the first research question. The second research question tracks teachers' attitudes towards CALL materials, their skills in their development, their perceptions of the challenges faced in the development process and their recommended training if any. For this end, a quantitative questionnaire was employed to address this question. Focus group discussions served as an additional data gathering tool in both phases as it helped decide which parts of the textbooks need enrichment through a pre-use, while-use, and after-use analyses; all held in regular coordination meetings throughout the school year.

2.2.2. Phase 2: The CALL Project

The CALL project, in the second phase- the experiment, is based on the application of the hypotheses cited above and the action plan generated from the exploratory phase. As such, the meaning attributed to 'experiment' here is broader than strictly manipulating dependent and independent variables and the rigorous experimental control of extraneous variables. It is instead an attempt to experiment CALL materials design for enriching 'Technical English' textbook series to meet the students' content area as well as language needs; through collaborative action research with various strategies to evaluate its effects to check whether it will work or not. Throughout the experiment observations, peer

learning, and focus group discussions were used as implementation tools to enhance the ability of materials development.

The current project is a collaborative action of both the researcher and the participants in setting the ground for the achievement of an objective, which is the digital enrichment of the technical English textbooks used at the school to increase engagement with digital learning and teaching practices. The role allocated to the researcher –during the intervention- is that of a coordinator, mentor, and materials writer. His task consists of discussing and at times exemplifying the main principles and assigning roles to the participants in each stage of the project implementation (Grenfell, 2000, p. 21). His research tools are focus group discussions, teaching reflections, learning logs, in addition to the teachers and learners' artefacts, which help him, track the development of the participants' performance and attitudes.

The participants' collaborative role consists of participating in focus group discussions, paying careful attention to the provided explanations and illustration about each stage of the project, applying the acquired skills in various stages by performing the required tasks; and sharing their contributions. The participants had to share their contributions with the whole group, bear reproach, propositions and recommendations. This dynamic, negotiated, and reflective research method is very positive in the sense that it makes every participants' experience a new 'learning-by-doing experience for the rest of the group (Williams and Burden, 1997, pp. 164-165).

The presentation of the CALL Project in the remaining of this section discusses the chosen design, in attempt to answer the research questions and, subsequently, test out the proposed framework-as generated from the theoretical part- and the exploration in the first

phase of the research. It also describes the participants, setting, and context of the experiment, as well as the objectives achieved through implementation.

2.2.2.1. The rationale of the Project

As has been discussed, digitization (including web 2.0) provides a ripe context for the emergence of experience as an essential factor in active knowledge-building. Thanks to the broad array of human experience that it provides, it allows language learners become 'prosumers' (Toffler, 1984), consumers and producers, rather than mere recipients of information, permitting them to learn by doing things themselves. Along with this, non-linearity of information, active knowledge creation, negotiation of content and what to explore, all contribute to developing a positive effect on perceptions of autonomy and competence, shift perceptions of externally regulated behaviour to an internal source, better facilitate active L2 participation outside the class time, and build more flexible thinking skills among learners. Therefore, experience (including mistakes) can provide the basis for most learning tasks and projects. What we need to do as teachers, on the word of (Jenkins, 2006, p. 259), is "to rethink the goals of media education so that young people can come to think of themselves as cultural producers and participants and not simply as consumers, critical or otherwise".

Hence, the EST practitioner, like any other EFL teacher, is faced with the task and responsibility of developing a clear conception of the possible extracurricular activities that can be undertaken, and ways to back and assess the learning that could evolve out of this venture by the learners. Like so, we can help guarantee a trouble-free technology uptake. Undoubtedly, the primary intention is not to limit student's web 2.0 uses but rather to leverage this use from a simple technological asset to become a learning platform to accelerate language acquisition.

Experiential learning prizes experience as essential to learning and accentuates the learner's experience as the main contributor to the learning process. Learning via experience is also allied to learning through action, learning by doing, and learning through discovery and exploration. As a methodology, experiential learning urges teachers to "purposefully engage with students in direct experience and focused reflection to increase knowledge, develop skills, and clarify values." (Association for Experiential Education, para.2). Thus, through projects and tasks, the experiential learning phases allow students to practice real-life communication in a setup scene, to mull over their emotions and language learning experience, and enable them to associate and transfer this classroom experience into the real world.

It has been pointed out earlier in the literature review that digitization (including the internet) provides experiential tools combined with a web 2.0 ubiquitous setting that support more interaction, engagement, knowledge creation and participation among EFL learners. Accordingly, web 2.0 ubiquitous learning projects and, or tasks can improve experiential learning scenarios in which learners may engage. This is a tremendous asset for EFL acquisition as it would encourage ubiquitous knowledge building under the design of web 2.0 interactive, collaborative projects/tasks that are more often supported by the experiential tools that digitization affords.

This ever-growing range of tools makes it further possible for teachers to design more sophisticated and professional (multimedia) tasks/projects as communication, sharing, networking, designing and creating materials, and even publishing from the very simple to the most refined. They can then move away from learning as responding to instructions based on vicarious experiences presented via pre-selected old drill and practice media and materials, towards more engaging learning through activities, during which learners become co-designers of study materials for themselves and others. This is especially

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proper in EST contexts, where the students' roles as experts of a given discipline are very apparent. We believe that this involves some amendments in ideas about teaching, learning, assessment, and self-responsibility. As such, student participation is no longer enough, and his contribution is vital in order to make a difference.

A significant project for a course, thus, could be one, where students are set into groups; each assigned a topic relevant to the course and their area of specialism. After, each group must prepare a report and give a presentation using whatever type of technology is most suitable (word-processing, HTML, audio, video, or a combination of all). This task is a tremendous asset to textbook enrichment concerning the topic researched in a way that is helpful to all of the students enrolled in the course. For that reason, the best contribution-oriented tasks are those that are a coalescence of discovering and creating, comparing and discussing, and building on other learners' products. Every project culminates with a class presentation of the final product, using different presentation tools, that serves as a follow-up activity that encourages students to compare and contrast their ideas with those of their classmates, and a place where peer assessment takes place. This way, students are actively engaged in the learning process, in a way, which directly nurtures the course as a whole, not just their learning. The resultant products are, by definition an excellent fit to the course, the students' needs and interests, and to the local communication norms and culture.

To this end, the present research endeavours to promote a 'contributing student' pedagogy that stimulates learner engagement and self-guided learning and creates optimum opportunities for practice, creativity and autonomy. Accordingly, the learner is no longer required to acquire a bulk of encyclopaedic knowledge that must be internalised, but rather to decide on the learning needs, make sure that the input relates meaningfully to those needs and tracks the way the learning experience is shaped and adapted over time as the

course proceeds. This involves two major parties: language teachers and learners. To raise learners' chances of success, shaping the conditions within which students can become engaged in their learning, would be inescapable. However, teachers should –first- be highly conscious of the role of technology to support this pedagogy, and –second- make the students aware of its benefits while developing and delivering lessons, provide encouragement, and practice opportunities. After all, e-literacy is as important as language literacy.

In light of the above, our 'Ubiquitous Learning Experience' conception assumes that learners can base their learning on their own professional experiences. As such, they can reinvest their e-literacy skills by working them out to solve their learning problems. This often requires identifying real problems and integrating learning into the "learner's broader world" (Merrill, 2002, p. 45). For instance, to solve the problem of technical vocabulary acquisition that most of our EST students face, a group of learners is assigned the role of designing and developing an edugame that helps solve this problem. They are then involved in direct experience in using the target language communicatively in a class presentation where they introduce their final product to their classmates (see chapter 4 for a detailed explanation of the project). The resulting edugame is uploaded to the school-learning platform (Chamilo) and offered to the rest of the students to download on their mobile phones. Ubiquitous access or reuse- access independent of time and place- to these resources is essential for the subsequent knowledge-building and sharing, which necessitates a network system and web tools. This will enable the learners to hone, practice and deepen their understanding of foreign language learning and the role of technology in EFL effectively and efficiently along the course.

Towards achieving a ubiquitous learning experience for learners, some factors are evident:

- The importance of demonstrating the added value of web 2.0 as a learning platform rather than a tool to support learning

- The need to understand and take account of the experiential tools that web 2.0 provides

- The complexity of the relationship between pedagogical changes and their impact on teacher's practice

- Recognition that the characteristics of web 2.0 tools align well with the perceived wisdom of 'good pedagogy' (inquiry-based learning, project-based learning, ubiquitous learning, dialogic and collaborative learning, constructivism and active engagement), and, hence, experience and ubiquity need to be the cornerstone of any design perspectives.

- An awareness of the learner's role and contribution in the development of a school repository of learning objects (CALL materials)

These principles are on part with Jonassen, Peck and Wilson's (1999) notion of meaningful learning, which they define as active, constructive, intentional, authentic, and cooperative. They also map on Sfard's (1998) *Acquisition-participation* approach to learning and extend the participation facet to include a contribution orientation in line with Collis and Moonen's (2006) *Contributing Student* approach. Moreover, they side well with Kearsley and Shneiderman's (1998) *Engagement Theory* and *Action Learning* (Dopper&Dijkman, 1997; Simons, 1999). Table 7 contrasts these approaches in an attempt to clarify the key ideas of the 'Ubiquitous Learning Experience' that we want to offer to our students.

The 'Ubiquitous Learning Experience' (ULE) conception amalgamates many of the features identified in Table 7. However, it differs from these approaches in that it is more flexible as it encourages the building of ubiquitous multimodal content under the design of interactive, collaborative projects that are more often than not supported by ICT. It also

promotes formal and informal learning inside and outside the classroom. Unlike *Engagement theory*, which assumes a particular type of activity approach (group-based projects for external purposes); it can combine independent learning with collaborative learning, students' interests with clear expectations through a variety of multimodal tasks that respond to various types of learners.

Table 7

Learning characteristics relating to active students

"Participation-oriented" (Sfard,1998)	"Action Learning" (Dopper & Dijkman, 1997; Simons, 1999)	"Engagement Theory" (Kearsley& Shneiderman,1998)	"The Contributing Student" (Collis and Moonen, 2006)
Key definition of learning: Learning as participation, the process of becoming aa member of a community, "the ability to communicate in the language of this community and act according to its norms" (p.6); "the permanence of having given way to the constant flux of doing" (p.6) **Keywords:** Apprenticeship, situatedness, contextuality, communication, social constructivism, cooperative learning; Belonging, participating, Communicating **Stress on:** "The evolving bonds between the individual and others" (p.6); "The whole and the parts affect and inform each other" (p. 6) **Role of the instructor:** Facilitator, mentor, expert participant	**Key characteristics:** (a) Practical problems are central: Learning is based on working on problems from one's work situation (b) When there are contacts among learners, these are focused on stimulating self-reflection and learning from others (c) Instead of"lectures", learners use contact times for activities **Role of the instructor:** Leader, motivator, and guide of the learning processes, giving feedback on evolving phases of the problem-oriented project, and evaluator of the final submission. Must ensure that learner contact is more than the sharing of experiences but also that experiences are related to the theory **Stress on:** Learning to learn, to collaborate, to self-regulate	**Key idea**: "Students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks"(p. 20) **Key characteristics:** Learning activities That (a) "occurs in a group context (i.e., collaborative teams) (b) are project-based, And (c) have an outside (authentic focus)" (i.e., are meaningful to someone outside the classroom) **Role of the instructor:** Supporting and screening the initial definition of projects and formulation of teams, guide on working in teams, provision of criteria to evaluate projects **Role of technology:** "To facilitate all aspects of the engagement " (p.23)	**Key ideas:** Learners contribute to the learning materials via contributions made available to others ina Web-based system. The others may be others in the same group or others at other times. **Key characteristics:** (a) the Web site is largely empty at the start of the learning experience; the learners and the instructor will fill it via the process of many activities during the course (b) Learners learn from realistic materials as well as peer-created materials as much as or more than professionally developed materials (c) LearningMaterials contributed by students are re-used in other learning settings **Role of the instructor:** Designer of activities and feedback and monitoring strategies for activities. **Role of technology:** To facilitate all aspects of the activities

Source. Collis &Moonen, 2006, p. 55

Likewise, it supposes learners can base their learning on their own professional experiences as is at the base of *Action Learning*, yet, an effort for making such experiences meaningful for learning through reflection is crucial since experience per se does not automatically signify that one learns. Besides, contribution and interconnection are critical characteristics of the ULE employed to encourage an extensive, macro-intelligence that is moulded and amended over time using knowledge interdependence and sharing, and the enactment of abilities (both language and e-literacy skills). Thus, while it shares characteristics with other pedagogical approaches in the literature, it is a pedagogic vision that provides sheltering strategies for language development and understanding of today's technology innovative uses.

Figure 6 below outlines a framework for web 2.0 integration, which captures the factors listed above. It demonstrates how effective its implementation can only be achieved if three interrelated aspects; namely design, pedagogy, and practice, are considered in conjunction. The practice can be further divided into teacher- and student practice. Each aspect informs the other two, and vice versa. So, pedagogy 2.0 principles and opportunities should be used as guidance to inform design and influence practice. Practice (be it student- or teacher-directed) along with their perspectives, changing roles and responsibilities should also inform design, but also help to guide future pedagogical considerations (both inside and outside the classroom). The design also has its bearing on both pedagogy and practice.

Figure 6

Conceptualising a ubiquitous learning experience
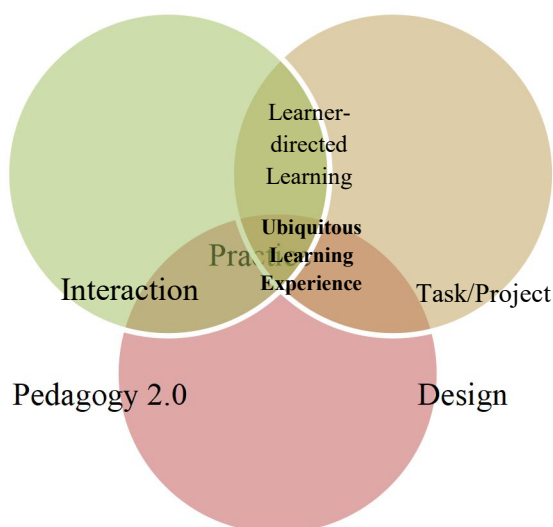
Source. Khenioui, 2019

In summary, the following fundamental features underpin the extramural, ubiquitous learning experiences resulting from the proposed framework:

***Learner validity*:** it makes use of activities and tools that learners usually employ in their everyday lives, which reflects their needs and interests and involves them in using technologies in ways that reflect their out-of-class practices.

***Collaborative and autonomous learning*:** it allows students to develop collaborative skills through collaborative feedback and content generation leading to collective intelligence. It also helps in the growth of the skills needed for autonomous learning by leading them to recognize their role in managing their learning.

Multimodality: It grants the possibility to not only make use of authentic multimodal input but also creating it.

Reflection: reflecting on their learning process lets students identify the tasks and tools that they prefer when learning, which has a direct impact on their motivation and, hence, success.

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Ubiquitous knowledge building: the extramural activities, in which students engage, allow for flexibility and convenience of learning so that learners have control over their place, mode, and manner of learning.

2.2.2.2. The Chamilo Campus

An integral component of contributing student pedagogy, in our research, is technology. Even though networks and computer technology, in tenet, are not compulsory for the approach, they "make it feasible, scalable, and manageable for both instructor and students alike" (Collis and Moonen, 2006, p. 61). Without technology, particularly space where the teacher and students can share their contributions, the application of the project, as explained in the above rationale would be challenging to apply. The project is only viable and scalable if well-designed and easily reached web-based tools are on hand; otherwise, there would be no suitable, shared repository of contributions (i.e., CALL materials). Ubiquity necessitates a Learning Management system (LMS)-any kind of software platform designed to facilitate the management and delivery of courses and the monitoring of students' progress- with a wide range of flexible and adaptable features that confer four essential freedoms: to use, study, modify, and distribute one's contributions.

The virtual campus is a component of LMS that is widely adopted by many higher education institutions across the world, either as a backup resource for classroom instruction or as an instructional tool for distance education programmes. It is increasingly utilized across Algerian universities to enhance the knowledge of students and widen their learning opportunities. Chamilo is one of the latest technology platforms used by the National Preparatory School of Engineering Studies (NPSES) as a virtual space that offer a wide range of flexible and malleable features supporting easy management and delivery of courses, students' progress mentoring, effective independent study, and interaction among

all parts enrolled in a course. A teacher, using Chamilo, has access to a series of tools that can adapt to his needs and wishes, and those of his students. It can:

- import or create **documents** (audio, video, images) and publish them,

- build **tests** and **exams** with **automated scores and feedback** as required,

- build or import (SCORM and AICC) compliant courses,

- set and receive **virtual assignments**, and manage **projects** (through the blog tool)

- describe the components of the course through **description** sections,

- communicate through **forums** or **chat**, and publish **announcements,**

- add **links**, and set a **virtual classroom** (through the video conference extension)

- create **workgroups** or laboratory groups,

- manage **scores** through the assessment tool,

- create **surveys**, use glossaries and agendas

- add a **wiki** to create documents collaboratively,

- register **attendances** and enable **tracking** of learners in courses,

- Elaborate **a class diary (course progress)**.

The instructional tools inherent in the Chamilo Campus makes it viable to implement the said contribution approach and, thereby foster, amongst other things, the UBL experience we want to offer to our students. It integrates appropriate upload, collaborative and communication functionalities that make it a common medium into which contributions (CALL materials) are displayed for further sharing as well as for feedback and assessment.

2.2.2.3.Objectives of the Project

The project objectives, for the experimental groups, were discussed by the teacher coordinators as the purposeful and practical provision of guidance for a technology-

supported pedagogy for EST learning and language teacher continuous professional development that advances the development of CALL materials and the design of communicative, connected, task-based ubiquitous learning experiences for our learners. The general goal of such an endeavour is for teachers to be helping learners to become producers and creators of knowledge, and become adept at research and collaboration through connectivity and engagement with digital learning and content creation. The specific objectives of the project aimed at making the teachers able to:

1. Bring connectivity and CPD training to increase engagement with digital learning and teaching practices

2. Design effective learning experiences with technology (including web 2.0)

3. Train students to use any available digital equipment (e.g., their mobiles, tablets, personal computers) for language learning with or without internet.

4. Adapt and use ICT creatively to aid learning in and outside the class

5. Encourage learners to create CALL materials to enable them to use English, their e-literacy, and their critical thinking skills in new and original ways.

2.2.2.4.Participants

In the context of the CALL Materials Project, seven EFL teachers of the Department of Foreign Languages at NPSES, Algiers, worked together to develop digital enrichment for three textbooks for technical English (Technical English 1 for first-year students, Technical English 2 for second-year students, and technical English 3 for third-year students). The group consisted of four EFL teachers with experience in materials design and development and ICT training, one teacher coordinator of the third year with e-learning training, one ICT researcher and teacher coordinator of the first year, and the researcher as the coordinator of the second year and the whole project.

The participants worked in three groups; each headed by a coordinator who is responsible for one level of the EST textbook series. Each coordinator worked with his team complying with the syllabus and EST curriculum already adopted at the school. However, they agreed to work on enriching the adopted textbooks with digital materials and sharing them with other members. In terms of proficiency, year 1 worked with the beginner level, year 2 worked with pre-intermediate level, and year 3 worked with an intermediate level. In this effect, the teachers within each group provided authentic samples of digital resources (e.g., videos, blogs, photos, posters, glossaries) and used java software to produce audio-visual materials (Hot Potatoes). Drawing on Sert and Li (2017), a process-oriented reflective practice was selected as a qualitative approach to scaffold and track teachers' materials design and development skills. In the process, the teachers engaged in peer feedback as a means to increase collaboration and task awareness. Data were collected by each stage end to calibrate the course of action and reflect on the process.

On the hand, year 2 prompted students to invest their engineering and e-literacy skills in project works connected to their study field and responsive to their learning needs to help raise their awareness of the use of technology in FL learning and deepen their understanding of the subject matter. The resultant materials are peer-reviewed and made accessible on the Chamilo campus after being discussed in the classroom. The projects were compulsory to all the students enrolled in the second year; it is an integral part of their EST course for which they would be evaluated. By considering all second-year students, the researcher took into account the possibility of non-response; learners may not participate for different reasons, and this would reduce the number of the sample population with its significance. Besides, this choice is adopted to avoid biasing results for the following reasons:

a) Even though not the same teacher is teaching all 'second-year' groups in ENPEI, the students follow the same programme and are subject to a joint examination. Homogeneity of instruction is ensured through pedagogy teams, often headed by coordinators. Hence, if one of the teachers uses any treatment or new teaching method that is different from the other groups, learners' suspicion about the teachers' fairness may arouse, which would lead to their demotivation. They would also believe that the teacher favours some students over others or even they are overburdened with extra work.

b) 'Second-year' students are selected to be the population at this phase of the research for some particular reason. First, they are supposed to have relatively developed some spoken and written EST, which allows them to engage in project works. Second, they have a unit within their curriculum labelled 'presentation skills', which aims at developing their oral and written proficiency in real communication contexts. Third, all the students possess a personal computer and are often keen at coding and web designing, which helps accomplish the proposed project works.

Moreover, the research aims to elicit the processes and products that occurred in this project-based and web-supported learning environment; a bird's-eye view on the range of learner texts and project outcomes through the lens of ULE as defined above is targeted. Henceforth, there is no limitation to the form and content of the potential outcomes. However, students are well aware that these outcomes are going to be published on the school platform, evaluated in an examination, and thus should meet appropriate linguistic and formal criteria as well as display a high degree of creativity and originality. It is only part of the potential demands for students will have possibly stemmed from the design features of the project that, in essence, puts the learners as choice-makers into the centre of attention.

In action research, generalization is not an aim; therefore, small groups are often the suitable sample size. Like so, the groups in this project are not numerous, and the method is applied only in one college (NPSES).

2.2.2.5.Procedure

The first step in conducting the project was to introduce the CALL Project to the teachers; its aims, tasks and their roles. In addition to discussing the role of the learners and the presentation of the platform where the materials are to be distributed and shared, describing its features, usage, and the way they should join either using their existing account –if they already have one- or through creating new ones.

The second step in the project was interaction along the academic year 2017/2018. This latter happened through phases. In the first phase, in order for the participating teachers to work efficiently together, it was important from the beginning of the project to build a form of solidarity, to explore expertise and potential of each group member, to establish a common understanding of the notion of digital enrichment among each sub-group and to develop a set of principles and criteria for the enrichment of the EST textbook. Once a 'working definition' within the context of our work was achieved and the principles were set, the next phase was to discuss which parts of the textbook need enrichment, where the teachers analysed and evaluated the textbook under discussion. The last phase is the digital enrichment of the textbook with digital materials. It includes the following aspects to be collected and discussed in coordination meetings:

- The collection of available internet resources (e.g., photos, videos, audio and written texts, digital educational materials) from various sources
- The development of a school repository of learning objects for EST

- The design of tasks and projects that encourage students to create CALL materials themselves (e.g., games, picture-dictionaries, wikis, blogs, videos, podcasts, PowerPoint presentations)

In the third step, students were engaged in project-works where they were to collaborate in small production teams to explore a problem-relevant to their field (EST) and responsive to their needs-and were led to critically solve it. The students were first introduced to the thematic framework of the project, through which they gained a general overview of the problem. Then, they were familiarised to the necessary vocabulary and concepts throughout each couple units of the textbook and a word cloud from which they choose essential terms to be defined in a learner-generated glossary. The learners then enter into a phase of self-directed research and data collection, which is directed towards the planning of the final product, including decisions regarding its form and content; an analysis of the necessary communicative and non-communicative competencies; and identification of potential activities and tools that would ease project completion. Once the research is over, the learners prepared for their data presentation; they had to agree on the form and content of their project outcome, which was often in the form of innovative products such as videos, blogs, edugames, posters, picture dictionaries, and multimedia presentations. The presentation of each project took two forms: the learners presented and discussed their work in their classrooms; all of the contributions were made accessible on Chamilo along with an interactive feedback system open to all the students enrolled in the course.

Learners were notified that their participation in the projects is compulsory; it is an integral part of their EST course for which they would be evaluated. The evaluation is considered by all teachers, who are part of the project, to boost learners' interest and productivity; an act that is a reflection on the focus group discussions. This has initiated a

sense of competitiveness among the students regarding the best product and best presentation; a glimpse at students' contributions reveals the accuracy and diversity of projects outcomes.

2.2.3. Phase 3: Reflection

Reflection is a salient feature of EAR. It allows teachers to ruminate about their practice, goals, purposes and methodologies through a reflective process that may play a part in making a new world of education. Seen this way, it plays a critical role in teacher learning and professional development (Cirocki& Farrell, 2017a, 2017b; Farrell, 2015; Widodo, 2018; Widodo & Ferdiansyah, 2018), grants teachers the chance to self-assess their teaching knowledge and practice (e.g. perceptions, attitudes, beliefs, assumptions), as well as share thinking and practices in well-established communities of practice (Curtis, Lebo, Cividanes, & Carter, 2013; Farrell, 2013). As the heart of the teaching practice, then, professional development and education, reflection is highly recommended as a useful tool in upgrading self-knowledge and pursuing new ways of educating students (Kheirzadeh& Sistani, 2018).

At this stage, reflection stage, interpreting what has happened by reflecting particularly on the effects of the intervention and considering any further actions that seem necessary is the main task of the teacher/researcher at this phase of the research. Looking critically at indicators of change and not just its apparent 'signs' is an essential step for showing that change has occurred. Reflection in EAR, then, helps notice more fundamental changes such as changes in 'mindset', their views about learners, learners' views about learning/teaching and the teacher and learner development process. In this vein, Farrel (2012) argued that reflective practice allows teachers to reflect on their practices and sort out the drawbacks and shortcomings to improve their performance in the future better.

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Recently, most teacher knowledge research focused on the construction of personal and practical knowledge by teachers (pre-or in-service) (e.g. Morton & Gary, 2010; Tsui, 2007); it sees it as personal, practical and tacit that is developed from their experiential practice when they respond to the context. Hence, two key elements are crucial to personal practical knowledge development: a reflection on practice and personal understanding. While the former allows the teachers draw on the theoretical knowledge base to develop their understanding of the knowledge for context, the latter is tightly related to the first and is a uniquely particular way of reconstructing the past and ways for the future (Tsui, 2007; Connelly & Clandinin, 1988). Taken jointly, they allow the development of critical and reflective thinking while exploring practical problems.

At the reflection stage, phase three, all the data gathered about the intervention are examined to track the teachers' development of critical knowledge of CALL materials, in an attempt to answer the third research question. This latter evaluates the knowledge of self and is a process-oriented reflective practice. Data, at this phase, comes from teachers' reflection logs of on their teaching/learning process with these materials, ways they think these technological tools could be improved in the future to better meet the students' needs, besides their evaluation of the students' materials and the projects. These reflections constitute the data to be analyzed at this phase of the research besides students' artefacts.

Seeking students' voices to improve instructional practices and having them reflect on their learning is well supported in literature in student development, motivation theory, self-determination theory, and constructivist learning theory (Sands et al., 2007). Thus, listening to students and analysing their reflections helps in interpreting their experiences and can also assist in empowering classroom practices. It can further provide teachers and students alike with a sense of self-esteem agency and membership. According to Levin (2000), comprehending students' perceptions and involving them in discussions about their

learning experiences can teach us a lot about classroom and learning processes, and even assist in determining students' commitment to learning. Following this line of thought, students' reflective logs were used to determine students' perceptions about their project works and to establish the training needs for future EST learning and projects. This would help transform and energize future activities and projects and could engender a self-fulfilling prophecy of increased learning, student agency, and community consciousness.

Altogether, the research tools and steps are placed within a framework of exploratory, experimental, collaborative action research method, which tacks informants' abilities, and personal and practical knowledge development. The purpose of this methodology is to support qualitative and quantitative findings to track how do teachers/learners reveal and display their knowledge of the design and development of CALL materials, in addition to any improvements of these abilities as achieved through the hypotheses cited above and experiential practice enhanced by observation, peer-learning (collaboration), and focus group discussions.

2.3.   Significance of the Research

In this era of prolific use and debate about the utility, integration and efficacy of CALL, one constant that is frequently missing from the purported ideologies and opinionated conjectures is the perspective of the teacher and learner as designers and content creators. Repercussions for CALL materials development are often neglected in the discourse surrounding learning in contemporary society- particularly with educational technology. This provides another dimension to the current research as it asserts the informative classroom transformation is instigated when the most affluent collaborators- the teacher and student- are engaged in content creation (i.e., CALL materials development) to provide meaningful personal insight. According to Egbert (2005), CALL research should entail:

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> *When we talk about CALL research, then we are talking about studies that take an analytic approach by looking at one or more variables (e.g., learners, language, context, tools, tasks/activities and peers and teachers) in any number of ways or studies that look at the system of which these variables are part, at their interactions and complexities and their effects on one other. (p.5)*

In this regard, it is reasonable to claim that current study rightly fits into CALL research in that it looked at materials, teachers/ learners, contexts, and the internet experiential tools provided as a whole picture. It contributes to an understanding of how guided out-of-class learning practices/experiences impact learning trajectories and represents a movement away from focussing on "what technology can do for the student to what the student can do with technology" (Godwin- Jones 1999, p. 49). More precisely, this study brings to light that educational aspect of the technological endeavour, yet extensively neglected, namely the pedagogical aspect of the instructional act. It unfolds three levels of contextual factors affecting the process of materials development: (a) the context, (b) the educational potential of the evolving social web and digital technology, and (c) the teacher and learner's new profiles. This has placed the teacher and learner at the centre of discussion. The present study would be significant in terms of the following reasons:

New context

Given that little or no research in the field of TESOL has investigated the development of CALL materials looking at Algerian students in an EST context, this study demystified how learning majors/specialities influence their use of ICT in learning English and how this, in turn, influence their learning practices. It was hoped that the results of the current study would provide researchers and teachers with practical implications, in relation to instructional materials development, teaching and learning EST through technology.

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Adopting a contributing student pedagogy

Preparing students for the workplace requires 21st –century skills, which comprise digital literacy, inventive thinking, effective communication, teamwork and the ability to create high-quality products (Partnership for 21st-Century Skills, 2006). This prompts educators to rethink what and how to teach today's students. Therefore, a pedagogical approach that acknowledges a shift from lecture-style instruction to participatory and contributory learning is well aware of the fact that technology is changing what we expect of learners and, hence, is worth applying. In this regard, this study has included learners as active collaborators in the teaching/learning process and as co-creators of study materials in project-work, inquiry-based and problem-based learning, mostly recommended by The Partnership for 21st Century Skills (2009).

Professional development with exploratory action research

Despite the multiple initiatives by the successive Algerian governments towards full integration of ICTs, these are still defined in terms of occasional use of computers and data projectors for material-presentation in the classroom (Bouchefra & Baghoussi, 2017). Though significant concerns in the image of the absence of facilities, lack of training, and stakeholders' attitudes, are apparent in most research about Algerian CALL (e.g. Bouchefra & Baghoussi, 2017; Boulmerka, 2016; Guemide & Benchaiba, 2012; Hamdy, 2007), providing opportunities for professional development is, henceforth, an influential aspect that needs to be mapped out if we are to transmute the current situation. Thus, the need for professional development to support transformational learning experiences via technology is displayed in the present study through exploratory action research (EAR). While exploring factors that determine teachers' likelihood to adopt CALL is important; converting that knowledge into an action plan for creating transformational learning experiences for both the teachers and learners is premier. Likewise, rather than merely

focusing on using technology as a presentation tool, engaging teachers in group discussions, collaborative work, and materials development can help faculty to begin to question their teaching/learning concepts as they construct/reconstruct their educational technology knowledge. To this effect, the current research translates the need for continuous professional development practices by in-service teachers on technology, its usage by students and its influence on the teaching/learning environment.

2.4.   Data Collection Tools and Procedures

Collecting relevant data is the "central methodological question for any research" (Allwright 1998, p. 274). In this study, qualitative data were collected through focus group discussions and written reflections, in addition to the teachers and learners' materials, which constituted primary data. Quantitative data, on the other hand, were gained from the teachers' questionnaires and students' technology/ internet use logs.

For this end, four types of instruments were used to collect data for this study:

1. A qualitative questionnaire for the teachers to identify the current situation of CALL materials development and use by Algerian EFL teachers (see Appendix I);

2. Teachers' interviews to consolidate and enrich the data gained from the questionnaire.

3. Students' logs: Two types of logs were used with the students (see Appendix I). First, Students' internet use logs used to keep records of their technology/internet use five times for two weeks. This helps to get information about what engaged participants on the internet and how they used internet technologies. Second, reflective logs were generated by focus questions after the collaborative, peer-based interactive learning experiences through and after the end of the experiment.

4. Focus group discussions among teacher participants' in the experiment to decide on the principles guiding the enrichment process, the areas that need enrichment, and the types of CALL materials to be used/created for enrichment (see Appendix I for Focus group protocol);

5. Teachers' reflection logs were used to track the development of CALL Knowledge among teachers (see Appendix I, for Reflection Log prompts).

2.4.1. Teachers' Questionnaire

To collect primary data to answer the first exploratory question formulated above, a quantitative questionnaire was developed to spot the current situation of CALL materials development and use by Algerian EFL teachers. This questionnaire was constructed by reviewing recent literature and research on CALL materials development, principles of their development and the challenges for it (e.g., Al-Busaidi & Tindle, 2010; Canniveng& Martine, 2003; Dashtestani, 2014; Kervin & Derewianka, 2011; Moterram, 2011, 2013; Reinders & White, 2010; Soleimani & Mola Esmaili, 2016; Tomlinson, 2012; Zhao, 2005). It consists of five parts and fifty-three items. The respondents were invited to answer yes/no questions (part 1) or to select a scale, out of four and five items to inform the researcher about:

1. Their ICT facilities and CALL experience by answering yes/no questions in the first part of the questionnaire

2. Their attitudes towards CALL materials (part 2 of the questionnaire) with scales ranging from 1= 'strongly disagree' to 4= 'strongly agree';

3. Their and other colleagues' perceptions of the challenges of developing CALL materials (part 3) with the same four scales in the second part.

4. How they rate their skills in CALL materials development (part 4); with scales ranging from 1= 'not very proficient' to 5= 'very proficient'; and

5. Their opinion about the areas/skills EFL teachers need to develop more with scales ranging from 1= 'least urgent' to 5= 'most urgent'.

The close-ended questions type was selected to encourage the participants to complete the questionnaire. Further, to get more insights from them, they were encouraged to add more input concerning the training areas that they need to develop more about CALL materials development and use.

The British Council organized an international ELT conference in Oran, in Mai 2016. One thousand two hundred (1200) ELT practitioners from all over Algeria convened to consider the theme 'theory into practice' from a variety of perspectives and approaches, taking full advantage of the international make-up of the presenters and the vast diversity of experiences. A recurring theme through the conference was technology uptake by EFL teachers and ICT integration, which has generated intensive discussions to reflect and analyze the current CALL situation for ELT in Algerian higher education, which has provided a ripe context for data collection. Perse, the study aimed to survey a random sample of a thousand and two hundred EFL practitioners (teachers, trainers, teacher educators participating in the conference). More than three hundred (300) practitioners (about 25% of the total population) were approached either by email or face-to-face to participate in the study. Only one hundred-five amongst them returned the completed questionnaire. Respondents' answers were converted into numerical data (via coding) that were analyzed through statistical software in the computer (SPSS) to present quantitative data.

1.4.2. Teachers' Interview

Interviews are a central mode of data collection within a qualitative methodology. They are often perceived as an exchange of ideas between two or more participants on a topic of interest (Kvale, 1996). They provide the researcher with a process of getting and exploiting knowledge from the information being exchanged and permit the participants to explain their particular situations and points of view and offer their perceptions and interpretations of the world (Cohen et al., 2007). Interviews usually serve three main goals: (a) gaining information that directly links up to the objectives of the research; (b) testing an existing hypothesis or suggesting the use of a different one; (c) complementing other methods in a research project (ibid) and gathering information with direct impact on the research objectives.

Interview styles vary in nature according to the level of structure allowed; they can be unstructured, semi-structured or structured depending on the objectives and type of the research project. In this study, a semi-structured interview schedule was undertaken to guarantee a degree of consistency between the topics discussed. The interview schedule was prepared with reference to the review of the literature as well as the data collected from the conducted questionnaire survey. This schedule combines a set of open-ended questions since the interviewer uses, according to Preece at al. (2002, cited in Thomas, 2010),

a set of pre-planned core questions for guidance such that the same areas are covered with each interviewee. As the interview progresses, the interviewee is given the opportunity to elaborate or provide more relevant information if he/she opts to do so (p. 314)

Having a pre-planned schedule and a framework of questions provides general guidelines to keep the interview on the right track while reserving the flexibility to alter the wording

and order of questions to the demands and flow of each interview. Given the nature of this research problematic, which is generally underexplored, it is hard to cover all the aspects that need investigation and, at the same time, keep the direction of the interview under control. Therefore, leaving room for unforeseen issues as they show up is among the main advantages that rendered the use of semi-structured interviews as a proper research instrument for this phase of the research.

Likewise, the quantitative data from the questionnaire were triangulated with the qualitative data from informal semi-structured interviews with selected volunteered teachers from those who participated in the survey. These interviews consist mainly of a list of open-ended questions, as the researcher preserves the right to ask additional questions to elaborate on issues and to seek further comments and information when deemed necessary. They cover the same aspects explored by the questionnaire, so through a set of questions, the researcher explores teachers' CALL experience, attitudes, training, skills, challenges they associate with CALL materials development, and their recommendations for overturning the current situation. Even though, employing quantitative and qualitative research tools in conjunction with the teachers came out of necessity more than choice, crosschecking and comparing their data helped the researcher gain a deeper understating of the issue under investigation.

1.4.3. Students' Logs

Learning logs, or students' logs, have been advocated as an effective means to help students develop cognitive awareness of their learning, and an efficient tool for cognitive monitoring (Commander & Smith, 1996). They differ from journals in that they call on reflection on specific academic skills, techniques and experiences; they are constricted in scope and centre on the process of learning with little, or no, focus on students' feelings towards a subject matter. Logs are deemed beneficial to the learner (Commander & Smith,

1996) as they stimulate his meta-cognitive awareness and cognitive development. For the teacher, logs are an appropriate method to get a record of the students' learning journey in and outside the classroom. They have been used across many disciplines and can be very simple and centre on straightforward questions like what they have learned at the end of each class (Babcock, 2007) or more complex.

For the purposes of this study, two logs were used. Internet use logs offer a practical alternative to observation given the varied purposes and locations where internet is used. They are also an appropriate method to use over a two-week data collection window to increase the opportunity to capture use/learning practices that might not occur in the classroom. Via students' self-report logs, their interests and needs for using internet technologies, especially for learning purposes-mainly English-; were explored to help understand their engagement in internet activities, which would help us in the design of tasks and digital materials that best suit these preferences and activities (see Appendix E). As such, logs were used to understand what engaged participants on the internet in their everyday activities.

For this end, only fifty students (aged from 19 to 21) from the school (ENPEI) agreed to keep records of their internet use. All parts, like others of their generation, had used the internet previous to the study and were part of the increasing trend in Algeria towards more internet use. As a first assignment in the early days of the course for the academic year 2018/2019, the participants were required to maintain a log, where they have to fill in their internet activities from September 23rd to October 1st. They were asked to monitor and keep records of their internet use five times for two weeks; a period and time-frame chosen in order not further to burden the busy students with course-related assignments and activities. For the same reason, the students were asked to fill in their logs at their convenience to avoid competition with their coursework. The logs were divided

into six parts (see Appendix E): purposes for using the internet, devices used and the amount of time spent on each device, and websites surfed by the participants. It is believed that these six parts would help us gain an idea of what stimulates students on the net and how they use internet technologies.

Participants returned a total of one hundred and eighty-four logs: twenty-five participants each returned five log entries, eight participants each gave back four log entries, five returned three log entries, two respondents each gave two log entries and ten participants each handed only one log entry. The reasons that the twenty-five participants provided as to why they did not return all the five records are the following:

- The logs were not part of their coursework; they would rather spend more time finishing the other so-called complicated scientific modules.

- Five participants were reluctant to keep the logs and claimed it to be a matter of privacy

- Other participants simply forgot to edit the logs. They only filled one or two logs right before the logs were gathered.

- Five participants were worried about confidentiality, given that they are studying at a military school.

As Munby et al. (2001, p. 883) put it: "conceivably, qualitative research's most significant contribution to teacher education has been its inclination to listen to teachers and students of teaching". Accordingly, tapping knowledge sources and ways of thinking about learning to teach for a more affluent understanding of knowledge construction and pedagogical learning is a necessity. Thus, students' voices to the CALL project and their process of collaborative, interactive learning were sought in this study as crucial and informing through written reflective logs. These latter were generated by focus questions

to reflect on the learning experiences, through which they have been. Participants were asked to respond to the focus questions in the log to provide a general direction for their responses, though they were encouraged to add other comments if they are willing to do. Paragraphs of four to five sentences were initially suggested because students were learning English as a foreign language (FL) and were, for the most part, reluctant to producing an FL text. More extended responses were also welcome and encouraged, but it was not meant to add more pressure on students, who already found writing and expressing themselves in English more challenging. This way, reflective logs differ from a personal diary or journal in that students were guided by focus questions on a particular issue rather than freewriting, which may not focus on a relevant issue.

Fifty students in the second year EST program agreed to maintain reflecting and editing logs by the end of the course of the same year. They were invited to provide feedback about the value of the project work to the development of their overall EST proficiency and presentation skills. Students were required to fill in a four columns chart by the second-semester end; answering the questions within each column. In the first column, they were asked to transpose their perceptions about the overall experience of EST project-works. Two main questions were raised as to students' general perceptions:

1. What is your general perception of the projects in technical English?

2. What was the most enjoyable aspect of the project? Why?

In the second column, they were to reflect on their own project, and they were to indicate what sources they used (especially, internet-based ones) and to explain the 'Why' behind these choices. They responded to three main questions:

3. What was the most useful thing you learned by doing the project?

4. What did you learn from your team while doing the project?

5. From the presentations, we found that you like to use (images, videos, PPP, and production of your own, etc.) to complete your projects.

    a. Why do you do so?

    b. How do you choose them?

    c. Which of these materials helped you learn better or easier English?

6. What problems did you encounter when finishing the project? Please explain.

In the third column, the participants were asked to mull over the project in terms of learning achievements and the way it helped, or did not help improve their English proficiency:

7. How did the project help you improve your English?

In the last column, students were to evaluate the whole experience by stating its main advantages and disadvantages. They were also required to add any suggestions as to what they would like to change about the projects if they wished. Three questions were asked in this respect:

8. What are the main advantages of project work?

9. What are its main disadvantages?

10. What would you like to change about the project? Why?

The reflective logs were semi-structured, and the questions within were thought of beforehand to "ensure that the same general areas of information are collected from each participant" (McNamara, 2009). They were used to guide students' 'synthetic reflection' (Cottrell, 2003), which allows them to appreciate the linkages between their recent personal project-work experiences and the bigger picture.

1.4.4. Focus Group Discussions

This method calls for gathering a group of people to discuss a given issue; that is why focus groups are known as 'Discussion Groups' or 'Group Interviews' (Dawson, 2002, p. 29). Focus groups fluctuate from being highly structured to being relatively spontaneous by a mediator/ facilitator who sets up the topic, asks questions, and certifies the contribution of all the participants. The discussion can be recorded, and the obtained data is analysed, either qualitatively or quantitatively (Dawson, 2002, Darlington & Scott, 2002). Focus groups are often triangulated with other traditional methods such as questionnaires and interviews (Cohen, Manion, and Morrison, 2005) for more reliable data. The following issues usually guide implying this method:

- How many focus groups to be used? There should be more than one

- What is the size of these focus groups? They should not be too small or too large (between four and twelve members).

- Participants should have knowledge or experience in the required area.

- Participants should feel comfortable to talk, i.e. the facilitator should make the participants trust him/her through ensuring that they will be heard and valued and that they will experience no kind of pressure either from the side of the facilitator (to oblige them to talk) or from the side of the group members (Cohen et al., 2005; Darling & Scott, 2002).

The main advantage of focus groups relates to the impact of interaction on participants. Said differently, participants, especially if acquainted, may help each other overcome inhibitions, feel comfortable to share their ideas and experiences, and even remember issues that might have forgotten. Their discussions can also generate new themes, ideas and a wide range of responses per meeting in a short time, compared to one-to-one

interview, which decreases the interference and the impact of the researcher bias. Moreover, focus groups assist in gathering feedback from preceding studies (Cohen et al., 2005; Darling & Scott, 2002; Dawson, 2002).

Nevertheless, this method has cons, which are mostly linked to either the participants or the researcher. For instance, participants may feel timid, sore or nervous about speaking publically; other participants may not have a say or agree with the prevailing ideas, while others may sully individual's views. The researcher, on his side, may find it challenging to handle or tone down the group, may face difficulties due to the lack of equipment, or when extracting individual views (Cohen et al., 2005; Darling & Scott, 2002, Dawson, 2002).

In the study at hand, the focus group method was employed with the teachers participating in the CALL project at the National Preparatory School of Engineering Studies (NPSIS). Six focus groups were held within the CALL project; before, while and after using the course books. Focus groups were for each year for the participating teachers (total of ten teachers) of each level during regular coordination meetings; each meeting lasted for one hour and a half, and discussions were relatively structured and recorded using a Smartphone. Separate focus groups were conducted as it was anticipated that the teachers within each group would be more open and comfortable with colleagues. The participants were gathered to openly discuss enrichment principles, what areas of the course books need enrichment, and the possible projects to be assigned to students that encourage them to use internet technologies and trigger their creativity. Questions for the focus group were generated from informal discussions with teacher coordinators and informal discussions with students as their learning difficulties, their needs, motivation, and the possible solutions to provide further clarity and active discussion.

1.4.5. Teachers' Logs

Teacher logs are a reliable means of collecting data on instructional practices. They offer 'a real-time' method (Glennie, Charles, & Rice, 2017) for gathering valuable data on classroom practices by providing teachers with a tool to record and reflect about specific practices and the impact they may have had on them and their students. These self-reported records, repeatedly collected over a given period, "present a series of snapshots that capture ongoing classroom practices" (Ibid, p. 88). They can help teachers chew on their implementation of new practices and materials and are acknowledged as a promising professional development tool that gives a fuller picture of instructional activity than one gets from frequent observations and end-of-year surveys (Ibid).

Henceforth, teachers' voice to the CALL project and their process of collaborative action research were sought as critical and informative through written reflection logs. To facilitate teachers' participation, the logs were made easy to complete through prompts. Like this, teachers were not burdened by having to look up information while engaging in free writing, which may focus on irrelevant issues. Instead, they were asked to reply to the prompts in the log to provide a general direction for their responses. They were, however, encouraged to add other comments on the CALL project at their wish. Having teachers complete the logs aver a specified time period-after final examination- and setting target dates for doing them seemed to help teachers maintain a focus on this activity.

The teachers were asked to give their feedback of the value of the CALL project to the development of their overall instructional materials analysis, evaluation and development skills, besides their opinions about their students' engagement CALL materials design. For this end, they were asked to respond to the prompts in a two columns log by the end of the second semester. The first part of the log is for teachers to note down their reflections about the whole project and their particular roles. They were required to

unveil their perceptions about CALL materials development and to disclose their learning process throughout the project, as well as how they think the resultant materials could be improved for future teaching. The second part of the log is for the teachers to muse about the students' project works and the ways these were beneficial to their students' learning and overall language development. The prompts within the logs were used to guide teachers' reflections and help them to appreciate the linkages between their recent personal CALL materials development experiences and those of their students to create the bigger picture.

Consents have been granted from all the teachers participating in the CALL Project for writing reflections on their experiences and learning of CALL materials development throughout the different stages of the experiment and later to use them as data for the research at hand. Our data set, then, at the last stage of this study is teachers' written reflective logs on their learning process during the project, as well as how they think these technological tools and products could be used and refined in the future. These consist of ten log entries in total, with each teacher completing two reflective logs by an average of around two thousand (2000) words each; based on the design of the materials and tasks.

2.5. Data Analysis Procedures

This section describes the process of analysing the multiple sources of data of this research, taking the multifaceted nature of the data collection tools into consideration. It gives a detailed description of the analysis process in relation to the research phases, intermingled with the introduction of the computer-based analysis programs used during the analysis. These programs are chosen according to the type of data, be it quantitative or qualitative.

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2.5.1. Quantitative Data Analysis

All quantitative data were analysed and processed via statistical software in the computer (SPSS version 24). This latter is a statistical data analysis program that helps to conduct a range of statistical assessments and analyses instantaneously. It also helps to describe the structure of the data in a way that is easy to describe and interpret. Moreover, it is fitted with graphical displays of the data and the results from the analysis.

The questionnaire results were first recorded in Excel management tool and downloaded in a format suitable to be opened in SPSS 24. Quantitative data is composed of numeric values attributed to each of the questionnaire items. Data entry errors were deleted from the database before examining the data and later using statistical procedures to interpret it. Measures of central tendency as mean and standard deviation were used to help develop general trends within the data. Besides, percentages and frequencies were calculated for all the survey questions, while tables and figures are presented to display the results of statistical analysis to show quantitative results at a glance and display the trends within the data.

2.5.2. Qualitative Data Analysis

Nvivo version 10 qualitative data analysis software was used to analyse qualitative data. Nvivo is a qualitative data analysis program that helps to code and organises qualitative data and to evaluate and interpret texts systematically. Using Nvivo 10 assists in creating and moving nodes (also known as codes or themes), use colour-coding, and create a visual overview of the node distribution along with the dataset. To prepare the data for analysis, the interviews and focus groups were transcribed verbatim into word-processing files, which were later uploaded to the said software for analysis. Reflection logs, however, were scanned and transported to the program as pdf files.

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Grounded (Croker, 2009) qualitative content analysis was used to sort out the emerging themes from the different qualitative data instruments. Our dataset consists of teachers' semi-structured interviews, focus group discussions, their reflections and students' internet-use and reflection logs along with the different phases of this EAR. A grounded approach was used to explore the data through several stages, while two mechanisms were employed for its interpretation. To trace the development of CALL knowledge (reflection logs), an 'open coding' bottom-up technique was initially used to see the emerging themes from what the teachers and students already know and what they have acquired from the project. A top-down coding technique, however, was used to set enrichment principles (focus groups) and to interpret some parts of the students' internet use logs and semi-structured interviews.

To trace themes through the data, one written feedback was used to build nodes from each set of data (separately); the aim is to code all the relevant information under different categories. The next step involved examining all the resultant nodes and revisiting the dataset, during which some nodes collapsed with others, while some were erased. Using a constant comparative method, the resultant nodes were grouped under relevant sub-themes to reduce the data and facilitate its analysis and interpretation. The last stage of data analysis was to go through all these sub-themes and group them under main substantive themes. It is worthy to note here; these themes were already defined and shaped the analysis of the interviews, focus groups and internet-use logs. However, this was a post-analytic treatment of the emerging themes rather than a top-down one for the reflection logs. To ensure intercoder reliability, 25% of the whole data were randomly assigned for coding by an independent researcher; intercoder reliability ranged between 85% and 90% for each theme. The use of thematic analysis allowed a rich; flexible, intricate and detailed investigation and description of the data

Overall, data analysis in this thesis comes in chapters three, four and five. The first two may be referred to as analytical while the latter as reflective. Phrased differently, chapters three and four predominantly give facts or basic information necessary to set the ground for the action project in the second phase of the whole research. Chapter five, on the other hand, portrays the participants' and the researcher's interpretation and analysis of the whole action as executed in the practicum 'CALL Project'.

Conclusion

This chapter has described how this study was planned and conducted. Exploratory action research was explained, and explanations of why it was found appropriate for this research were given. Besides, the CALL project carried out in the present study was detailed. Different data collection techniques and the reasoning behind the use of each technique were considered. The chapter ends with an explanation of ways of interpreting data; paving the way for the presentation, the analysis, and the discussion of the results for which the coming chapters are consecrated.

Chapter Three: CALL Materials: Demystifying the Myth

Introduction

The third chapter reports on the results of a preliminary investigation, conducted in 2016 before an experimental pedagogical intervention planned for the academic years 2017/2018, 2018/2019 at NPSES, to evaluate the current situation of CALL materials development and use by Algerian EFL teachers and to determine students' habits and technology practices for general and EFL learning purposes. Data analyses are arranged in terms of sections for each sample population category, i.e., teachers' data analysis and students' data analysis, while each section is subdivided into subsections depending on the investigated aspects. An in-depth discussion follows each section to interpret the findings, link them to the data gathered from other tools and relate them to what has already been discussed in the review of the literature. This helps in generating and forming an action plan upon which the experimental pedagogical intervention is to be premised.

3.1. Teachers' Data Analysis

The success of any educational development depends on passion, skill and attitude. If teachers have positive attitudes towards CALL materials and are passionate about exploring new ways of teaching/learning, they will make room for both teacher and learner-generated CALL materials despite all the challenges they may encounter along the way. In light of this, the current section is devoted to unravelling the present challenges and difficulties that enable EFL teachers to acquire materials development and implementation skills. Two instruments were used jointly for this purpose; a questionnaire and a semi-structured interview, to permit further exploration and to give the participants a juncture to elucidate views where necessary.

3.1.1. The Questionnaire

Teachers' questionnaire consisted of eight sections, all of which designed to investigate different aspects of the current research and help answer the previously set questions. These include:

- Background Information

- Attitudes towards the use of CALL materials and their development

- Perceptions of the challenges in developing CALL materials

- Perceptions of CALL materials development skills

- Recommendations for training

Question types differ from one section to the other according to the nature of the information being investigated. The first part consists of closed-ended questions used to uncover the demographic data of the participants with their ICT facilities and CALL experience. The other sections are Likert-scale tables as they are intended to measure teachers' attitudes towards CALL materials and their development, CALL materials development challenges, skills, and recommended training.

3.1.1.1. Background Information

Demographic Information

Three strata of EFL teachers were recognised and involved in this study, as illustrated in figure 8. First, sixty-seven EFL teachers (65.7%) who teach English to the middle, secondary, or university students participated in the survey. These instructors were B.A. or M.A. holders, who had taught English for an average of 8.5 years, and their average age was 35.3 years. Second, five teacher educators (4.9%), who educate EFL teachers at universities were included in the study. These were TEFEL and Applied Linguistics Professors and PhD holders with an average of 25 years of EFL teacher

education experience at M.A. and PhD levels. A sample of thirty EFL teacher trainers (29.4%) was also part of the sample population. Twenty of these teacher trainers were Magister graduates of TEFEL with an average of 8.2 years of training pre-service teachers and an average age of 38.3 years. The other ten teachers were inspectors responsible for training in-service teachers for different language teaching institutions. These were mostly B.A. holders with over twenty years of experience in the field. Their average age was about 50 years. The participants were from the four poles of Algeria because data were gathered in an international conference as already explained in the previous chapter, which would help get a fuller picture of the current situation of CALL materials development.

Respondents' ages ranged between twenty-six (26) and fifty-five (55) years old. The first age range (under 30) comprised twenty-four (24) teachers, the second category (30-50) entailed sixty-two (62), the third category (over 50) included eleven (11) teachers. In contrast, the remaining eight teachers did not mention their age. Concerning the working experience of our respondents (table 8), twenty-six (24, 8%) of them fell within the first teaching experience category (under five years). However, the second category (6-10 years) included forty-four (41, 9%) teachers. Two respondents (1, 9%) stated that they had twelve years of teaching experience; meanwhile, nine participants (8, 6%) specified that they had a teaching experience within the fourth category (15-20 years) and twenty others (19%) had more than twenty years of teaching experience. Four respondents forgot to mention their teaching experience.

Figure 7

Respondents' background and age range

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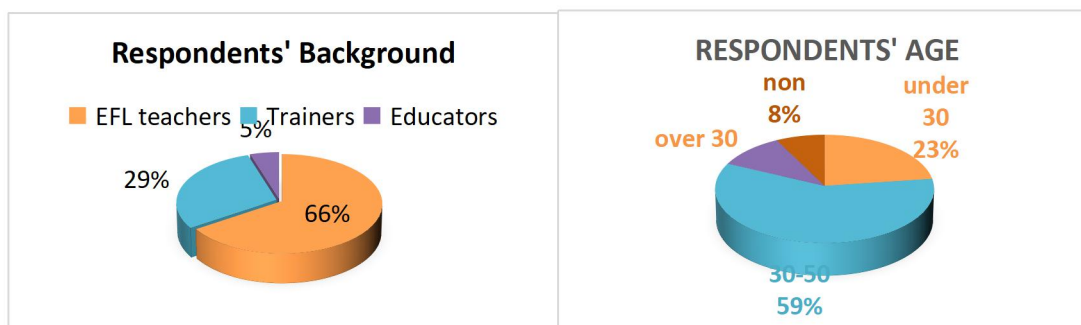
The results obtained show that the subjects vary in both their age and their teaching experiences. The least experienced participants (24, 8%) have about six years of teaching experience, and the most experienced (19%) have more than twenty years of teaching experience. The rest have between six to twenty years. This finding indicates that a high degree of teachers has a certain degree of professional maturity that would add more credit to the study at hand. Moreover, the age and teaching experience can be of significant help in revealing, at least the related fundamental challenges and attitudes towards the use and development of CALL materials for English teaching/learning and the factors backing their attitudes to provide some informative suggestions for the adoption and development of CALL materials.

Table 8

Respondents' Teaching Experience

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	under 5 years	26	24,8	25,7	25,7
	6 - 10 years	44	41,9	43,6	69,3
	10-15 years	2	1,9	2,0	71,3
	15-20 years	9	8,6	8,9	80,2
	over20years	20	19,0	19,8	100,0
	Total	101	96,2	100,0	
Missing	System	4	3,8		
Total		105	100,0		

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ICT Facilities and CALL Experience

Table 9

Internet/Computer Access

				Frequency	**Per cent**		**Valid Percent**	**Cumulative Percent**
Home	Valid	Yes		94	89,5		89,5	89,5
		No		11	10,5		10,5	100,0
		Total		105	100,0		100,0	
Institute	**Teachers**	Valid	YES	63	60,0		61,8	
			NO	39	37,1		38,2	61,8
		Missing	Total	102	97,1		100,0	100,0
			System	3	2,9			
		Total		105	100,0			
	Students	Valid	YES	48	45,7		45,7	
			NO	57	54,3		54,3	45,7
								100,0
		Total		105	100,0			

The respondents were asked to identify their access to potential internet-networked computer devices in two locations, namely at home and their institutions. As it can be discerned from Table 9 above, home represented our respondents' most frequent place of internet computer access as most of them (91,4%) reported that they have internet connexion and a networked computer at their homes. In comparison, only (60%) stated that they have these facilities at their institutions. Most of these institutions are universities as reported by the respondents; most middle and secondary school teachers have admitted that such facilities are out of their hands at their workplace. This fact is backed up by the results from previous research, which asserted that infrastructure and connectivity are at best basic in Algerian secondary schools (e.g., Boucherfan 2017; Hamdy, 2007).

In response to the third question, where the respondents were asked whether they have any internet/computer facilities for the students at their institutes, 45,7% of informants stated that their institutes provide internet facilities for the students. In contrast, more than half of them (54,3%) noted that their students are not that fortunate. As for

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training on ICT, half of the respondents reported that they received training on how to use ICT, while the other half had not (see figure 8).

Figure 8

ICT Training
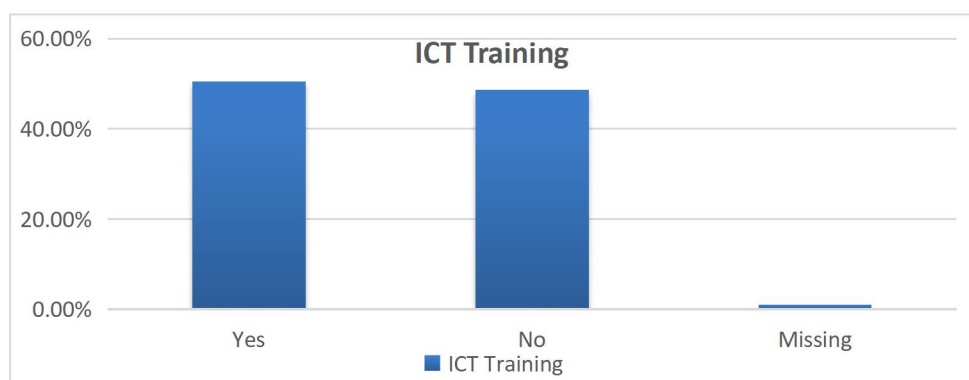
Three questions were raised as to the use of CALL in teaching practice. At first, teachers were asked whether they use technology when preparing their teaching materials. The majority (91, 4%) of participants confirmed their use of technology when preparing their lessons, while only8, 6% of them denied its use. The teachers were then asked whether they have ever taught using CALL applications. Figure 10 demonstrates teachers' CALL use in their practice, where over a half (55, 2%) of the participants stated that they had used CALL applications when teaching, however (44, 8%) responded that they had not. The next question asked informants whether the syllabus they teach contain any CALL materials. About 56% of the respondents specified that their syllabus is free from any CALL materials, and only 44% confirmed that their syllabus has a CALL component. These results show that despite that, most syllabi do not entail using CALL components and the lack of facilities at institutes; the teachers commonly use technology for classroom material preparation, supplementary classroom material gathering and/or presentation. This indicates that they value the role of CALL as a facilitating implement for accomplishing professional tasks as well as growth.

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Figure 9

Teachers' CALL practice
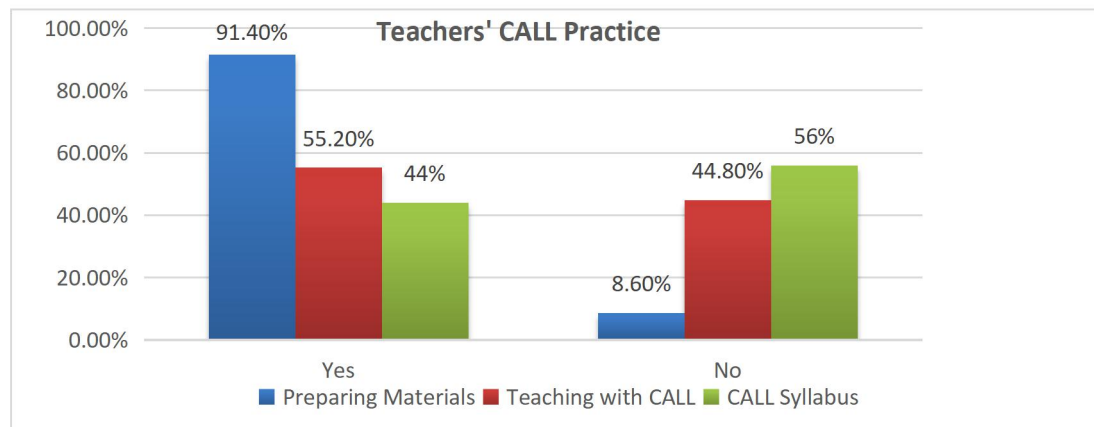
3.1.1.2. Attitudes

It is worthy of note that the review of the recent literature and research on CALL materials development, principles and challenges of their development (e.g. Al-Busaidi & Tindle, 2010; Canniveng & Martinez, 2003; Dashtestani, 2014; Kervin & Derewianka, 2011; Motteram, 2011; 2013; Reinders& White, 2010; Solaimani, 2016; Tomlinson, 2016; Zhao, 2005) passed on acumens into the construction of the list of items in each part of the questionnaire, which resulted in an amalgam of positively and negatively phrased items to reduce acquiescent response bias (Nunnally, 1967). The first section speculates the participants' attitudes toward the use of CALL materials and comprised 13 four-point Likert-scale items; responses were represented by a mean score on a four-point scale ranging from 1 'strongly disagree' to 4 'strongly agree'.

The mean score of responses was 3.20 (significantly high) for all items with a standard deviation below 1 (0. 40), which means that the answers did not vary much. Most of the informants adopted positive attitudes regarding CALL materials and their use in EFL courses. While all the participants were of the same mind about the importance of

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CALL materials development by EFL teachers and their authenticity, their opinions split

about the seventh and eight items; half of them believed that developing CALL materials is

not such an easy task and that it requires high costs. Despite the differences in perceptions,

the respondents in principle expressed positive attitudes about interactivity, accessibility,

learner engagement and motivation, students' autonomy, collaborative learning, immediate

feedback and the facilitating role of CALL materials in teaching English as a foreign

language (TEFL) and EFL teachers' professional development. Moreover, the analysis of

the informants' choices revealed that they had enthusiastic attitudes regarding the first and

last items as the vast majority opted for the top favourable value, i.e., strongly agree

(69,5%; 52,9% respectively). Distinctively, the informants strongly agreed that EFL

teachers should churn out CALL materials and that this activity will chip in their

professional development.

Table 10

Attitudes towards CALL Materials

Items	N	Min	Max	Mean	SD
Item 1	105	1	4	3,59	,730
Item 2	104	1	4	3,12	,998
Item 3	104	1	4	3,58	,664
Item 4	103	1	4	2,83	1,033
Item 5	102	1	4	3,27	,773
Item 6	104	1	4	3,24	,782
Item 7	103	1	4	2,66	,811
Item 8	101	1	4	2,51	,890
Item 9	104	1	4	3,13	,813
Item 10	104	1	4	3,39	,743
Item 11	99	1	4	3,17	,700
Item 12	104	1	4	3,59	,705
Item 13	104	1	4	3,42	,706

3.1.1.3. Challenges

Section two explores teachers' perceptions of the challenges in developing CALL

materials by EFL teachers. Unlike attitudes, teachers' perceptions of CALL materials

development challenges are not consistent as the difference in responses reached in some

cases, a standard deviation of 1.05. All teachers seem to reasonably believe that lack of teachers 'expertise (M= 2.86) and lack of education (M = 2.75) are common barriers to the use and development of CALL materials by Algerian EFL teachers. In contrast, there is no luck of obligation as to the use of CALL materials (M = 2.36) (see table 11). The teachers stated that they are often encouraged to use CALL materials, a fact that was strongly expressed by educational supervisors, i.e., inspectors. Alike, respondents' responses to these items (1, 2 & 7) were consistent at a standard deviation around 0.90. Conversely, the standard deviation for the remaining items ranged between 1 and 1.05, which means that responses differed significantly between respondents as some of them seemed to strongly agree on the importance of some items (4 points). In contrast, others had a complete adverse response (1). A case in point is lack of funding and insufficient training (items 4 and 6 respectively). However, in other cases, positive responses seem to be isolated instances as in case of the last item, where a lack of necessary tools was considered as an essential obstacle towards developing CALL materials. Lack of time (item 3), on the other hand, was not considered as a hindrance for the same case, while opinions split when it comes to cultural resistance.

Even though informants' responses seem variant, the overall mean of all items landed at 2.60, with a standard deviation below 1 (0.45). Therefore, one can conclude that lack of expertise, lack of education/training, lack of funding and lack of necessary tools are significant snags to the use and development of CALL materials. Lack of time and lack of obligation are not substantial factors impeding the said tasks, but cultural resistances are an aspect that requires further investigation within the interview.

Table 11

Challenges to CALL materials Development

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Items	N	Min	Max	Mean	SD
Item 1	104	1	4	2,86	,730
Item 2	104	1	4	2,75	,998
Item 3	104	1	4	2,38	,664
Item 4	99	1	4	3,02	1,033
Item 5	104	1	4	2,44	,773
Item 6	104	1	4	3,08	,782
Item 7	101	1	4	2,63	,811
Item 8	104	1	4	1,93	,890

3.1.1.4. Skills

Table 12 portrays informants' responses in regards to their perceived skills of CALL materials development. It is worthy of note that items within this section were presented by a five-point scale ranging from 1 'not very proficient' to 5 'very proficient'. The items within this section were further divided into technology integration skills (items 1, 3, 5), e-literacy skills (2, 6, 7), and materials development and evaluation skills (4, 8). Taking into account that the highest score (very proficient) was 5 points, the overall mean score of 3.21 yielded by the general listed skills is significant, except for the last two items that got the lowest mean score (M = 2.92, M = 2. 98, respectively) as 64% of our respondents had basic or limited knowledge/ability to new CALL software and basic or limited proficiency in evaluating its usefulness. The results indicate that EFL teachers were perceived to be more proficient in extending their textbooks with CALL, developing/adapting for their EFL courses and adapting the use of CALL materials to their teaching styles, compared to their knowledge of materials development principles and theories and online language teaching materials development. The standard deviation of the former items (items 1, 3, & 5) is below 1. Nevertheless, it is also worth pointing out that some informants were much more skilful than others, as the responses varied widely to reach a standard deviation of 1.16 because they ranged from 1(not very proficient) and 5 (very proficient).

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Table 12

Teachers' CALL Materials Development Skills

Items	N	Min	Max	Mean	SD
Item 1	104	1	5	3,51	,93
Item 2	100	1	5	3,06	1,15
Item 3	105	1	5	3,43	,92
Item 4	102	1	5	3,11	1,15
Item 5	104	2	5	3,49	,99
Item 6	105	1	5	3,23	1,08
Item 7	102	1	5	2,92	1,10
Item 8	104	1	5	2,98	1,16

3.1.1.5.   Recommendations for Training

Responses to the items listed in table 13 below were analysed according to five-points Likert-scale survey ranging from 1= least urgent to 5 = most urgent. Our informants' listed CALL materials development/evaluation skills (M = 4.20) and teachers' technology integration (M = 4.16) as the top urgent issues that need training, in addition to their inclination to enhancing teachers' overall materials development/evaluation (M = 4.15). However, their responses to the first and last items were less consistent with a standard deviation ranging between 1.067 and 1.160, especially for the first item where (3.88) was closer to neutral as some respondents' (13.5%) expressed negative intentions towards e-literacy training (1 point). Nevertheless, an overall mean of 4.043 made it clear that respondents do believe that training is compatible with EFL teachers' current CALL materials development competence.

Table 13

Recommendations for Training

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Items	N	Min	Max	Mean	SD
Item 1	104	1	5	3,88	1,160
Item 2	105	1	5	4,16	,833
Item 3	104	2	5	4,15	,932
Item 4	104	2	5	4,20	,742
Item 5	103	1	5	3,83	1,067

3.1.2. Teachers' Interview

Follow-up interviews were conducted after the survey questionnaire to collect more validated data. These consisted of a set of open-ended questions with a semi-structured format, designed to deal with the same aspects of the questionnaire. However, even though the same aspects were taken in during all the interviews, the researcher, at times asked additional questions deemed de rigueur to reap more insight on several unforeseen issues as the interviewees brought them. The interviews data were analysed and coded concerning the main questionnaire topics. Specifically, the data were examined, and then the emerging themes for each prompt were presented and described. The following prompts guided the interviews:

- Role of CALL materials in EFL teaching

- Role of CALL materials development in EFL teachers' professional development

- Challenges to CALL materials development

- Perceived CALL materials development skills

- The types of CALL materials used/developed for EFL classes

- CALL materials received training

- Perceived strategies to CALL materials normalisation

3.1.2.1. Participants

The interviews were conducted with a stratified sample of EFL practitioners from those who participated in the questionnaire survey and comprised twenty-five interviewees in total. These included twelve EFL teachers who teach English to middle, secondary and

university students of different majors. They had taught English for an average of 5.75 years, whereas their average age was 30.75 years. All five professors (teacher educators) who participated in the questionnaire agreed to take part in the interview, in addition to eight teacher trainers. These latter include both pre-service and in-service EFL teacher trainers with an average age of 40.3 years and an average of 15 years of experience in the field. The least experienced interviewee had three years of teaching experience, while the most experienced had thirty-two years of experience in the field. The participants were from the four poles of Algeria to help raise the credibility of the research. The findings from the interviews are presented to shore up the analysis and interpretations of the questionnaire.

3.1.2.2.   CALL Experience

Concerning internet-networked computers access and use, the majority of our interviewees seemed regular users since 88% of them stated they used technology frequently, or as interviewee number one puts it: *"technology is very important in everyday life, so we rarely find someone who is not using it every day and every time"*. On the same issue, interviewee number three stated, *"Technology, especially the internet, is such invasive in our life that we rarely find someone who is not taken by it"*. Three teachers, who stated that they are not regular users of technology in general, made the only exception. They referred this to not being fun of technology as all of them were immigrant teachers born well before technological advancements.

Other stated reasons include limited access and availability constraints, especially at their institutes. Nevertheless, most of the interview participants were eager users of CALL in their teaching practice, especially when preparing their lessons as they noted that technology, especially the internet, is the primary source of authentic materials that fuel their lessons and enrich their regular curricula. Some of the informants (about 40%) also

reported the use of some CALL applications in their classrooms. Examples of these applications include presentation tools such as PowerPoint, word when writing lectures or exams, media players when displaying audio or video materials. In this regard, one university teacher commented saying, *"I essentially use PowerPoint when presenting my lectures; which is more practical and more visually appealing than writing on the board. I also use media players when teaching speaking/listening classes to run audio and video files"*. All five secondary school teachers reported that they are not using CALL applications while presenting their lessons referring this abstinence to the luck of ICT facilities as reported by one of them, *"the absence of audio-visual equipment/laboratories has rendered the use of such materials hard to pursue"*.

3.1.2.3. Training

As for receiving any training on how to integrate ICT in their teaching, or produce/use CALL materials, eighteen of the interviewees specified that they have never taken any type of training, neither theoretical nor practical; while, they have all testified that they have certainly not been involved in any CALL materials production projects yet. Nevertheless, all the interviewees have voiced their disappointment for the scantiness and, at times, the inadequacy of training, and upheld hopes for opportunities to receive CALL training, be it at their institutes or even at other institutions at their expenses. Some of them said:

"EFL teachers need to take part in some technology integration training programmes. Actually, the training should be regular so as EFL teachers would be able to beware about the most recent creations and techniques and use them in their EFL classes."

Some added, *"Delivering intensive training in connection with CALL is a priority."*

On the same issue, another pre-service teacher trainer added:

"I guess most universities and training schools have a computing course. Instead of teaching students' things like Word and Excel, it would be better to teach them to integrate technology in their future classrooms and to introduce them to CALL materials development."

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On the other hand, interviewee number ten claimed that he had the chance to receive theoretical and practical knowledge on the use of Moodle in teaching at the University of Setif. CALL was introduced to teachers as a series of training workshops, which he described as *"very interesting, very advanced and much-needed courses that have done well to our professional development as teachers"*. Meanwhile, most inspectors asserted that their training syllabus is very compact, which makes it hard for them to hold workshops or training lessons on CALL materials development/use. However, some of them have acknowledged their efforts in delivering some said training on the integration of ICTs.

3.1.2.4.   Attitudes

Most of our interviewees perceived the use of CALL materials as useful and potent for language teaching. The majority (90%) of them overtly expressed their appreciation of CALL materials and displayed no apprehension, including those who previously referred to no earlier experiences with the said materials. They believed that using such materials can chip in the quality of not only their teaching but foreign language learning as well. Interviewee fifteen, for instance, mentioned, *"Keeping up with technological advances helps better teaching and learning becomes more productive"*. Authenticity, motivation, learner engagement, accessibility, diversity, interactivity, and differentiation of instruction to suit students' varying learning styles were the most significant virtues of CALL materials mentioned by the participants. Some of them (60%) stressed the fact CALL materials are a handy and a motivating agent that they would seek after to use in their classrooms whenever needed. In this regard, one teacher trainer suggested, *"CALL materials should be implemented gradually and be part of our national curricula"*.

To this end, most of the participants expressed their positive stance on producing and using CALL materials. On the same issue, interviewee twenty-three stated, *"The*

integration of technology and CALL materials development along training sessions are highly recommended since this helps in improving the quality of teaching FL". Another teacher trainer reported,

"I recommend that the institutions where EFL teachers work should take the matter of integrating technology and developing CALL materials seriously and provide teachers with enough training in both field as well as sufficient funding to achieve that teaching goal."

The participants alleged that this endeavour helps in improving their teaching quality, professional development, e-literacy, and allows them to have a say in decision-making processes. In addition to training EFL teachers, some participants stressed the importance of not only training EFL teachers but teachers' trainers as well, considering their more prominent role in this process. A point in case is a university teacher who affirmed, "A top priority, I guess, is to train the teacher trainers first before any attempt to generalise this kind of teaching; otherwise, it will be chaos". Similarly, he was also cautious over any peremptory introduction of CALL as he pointed out that this would indeed threaten the process of teaching.

3.1.2.5. Challenges

The interviewees (about 90%) reported that technological facilities are the main hindrance in front of using different types of CALL materials. Some clarified that their interest in using ICTs diminished significantly when faced with minimal facilities for using digital materials. Almost all of the participants believed that such facilities (both hardware and software) should be at their service. They reported,

"Useful materials (tablets, language labs) should be provided for students and teachers."

"Provide Algerian schools with CALL facilities such as computers for each pupil."

"It is advisable to build audio-visual laboratories as well as provide smart boards in ordinary classes."

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A recurring challenge, which was often reported by the majority of participants, is lack or inconvenience of training on how to use/develop materials. Currently, then, it seems that teachers are short of the essential pedagogical and e-literacy skills to use/develop CALL materials. Other participants (54, 5%) believed that teaching methods and even curricula must be reconsidered. A teacher trainer made it clear that *"there is a need to know more about CALL and to reconsider national curricula to gradually implant CALL materials within syllabi"*. He further asserted that this undertaking is not compatible with Algerian teachers' current instructional practices. Other participants referred to cultural resistances as the second interviewee reported that such problem is prevalent

"Especially at middle and secondary schools where conservative, old-fashioned views linger on and where using videos and songs is thought to be unprofessional and contributing very little to teach exam classes more important skills."

Another cultural obstacle that was raised by one teacher educator is that of teachers' attitude towards collaboration and sharing, which are the main characteristics of CALL materials. According to him, the use and development of CALL materials by EFL teachers is not possible at present since this attitude is customary in the Algerian EFL context.

*"The most crucial point about CALL materials is that, culturally, teachers believe that their teaching materials belong to them; they wouldn't share them with others. However, CALL pedagogy is based on generosity and collaboration in delivering Knowledge and promoting cooperative learning and teaching. We need to change, first teachers' attitude towards the issue" (*interviewee four)

Two other interviewees referred to students' attitudes and e-literacy skills as chief factors to be considered before any technological uptake. The first of them stated that we, as teachers, take it for granted that our students are techno-savvy given that they are born in the 21st-Century; however, this is not always true. He goes on stating that students feign to have positive attitudes but, in truth, their attitudes are very negative if forced to work

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with CALL and, subsequently, put up with the subsequent extra burdens. The other teacher accentuates the importance of raising students' awareness about the importance of technology integration and CALL materials and providing appropriate tools to help achieve this goal.

"Teachers and decision-makers should raise students' awareness of the importance of integrating technology and CALL materials in EFL learning. Unfortunately, most of our students do not even have an email address and rely on traditional methods of learning. The university is always selfish by not buying adequate technological means for the teachers and learners" (interviewee thirteen)

The last interviewee listed, in addition to teachers' training and technological facilities, the lack of time and teachers' social stability as other obstacles contributing to teachers' helplessness to integrate these materials. To her, *"The problem is not only with teachers' training but with the availability of CALL tools in the institutions together with time and social stability that teachers need to integrate these materials."*

3.1.2.6. Skills

The results of the interview showed that most EFL teachers (89%) have basic or limited knowledge about the use and development of CALL materials for their EFL courses. Some participants (56) declared that they are not sure whether they had the required skills to create the materials themselves. Other interviewees mentioned that they did not know how to develop digital materials, especially for online courses.

"Well… as I told you, I think I know about CALL materials as I usually use the data show and computer as a means to show textbook content and display audio and video files. I also use PowerPoint and word to prepare grammar lectures and exams, respectively. However, I have no idea about how to create digital materials. I thought that I'm techno-savvy, yet it sounds like I am not" (interviewee nine)

Following our explanation of the different types of CALL materials, an overwhelming majority of participants (about 95%) concluded that their knowledge about CALL materials is at best rudimentary and that they are not able to produce and, at times, even

use them appropriately. They agreed that more types of training (theoretical and practical) and preparation is urgently needed to be able to use and create the said materials. In this regard, interviewee fourteen stated,

"Teachers' knowledge of CALL is the first recommendation that comes after their syllabus design and materials development ability and a supporting favourable environment with enough materials and media is the best start. CALL materials, then, is the legitimate child."

3.1.2.7. Recommendations for CALL Materials Normalisation

Considering the aforementioned challenges, our interviewees proposed several solutions towards CALL materials normalisation in Algerian schools and universities. Teacher educators suggested that addressing teachers and students' change resistance is the first step towards CALL integration; otherwise, any negative attitudes would result in undesirable practices as teachers and students may glue to their old practices regardless of the available facilities. Additionally, the majority of our interviewees (about 90%) stressed the need to know more about the theoretical and practical aspects of CALL materials development and pointed out that training on CALL materials creation should be an integral part of both teacher education/ training programmes.

Teachers trainers (32% of interviewees) stated that ongoing training, where the participants reflect and share their experiences and skills in CALL materials development through periodic workshops and care-and-share meetings on how to create CALL materials, is highly recommended. Additionally, interviewee number four stressed the need for training teachers and students by computer science specialists the potential applications of CALL for both use and development. He further asserted that the benefits in terms of teaching quality and learning productivity would be great.

"To keep up with technological advances, better teaching and learning become productive; our institutions should seek to have an office for computer science specialists with their

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premises. The ICT crew provides training for students and teachers on the potential applications for use and development. A first major outcome will be apparent in developing online courses and gathering teachers and students in exchange platforms for curricular and extra-curricular activities."

Almost all of our interviewees cited a recurring demand for the improvement of technological facilities and equipment. They believed that training would be in vain if no hardware or software is available. Other participants held that integrating CALL materials and software tools in course books is a necessary step so that teachers get used to using and adapting these tools during their courses. Furthermore, they maintained that CALL materials absence is well beyond the boundaries of single institutions and must be tackled at a macro level through reconsidering our EFL curricula and rallying all the necessary factors behind this cause.

"integrating gradually CALL teaching materials in course books, delivering intensive training in connection with CALL but more importantly, providing all schools and education institutions with hardware, as well as software and make them easily accessible to all teachers and learners within the classrooms".

The teacher educators (20% of the interviewees) were of the opinion that many EFL teachers do not possess the required knowledge and skills to develop instructional materials in general, not to mention digital materials. Likewise, they suggested that a top priority is to empower teachers with the needed knowledge and skills for instructional materials development, without which creating CALL materials would be irresolvable. They also called for special modules and workshops in teacher education/training programs vis-à-via instructional materials development, in which CALL materials development is an integral component of the course/training.

3.1.3. Teachers' Data Discussion

The findings of the descriptive statistics and qualitative data clearly show that the majority of our sample population are frequent users of internet technologies as they use

them regularly when preparing their lessons. Nonetheless, the places where they access these technologies seem pretty much limited to their living places as many Algerian educational institutes (especially at middle and secondary education) lack the most basic facilities in the image of computer laboratories and internet connexion. Howbeit, teachers' regularity of use and contact with internet technologies is regarded as a sign of positive attitude and a predictor of CALL future integration (Bouchefra, 2017; Kersaint et al., 2003). In this line, Cox et al. (1999, cited in Mumtaz, 2000) noticed that technology regular use fallouts in ICT use confidence, which renders CALL adoption smoother and alters teachers' perceptions of CALL utility positively.

Concerning training on CALL integration, the participants reported that they either had some basic ICT training or that they did not receive any training at all. This fact brings to the surface the negligence and inconvenience of CALL in teacher education programmes both at post-bachelor degrees at universities or teacher training programmes at training schools (e.g., ENS). The results also indicate that even when computing classes are offered to students, it is totally decontextualized, technical and entirely irrelevant to ELL or ELT; in truth, students learn more about the different components of computers rather than how to manoeuvre them or use them for learning/teaching purposes. On the other hand, formal in-service teacher training programmes, which unlike middle and secondary schools are rare for university teachers, also seem to neglect about CALL and, especially CALL materials development. Inspectors seem to recommend EFL teachers to use ICTs in their teaching regularly; however, they mainly limit CALL to computers and data projectors and fall flat to show them how other technologies can empower and suit their teaching practices, especially the use of web 2.0 applications and the use and development of CALL materials by themselves. Moreover, our participants' limited perception of CALL materials and the dearth of training stems from their restricted picture

of CALL to in-classroom content delivery without considering the other options beyond classroom walls. Nevertheless, respondents' regret, expressly in the interview, of not receiving appropriate training on CALL materials use/development and their eagerness to go through it are promising signs of our teachers' awareness and willingness to adopting it, if circumstances bode well.

Since the findings indicated that many of the participants are regular users of technologies, one can estimate that they have the basic skills for operating them. However, the interview findings proved that our informants seem less familiar with other relatively advanced applications (e.g., authoring software), which might hinder their ability to function appropriately in a technology-enhanced environment and fulfilment of their assigned new roles as designers, facilitators, guides and materials developers (Warschauer& Healey, 1998). Likewise, computer literacy is acknowledged as a determining factor in teachers' attitudes towards CALL (Berner, 2013 cited in Faozieh & Abbas, 2013) as teachers may refrain from using CALL if they are in short of the required skills and knowledge to make abreast decisions and take up CALL efficiently (Faozieh & Abbas, 2013; Wang, 2008). Besides, ICT competence has its bearing on teachers' confidence in using CALL, which may even result in CALL avoidance (Jones, 2004). As such, basic ICT skills are not sufficient and acquiring more advanced skills is necessary for effective CALL adoption.

The findings clearly show that our informants have positive attitudes towards the use of CALL materials, which would facilitate the transition from using traditional resources to CALL materials in the future. According to Richards (2001), because of the teachers' focal role in the EFL curriculum, their attitudes can ease the implementation of any changes in the curriculum (Richards, 2001). Given the importance of teacher education and teacher training in allowing EFL teachers to produce and use CALL materials

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(Tomlinson, 2003), the fact that the teacher trainers and teacher educators were of the same attitude as teachers can assist in motivating and preparing teachers to produce and use CALL materials. The educational authorities should, on their own, take these attitudes seriously to take proper measures to boost these constructive attitudes and beliefs regarding the use of CALL materials. The findings are also compatible with previous research, which reported the positive attitudes of EFL teachers towards different CALL components (Aydin, 2013; Bouchefra, 2017; Dashtestani, 2014; Mathews-Li & Elaziz, 2010). Therefore, teachers' alacrity to adopt CALL materials will be very promising in Algeria, as Algerian teachers perceive their role as significant and advantageous.

The findings also prove that the participants had positive perceptions regarding their likelihood to develop CALL materials. Providing room for teachers to create instructional materials, including CALL materials, is vital to the process of teacher professional development (Tomlinson, 2003). Tomlinson (Ibid) further suggests that taking part in materials development activities helps to advance teaching expertise, confidence, positive attitudes, and teaching efficiency. The results are similarly consistent with other studies that indicate the correlation between the virtues of EFL teachers' CALL materials development and the positive impacts on their professional development (Al-Busaidi & Tindle, 2010; Canniveng & Martinez, 2003; Dashtestani, 2012; 2014; Masuhara, 2006, Sert & Li, 2017). Promoting teacher-created materials can play a crucial role in arming EFL teachers with the necessary CALL materials development skills to facilitate their professional development. This fact brings us back to the need for CALL materials use/development training, which is mostly dependent on teacher trainers and teacher educators' skills and willingness to train the said teachers.

Even if hardware and software are made available and accessible, teachers still need not to lack many essential skills to create CALL materials. It seems that our

informants are relatively competent in CALL materials' use. However, this use seems, to a large extent, restricted to materials presentation and content reinforcement, mainly via computers and data projectors. This brings us back to the limited employment of CALL to in-classroom use, as the teachers tend to turn a blind eye on the various affordances of the internet and confine it to accurate resource retrieval. The teachers appear to lack the necessary skills to develop digital materials, especially for online courses, which need more honing. Additionally, taking into account that almost all our respondents are regular consumers of CALL materials and usual users of technology means that they have some predisposition to learn more about how to use and create the given materials if offered the required training. Similarly, all our interviewees have stressed the need for training that they regard as crucial for technology integration and empowering them to take on CALL more appropriately and effectively.

CALL materials use/development in the Algerian EFL context is subject to some intervening obstacles. First, our informants see the lack of technological facilities and resources a dissuading issue that hinders CALL materials use/development. Lack of practicality, which refers to the sufficiency of computer-based facilities to use a given CALL material, is considered as a significant criterion for CALL appropriateness (Chapelle, 2001). Besides, both lack and, at times, the inadequacy of facilities can sincerely fetter any venture towards CALL integration and may even dishearten enthusiastic teachers (Mumtaz, 2000). Second, the respondents considered the lack/inconvenience of education/training a major repelling factor that has been referred to repeatedly.

Similarly, informants, especially in the interview, emphasised the need for amending teacher education programmes to include the necessary skills for CALL materials use/development. Third, scarcity of funding is another hurdle to CALL materials creation,

as Algerian EFL teachers cannot access new software tools and technological resources in language teaching. The cost of the to-be-used or to-be-developed technologies is of great magnitude in CALL materials production (Moterram, 2011; Reinders & White, 2010). Cultural resistances are other barriers to CALL materials use, as some teachers seem too attached to their most trusted "chalk and talk" (Cuban, 1999) methods, while others appear reluctant to share their most treasured resources with others or even use theirs. According to Dubin and Olshtain (1992), EFL teachers wonted to the use of traditional materials and resources are often inept in the use and production of modern and technology-based materials. The Algerian EFL context, then, is a point in the case where glueing to traditional approaches to materials use has kept at bay the need for insertion of more interactive and modern materials such as CALL materials. However, informants have shown their inclination and readiness for their future use- if the raised issues are solved, and the conditions allow.

3.2. Students' Data Analysis

This section aims at presenting and interpreting the data gained from the students before the CALL project. It reports on students' interests in and needs for using internet technologies to help understand their engagement in internet activities as influencing factors in their learning and use of technology in their courses; which can assist teachers to design appropriate technology-based learning activities and help the students complete their learning projects. Logs were used to unveil what engaged the participants on the internet in their everyday activities. Before filling in the logs and conducting interviews, the participants were briefed about the nature and purpose of the study and given instructions on completing the records. Taking into consideration the principles of anonymity, confidentiality and privacy, the participants were assured that the collected

data would not be linked to individuals. The language used in the logs and interviews was English.

3.2.1. Internet-use Logs

A representative sample of fifty students was asked to keep records of their internet activities. The logs are made of sections set out into four entries designed to answer the aforesaid research question. These aspects are as follows:

- Internet activities

- Time spent online

- The used devices

- Goals for using the net

- The accessed websites

The question type in the logs differed from one log entry to the other according to the data that the researcher aimed to obtain. Section one elicits participants' purposes for logging onto the internet by selecting all that applied from a list of eight items. The second section comprises two questions regarding time spent online and the devices used. The third section included one open-ended question, and a multiple-choice question and the last section entailed a chart where the participants note down the accessed sites and the language for surfing them.

3.2.1.1. Participants

The representative sample of this study comprised fifty students, who are second-year undergraduate students enrolled in a compulsory EST course (face-to-face delivery mode) and are assumed to be computer-literate. Respondents' ages ranged between eighteen (18) years old and twenty years (20) old. Male participants represented the overwhelming proportion as their number exceeded the (80%) of the sample population,

whereas, the number of females did not exceed ten girls (10%). It is worth to mention that the logs were distributed randomly regardless of age, gender or grades of the students. Figure 10 displays the gender distribution of the students' sample who took part in the study at hand.

Figure 10

Students' Gender
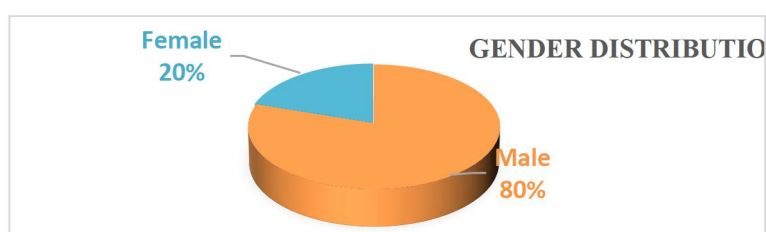
3.2.1.2.   Internet Activities

In the first section of the log, the participants identified their purposes for using the internet by selecting all that applied from a list of eight everyday internet activities: interaction, learning, search for information, checking the news, downloading films and music, playing games, writing comments, and blogging. Figure 11 below portrays how many times each activity was consulted in the collected logs. As the informants were allowed to check more than one item within each log, the total equals more than the number of the collected logs.

Figure 11.

Students' purposes for using the Internet
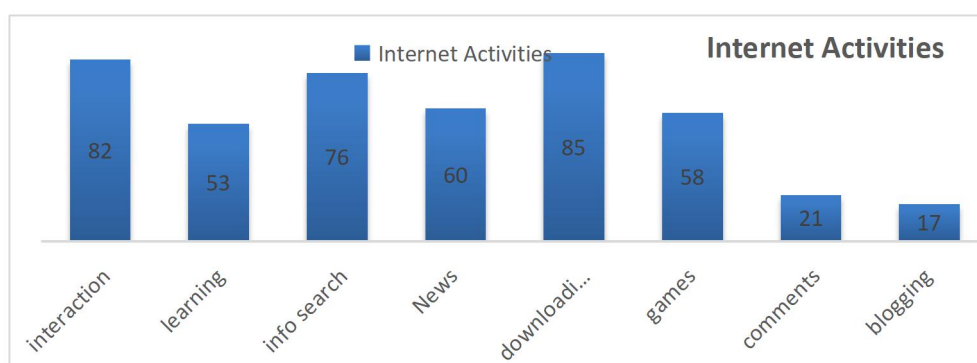
According to the data, it seems that there are two most prominent activities carried out by the students, namely interaction and downloading films and music through a typical web 2.0 phenomenon of social networking. Using a search engine to find information also features very high on the list of the most frequent online activities among the respondents (checked seventy-six (76) times). The third most reported usage was checking the news, followed by playing games (Fifty-eight times). Less than fifty-five reported using the internet for learning purposes. Some students also seem to use the web for posting comments on the web and, for unknown reasons; very few of them reported using a quite popular web 2.0 tool of blogging- an internet-based diary or log in which a user can post a text or digital material, while others can comment it. It was only checked seventeen (17) times. Only one participant reported not using the internet. When asked about this response, he replied that he simply did not want to share information about his internet activities.

3.2.1.3.   Time Spent Online

In the second section of the log, the informants were asked about the average of time spent online. Given the ubiquity of most modern internet-accessible gadgets, the participants may stay logged in all day long, but they only use them when necessary. For that reason, they were requested to record the overall hours they spend their time doing the noted activities. Participant logs noted how long it takes to perform their activities on the days they choose to record. According to the data, the majority of the respondents 52% (N= 26) stated they usually spend an average of 3-5 hours online, whereas 36% (N= 18) spend an average of 0-2hours. Four participants (8%) reported spending an average of 6-9 hours per day, while two participants (4%) stayed online for about ten hours (10H) or even more. Figure 12 below portrays students' access time.

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Figure 12

Students' average time spent online
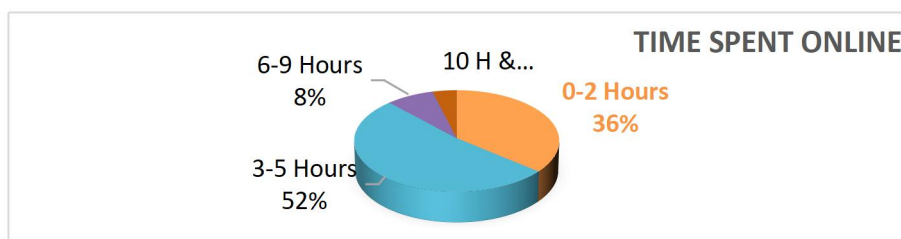
3.2.1.4. Goals' Setting

In the third log entry, two main questions were raised concerning the specific goals of using internet tools. The first asked the students to report any specific goals for undertaking the identified activity, while the second required them to specify the person who has set the given goal; is it the student himself, the teacher, or someone else. Regarding the first question, goals were organised and categorised; similar ideas were grouped with the names of those who set the goals.

The participants were also required to record the internet activities they frequently perform. The pinpointed main activities, according to the log responses, are organised in Table 14 below. They were grouped under seven headings corresponding with the respondents' goals for engaging in each task, namely social activity, study, entertainment, search, checking the news, shopping and not having any specific goals. These were elucidated as follows:

Table 14

The Logged Internet Activities

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	Participants	Internet technologies used
Social activity	20	- Messenger sites (e.g.Omegle, messenger, Snapchat) - social networking sites (e.g., Facebook, Twitter, Instagram) - email (e.g., Gmail, Outlook) - Viber
Study	21	- Search engines (Google, yahoo) - Social networking (YouTube) - Learning websites (e.g., Exo 7, Math 7, bibmath, coding Academy) - Encyclopaedias (Wikipedia) - Online libraries (golibgen, bookjuice) - Language learning applications (e.g., Quora, Udemy, Duolingo) - TEDx Talks
Entertainment	25	- Watching and downloading movies (e.g. egybest, shahid 4u) - Listening to music (e.g., RNJ music) - Playing games (e.g., timeslayer, league of legends, gamersnack) - Watching sports (e.g., bein sports, koora shoot, Yalla shoot) - Browsing sites that interest them (e.g., violion.com, Futura, Doctossimo) - Developing applications and programming
Search	21	- Google - Yahoo - Wikihow - You tube - Wikipedia - Comment sa marche
Check the news	15	- News websites (e.g., TSA, DW Arabic, CN Arabia, France 24) - Youtube news channels
Shopping	2	- Shopping websites (e.g. Aliexpress, Jumia)
No specific goals	4	

Social activity: The informants reported using particular sites and applications to interact with friends, family, and classmates. Communication via messenger sites and activities on social networking websites were amongst the most common internet activities recorded by the participants. According to the responses in the logs, participants explained that checking social networking sites was fast; they posted their status or just "checked in on Twitter" for a second. They usually interact with each other by either posting or commenting on others' posts on Twitter (as an example). The most cited network platform for social activity was Facebook.

Study: Online learning tools were top-rated among our students as they listed a variety of tools fitted with their learning practices. The participants noted that search engines were beneficial for their studies as they help them find answers to their assignments, articles or

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even lectures for the course topics of the week. Besides, using search engines, the use of learning websites to access extra materials and exercises to practice and revise what has already been done in the classroom was widespread amongst the students. The informants also perceived the use of YouTube as useful for their study; they are using it to get tutorials for their lectures to clarify any misunderstandings. Next in line, we find language learning applications such as Duolingo and Quora. Nevertheless, the participants did not mention using Chamilo (the school learning platform) for learning purposes.

Entertainment: The informants reported the need for entertainment such as watching movies, sports, listening to music, playing games, and other activities done during their leisure time. An interesting finding of this investigation is that although most of the students consider internet technologies as a source of entertainment during their leisure time, regularly, they tend to use it to develop applications, games and to learn programming and web development, once free.

Search: The students looked for information and materials via different tools such as yahoo, Google, and Wikipedia. The information included lectures, weather reports, tutorials, inspirational talks.

Check the news: checking the news was for both political and sports purposes as the participants checked the news to understand current issues or news at both national and international levels and, at times, to follow their preferred sports teams or sports figures. The participants did not note checking the news for academic purposes but just their interest.

Shopping: Two participants mentioned online shopping as an online activity. One of them preferred Aliexpress for her online shopping, whereas the other preferred surfing different

sites for product information, comparing products and prices and, then finding the best seller to place an order.

The obtained data disclose the students' habits towards the application of internet tools in their daily life and learning contexts, providing a glimpse at their daily online activities and unfolding certain information related to the sphere of learning English. It shows that the purposes of using the internet are diverse. Each purpose seemed to match participants' individual needs, interests, and goals. As such, the students appear to be engaged in a variety of language learning internet activities, the understanding of which might assist teachers in creating engaging class-related activities to increase students' engagement and ease the process of technology uptake.

It is equally important to know who made the choices and set the goals for the students' internet uses, as this might give not only a picture of students' engagement with technology but also helps gain insights on how do teachers take on the challenge of teaching digital students in this digital age. According to the log records, the reasons the informants opted for specific internet materials differed, however, their choices, more often than not, matched their goals.

Personal goals. Forty-two students reported using internet technologies solely for personal goals, such as social networking sites for social interaction. Seventeen (17) informants stated downloading songs, movies, and having fun in their spare time as main personal goals for using internet materials. The vast majority of participants listed using search engines such as Google and Yahoo to look for information of their interest. Fifteen (15) participants reported using the internet for study or language learning purposes. They mentioned learning programming, developing games and applications in addition to learning school subjects such as mathematics. As for language learning, their goals

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included learning new languages such as Japanese and Turkish, learning English vocabulary, improving listening comprehension and speaking skills. One participant reported using the internet for personal development through TEDx inspirational talks. Some participants also listed communication with others as an excellent means for intercultural exchanges and openness, especially with peers from other cultures. One participant mentioned not having any specific goals for using the internet, just using it for passing the time.

Both Personal and someone else's goals. Three participants noted using social networking sites such as Face book to contact their families and friends in their hometowns. Two of them reported chatting with friends on messenger and Viber because their friends used them for communication. The other participant mentioned using social networking sites to get in touch with worldwide peers with the same interest to open to the world and to make friends worldwide. They also reported consulting Facebook news pages of their hometowns to keep up-to-date on what is going on there.

Personal and Teacher's goals. Only four participants stated it was both their personal and their teacher's goal. They listed searching for exercises and materials to finish assignments and to revise the themes they failed to understand in the classroom as primary purposes for internet access.

All in all, students identified their own goals as the main driving motive for using internet technologies. A tendency found in the logs is that their choices were tightly related to their needs. Nevertheless, very few teachers asked their students to employ internet materials while learning. Like so, responses gained in this section suggest that different internet materials met different people's needs, interests and goals. The results also suggest that the students engaged in certain activities because they had specific goals for using the

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materials. Besides, goal setting and having choices are essential components to boost student engagement during a task (Chang, 2014).

3.2.1.5. The Language Used on the Net

The last section of the logs elicits the websites visited by the participants and the language they used while surfing them. The websites were listed and counted, and the languages used were counted and categorised into three categories: first language (Arabic), second language (French), and foreign language (English). According to the data gathered from the logs, the language used while accessing the materials seemed to be determined by either personal preferences or logged-in websites.

The participants identified about sixty websites, amongst which Face book, YouTube, Instagram, email, Google, egybest, TSA, Exo 7, Wikipedia, and coding academy are the most-used websites by the students. Table 7 below portrays the language used for each of these websites by the participants. It shows that the language the participants used most was French. This can be inferred to the fact that French is the language they are using to study within their majors. Based on the logs, the reasons why the participants used their first, second or foreign language are detailed below.

Table 15

The language used by the students while surfing the net

	Facebook	Youtube	Instagram	egybest	google	Wikipedia	Exo7	TSA	Coding Academy
Arabic	04	06	02	13	02	03	0	0	0
French	16	11	09	0	06	08	10	05	06
English	12	07	07	06	02	03	0	0	0
Not reported	01	0	0	01	0	0	0	01	02
Number of participants	33	23	18	20	10	14	10	06	08

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Facebook and Instagram: eight participants explained that they used Facebook or Instagram in French or English, to communicate with friends from other countries, especially for intercultural exchanges. Five participants used Arabic mainly when communicating with their families; while four informants specified that they wanted to deepen their second or foreign language learning by practising/using them on Face book or Instagram. The data shows that the addressees are the main reason for the language used in social networking communications.

YouTube: the informants noted that they were on YouTube to listen to music, watch movies, or study in Arabic, French or English. Students added that they usually look for tutorials about the points they did not understand in the classroom in French, while, at other times, they shared the videos found there with friends and made comments in the three languages depending on the language of the video under discussion.

Egybest: Many of our informants informed logging into egybest, which is an Arabic website for watching movies in Arabic or English. While the majority of these students used the language of the website, six participants reported watching movies and serials in English. The participant, who did not specify the language, explained that while the website is basically in Arabic, he watched videos presented both in English and his first language. They asserted that their attention was on what they wanted to watch.

Google: The informants used Google as a search engine, for using GPS, and for other services provided by Google. Five participants used Google search engines on the day they filled out the log, which was available in French on their devices. They reported searching for the information presented in all three languages. They stated that their focus is mainly on the information they access on Google, so that could be French, English or Arabic. The

two participants who used all three languages on Google were using the Google translation app, so they noted multilingual for language use.

Wikipedia: The participants used Wikipedia as a source of information on various topics of their interest. They specifically noted that the language they used depended on the researched topic besides their language proficiency when there is a choice between their second or foreign language; they usually used French mostly, Arabic or English.

Exo 7: The informants used French solely on Exo 7, as they searched the lectures and themes; they did not understand in their math classes. Besides, some clarified that they also used it as a source of exercises to practice things learnt in their classrooms. This website is in French, which is the language they used to study their majors.

TSA: Participants used French for checking the news on the TSA. The sole participant who did not specify the language explained that used both his first and second language for the same purpose. The informants explained that checking the news in French would help them improve their second language and ease their learning of other modules in the same language.

Coding Academy: Some participants showed a keenness to learn coding and programming, develop applications and games on Coding Academy. The informants stated that their focus was learning the fundamentals of coding, so that could be easier in French, the language of their major.

All in all, the language used by the informants showed that the students used various internet materials and resources and with other people with whom they interacted. These materials are, at times, put up in multiple languages, from which they could choose. Like so, they opted for their first, second or foreign languages based on their purposes and

audience. The participants reported using French and English most on the net compared to their first language, Arabic. This signposts that the participants are aware of the opportunities to be exposed to these languages on the internet and, more importantly, they were willing to use the internet in languages other than their mother language. This shows learners' willingness to take risks while learning, which implies their readiness to take on challenges in learning from internet technologies that, in turn, may increase task engagement.

3.2.2. Students' Data Discussion

Student's logs analysis revealed that our students' sample population are regular users of internet technologies as they recorded using them daily. This regular contact shows that the surveyed students are typical representatives of the so-called e-generation, whose life is dominated by technology, while social media and digital gadgets are an integral part of the culture in which they are immersed. As familiar to all the speakers of the 'digital language', our students exhibit acquaintance and experience with various web 2.0 materials. Many of them regarded themselves as independent users of the internet since most of their online activities are guided by their desires and goals. They usually spend an average of 3-5 hours online, and the majority of this time is spent on interaction with family and friends through social networking sites. This finding backs the idea that youngsters' online habits all over the world are pretty much the same. For instance, according to Richter (2013 cited in Selevičienė & Burkšaitienė, 2015), social networking takes up the most of Americans' online time; most of them spend an average of 37 minutes per day consulting sites like Facebook, Twitter, or LinkedIn. In the case of this investigation, social networking sites together with downloading and sharing videos and playing digital games, can be ranked as having a promising potential to be applied for learning EST, especially professional terminology.

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A small number of students reported using CALL tools for learning EFL, especially if we take into consideration that compared to other languages, the English Language is positively perceived by software developers, as a substantial number of EFL learning websites, applications were created as a result, most of which are free and easy to access. This can be inferred to several factors such as lack of autonomy and initiative as many students tend to rely on their teachers, focus on so-called difficult major-related subjects, or teachers and university as a whole neglecting their role in training and guiding students on how to use CALL. Despite this, an exciting discovery for this investigation is that our respondents seemed aware of the idea that internet technologies were already used as learning/educational tools, and that internet materials proved to be a useful learning medium elsewhere (e.g., mathematics). In the interim, the participants who reported using internet technologies for study purposes listed all types of technologies they have employed; at the top of which, we find: search engines, videos (tutorials), educational websites, and language apps to be their favourites. This signifies a fair acquaintance of our respondents with CALL materials outside the classroom, and their use as supporting tools for their classroom learning. This inclination towards these online materials can be invested in and used to boost students' learning. Likewise, the hybrid model (a blend of different media and face to face instruction) should be considered when planning a technology-enhanced EST course.

An outstanding discovery for our investigation is that some of our students are engaged with coding and programming different web materials and tools. The students explained that their focus was learning the basics of designing and developing various web materials and reported using internet technologies for such purposes as developing games, websites, learning applications and the like. Such activities meet the features of authenticity that can build on authentic tasks, which allow the students to learn, think, and

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solve problems as real engineers. Given that the students have a predisposition to internet materials, they can be guided to make proper use of these tools and exploit them effectively to incorporate CALL in their learning pursuit. Hence, making full use of CALL and magnifying its effect on learning call for proper training and guidance (Chien, 2004, cited in Wang et al., 2008). This affinity and willingness to develop digital materials and tools can have a tremendously positive effect on students' learning pursuit if appropriately and efficiently exploited.

The findings of this investigation show a mixed picture. The most positive result is that the students perform various internet activities to meet diverse needs especially that it was established that students' acceptance of web 2.0 tools for learning ESP rests upon their ability to use these tools (Selevičienė & Burkšaitienė, 2015). More concerning, however, are the findings that the teachers lag behind in designing and calling for activities connected to active engagement and collaboration with online materials and tools (e.g. virtual learning, online courses, materials development), particularly that students are more than ever prone to the active creation of online tools than to the passive reception of online content. This indicates that something should be done to motivate and train teachers to be more active online about designing learning as developed societies are moving towards a participative paradigm. From the token, students need also be educated on how to exploit existing e-tools and their e-literacy skills for monitoring, planning and creating their learning materials.

3.3. Implications for the CALL Project

The objectives of the exploratory phase of this research were to understand teachers' attitudes and skills, and learners' habits regarding the usage of CALL materials (mostly internet-based materials) to establish their technology acceptance levels as predictive of their adoption of CALL materials for learning English. The findings show that the majority

of teachers (at all levels be it middle, secondary or tertiary) were optimistic about the use and development of CALL materials given that some requirements are met, the least of which is the provision of adequate training and ICT equipment. On the other hand, students proved to have a more positive standpoint as they manifested some promising signs that indicated their inclination towards internet materials; they are in a way much more acquainted with ICTs and other forms of modern technologies than their teachers. Moreover, we have identified a gap between students' informal internet activities and formal learning primarily that they were rarely guided or required to perform any internet or CALL related tasks and or activities.

This investigation reveals the importance of CALL and internet activities for students. Through appropriate tasks, the students may become aware that these activities form an integral part of the whole language learning process and that they should invest their e-literacy skills to practise and solve their FL learning problems to improve their foreign language skills. By giving details about their internet activities, they can be better helped in their learning process and can receive authentic tasks much similar to the activities they already practice and the possible activities, with which they may not be familiar. The students can also share their materials and feedback on their CALL activities/tasks with the teacher and the other students so that the whole class and even the institution can benefit as they can also receive useful advice and feedback from others.

On the other hand, it is vitally clear that teachers can benefit from the findings related to students' informal CALL practices and activities. They can take advantage of these activities and encourage the students by suggesting ways to use appropriate tools and learning materials. Moreover, the teachers can build on authentic tasks that are based on students' informal activities that meet the features of authenticity and allow them to act and solve problems as real engineers. Likewise, the teachers could revise the way they teach in

the classroom and adjust it to the students' internet activities and integrate these activities into their curriculum and regular class or out-class activities, tasks or projects. They can also use more digital materials in the classroom and promote informal learning via adopting 'blended learning' (Meyer, 2007, cited in Bouchefra, 2017).

This study brought to light the fact that the internet is much used by the students in informal learning activities, as they were rarely asked to perform such activities by their teachers. However, teachers could take advantage of this by suggesting extramural activities and tasks that the students could practise on the net. Besides, they can also help students set learning goals during CALL-based activities and suggest materials development tasks in English to solve some of their learning problems. For instance, the participants reported that they liked to watch videos and songs and to share information and exchange their thoughts by commenting on social networking sites. Teachers can ask students to do a mini-project, find a piece of news, identify the problems, discuss and find solutions and present their results in a video. The students can demonstrate the videos they created to their teacher and peers and explain their choices or summarise their videos in a comment box. As such, with clear goals and authentic approaches to tasks/projects, students can be more engaged in the learning process (Lin, 2012). By doing so, teachers may engage students in different projects that mirror their usual internet activities and meet their needs, interests and goals. In this line, Reeves and Reeves (2012, p. 117) assert "it is much more effective to engage students in tasks that reflect the ways their knowledge, skills, attitudes and intentions will be applied in the real world". Taking into account the difference in the time spent online, teachers might also consider the amount of time needed to complete each of the assigned tasks.

Nevertheless, teachers can help to shape and leverage students' technology usage only if they are responsive to the needs of the professional world mostly dominated by

technology.   Hence, there is a right and responsible call to prepare teachers for the realities, trends and needs of the 21ˢᵗ Century. Indeed, knowledge levels, necessary competencies and teaching roles frequently change as education becomes increasingly refurbished by technological innovations. Henceforth, the goal of teacher education programs is to ensure that the training curriculum keeps pace with the changing professional practice and does not lose sight of the need to keep the foot planted in the realities of the educational delivery system. Educational institutions (middle, secondary and tertiary) also have a responsibility to their teachers and students to provide necessary facilities, be they hardware or software, and adequate training to ensure an education that adequately prepares them to function competently in their real-world professional roles.

In Algeria, CALL materials use, and development training faces several challenges, as evidenced by the data gained in this phase of the research. This is due in part to the negative attitude that teachers often held about CALL materials development which is perceived as difficult, expensive and oft esoteric. Teacher educators, trainers and coordinators must dispel existing myths about CALL materials development among both pre-and in-service teachers and optimise their capacity to lead independent initiatives in keeping with the Algerian educational agenda. One crucial step is to embark on a journey of continuous professional development where they make it their duty to peruse different CALL tools and modes and choose those that best suit their contexts (Jonassen & Easter, 2012 cited in Agamba, 2015). Like so, the creation of such positive learning environments helps encourage teachers to participate in future development activities. Furthermore, the experiences individuals go through in a given activity or course are presumably to shape their behavioural responses in future junctures as evidenced by the Attribution Theory (Weiner, 1972, 1985; Martin & Dowson, 2009). Thereby, the collaborative development of

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CALL materials for use in concrete EFL/EST subjects is necessary as well as their course plans and textbook support.

To ensure the application of the previous recommendations, it is imperative to organise them under one thorough action plan for a practicum project designed to respond to the needs identified above and carried out in the second phase of this thesis. The practicum project follows a bottom-up approach to the construction of a teacher professional development scheme achievable with less expensive interventions. The main aim of this professional development proposal is to enable faculty to create and implement course-embedded digital materials and tasks that address 21st Century skills of collaboration, communication and problem-solving. The process involves utilising technology to enrich textbook content and transform pedagogy via project works that build on students' recorded internet activities, with relevant adjustments, to offer a richer, more meaningful learning experience for the students.

The cornerstone of this practicum of introducing CALL materials development is forming a team of teachers ready to take part in this endeavour in our department. This team will be in charge of some organisational and practical aspects, yet its most important task is to define the type of enrichment to be embraced and develop a set of principles and criteria for this process. Therefore, they are asked to answer the following questions, mostly discussed in the next chapter, in focus group discussions:

- Why should we enrich the textbook with digital materials?

- What is the aim of enrichment? What teacher/student benefits do we seek?

- What type of enrichment?

- To what extent do we enrich a textbook?

- What parts of the textbook to enrich?

- ▪ How do we select enrichment?

- ▪ How do we engage students in the process?

Answering these questions by the participating teachers helps determine the overall strategy that shapes the implementation process and keeps it on track. The goals, objectives and the roles of the participants and their students should be clearly stated as they must be a combination of "institutional goals, faculty goals, and student goals" (Moskal, et al., 2013, p. 16) given that it is not viable to focus on one aspect at the expense of the others. From the same token, Moskal et al. (2013) listed some goals to be considered when planning a technology integration model:

> *Institution-centred goals might include more efficient use of classroom resources, or extending campus outreach. Faculty-oriented goals can include improved teaching through faculty development and adoption of innovative, student-centred teaching practices. ... Student goals are increased convenience and flexibility, expanded access, greater student academic success, or enhanced information literacy (p. 16)*

Though it was reported that materials development knowledge and e-literacy skills are significant recommendations for CALL materials development, the approach that the researcher suggests is a professional learning experience that allows the participants to learn from each other. As such, the project team involves individuals who are well knowledgeable about CALL and or materials development so that they can see the worthwhile of taking such a move and putting their expertise into the exchange with the other members in the form of peer learning. Ultimately, this collaborative action learning is much similar to a craft apprenticeship where the experienced practitioner defines and communicates to others how far or close, they are from full membership in a community of practice. Similarly, the team is expected to develop new policies or update existing ones so that the proposed innovative project aligns with the students' changing profile and CALL

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activities. Developing purposeful and strategic employment of students' basic ICT skills within the materials development practicum could improve their attainment, engagement and final grades. According to Sankey & Hunt (2013, p. 793), a successful strategy to ensure student engagement is to "manage students' expectations by focusing on learning outcomes and by establishing the relevance of the course to students' professional lives, particularly through authentic learning activities and assignments". Henceforth, building on an 'architecture of collaboration' among all the involved parties, be they teachers or students, can provide unprecedented opportunities for EST learners to become active contributors to their learning.

To confirm what has already been asserted, it is imperative to track the way the participants reveal and display their ICT skills with their pedagogical knowledge and skills in the design and development of audio-visual web-based activities through their reflections on the materials they produced throughout the project. Such practice would also allow us to form an overall idea about how well the approach worked out in our context, how well the students and teachers appreciate the approach, and what technical or pedagogical challenges might get along the way. The data collected after the implementation of the practicum project are organised and analysed in chapter five of this thesis. The next chapter (four), however, is restricted to the implementation phase where the enrichment process is carried out, and its principles and products are illustrated.

Conclusion

This chapter has combined analysis, discussion and implications of the data gathered in the exploratory phase of the research. Data of each sample population, be it teachers or students, is analysed, discussed and reflected upon. The findings from this cycle of the research identified a gap between students' informal CALL practices and

formal learning realities, given that they are mostly self-directed and personal-goal oriented. Teachers, however, proved to have a positive attitude towards the use and development of digital materials, whereas students had a more positive stance exhibiting some promising activities. In addition to the factors impeding CALL normalisation in formal learning contexts, this chapter has also identified several requirements deemed essential for CALL materials development and use in the Algerian context. Finally, data analysis and discussion sparked a vision of an ambitious professional development practicum, which would not only provide the participants, be they teachers or students, with insights about ICT integration into teaching/learning but also allow them to create content specific tools and applications mostly responsive to their contextual needs.

Chapter Four: Textbook Enrichment

Introduction

The current chapter is an endeavour to put together the theoretical rationale generated from the review of the literature with the findings of the exploratory cycle in order to put forward a set of informed digital enrichment practices that could help integrate educational technologies into the practices of teachers and students at the level of the English department at NPSES. It aims at giving a detailed description and presentation of the enrichment process with some illustration of the resultant products, be they students' or teachers creations; starting with a description of the textbook under concern. The focus group method was employed at this phase of the research to help set enrichment goals, types and procedures. The gathered data is analysed and presented according to themes emerging within the discussion, which are demonstrated in the operational plan as questions generated in the previous chapter. The chapter concludes with a summary and discussion of the obtained results.

4.1. Presentation of the Textbook: Technical English Level 2

Technical English is a four-level course destined to learners in technical or vocational education as well as employees in work training. It aims to develop the fundamental language and skills required for successful communication in all technical and industrial specialisations. The course has four main components:

- Course Book

- Coursebook Audio CD

- Workbook with Audio CD

- Teacher's Book with Test Master CD-ROM

The course reflects a task-based approach and follows a multi-thread syllabus, which is organised around functions, notions, grammar, vocabulary and the four skills. Content is presented in a cyclical approach, in which the notions and functions, tackled in one level, reappear with more complex grammatical exponents in superior levels.

Level 2 is intended for students who have accomplished level 1, or possess an elementary knowledge of general English, and require a pre-intermediate course in ESP; it is benchmarked against CEF level A2. The coursebook comprises twelve core units and six review units. Each core unit is parted into three sections unified by a single theme, which may be a function, a concept or a topic, and meant to be completed within 60 -to- 90 minutes each (see appendix C for textbook content). Each review unit reviews and practises content from the previous two core units and culminates with a project section, which encourages the students to carry some simple further research into topics related to those of the core units. The teachers' book with Test Master CD-ROM support level 2 teachers with explanations of key technical concepts in the course and a range of tests (entry, exit tests, progress tests and individual unit tests) easily customised according to purposes and needs.

The coursebook contains a section dubbed reference made of different sub-sections, which provide grammar summaries, reference material for the learner, extra material needed for pair/group work, audio scripts for the listening material, and a double-page speed search section containing several reading texts of different styles, topics, and formats for the scanning activities. Word lists of the keywords dealt with in each unit are supplied to the teachers and students in the teacher's books and workbook, respectively. The workbook offers further practice of the language covered in the coursebook and comes with a CD that affords extra listening practice.

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4.2. Focus Group Discussions

Priorly to the participatory CALL materials project, focus groups were conducted to offer the means to explore the perspectives of teachers on factors deemed necessary for their inclusion at the school. They were used to explore teachers' opinions, concerns and experiences. The participant teachers were tempted to generate their thoughts, questions, frames and concepts, and pursue their priorities in their terms. This helps certify ownership of the findings by the participants and, hence, improve their contribution in and commitment to the project, as they would become more eager to chip in if directly asked about their opinion on the subject under concern (Eliadou, 2007). Focus groups served as action learning conversations through a process of ongoing reflection and learning with the support of participant peers aiming to take action to improve practice (McGill & Brockbank, 2004). In this research, action learning was both a teaching and learning approach that guided the digital enrichment process. Focus group discussions allowed the participants to glean a framework for digital materials design, development and delivery by:

- Framing of enrichment as a conception

- Unpacking its meaning according to the context, needs and interests of the students

- Discussing different models of enrichment to build up one that fits our context

- Identifying assumptions that underlie current ways of framing the enrichment process

- Reframing our understanding of the CALL project

- Making more informed decisions and taking informed action to implement the project

The total number of focus groups was ten, and the discussion was guided by prompt questions to draw the participants' attention to the points that they may forget, to get relevant information to the practicum project, and to keep the conversations on the right

track to avoid having discussions out of subject/interest. Using the same prompts to set up the framework of analysis of the focus group transcripts offered points of reference that guided the layout of the heuristic maps of the emergent themes and subthemes. Henceforth, the presentation of the results will be guided by these prompts to avoid superficiality of findings and the over-interpretation of data.

4.2.1. Types of Enrichment

A shift from textbook-led teaching/learning to a textbook-based one, by harnessing the affordances of technology, requires a working definition of the notion of digital enrichment within specific contexts besides a general understanding of its meaning in standard EFL textbooks (Feng, 2005). Hence, as an initial step in our project, the team participating in this venture was to draw an understanding of this notion in line with previous research which has centred on the digital enhancement of general EFL textbooks (e.g., Mitsikopoulou, 2014, 2015), and later define the concept within the context of our work. This proved no easy task, on account that it is practically an underexplored area in EST.

Feng (2005) described three main trends of enrichment in EFL contexts. The first trend stands for 'individualised' enrichment which provides extra support for a minority of students by exposing only the gifted ones to a highly advanced subject matter. It is also known as acceleration or curriculum compaction. The second trend is addressed to all the students and offers them opportunities for personal and social development, greater fulfilment and intellectual satisfaction than the mandated curriculum (e.g., via problem-solving). Enrichment here is running through the whole curriculum and provides alternative approaches to its topics, promotes prolonged investigatory activities, presents accessible aspects of the subject uncovered by the syllabus, and highpoints nexuses with other school subjects. The last one sees enrichment as a set of techniques flexibly operated

for learners' educational needs. He (Ibid) argues that one's conception of enrichment has significant implications for the questions pertaining to it:

- for whom enrichment is meant and why,

- where and when enrichment should take place

- which parts of the curriculum should be enriched?

- Can all students benefit from enrichment?

Although digital enrichment can take on various forms (Feng, 2005; Mitsikopoulou, 2014), it is evident that it can never be a stand-alone quality, as it often entails the presence of what it qualifies, in our case, CLIL Textbook. Hence, it can be understood here as the creation of accompanying/additional digital resources to the materials presented in a global EST textbook, Technical English Level 2 in our case, to enhance the students' learning process, as well as a means for creating better opportunities for personal and social development, greater engagement, and 21st-century skills enhancement through problem-solving and project-works. This is to be done judiciously, as it is necessary to identify not only the content but also the delivery means, i.e., the technological features that can be profitably utilised for the set pedagogical purposes.

In practical teaching terms, as agreed by the participant teachers, the materials available in the package (as described in the previous section) can act as a base, or considered as a point of departure for further customised development when employing a new digital dimension of input, an activity/task to the existing content, or even a project-work that can be supplemented. The main objective behind such a consideration is to make accessible most of the materials within the package, especially those not exploited in the classroom considering time allotment limitations, and to play up the rich materials it offers.

After this, we moved to set the criteria for developing relevant learning materials to be used in the CALL project, which are thoroughly outlined in the next section.

4.2.2. Principles of the Digital Enrichment

Initially, it was essential to define the parameters upon which to base our decisions for the development of the digital materials. Henceforth, in order to make informed decisions about these issues, we have set a principled approach to enrichment, which draws on previous research (Mitsikopoulou 2014; Peacocck, 1939) focusing on the enrichment of general EFL textbooks and outlines a set of criteria for the digital material development in a CLIL, EST, course, as discussed below:

Principle 1: set focused objectives that establish a methodical enrichment running throughout the book.

The creation of goal orientation to enrichment excludes the danger of accidental enrichment in different parts of a textbook. Like so, attention was paid to have clear, well-defined goals and objectives for any kind of the suggested digital activities. For instance, videos are used to visualise graphic representations of content, when listening to descriptions, glossaries and edugames are collaboratively built for the learning and consolidation of content-EST- vocabulary. To provide methodological structure to the enrichment process and create some sort of internal cohesion, the same type of enrichment can be applied in different units of the textbook. This helps familiarise the teachers and students with the type of the digital supplementary material in the course and ensures easy progress and use of the enrichment material.

Principle 2: needs investigation and textbook analysis precede any decisions about the type and extent of digital enrichment

Informed decisions about enrichment (i.e., what and how to enrich) result from the systematic analysis of students' needs and evaluation of the textbook package. Thus, to develop the proposal for this EST context, a needs analysis was undertaken via focus group discussion with the participant teachers (English & content teachers). It uncovered the main difficulties they faced when teaching this subject, identify the linguistic and social skills they deem necessary in this area (case of content teacher), and elucidate the kind of support that they consider necessary and helpful for the students' learning. Then, the textbook was thoroughly analysed in terms of the results of the previous needs analysis.

Principle 3: the nature of the enhancement should be supportive of the textbook not subversive of its philosophy

The approach adopted to enrichment is not, any sense, a remedial one, attempting to 'fix' problems within a textbook or 'alter' its design and philosophy. The group adopted a positive stance aiming "to add to the quality" of the adopted textbook. In such a way, our enhancement process moved away from the ideology of correction (generally adopted by textbook evaluators) to embracing a support philosophy, which maintains the positive perspective held by the teachers towards the textbook under concern.

Principle 4: enrichment materials should introduce and establish some kind of connection with the students' content area

Given the hybrid nature of CLIL courses and the challenges it may present, the design of ubiquitous supplementary materials for the students to do outside the classroom at their convenience can help lessen these problems and facilitate the learning process. Since class time is exceptionally constrained, these materials should aid students to revise

what they study in class, also giving additional support for those in need, and providing learners with the chance to deepen their knowledge, acting both at the level of language and the level of content.

Principle 5: opt for resources that allow and encourage student contribution whenever possible

The contributing-student approach adopted in this intervention emphasises activities that involve learners as active contributors to the learning experiences and resources. Such activities encourage learners to contribute something to the LMS, Chamilo in our case and then build on those contributions as the basis of consecutive activities. These activities can have various forms and be executed both in an individual mode or by a group. A sample of the sort activities is a resource on Chamilo called 'Glossary', which is made up of an encyclopaedia, to which the students can collaborate to clarify the terms difficult to understand. For instance, each learner can search these words and generate entries, an image, a short definition, or any other information they may judge useful to a better understanding, besides keywords related to the concept, if any. The subsequent entries, with different layers of knowledge, will reappear each time the defined term or its associated keywords appear in any part of the course, thanks to hyperlinking.

Principle 6: enrichment may include activities/projects designed to aid learners to develop 21st-century skills

Students need not only to develop basic skills such as recalling information, understanding discipline-specific terminology, and applying linguistic rules in practice exercises; they must also be required to collaborate, search, analyse, evaluate, and create through appropriate tasks. Likewise, open-ended activities, where students are required to follow different and alternative mental paths or adopt their way of solving a problem or

carrying out a task, are desirable. Henceforth, the provision of challenging tasks by providing meaningful activities framed as quests or projects may contribute to fostering aspects such as problem-solving, creativity, and collaboration skills, which are highly esteemed features in 21st-century citizens, because technology alone cannot be able to cover them.

Principle 7: EST digital enrichment is an interdisciplinary project that necessitates the collaboration of experts from other disciplines

The development of an EST learning support system requires the collaboration of EFL teachers, who act as content developers, content teachers who help identify the language and content needs, e-learning and software experts for technical support, and the students as co-developers. The group members were required to similarly negotiate and contribute to the creation of digital resources for all the units of the textbook entailed by the EST program. They also discussed the roles they may play, as this would facilitate collaboration and build a sense of commitment in the participants, and allow them to enact their agency, and perform their role identities (see table 16 below for participants roles). This further ensured equal opportunities for engagement and contributed to the development of similar pedagogical and technological expertise.

Table 16

Project Participants' Roles

Participants	Roles
Researcher	Co-ordinator, mentor, resource person, co-developer/writer
English teachers	Language expert, Co-writer, digital material designer/organiser
Content teacher	Co-collaborator, resource person
e-learning expert	Technology advisor
Students	Input provider, co-creator

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The above principles were gradually developed during focus group discussions and were closely followed by the CALL project group. Refinements were added along the various stages and steps of the enrichment process, which are presented in the next section.

4.2.3. Phases of Enrichment

As for the methodology approved to design digital resources that enrich the aforementioned EST course, adopting the principle-based approach described in the previous section, it consists of three main stages, which are summarised in Table 17 below, *Needs and Textbook Analysis and Planning, The Enrichment Design, and the Implementation stages,* each proceeding in some steps. It is worth noting that while the use of phases echoes some linearity, which is essential for data presentation, the whole process proved to be relatively recursive.
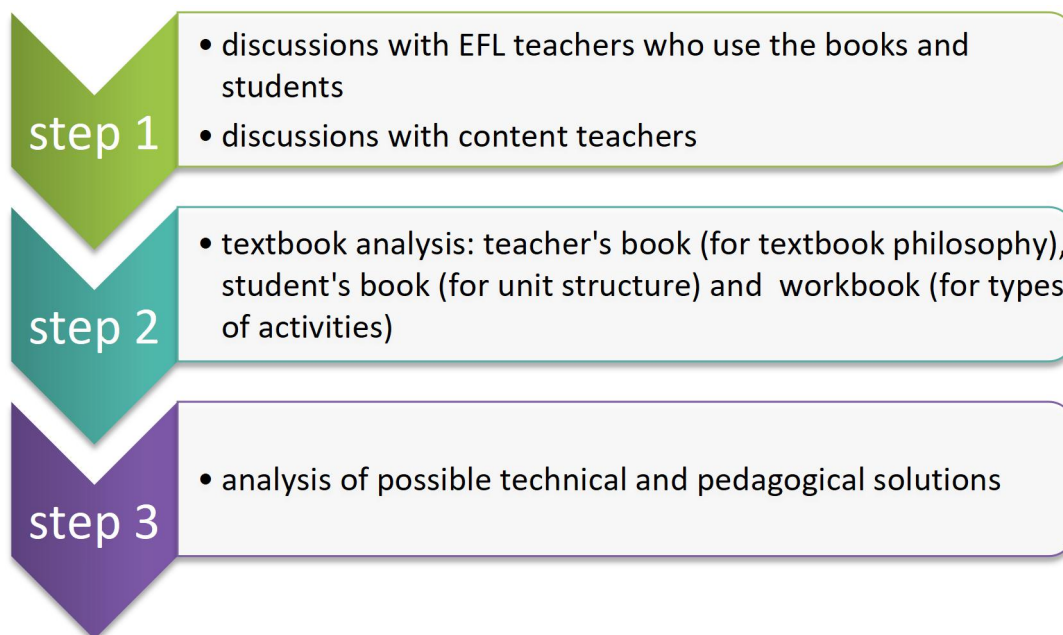
Table 17

Stages and steps to enrichment

Stage	Steps	Phase
Needs and Textbook analysis and planning	Step 1: needs analysis with English teachers Step 2: involving interested parties (content teachers) Step 3: reviewing the textbook package according to needs analysis results Step 4: identify possible parts in the textbook that need enrichment Step 5: the exploration of possible enrichment types Step 6: setting aims and objectives Step 7: settling types and degree of enrichment	Phase One
Enrichment Design	Step 8: Design Specifications Step 9: exploring appropriate pedagogical and technological solutions Step 10: create a sample of each type of enrichment Step 11: design project works to engage students as co-developers Step 12: discuss the projects and design briefs with the students Step 13: explore potential and get feedback Step 14: finalise product sample, proceed with the development	Phase Two
Implementation	Step 15: develop content Step 16: review content and get feedback Step 17: create materials Step18: review materials and check user interface Step 19: present students' materials and provide feedback Step 20: share materials in the Chamilo site of the EST course	Phase Three

4.2.3.1. Preparatory Activities for Enrichment

The first step of the preparatory activities involves an investigation, in the form of a focus group discussion, with the English teachers to identify the main difficulties they faced while teaching this subject, the things that work best for them, and the areas that need strengthening in the book, and illuminate the kind of support they deem necessary and beneficial for students learning. This step also involves discussions with content teachers to get their side of the story about key topics or themes relevant to students' engineering areas. Then, the whole textbook package is thoroughly analysed in search for possible ways to enriching it, taking into consideration the results of the preceding needs analysis. Subsequently, a list with all plausible propositions for enrichment is primed, considering that diverse facets of the textbook are covered. So far, it is imperative to formulate the aims and objectives of digital enrichment to be followed before deciding the kinds and degree of enrichment.

Figure 13

Preparatory activities to the enrichment

step 1
- discussions with EFL teachers who use the books and students
- discussions with content teachers

step 2
- textbook analysis: teacher's book (for textbook philosophy), student's book (for unit structure) and workbook (for types of activities)

step 3
- analysis of possible technical and pedagogical solutions

4.2.3.2. Enrichment Design Activities

This phase concerns the conceptualisation of the specifications of the type of enrichment. It comprises a detailed portrayal of the targeted materials, the assumed work, the media to be exploited, and all practical considerations for the development of the digital product. The next step includes a survey of internet resources with a reflection on the types of activities that could be generated from them, counting their affordances in view of addressing the learning difficulties and fulfilling the objectives identified in the previous stage. After determining specifications and examining possible pedagogical and technical solutions, it was essential to search for appropriate ways to engage students in the development process, taking advantage of their e-literacy skills. Next, design briefs are generated, and potential products are discussed with students according to their skills. The activities assigned to students were based on the learning content taught in class but also tempted the learners to use alternative resources and present their assignments in novel formats such as videos, presentations, games, infographics. Later, the materials were produced and curated in the Chamilo site of the targeted course.

4.2.3.3. Implementation

During the last phase, the complete activities, tasks, scripts are developed by English teachers, which are later revised by the group members, before materials are created and shared on Chamilo. After that, students' assignments are presented, and their products are discussed, and feedback was provided. Careful attention was paid to features related to the user interface for all the products (clarity of instructions, user-friendliness, the sequence of activities) and final amendments are issued before displaying the online learning materials on the LMS to which all enrolled students had access. Involving all concerned parties in the creation of digital resources has avoided one-sided approaches to the enhancement and

ensured that the process takes into account the feedback gained from the English teachers, content teacher and e-learning expert and the students.

4.3. The Pedagogical Design of the Materials

This section focuses on the pedagogical design of digital resources along the lines of Tomlinson's (2003) classification of educational materials. This latter includes the following types:

- Informative materials, inform the learner about the target language like glossaries, picture dictionaries, grammar comics, infographics and audio extracts

- Instructional materials, guide the learner in practising the language such as edugames, reading and listening apps, self-assessment tests

- Experiential materials, provide the learner with experience of the language in use like digital stories, virtual tours and interactive maps

- Exploratory materials, aid the learner to make discoveries about the language, e.g. a Mystery and a Lost series, English Quests and writing apps

Figure 14 gives an overview of the various types of digital enrichment resources developed for Technical English level 2 (TE2) according to the four categories of materials explained above.

Figure 14

Types of digital enrichment for TE2

informative	instructional	experiential	exploratory
• informs learners about language • glossaries, grammar infographies	• guide learner in practising the language • edugames, self-assessment tests, reading apps	• provide exposure to language use, ease personal engagement • videos	• aid learners make discoveries about language • web quests • electronic dictionnaries

4.3.1. Informative Materials

As the name implies, this type of materials offers information about different aspects of the target language. A series of resources have been used to create materials for vocabulary building (e.g., glossaries) and provide linguistic scaffolding (PowerPoint presentations and infographics).

Chamilo provides a tool named 'glossary' (see figure 15), which is made up of a small encyclopaedia that all those enrolled in the course (be they teachers or students) can generate collaboratively, as they discuss terms, they may find difficult to understand or retain. Each individual can share information about these words and create new entries with a picture for illustration, a brief definition of a concept, or any other content they deem illustrative as well as keywords associated with given concepts. The generated entries will reappear each time the defined term or related keywords surface in any part of the course, thanks to hyperlinking. This way, the students can click on the term, and a window with this glossary entry will pop up immediately. Likewise, students have access to different strata of knowledge to work out their doubts instantly, which proved useful for this EST course.

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Figure 15

Glossary generated by participants

Though intended for presenting dense statistical information, infographics have proven their utility in the teaching of foreign languages, English is no exception. As reported in the literature (Mitsikopoulou, 2014), infographics utility is tightly related to their ability to convey much information in a few words, they are much easier to read and remember as well as they advance learners' visual literacy. Further, they can employ different colourful graphics such as circles, lines, pictures, emojis, and laconic, terse, and easy to remember text. They can take on various forms and serve multiple purposes. They can be used as posters to illustrate certain grammatical forms (e.g., time clauses), new vocabulary (e.g., compound adjectives), punctuation rules (uses of a coma), or a writing technique (e.g., describing a process).

To this end, Canva (https//:www.canva.com) has been used to create different infographics to demonstrate different notions, functions, and vocabulary covered in the textbook (see figure 16). Students were also prompted to create collaboratively, or

individually infographics to visually represent useful information that they need to remember as a form of revision notes (see figure 17).
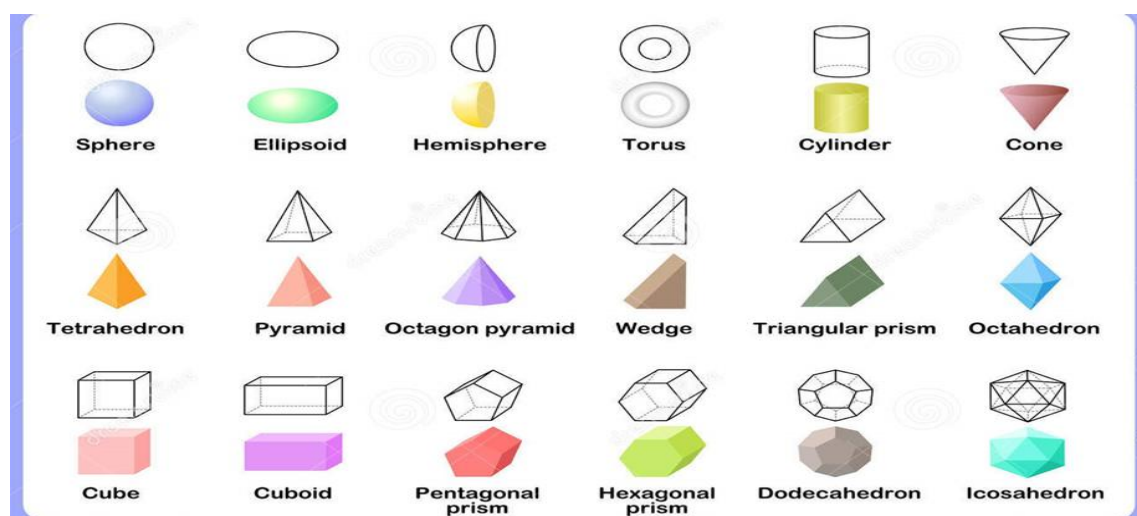
Figure 16

An infographic illustrating some phrasal verbs

Figure 17

A student infographic illustrating 3D shapes

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4.3.2. Instructional Materials

A series of resources have been used to create activities that lead the learners in working with essential scientific and technical vocabulary and review key disciplinary and language content. They help to examine comprehension and to review learning.

Matching activities were created using chamilo 'Matching activity'. Such type of activities allows students to make specific connections of aspects covered in different sections of the same unit, or other units. For instance, a brief account about specific elements (e.g., physical or electrical forces, properties of materials, testing materials) and the classifications they can have (e.g., types of materials: rigid, flexible, elastic, plastic) are discussed, learners can be asked to classify a series of materials according to these elements by clicking on the corresponding classification. Additionally, in figure 18, have been used to ask students to match each type of motion to its definition. Further, these activities are used to address some learning difficulties that students may have when dealing with words like 'How' and 'What', by aiding them to identify different types of questions and likely answers for each.

Figure 18

Matching Activity on Chamilo

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Moreover, simple choice activities were also developed using Chamilo tools to help students make some conclusions drawing on the information they have seen in class while reviewing some useful linguistic structures in a meaningful context.

There is no denying of the motivational power that games, be they physical or online, can have in creating enjoyable learning experiences (Tomlinson & Masuhara, 2009; Henry, 2013; Liang, 2011; Turgut & Irgin, 2009), and supporting academic development in different educational settings (Seaborn and Fels 2014). In view of that, edugames were prepared by teachers using well-known game and puzzle software (e.g., Wordsearch, crossword, unscramble words, matching, and multiple-choice) to offer practice in specific terminology and grammar covered in the textbook. *Educaplay,* for instance, has been used to develop a game (figure 19), where the students are required to compare and contrast the features of different mechanisms by selecting not only the aspects that they have in common but also the distinctive elements of each of them. When clicking on a given card, the name of the classification, to which it applies, emerge on the top bar, and the student has to click on the remaining cards pertaining to that group.

Figure 19

Identification of elements of a group

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As explained previously, the materials offered by the textbook package acted as a point of departure for the enrichment of the EST textbook under concern. Hence, a primary consideration for the group members was to make the materials available within the EST package handy and to uncloak the rich materials they offer. Like so, unit tests from the Test Master CD-ROM and review tests from teacher's book and workbook, which proved underexplored due to lack of time as revealed in focus group discussions, were converted into online self-assessment tests to be used by the students. This way, a test essentially intended for classroom assessment was transformed into a self-study evaluation means for the students to use at their convenience (figure 20). Chamilo 'Test' tool was selected for this type of enrichment. However, the transition to online remote assessment proved no easy task given the change in modes (Jewitt, 2002; Mitsikopoulou, 2015; Snyder, 1998), which necessitated, in some cases, redesigning some activities of the pen-and-paper tests according to software restrictions. Thus, the philosophy of the electronic resource and its associated customs acted here as a criterion of the selective process of activities.

Figure 20

Screenshot from a self-assessment test

4.3.3. Experiential Materials

Experiential materials provide exposure to language use by facilitating personal engagement rather than focusing on language items (Tomlinson, 2003; 2012). The experiential materials created for this purpose are built on visual and multimodal content. In contrast to instructional materials, this type of materials does not comprise any language activities. It is intended to serve as supplementary resources; it is left to the EST teacher to determine how they are going to be exploited.

Disciplinary information plays a crucial role in EST textbooks, as they are built on activating learners' content schemata to acquire new content knowledge and develop foreign language skills. Learners are often asked to understand and communicate subject-specific vocabulary in English, discuss and write subject-related matters, diagnose causes and suggest solutions in the target language, to learn about mechanisms and properties, and about various machines and systems, they have never seen before. In our project, we used YouTube, the most popular technological video tool today, in an attempt to make subject matter input more relevant to students. The main aim of such a task is to offer an additional resource, allowing students to visualise a specific mechanism or technical process. For instance, after students have a read a text about Tunnel Boring Machine in their textbook (Figure 21), they may watch a short video (figure 22) to enhance their experience with the machine, mostly that many of them failed to visualise the way it works from the text dues their language level.

Figure 21

A text on TBM from the textbook

THE MB471-316 TUNNEL DRILL – one of the largest hard-rock drills in the world

1 The face of the cutter has 85 teeth. Each tooth is 60 cm long. The cutter face rotates about seven times a minute. When it rotates, the teeth cut large circles into the surface of the rock.

2 Pieces of rock fall to the ground. They are collected by large scoops. They are then dropped into chutes. When the cutter face rotates upwards, the rocks fall onto conveyor belts. They are then carried to the rear of the machine.

3 Hydraulic cylinders push the body of the cutter slowly forwards. As it moves forwards, steel shoes move outwards and grip the tunnel walls. At the same time, two legs push down and lift the machine off the floor.

4 Fifteen electric motors supply the machine with 6,375 horsepower. The power is connected to the cutters by means of a 13,800-volt cable.

5 There are two drills attached to steel arms. These are located immediately behind the cutters. When the machine moves forwards, holes are drilled into the roof of the tunnel. Then the holes are filled with bolts and cement. This strengthens the roof.

6 The machine operator sits in a cabin at the heart of the machine. Here he/she controls its speed and direction. Video cameras monitor the cutter and the tunnel.

Figure 22

A screenshot from a YouTube video on TBM
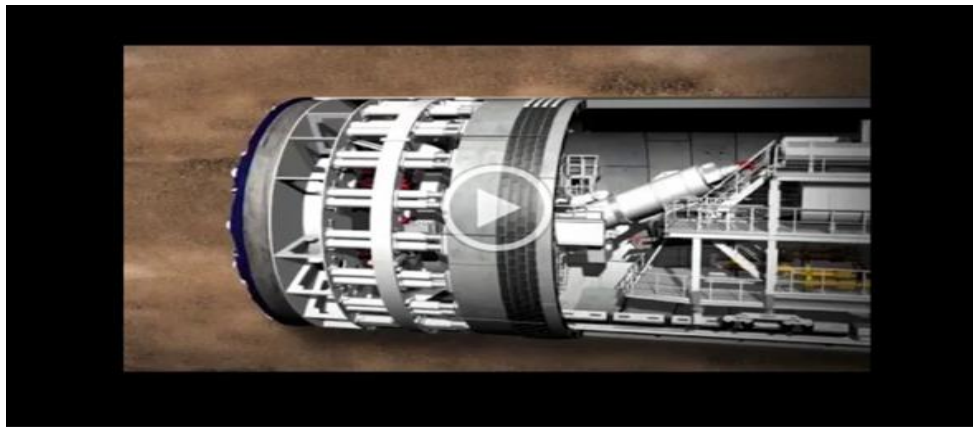
4.3.4. Exploratory Materials

Exploratory materials, unlike other types, aid learners to make discoveries about the target language. These include WebQuests, digital dictionaries and translators, and writing tasks. They involve learners in some kind project-based tasks, the case of WebQuests, or guide them through modelling and scaffolding to explore different subject-related genres.
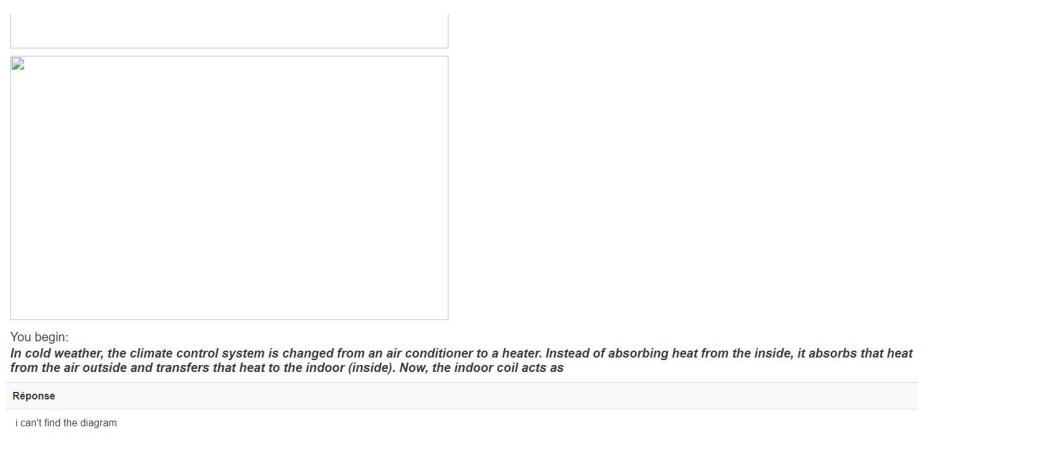
Some writing tasks have been designed to help students develop their writing skills while connecting what they are learning to their context and life. The 'open question' page offered by Chamilo has been used to create activities where students need to write their answers. Learners are often prompted to relate key ideas to what they know about the world and process them in a new way instead of committing to memory and repetition.

This allows them to showcase their understanding of the information they have learned. Some useful sentences with useful language forms can be made available as a means of scaffolding (see figure 23).

Figure 23

Essay Activity from Unit 8

You begin:
In cold weather, the climate control system is changed from an air conditioner to a heater. Instead of absorbing heat from the inside, it absorbs that heat from the air outside and transfers that heat to the indoor (inside). Now, the indoor coil acts as

Réponse

i can't find the diagram

Another type of activities that falls within this category is WebQuests. The idea behind such kind of enrichment is for students to navigate the web for a given problem relevant to previous topics discussed in class, assess appropriateness, collect and analyse information from different sources, and synthesise a response of some kind by creating a final online or offline product (see next section for samples of students' products). At the outset, the students were prompted to show how to navigate the web, use it to find useful information, and assess whether this latter is relevant to their learning.

E-dictionaries and translators are essential semiotic tools that students did not report using in their internet-use logs (see section 3.2.2). Hence, it was imperative to design activities that prompt the students to employ these tools in certain situations and for particular purposes. Such tools are useful for understanding the meaning and use of words in a particular context and a beneficial way to enhance their vocabulary repertoire. They can also help learners revise key deixis that is essential to understand the function of some

words, whose denotation changes from one discourse to another. Likewise, figure 24 illustrates an activity that has been designed the problem that some students have when they confuse nouns for verbs, and, accordingly, it aims to identify the words that be used as verbs or nouns, and those that do not serve this duality.

Figure 24

Deixis identification

4. Many words can function as verbs and nouns. two words in the list below cannot serve this dual function. Which are they. Use a dictionary, if necessary			
spoon	serve	husband	compost
rile	keep	meet	sloop
convict	effect	remove	rime

Save and continue

4.4. Engaging Students in Materials Development

The next step in this pedagogical intervention depended on assembling students' existing digital skills with their acquired/enhanced language ones to explore a problem- relevant to their field (EST) and responsive to their needs- and are led to critically resolve it. In addition to improving language skills, the projects target the enhancement of students' existing digital skills, specifically their ability to evaluate and use internet materials in their learning pursuit. This process focused on five main competencies:

- Plan and produce materials which reflect increasing proficiency in analysing situations and developing solutions
- Write and speak confidently and well
- Work with and get along with diverse people in several situations
- Serve in or lead teams productively

⁜ Produce targeted, effectively written, spoken and visual messages in media, group and interpersonal settings

Central to the project-works are their topics or themes because they inform not only essential vocabulary and language forms but also help articulate key content ideas and the final product looks. Four themes were presented to students who selected the one they wanted to accomplish. They deal with a variety of topics or themes pertinent to those of the textbook and relevant to the learners' academic area. The project-works were set into themes that can be of interest to students and connect what they are learning to their vocational context and life, in a way that prompts them to rely on their proficiency level to face EST roles and vocational competencies in the future.

The next sub-sections aim to elicit the layout, processes, and products that occurred in these task-based projects. They describe the general their layout by the example of one selected project cycle and provide a scenic view on learners' products resulting out of such projects.

4.4.1. Project-work Layout: A Task-based Project

The design of the project-works followed Kaliampos and Schmidt's (2012) contribution to task-based projects. It is intended to exploit the pedagogical potential of TBLT, EST, and CALL. In addition to enhancing presentation and language skills, it aims to enhance learners' idiosyncratic ways of learning, collaboration aptitudes, autonomy, self-direction and contributing flairs. It also aims to leverage learners' digital literacy skills by prompting them to push the limits of their existing ones to raise the overall quality of the final product. Accordingly, the projects are ideally organised and sequenced in tasks that require entails L2 performance while bearing liaison to authentic communicative situations outside the classroom (Ibid).

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Following these principles, in line with Legutke and Thomas (1991), the projects evolved in six steps (see figure 25). (1) In the preparatory phase, projects were initiated with a classroom lottery, in which learners were assigned their theme roughly two months ahead of classroom presentations. It was also at this stage that the students were divided into groups of 3-4 students and project-themed mind maps were collaboratively created on the whiteboard. (2) In the topic exposure phase, thematic frameworks were introduced to learner groups where learners gained an overview of the problem and were familiarised to the necessary vocabulary and concepts in a word cloud, from which they choose the essential terms to be defined in a learner-generated glossary. (3) In the self-directed research and data gathering phase, learners are directed towards the planning and colloquy of the final product, including choices about its form and content; an analysis of the necessary communicative and non-communicative competencies; and identification of potential activities and tools that would ease project completion. (4) Once the research is over, students start preparing for their data presentation; they had decided on the form and content of their project outcome, which was often in the form of a creative product such videos, edugames, picture dictionaries, posters, and multimedia presentations. (5) The presentation of each project took two forms. The learners presented and discussed their work in their classrooms and all the contributions were made accessible on Chamilo along with an interactive feedback system open to the students enrolled in the course. (6) The evaluation phase was undertaken in classrooms. Examples of the principle of meaningful task sequencing with a focus on learners' innovative products will be discussed next.

Figure 25

Project-works Process
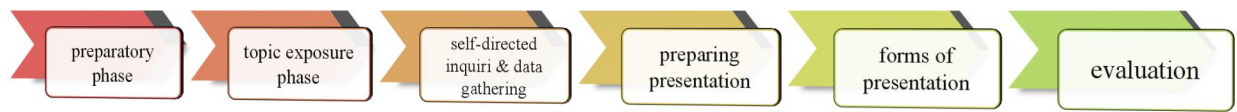
4.4.2. A Scenic View on Project Task-cycles and Learner Texts

We provide, here, one example of the assigned project-works. A scenic view on the range of learner texts and projects outcomes through the lens of TBLT projects, as explained above, is applied. Students' contributions reveal the accuracy and diversity of projects outcomes. However, for space constraints, we provide this example for two main purposes. The first is to illustrate the TBLT-cycles variety of texts developed by these EST learners. The meaning of a text, here, exceeds the products of written learner composition to virtually encompass any form of learner L2 production, using different channels and media of communication (Legutke, 2009; Kaliampos & Schmidt, 2012). The second is to provide a variety of our students' achievements along the process.

In the EST project-based curriculum described here, the teachers collaborated to adapt and design their class projects so long as they fit with within the framework of the EST textbook. On a practical level, all the projects have to:

- Be at least partly focused on the relationship between technical knowledge and real-life work or training situations

- Encourage the development of educational technology skills

- Encourage the building of the four core language skills

- Encourage the development of 21st-century skills

Following are descriptions of three types of projects and the relative themes and likely products of each within the context of this EST program. These projects are summarised in table 18 below:

Table 18

Projects Themes and Suggested Outcomes

Themes	Suggested Projects	Outcome products	Language Focus
Describing forces, material properties and causes/results	Making a documentary video explaining what might have caused the Titanic to sink so quickly and present it to the rest of the class	Video Presentation	Vocabulary: property suffixes: -able/-ible, -proof, -resistant Language: describing materials properties and explaining results
Problem-solving work-related problems	Making a presentation suggesting a solution to a work-related problem and formulating recommendations in a written report	Presentation Writing a Report	Vocabulary: engine and car descriptions Language: comparative and superlative forms
Making a presentation of an improved product	Writing a brochure or poster of an improved product against a given design brief and presenting it to the class	Poster/brochure Presentation	Vocabulary: aeronautics: drag, lift, thrust… Plane parts: wingtip, fuselage… Language: revision of a range of forms Skills: marking stages of a presentation

A Micro-analysis of Project Task-cycles: Documentary Video

In this example, a case project theme has been selected to allow for a condensed and deep insight into the processes and procedures of the projects.

Learner-produced videos have always been a first-rate EFL language learning activity that involves learner participation in a variety of ways. Nowadays, with the relatively recent onrush of digital video technology and a concurrent drop in video-making and editing software, videos have become an even more influential teaching and learning method in language classes. Digital video footage, editing, and authoring add to content's allure, as easy broadcasting and distribution opportunities enable learners to enliven their EST texts and share them with others.

Specifically, for this course, the multiple English skills entailed producing a documentary video and the digital literacy skills needed to effectively use video making and editing software rendered such type of projects very attractive. Some of the students enrolled in the course, as depicted from their internet-use logs, had used video editing software before, but none had attempted to make a documentary in English using such skills. The teams assigned the project approached this challenge in two different ways.

Few life events receive as much global social and media attention, especially also in EST, as the tragedy of Titanic, which uniquely illustrates technical material properties, resistance to physical forces, opinions, and research polarities of diverse investigations. As a cultural event, the ship and the corresponding tragedy stand out as examples of mediatized historical events that have been increasingly fantasized by the advance of digital media and social networks. This mediatisation appears to appeal primarily to our young and digital audience, as the exploratory phase findings show that social media are the most extensively used web-applications, be it for communication or entertainment, for our student population.

Likewise, the Titanic project represents an auspicious and stimulating topic for the pre-intermediate EST classroom. It is a cultural discourse that offers a twofold authenticity

for our learners. First, serves as an authentic representation of the target culture and utility of technical material testing and the tragedies they cause in case of misinterpreting or considering their properties. Second, it uses the same tools of computer-mediated communication as many of our learners do as a matter of course nowadays, as reported in their logs. The Titanic Sinking Project (hereafter, documentary project) presented our EST learners with the challenge of finding out the forces, reasons, and people that were responsible for Titanic sinking. Learners were to act as TV investigators, retrace theories of research investigations in the target language, and make a reflective prediction of what might have caused the sinking against the backdrop of the Rivet Theory, historical and social accounts, and their technical knowledge.

As an underlying idea of the project, the students were supposed to adopt one theory accounting for the sinking explanations- the Rivet Theory- and virtually become a TV investigator and critical expert by investigating the history of the Titanic, what makes it unsinkable, materials used in its construction, how strong/flexible these are, how many people Titanic would hold, the lives lost. The people thought responsible for the sinking (such as White Star Lines) in order to produce an informed and accurate prediction of this historical tragedy. This prediction was to be displayed in the form of a documentary video and was to be presented in the classroom. Figure 26 presents a heuristic map of the project designed using https://www.canva.com/join/ksr-vxh-svm.

Figure 26

A heuristic map of the Titanic Project
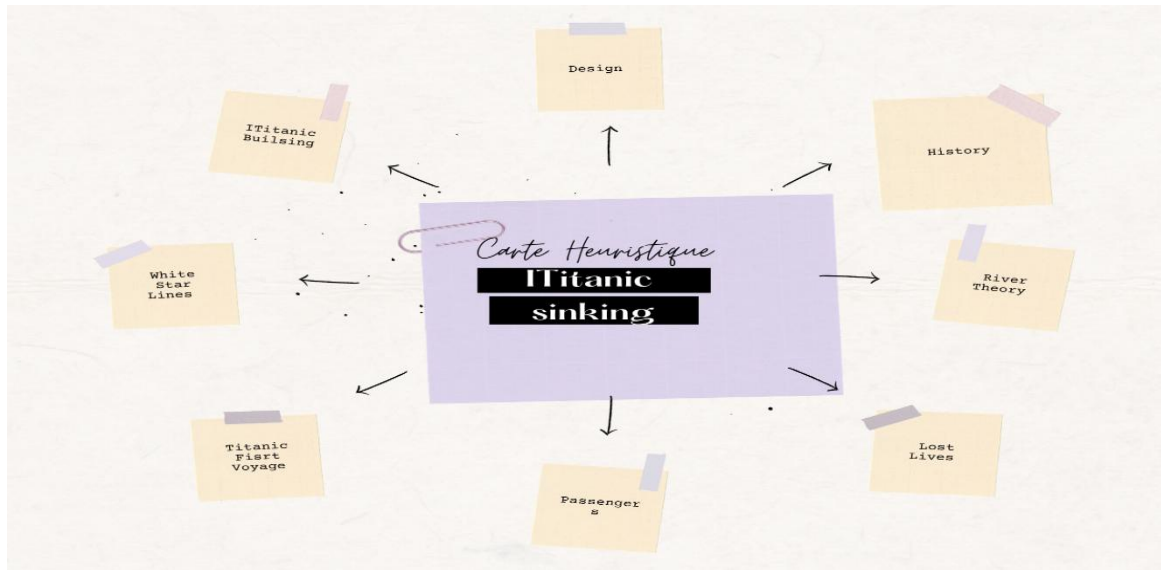
The project was introduced in four interactive task cycles addressing these topics: (a) history of the Titanic, (b) the design and building of the ship, (c) sinking of the Titanic, and (d) the Rivet Theory. In the first task cycle, the students were familiarised to the theme of the project and were guided to collaboratively generate a word cloud on the needed vocabulary and concepts using www.worditout.com/word-cloud/4514182 (see figure 27).

Figure 27

A collaborative student-generated word cloud
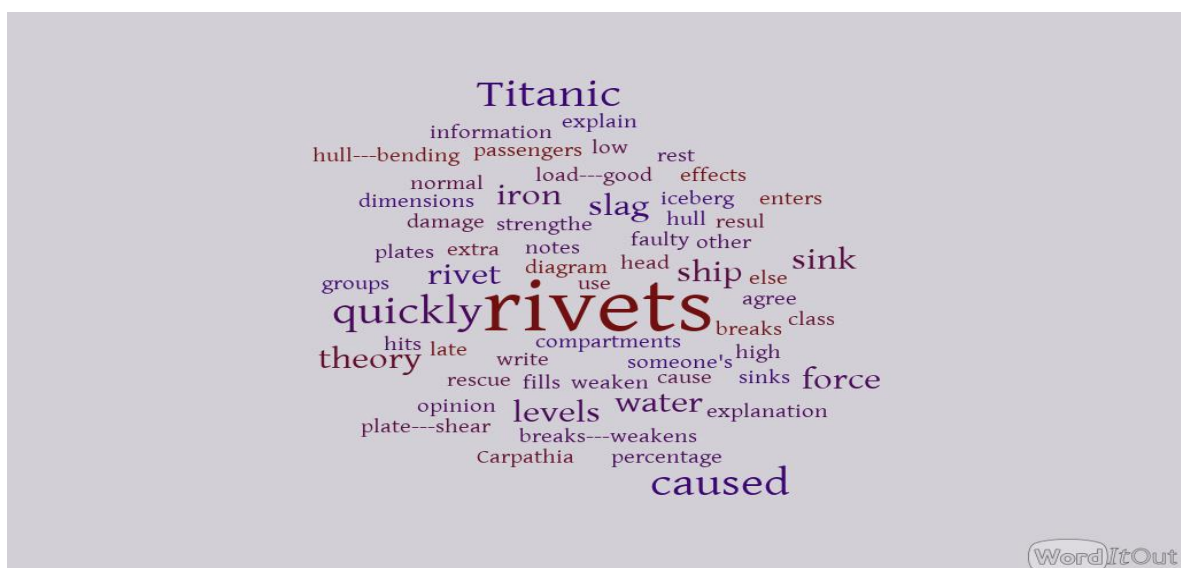
In the second cycle, the students are asked to gather information about Titanic from different sources tracking its design, building, and construction materials. In the next phase, the students are introduced to a timeline of Titanic sinking events (see figure 28) that students had to discuss according to the information they have gathered from the previous phase. The timeline provides a chronological order and a graphical visualisation on the events, a geographical map of the voyage indicating the ship's wreck site. It also presents a percentage of death rate per class and an RMS of the incident detailing total passenger fatalities. Next, they write an extended essay about the event as a synthesis of the information gathered so far.

After the essay is written and corrected by the teachers, students enter the third phase, where they are introduced to the rivet theory using the task cycle provided in the Textbook (figure 29). The learners discussed the theory and its accompanying diagram with their teams and, then the whole classroom. After, they were required to search for other theories accounting for the same happening, and compare it to the one discussed in the classroom. As a final product of task-cycle, the students are asked to write an explanation of how Titanic sinking was made more rapid by a failure of rivets using the information from the diagram, and how accurate this explanation is compared to the other theories, which they consulted.

Figure 28

Titanic Sinking Timeline

HOW TITANIC SANK

First five sections of the ship are flooded — 23:40-1:00

Stem lifts 45 degrees out of water — 1:00-2:00

Steam rises vertically and the ship sinks — 2:00-2:20

38% First Class
59% Second Class
75% Third Class
77% Crew

703 Survived
1,517 Died

Death rate by class

2,223 People on Board

THE RMS TITANIC

Passenger Category	Number Aboard	Number Saved	Number Lost	Percentage Saved	Percentage Lost
Children, First Class	6	5	1	83.4%	16.6%
Children, Second Class	24	24	0	100%	0%
Children, Third Class	79	27	52	34%	66%
Women, First Class	144	140	4	97%	3%
Women, Second Class	93	80	13	86%	14%
Women, Third Class	165	79	89	46%	54%
Women, Crew	23	20	3	87%	13%
Men, First Class	175	57	118	33%	67%
Men, Second Class	168	14	154	8%	92%
Men, Third Class	462	75	387	16%	84%
Men, Crew	885	192	693	22%	78%
Total	*2224*	*710*	*1514*	*32%*	*68%*

Source: www.Wikipedia.com | www.TitanicFacts.net
Prepared and Designed by Emin Sinanyn, Amberd Design Studio
www.AmberdDesign.com
9/26/2012

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Figure 29

Screenshot of Titanic project third task cycle

Source. Bonamy, D. (2008, p. 79)

Once their advisor checks the explanation, the students enter the last phase of the project. Now, they have to write a script for an informative documentary video about this tragedy using the information gathered and products generated in the previous phases of the project. The exemplary script in figure 30 is a contribution of a group of students, in which the students touched upon some of the most heatedly discussed cycle topics, i.e., ship construction, material resistance, myths surrounding Titanic, voyage information, causes of the rapid sinking, fatalities and consequences of the incident on maritime safety regulations, and, hence, tersely cover the core spots of the tragic incident.

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Figure 30

Exemplary student script

Titanic Video Script

If you've seen many movies that take place on the ocean you know how large and powerful the oceans of the world can be. It's hard to imagine a manmade vessel that could withstand absolutely anything the oceans of the world could throw at it. But that's exactly what many people thought about a ship called the **titanic.**

When the **titanic** left Queenstown, Ireland, on April 11th ,1912, with over 2200 passengers and crew members bound for New York, most of those on board probably believed the common myth that had been floating around for months: the titanic was

unsinkable...   UNTIL …

On an expedition in 1991 to the titanic wreck, scientists discovered a chunk of metal lying on the ocean floor that once was a part of the titanic 's hull. The Frisbee sized piece of steel was an inch thick with three rivet holes, each 1.25 inches in diameter [Gannon, 1995]. Since the retrieval of this piece of steel, extensive research has been done to uncover additional clues to the cause of the rapid sinking of the titanic.

the **titanic** disaster shocked the world and led to several new maritime safety regulations, higher-quality rivets or a thicker hull might have kept the ship afloat longer. but ultimately, the titanic was designed to be a passenger liner, not a battleship. "[the ship] was built to the best of their knowledge at the time and to the proper standards.

nothing could have survived what happened to it . . . "**the titanic** was just not designed to run into icebergs." when it did, nothing could stop its journey to the bottom.

Once the script has been approved amongst the team members, the students proceed to video making. The final step is to edit the video into a 10-minute news documentary and prepare a presentation of their findings and product to the rest of the class. At this point, students often prepare their presentations using PowerPoint (PPT) or other presentation software for showcasing data and material information and provide structure and flexibility to their talk. Figure 31 below showcases the PP presentation outline from the exemplary team project. By the end of the course, the final products are screened in class and graded by course instructors.

Figure 31

A group presentation outline
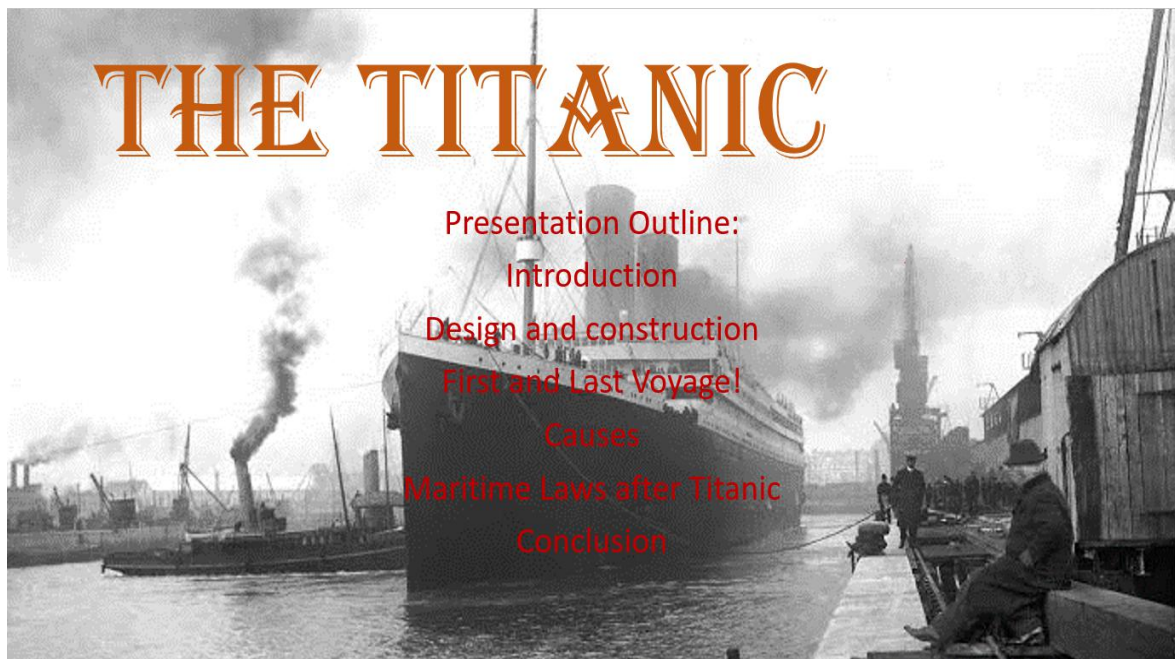
In terms of linguistic elements and demands, the task-cycles do not offer much information that would bound the necessary language competences. The students could draw their predictions from the information sought, discussed, and produced along the project process. Similarly, there is no restriction to the form and content of the final video.

However, the students are well aware that these outcomes are subject to assessment, and thus should meet proper linguistic and educational criteria as well as show a high level of creativity and uniqueness.

Our Comments

The learner demands associated with the production of this learner text are mixt. They comprise, among other things, linguistic demands regarding video script and explicit and pointed scenes; content-related demands, i.e., the search for prominent research on the topic and reaching a position towards these. Demands related to the creation and use of media, especially the video-making software, and also the selection and design of the scenery, writing style, and music are also issued. Discipline-related demands include discovering technical material properties and understanding how a let-down in their conformity leads to physical forces that can cause disasters; and, general characteristics of a news informative documentary as a genre.

This learner text can be categorised as a simulation, or rather, an interactive synthesis of the research, discussions and products from the different phases of the project. Here, in the exemplary learner text, the learners approach the Titanic tragedy through their research and different approaches towards its investigation. They do so by utilising the model of a graphical representation. However, this model is being used interactively in a non-static manner as a contextual background to their script (see figure 32). The learners embed their script in the context of the tragedy timeline, taking advantage of the course of events discussed in the second task-cycle of the research, and setting, the script and the scenery have been carefully selected by the students accordingly.

Language use is of great significance for the creation and the epistemic appeal to this documentary. This product entails the need not only to write accurately but mainly to

compose an account that is authentic of the students' rhetoric as well as embedded in a captivating narrative structure. The latter demand is met this example insofar, as the incident events flow chronologically with one another, the narrative gradually becomes more argumentative, and climaxes in the group's final supposition and final thoughts about the tragedy (see figure 33). The script does not only reflect the specific contents of the incident; it also comprises the technical rhetoric of the learning context.

Figure 32

Screenshots from a student group project outcome
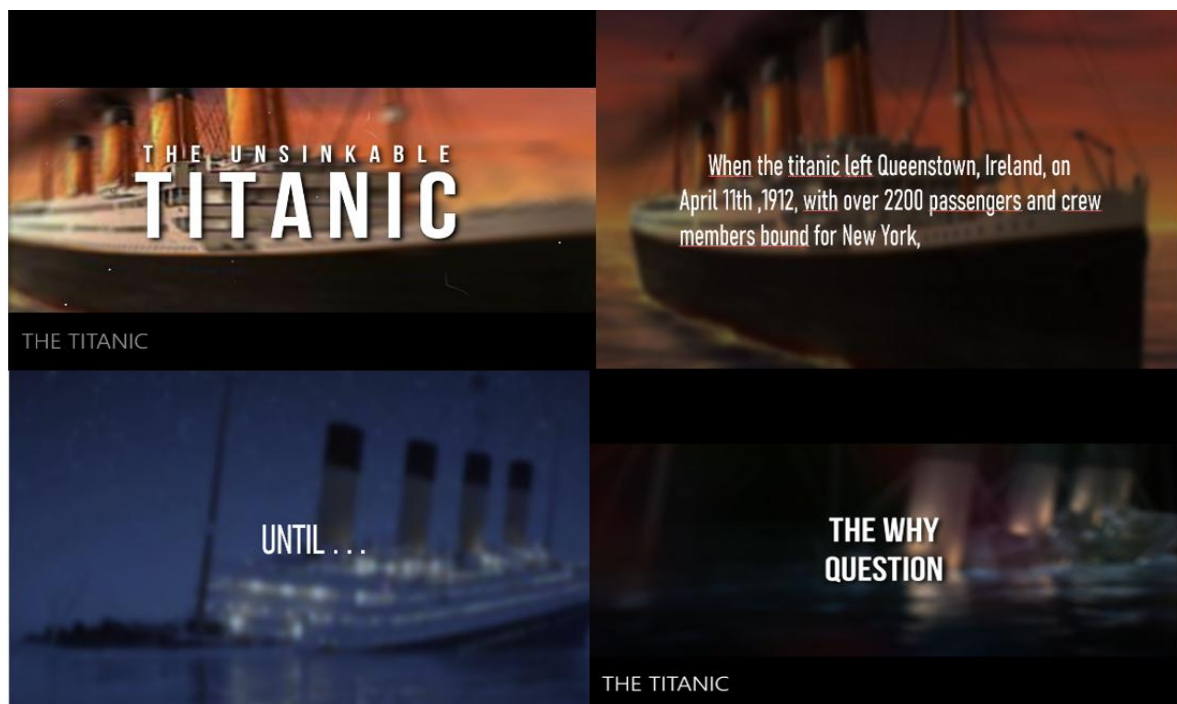
Figure 33

A screenshot of exemplary project final scene

These learner texts, thus, evoke a form of intertextuality concerning the typical features of an informative documentary manuscript as well as some particular discourses in the run-up to investigatory scientific and technical research, such as the use of vocabulary from the generated word cloud. Nonetheless, it is the choice and creative arrangement of these features that make these learner texts an interactive simulation of the target incident sprouting out of the project serial-arrangement, and learners' understandings and interpretations of the accompanying discourse.

Convincingly, we realised at the end of this process that the task requires all those involved, students or teachers, to plan carefully and adjust to unforeseen developments. It was vast and time-consuming, as it involves individual tracking of the participants and correction -feedback alternatives were very recurrent. However, as the stages of the intervention proceeded, the contributors were much more engaged and committed as well as much more demanding, in terms of negotiations, appraisal and collaboration.

4.5. Summary and Comments

This chapter has reported the design of EST materials through discussion and collaboration between the English teachers, the subject teacher and e-learning expert, and the students. In what precedes, the strategies, digital tools and resources that have been employed to supplement the aforementioned EST course were discussed. Eventually, these illustrate two critical variations of the digital resources compared to the textbook; namely, the new forms of interactivity employed in enrichment and the type of subject matter knowledge that is transfused through the digital materials. The first refers to the ways digital content interrelates with the content of the EST textbook and its impact on learning. In contrast, the latter refers to the digital visual representations comprised of supplementary materials that go well beyond still pictures to include short videos and voiced animations.

This project for CALL enrichment of an EST course has tried to address the challenges associated with such type of courses. It took into account the theoretical underpinnings of EST and intended to work on the four central areas of 21st-century skills, namely collaboration, communication, creativity and critical thinking. In truth, it aims to aid students to acquire and review disciplinary content, enhance their communication abilities both receptively and productively, develop their cognitive skills, and foster aspects such as creativity, collaboration, and problem-solving, which could be highly valued features in 21st-century citizens. This endeavour, as we have seen, targets different parts of the EST curriculum and includes a variety of materials including, informative, instructional, experiential and exploratory. Different tools and software were employed for this purpose, such as Chamilo activity tools and resources as well as other digital platforms and content creation tools (e.g., video production, online infographic tools), making informed use of the affordances of internet technologies.

The resultant materials have different characteristics. First, they provide explanations of relevant subject-related concepts that were presented using different digital tools, taking advantage of hyperlinking and multimodality. Second, these supplementary resources aimed at developing students' language repertoire by undertaking activities that allow them to communicate meanings, to understand and build content knowledge and to get things done. Likewise, verbal scaffolding activities were designed for students to learn the language forms in order to convey their ideas compellingly in a range of purposeful tasks. The scheme argues for the development of project-works that foster learners' creativity and critical thinking, and require them to collaborate with their teachers and mates to surmount their learning difficulties. Further, differentiation in learners' levels, styles, and interests was a major consideration to the design group that was sought through incorporating potentially motivating elements, hardly attainable with ordinary printed textbooks. More importantly, the new types of modalities characterising the supplementary digital resources displayed through an LMS expose students to new ways of meaning-making as well as new ways of learning.

Adopting a principled approach to the selection, design and curation of extra digital materials ensured a pedagogical experience marked by pedagogical consistency, interdisciplinary awareness, and a more personalised type of teaching, which may bridge some gaps related to either language or content hardships by offering ubiquitous resources that students can access at their convenience. Within this perspective, students are seen as global 'netizens' or 'cybercitizens' (Widodo, 2015), who can play a role in digital content creation and sharing, because they regularly participate in a digital world, to which they were born and with which they are familiar.

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Conclusion

The natural progression of this work is to assess the impact of this pedagogical intervention on the participants, be they, teachers or students. This could be done via reflection logs to record participants' perceptions of the usefulness of such endeavour, for which the next chapter is devoted. A subsequent step would be to evaluate the efficiency of the materials for the EST course, for which they were designed, which could be realised by undertaking a study, in which learning achievements of a group using the generated materials are compared with those of a control group. Nevertheless, it is beyond the scope of this thesis.

Chapter Five: CALL Materials Development: Change in Knowledge and Skills

Introduction

This chapter is devoted to investigate the usefulness of the practicum CALL project described in the previous chapter and its impact on the participants, be they, teachers or students. It seeks to describe practicum experiences as perceived by the participants in the reflection logs and reveal how it contributed to their learning and professional growth as understood from these experiences. The reflection logs provided 'student and teacher voices' that guided data presentation and analysis. This latter tackled first the reflections of the teachers who took part in the project, then those of the participant students. Next, each data type is followed by an in-depth discussion to interpret the findings, considering the review of the literature and the advantages and disadvantages that have been noted within the CALL materials development project.

5.1 Teachers' Voice: Change in Knowledge and Practice

This section reports on change in teachers' knowledge, attitude and practice as a result of their engagement in participatory CALL EST materials development. It details the conceptual approaches to and procedures for analysing and interpreting teacher participant collected data. Reflection logs were employed to gather qualitative data to elicit the respondents' perceptions. The data obtained from these reflection logs are analysed in relation to teachers' insights into the value of participating in CALL EST materials development. The findings demonstrate the impact of this latter on teacher professional development and students' language learning. Henceforth, the findings from teachers' voice could be interpreted in terms of whether they support, complement, add to or expand participants' knowledge, skills, attitudes, and practice.

5.1.1. Teachers' Reflection Logs

All participant teachers were asked to keep records of their journey in the CALL practicum project. The logs were guided with prompts, which are set out into two main sections designed to answer the last research question. The first log entry was meant to track teachers' CALL knowledge development as the project progresses, whereas the other log entry helped to map out students' language learning as perceived by their teachers.

Grounded (Croker, 2009) qualitative content analysis was employed for examining the reflections of teachers on their learning of CALL materials and their students' English learning throughout the CALL project as a continuous professional development initiative. This analysis allowed us to derive themes from the participants' reflections through their lenses and words based on their design of the materials and project works. Following a grounded approach, the researcher deeply read the reflection logs to identify, analyse, coordinate and order the data into emergent themes or nodes using Nvivo 10 through several extensive steps.

1. All written reflection logs were loaded to Nvivo 10, and one written feedback was used to build nodes.

2. Identifying all the emerging sub-themes in each part of the log; similar and interrelated ideas or thoughts were grouped together

3. Categorising and grouping all the identified sub-themes under four substantive themes, namely: CALL knowledge, professional development through materials creation, and students' EST learning, perceptions and challenges to the CALL project.

It is worth to note that these main themes did not shape the analysis; the nodes were reviewed, and the data was organised into themes with corresponding sub-themes as to

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make sense of the reported experiences (see table 16 below for the emerging themes and sub-themes). This was a post-analytic treatment of the developed nodes rather than a top-down one. In the data presented below, the findings are reported in terms of these four emergent themes.

Table 19

Themes Developed from Teacher Reflection Logs

Themes	Analysis	Token
CALL Knowledge	Disciplinary CALL knowledge (benefits and drawbacks)	-more authentic than traditional ones - raise students' motivation -improve content knowledge development and language acquisition -provide striking and rich multimodal resources -better engagement -creating more varied exercises -immediate feedback *-hardware playing up* *-adverse influence on students* *-not reliable as a testing tool*
	Instructional knowledge	-Activity type -technical problems faced -input selection -learning content difficulty
	Contextual Knowledge	-differentiated learning -student proficiency level -available technology -learner interest
Professional Development through Materials Design and Development	Analysis	-material selection (adoption) -material adaptation (enrichment, delete)
	Elaboration	-activity/task/project design -material development
	Collaborative Learning	-expertise exchange -collegial learning
	Interdisciplinary Learning	-developing content knowledge -developing digital literacy
	Autonomy	-less textbook-dependent -role & styles change -change in identity
Students' EST Learning	Creating Rapport	-ambient learning atmosphere -fun, relaxation, and satisfaction
	Collaboration	-teacher/learner collaboration -learner/learner collaboration
	Sympathy	-error-tolerating environment -learner/learner empathy
	Positive attitudes	-enhanced motivation -lower anxiety
	Better achievements	-enhanced results/better scores -improvement in the four skills -vocabulary building
	Engagement/participation	-more involvement in the course -active participation -less passivity

5.1.1.1. CALL Knowledge

Three components of CALL knowledge emerged along with the CALL project, and their development was reported in the teacher participants reflections. After analysing the textbook under concern, setting enrichment principles, deciding on the design of targeted materials, CALL components, producing online-digital exercises and tasks, and assigning project-works, teachers' reflections were illustrative of their knowledge and knowledge development of CALL.

Disciplinary CALL Knowledge

Understanding CALL entails being able to work out its benefits and drawbacks. The participants explained the way their knowledge about CALL as a discipline improved throughout the project. Likely, they demonstrated their disciplinary knowledge by reporting the main benefits and downsides of teaching in a CALL-supported environment.

Regarding the advantages of CALL materials, our respondents listed a number of them. The most frequently cited one is authenticity, which significantly assists in reinforcing lecture content with pictures, diagrams, videos, etc. that can help students understand better. Differentiation is another quite often cited benefit in the reflections. It is perceived as an excellent way to cater to students' varied learning styles and strategies. CALL was also conceived as an engaging and motivational factor as it breaks monotony for both the teacher and students. They also stressed that CALL is time-saving, as it helps manage lecture time better and bring to the surface things that can go unnoticed in a traditional classroom.

Similarly, the teachers maintained that the presence of CALL improves content knowledge development and facilitates language acquisition because it offers diverse forms of support that facilitate understanding of key ideas, as well as the learning of

linguistic knowledge and language skills that they need to talk about these notions. Other

minorly cited advantages include affording a space for sharing, immediate feedback, and

bearing flexibility across subjects. The following are examples that support these claims:

"using videos as materials can provide our students the chance to visualise a graphic representation of the content when attending to a description."

"static and dynamic pictures (e.g., Gif) can be used to clarify some shadowy ideas and illuminate possible doubts students may have about the way some systems work."

"benefits of CALL include time-saving, getting learners' attention and interest, providing a variety of choices to enrich the lessons' content, helping learners to get a deeper understanding of the points/ideas being discussed."

"different materials help me cater for different students' learning styles or memory: visual, auditory… they help engage the students more inside the classroom… the diversity of the materials makes it easy for me to decide what skill/part of the lesson is to be conveyed using what material… they break the monotony for both the students and me."

"harnessing the affordances of CALL helps provide various forms of assistance to ease students comprehension of EST content, and the learning of the language forms and skills they need to talk about these content/notions."

As for the drawbacks, the teachers came out with different answers; however, they

agreed on a couple of them. These drawbacks can be linked either to limitations associated

with some tools, the function of a type of technology, or adverse impact in the classroom.

They explained that Chamilo, on the one hand, provides a tool to create various exercises,

tasks, and even tests according to their students' cognitive and language profile and, on the

other, shows limitations of accessibility as it is only accessed on campus. This also shows

an awareness of using technology for blended and independent learning (in particular,

Chamilo in this study). Some participants referred to an adverse effect in the classroom, as

an over-reliance on technology may result in passiveness and laziness of all involved, be

they students or teacher alike. This brings the issue of proper pedagogical modelling to the

fore, without which the use of any technology would be useless, some teachers asserted. In

this regard, time is considered as both an advantage and downside, as some of the

participants maintained that using such materials requires adequate planning and preparation to harmonise them with the lesson objectives. The teachers split opinion when discussing CALL as an assessment system. While some have considered it as a time- and energy-consuming tool to exam administration and correction, others argued that it is not reliable as a testing tool. The last issue raised by the participants is the economic hurdle faced by some students, particularly for first-year students who are unable to access the platform since computers are only afforded at the second-year. The following are illustrative of these ideas.

"data-show makes it easy for me to use multiple media sources like audio, video, PowerPoint, etc..... availability of good data-shows in other labs is, thus, necessary. I would have found it more challenging to use it if I was made to teach in another lab. So, I am quite tied to the one I work in."

"Chamilo can be used as a form of distant or blended learning...being complementary to in-class teaching/learning...yet, it must be open to being logged in wherever the teacher/user is to achieve the purposes and philosophy behind it (like any other platform!)"

"my students-first-year- don't even possess a computer. How can I use the platform to support my classes? Further, it's only accessed on campus. Donc Chamilo pour l'instant is just a joke!"

"technical problems are often associated with CALL (e.g., sound quality, driver's virus infections...) ...misuse of these materials leads to passive teaching/learning."

"Sometimes, planning a lesson using a downloaded video needs a long time of preparation to adapt it to the lesson's content and learning/communicative objectives."

Instructional Knowledge

The second category of CALL knowledge that the teachers have established during the CALL project, as demonstrated in their reflections is Instructional CALL. This type of knowledge entails acquaintance with activity design (type and sequence of activities, learning deficiencies), besides a conversancy of technological courtesies in digital materials design such as graphic design, medium, colour, as well as right materials choice.

The teachers revealed their knowledge about the digital considerations in creating CALL materials, including graphic layout, activity type (e.g., game, multiple-choice, matching), colours and illustrations used (pictures, videos, diagrams) and clarity of instructions. The pedagogical reasons behind such considerations include increasing motivation, facilitating comprehension, avoiding ambiguity, and assuring ease of use. Remarkably, clarity of questions and directives guiding the exercises and tasks was reasonably considered. The participants explained that any lack of clarity might result in students' failure; appropriate guidance is an essential consideration. This is a result of the transition from face-to-face teaching/learning to remote instruction. However, this is not the sole impediment that the participants faced; technical problems were very prominent. However, despite these tech hiccups, the participants have settled confidence and developed skill in coping with the technical side of the project. In this vein, some participants wrote:

"It was an experience of trial and error…it was rather fuzzy at the beginning since it is a first-time experience…mistakes were usually made when creating the exercises/tasks on the platform… yet, we managed to accomplish the task successfully, hopefully!"

"background of the exercise must be appealing to students as it may affect their motivation and interest in the task, input materials such as texts, videos, diagrams, pictures must be attractive as well so that they enjoy doing the task."

"scores were added to the exercises and tests so that the students can assess their knowledge. A time limit was set for every test that we have created to prepare the students for exams. However, we didn't set any time-limit for revision exercises."

"we managed to add next and back buttons to shift easily across a series of activities within a test."

"We created a question bank, from which teachers can easily select the ones they want to create a quick test."

"hyperlinking was used to add glossaries and dictionaries for a better understanding of difficult vocabulary within a text… difficult words were associated with glossaries for easy access and comprehension."

"individual task instructions were, more often than not, rewritten to avoid ambiguity… lack of clarity may lead to a misunderstanding and answers mix-up."

"It happened that I created the whole thing/exercises but failed to share them… all that I have done was in vain!"

"even though we had limited technical expertise, we managed to create some useful backup to our course…it was a fruitful experience despite exertions."

Contextual Knowledge

Contextual knowledge implies an understanding of the transversal bond between context, pedagogy and material (be it a text, an activity, a task…). In this vein, the teachers displayed their contextual knowledge by responding to the requirements of the leading players in their context, namely their students and the CALL environment.

Learner relevance and differentiation were crucial aspects that teachers sought at different levels. First, there should be a differentiation in levels to match the proficiency levels of students, the teachers emphasised. Students' needs and interests, and digital literacy skills were influential considerations in materials writing according to the reflections. Variation in activity/exercise type according to these influential factors was a recurring theme in the reflections. In this regard, the focus was both on students' proficiency level in English and content knowledge and norms. Differentiation in terms of learning styles was another important consideration, according to the informants. Equally important, the teachers ranked learners' attitudes towards the platform as a critical consideration before any CALL endeavour. Especially in Algeria, where traditional teaching methods are still dominant. These ideas are evident in the following quotes:

"Some factors are key considerations in any materials writing tasks like students' needs, interests, and level."

"Input materials must be relevant to learners' speciality, and within their proficiency level… it cannot be above or under their level… for better comprehension."

"I assume that it's time for change… we are tutoring a different generation of students…they are better acquainted with technology than us… we must take this into

account and plan change accordingly… traditional teaching methods are no longer as valid as they used to be!"

"enrichment needs to be addressed to all students, be they lower- or advanced-level learners, each according to his level and capacities."

"CALL-enrichment can target the majority of students despite their proficiency level either in terms of content or language… a rich set of resources (open-ended exercises, virtual tours, quest exercises, creative tasks/projects…) where each student deepens as much as s/he wants/can, maybe convenient for this purpose."

"variety of material type can cater for different learning styles…reading texts and written exercises work well with reading/writing learners…videos, diagrams, graphic representations, flow charts. for visual learners…videos and vodcasts for auditory, while interactive resources can stimulate kinaesthetic learners."

"students' familiarity with technology does not necessarily bring about acceptance…It may be misleading… Accustomed to traditional teaching/learning methods, the transition to remote or blended learning may be difficult for the learners…being largely dependent/tied to their teachers, it is difficult for them to have positive attitudes for a new CALL environment where they have to totally or partially rely on themselves"

Contextual knowledge also encompasses CALL/technology environment as reflected in the logs. The technology available, its different attributes, access to it played a crucial role in the design of the enrichment materials. The following extracts show the advisements the teachers had when developing the digital materials concerning dis/advantaging the students.

"The platform allows the teacher to keep a record of exercises done by the students, the items they frequently missed/failed, and get an insight of what the difficult areas maybe for them…identifying in this way potential lacunae to address."

"We cannot ignore that first-year students do not have personal computers! The way we will proceed with first classes should be arranged accordingly; otherwise; this puts these students at a disadvantage in learning through the Chamilo platform."

"internet access is crucial! Students may face problems finishing their project-works if they have limited or no access to internet…they may discourage them and may even lead to abandoning the assigned work."

5.1.1.2. Professional Development through Materials Design

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Reflecting on the CALL project, the teacher participants hailed in-house CALL materials development as a platform for professional learning. Their reflections indicate that this endeavour is a form of professional development that permitted them to obtain new knowledge, understandings and skills, which built on and improved their prior knowledge, boosted their understandings of language and language teaching/learning practices, and honed their skills and practices concerning language materials development. The study participants spelt out, like the following teachers, that taking part in the enrichment process symbolised ongoing professional development, as it contributed to deepening their knowledge and expertise in the domain.

"Definitely! The CALL project contributed to my professional growth. The discussions that we had together and the various issues concerning materials selection and adaptation contributed to deepening my knowledge and expertise in the domain."

"That was a first-time experience! Collaborating with the other teachers, be they English or vocational ones, in selecting, designing and elaborating CALL materials is an initiative, I never took before. This made me realise the importance of ongoing professional development that can be captured via a collaborative professional enterprise such as digital textbook enrichment. Participating in new ways to integrate technology informed by CLIL along with practice opportunities, incited my knowledge and understanding of teaching EST through CALL to develop 21ˢᵗ-century skills."

The project-participants were, expressly, satisfied with the team approach to teaching and materials development, which they described as rewarding compared to individual approaches. This satisfaction is attributed to the good synergy between the project participants, which often involved organised focused proficient discussions that left no room for misunderstandings with what was required. Such measures enhanced the participants' engagement and commitment to the project. Academics viewed collaborative action and team-teaching approach as primary contributors to the project success and their professional learning. Collaborative action in critically reflecting on already existing (adopted) materials-textbooks, reviewing and redesigning their content, and developing new materials was indicated as a good opportunity for professional learning that has

contributed to the development of new understandings, insights, and practices in materials development.

"working in a team approach helps teachers exchange knowledge, experiences, one another's application of technology and teaching practices, techniques for better evolutions of lessons and tips for dealing with low-achieving learners. Teamwork, especially in a friendly and unstressful atmosphere, makes teachers share their teaching difficulties and seek help from colleagues' experience and expertise."

"collaboration is essential to view things from different perspectives. Hence, with the process of enrichment, one may take into account some aspects (e.g. learners' level, adequacy to the lesson's theme…) and neglect others. Collaborating with colleagues helped in widening the elements of concern while trying to enrich my teaching content by limiting and narrowing down the list of materials to be selected."

Another factor that the participants considered as influential when discussing the adopted team-approach was interdisciplinary collaboration. They stressed the role of the vocational teacher as a collaborator in identifying engineering topics and selecting scientific and technical input materials, recognising in this way the importance of topic and theme selection in materials design and development. In this regard, one informant clarified *"now, I recognise that I need to understand subject matter content, in our case engineering- scientific and technical content"*. While another one argued that language is coalescent to content *"language is an emissary of content. While learning EST content, the students developed both their technical and language knowledge."*

They as well acknowledged that such collaboration allowed a deeper understanding of students' needs and realms of interest, which enhanced the quality of the selected and created materials. They reported that focus group discussions provided a forum for professional dialogue, where the participants shared their concerns (e.g., material creation, understanding scientific/technical vocabulary, …), expressed their students learning needs, and found ways to guide their students with functional language analysis.

"I believe that collaborating with the content teacher was a good idea. This teacher is specialised in science and technology and has some knowledge of the English language.

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That helped in getting a deeper understanding of EST learners' needs and domains of interest. That was of a great benefit while trying to select, adapt, and create materials."

Another theme that the teachers expressed in their reflection logs is the improvement in their materials design and development knowledge and skills. The English teachers described the changes emanated in their knowledge and abilities in EST materials creation, coming out from their active involvement in the analysis, evaluation, design and development of CALL EST materials, which they ranked as a rewarding experience. They learned from the process of digital enrichment (described in Chapter 4) by taking part in a series of activities, including needs identification, setting a principled approach to enrichment, textbook analysis and evaluation, identification of main competencies, goal formulation, topic choice, authentic material search and curation, text adaptation, activities/tasks/projects design and creation, as penned by this teacher:

"the digital enrichment was planned and verbalised during coordination meetings. We had to analyse the EST textbook, students' as well as teachers' needs, students' informal CALL practices, and ways to integrate these into their formal learning. Though time-consuming and burdensome, this process allowed us to come out with language materials relevant to our students and context. Thus far, we designed the materials based on our beliefs and institutional program. We took advantage of students' informal CALL practices."

Acknowledging the role of students' voice in materials design, the English teachers emphasised the role of authenticity (both input and task) in content knowledge building and language development; one of them further explained that vocabulary and grammar are always cohesive and interrelated:

"I realised that authenticity is central and challenging. Whereas the internet has made it easy to curate authentic input, task authenticity is ensured by the teacher. Through appropriate tasks, students can learn the real use of technical terms and grammar. For instance, when the students talked about technical problems in the workplace, they learned vocabulary, which is important for reporting these problems. They also experienced writing a technical report. This way, vocabulary learning is more realistic than memorising lists of technical terms and grammar rules."

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Materials design and development skills are not the only areas that teachers benefited from; the practicum project was also beneficial for upgrading their pedagogical practices and raising their information search potentials and e-literacy skills. They learned to search for, select and employ the information they find on the web. They further reported that they discovered new content creation tools that can enliven their lessons and instructional materials, and revealed that this helps create a wide range of activity/task type. The English teachers agreed that technical assistance improved their technology-related expertise and allowed them to develop their teaching praxes when working on authentic language input/output to create digital materials. Their comments in the logs varied to indicate these benefits:

"The design and creation of digital materials was a new endeavour in the school. We used exercise creation tools on Chamilo to develop different types of activities that explored different dimensions of technical concepts and language resources. Although at the beginning we had difficulty working on the platform, our technical and technological know-how polished... we learned a lot along the way!"

"technical assistance and collegial mentorship directed us towards exploring and employing multimodality and hyperlinking, creating new types of activities and tasks, besides new forms of meaning-making."

Moreover, teachers' awareness of their role reconfiguration and change in styles and practices emerged in their reflection logs as a motivating factor that boosted their involvement and devotion to the project. Most participants realised their increasing autonomy in that they grew less textbook-dependent, which positively impacted their self-image as more capable teachers, who are no longer passive deliverers of marketed coursebooks. The following remark by one of the teachers summarises a good number of participants remarks in this regard:

"the thing that has made me more proactive in becoming more textbook free because I was not...if I think back to when we started, I wasn't really...I don't think I've ever heard of digital enrichment or not taking any notice of it, or even thought whether the textbook material is suitable to my students...hence, the proactiveness was a self-discovery and development journey with the support of peers."

5.1.1.3. Students' EST Learning

Mostly, the teachers evaluated students' contribution to the CALL project in a positive light, especially with language improvement and motivation. The teachers realised enhancement in their students' motivation by reporting two facets of motivated behaviour, namely participation and attention. They argued that most of the students could speak and discuss more (participation) and that many of them were all ears (attention) to their classmates' presentations, particularly when broaching new and exciting topics and genuine attractive products. On the whole, the English teachers felt their students have become more participatory, contributory, and engaged in the lessons. They further indicated, like the following participant, that this energetic involvement has diminished teacher dominance, which boosted their autonomy and engagement in the course, and triggered the development of different skills at a time.

"Most students show a high level of motivation, whether working on the project or discussing their colleagues' ones and tend to ask questions during and at the end of the project-work presentation. This is maybe due to the fact that they see it as an alternative to classical learning, where the teacher is at the midpoint of the process. Here, learners feel autonomous and practise using many skills at a time."

After engaging students in the CALL project via project-works, the participant English teachers agreed that the vast majority of their learners changed their attitudes towards the EST course because most of them realised its benefits for their future careers as engineers. However, few students were stated to maintain negative attitudes towards the method and were not active because of this reason. Two main explanations were cited for such averseness, namely disinterest in the topic and presentation and the incumbencies of working with CALL and putting up with the ensuing extra burdens. One instance is a teacher who scripted:

"contributing to the CALL project via project-works opened most students' minds on new prospects and further benefits of learning EST, basically for vocational and research purposes. As usual, this is not the case for all the students, as there are a few who are not

interested in the topic and do not give it any importance or value. Others find it burdensome, considering their study so-called overload."

Most of the students were claimed to gain benefit and improvement but with a slight difference. It is witnessed that the project-works allowed them to revise and employ technical vocabulary, amend their pronunciation, and improve their language and presentation skills. All the teachers stressed the fact that the four skills are not the only zone, which gained benefit. They thought that the pedagogical intervention was also advantageous in terms of discovering and interaction and clarified that the project-works prompted the students to search, discover, and present information in new and creative ways. Some participants pointed out that this CALL experience is stimulating, as it helped the learners hone and polish their e-literacy skills, and discover new ways of employing technology in their learning pursuit. Explaining how the CALL project helped their students become better EST learners, the teachers mentioned different justifications; the latter could be organised as follows:

"the project-works aimed and helped in developing some skills, mainly presentation ones. To a lower extent, speaking and writing skills as many tend to rehearse the part, they are to present…another category of students works hard on their writing by summarising their project findings and on developing their speaking skills by using note cards and expressing themselves spontaneously…"

"The diversity in students' artefacts provide evidence of their digital literacy skills and interest in the project-works… they have learnt as declared by some of my students to benefit from their informal hi-tech practices in their learning of English."

"The project boosted learners linguistic and sociolinguistic skills through acquiring and employing new technical vocabulary, language structures, together with presentation processes and discussions."

Many teachers reported that change in their practices, due to the CALL project, positively impacted the classroom environment, and shared their stances towards the humanistic aspect that grew in the class; they felt that the students become closer to each other and to the teacher, who became more of a guide and coach than a knowledge transmitter. Some informants mentioned the amusement, positive energy, confidence

enhancement, sense of competitiveness and security, and motivational nature of the intervention as main aspects that formed a convivial classroom atmosphere that was conducive to learning. Some thoughts expressed were:

"As for the classroom environment, there is a noticeable improvement in interaction and positive energy in addition to the sense of challenge between learners having the same topic."

"in terms of teacher/learner relationship, the project allowed the students to be playing the role of a presenter, which is traditionally performed by the teacher. So, the roles are reversed, and this led to a better understanding of what does it look like to be a transmitter of knowledge…something which, I believe, made the relationship less formal and more intimate, but still respect-based."

Most of the teachers believed that cooperative learning ensured via group-work was timely and operative for building a sense of community and solidarity among the students. They explained that the bond between the same team members have grown stronger, which allowed them to learn from each other, mostly that these were mixed-level groups, and develop intimate and cooperative relationships, generating a more profound sense of motivation and confidence. The following quote exemplifies a joint reflection among the group:

"project-works, in my opinion, have shown the sense of solidarity and cooperation between learners, especially the fact that they were done in small groups, which were mixed-level ones…in many occasions, a student intervenes to help clarify a point by another group member to show that everything is ok and under control."

5.1.1.4. Perceptions and Challenges to the CALL Project

Teachers' perceptions of the CALL project were chiefly laudatory with an admission of the need for further consolidation about some emergent challenges. These barriers can be listed in four main points:

First, the challenge in this study was to develop learners' proficiency in English and 21st-century skills within an EST programme. The main contention is that learners' major programme is generally packed with lectures, tutorials, revisions, and preparations for the

aggregate examinations. A project-work in an EST class will, likely, be viewed as an encroachment upon the time available for studying rather than a constructive endeavour. The teachers explained that some students complained saying that this is 'burdensome' and 'time-consuming' given their 'study overload'. Other constraints that teachers opine include time considerations due to learners' decision to allot more credit hours for a given module and inadequate response to a given EST related assignment.

Second, limited access to Chamilo Platform compared to other virtual platforms was ranked as a significant challenge to the contributing learning philosophy underpinning the CALL project. The participant teachers argued that the features of the virtual platform in Chamilo are more productive when there is a ubiquitous space for teacher/student interaction; ongoing discussion in the virtual platform is essential for feedback, coming from teachers and peers.

Third, technical problems, either when preparing, creating, or accessing digital materials, were a recurring theme in teachers' reflections. Data from the reflection logs indicate that the Chamilo Platform is very new to the teachers as well as to their learners. They explained that regular technical support in the features of the VLS was frequently needed for both groups.

Fourth, the informants clarified that the quality of a student contribution to the CALL project might be contingent on his self-perceived English language proficiency. They believed that some students lack the motivation to learn EST as well as participate in project discussions stems from negative perceptions of not having adequate skill and fluency to contribute to given project work, presentation, or discussion.

5.1.2. Teachers' Data Discussion

Reflection is the last cycle of this EAR journey, which serves to understand personal and professional accounts as lived experiences. It is also a tool for deep introspection and evaluation as well as action and change (Cirocki & Widodo, 2019; Widodo, 2015). In this cycle of the research, the teachers wrote reflective logs as a means for reflecting on what they experienced in their pedagogical journey and their engagement in the practicum CALL project. This reflection-on-action act helps the research participants, including the researcher, to understand their experiences and practices and become more reflective, critical, and analytical about their roles and actions.

Feedback from the teachers was chiefly approbatory with an acknowledgement of the need for further consolidation concerning some emergent challenges. They agreed that the CALL project was a new gripping, rewarding and motivating experience that helped them mature personally and professionally. They clarified that their lessons have grown more illustrious according to their students' needs and interests, which raised their motivation and engagement in the EST course. Such change in practices was also acknowledged by the teachers, who have felt that they have reconfigured their roles, enhanced their knowledge and reshaped their professional identities while engaging in context-responsive pedagogies.

The CALL project allowed the participants to renew and co-construct their knowledge and to change the way EST could be taught. Throughout this journey, the teachers reconstructed their knowledge and beliefs about CLIL materials development in terms of design, approach, content, activities/tasks/projects, and CALL. They developed their pedagogical knowledge of CLIL in EST materials development through sustained practice spanning two academic years. This is consistent with a literature base that suggests the impact that experience (both personal and professional) can have on teachers' beliefs about

pedagogical content (Richardson, 1996; Widodo, 2015). Data from the reflection logs highlight the importance of both content knowledge and an informed understanding of language materials development as a whole.

Participants also reported transformations in their CALL knowledge as a result of the design and development of CALL materials. Such knowledge encompasses diverse domains, namely disciplinary CALL, instructional CALL and contextual CALL knowledge. Most teachers understand that technology could offer a host of benefits, but these are subject to some principles to avoid its rather adverse outcomes. Approaching digital enrichment with such conscious notions has assisted the teachers to develop a set of principles with a focus on positive areas (authenticity, facilitating content and linguistic knowledge acquisition, providing a myriad of resources); displaying in this way their disciplinary CALL knowledge.

Technical design of the materials and activities lies at the heart of CALL instructional knowledge. The teachers showed their instructional knowledge by taking advantage of the strengths of CALL materials (see section 1.2.5), namely hyperlinking and multimodality, as critical aspects in activity/task design. They also took advantage of the practicality of technology (Chapelle, 2003) in terms of activity layout (background colour, size, font), while paying attention to the clarity of instructions given the change in learning mode. In terms of activity/task, the teachers focused on the type (open-ended, close, crosswords, writing apps) besides the sequence and developmental relationships between activities/tasks as fundamental elements to their effectiveness. It is worth noting that design is not merely a concern voiced in teachers' reflections; it emerged as a source of motivation in learners' reflections as well (see next section).

Contextual knowledge includes two essential elements: learners and at hand technology. Teachers' reflections indicated that learners were at the centre of the enrichment process by considering their needs and interests. This reflects their underlying commitment to learner-centred pedagogies by focusing on the authenticity of input and learners' needs (Kramsch et al., 2000). Besides, teachers have demonstrated critical and adequate knowledge of the technologies at their disposal, which is essential for their judicious decisions about their uses. Literature also documents that CALL knowledge can hardly be separated from general pedagogical content knowledge of the teachers, as they are complementary and informing each other (Sert & Li, 2017). Hence, learner-centredness revealed through teachers' reflections can also be attributed to their previous knowledge and beliefs.

Other reasoning echoed identity changes citing the increase in teacher autonomy and confidence. Participants' engagement with PAR changed their beliefs about their roles as mere transmitters of marked textbooks; they felt that taking part in the project helped build a more potent teacher identity chiefly characterised by the ability to introduce modifications in the curriculum via abreast and democratic decisions that are, basically, context-sensitive (Banegas et al., 2013). Such personal and professional development impacted the teachers positively as they perceived themselves more of facilitators and guides rather than spot persons when it came to roles in the classroom. This shift in instructor role was induced by a change in styles and pedagogical practices.

The teachers valued interdisciplinary dialogue and chronic reflections as key components of the entire design and implementation of the CALL project. They took the view that it was an occasion to discuss and disclose their ideas as well as mull over their pedagogical practices. Through PAR, the teachers accredited this enterprise as a means to discover varied pedagogical practices, apply EST to their materials and classes, integrate

CALL to practice, and prolong their motivation to improve their professional learning. Further, sustained reflection along with the PAR cycles through a series of pedagogical actions (e.g., focus group discussions, writing a reflection log) was approved by the teachers as a tool for becoming reflective practitioners, who are reflective-reflexive creators of knowledge from/for their context (Borg, 2010; Goodnough, 2010). As such, the participants turn out to be members of a digital materials development assembly held together by the mutual pursuit of a joint learning experience, epitomising a community of practice and a collaborative learning community (Wengen, 1998; Widodo, 2015).

In light of the above, the teachers and their students created a conducive pedagogical environment where learning to contribute became relevant and meaningful, even when e-literacy or language proficiency is limited. The CALL project, not only changed learners' attitudes towards the EST course, but also synergistically motivated the teachers to alter and improve their practices by exploring material development process, peer learning, and a participatory approach with a focus on ongoing professional development. Such a change in teaching practices motivated the students to overcome their fears and grow more autonomous and better achievers; a fact that was also revealed in learners' reflections (see next section).

Although this journey was time and effort-consuming, and required harmonised efforts, aiding teachers to understand the integration of new technologies and concepts (content-based instruction) through action is vital for their knowledge development and understanding of the language materials renewal. To this end, ongoing professional development schemes should be encouraged and sustained.

5.2. Students' Voice: Learning to Learn and Learning to Design

This section seeks to describe CALL practicum experiences as perceived by practicum students. It portrays the usefulness of the project-works and the designed CALL materials, and how they contributed to the learners' academic growth as depicted from their reflections. It presents the analysis and interpretation of the reflection logs used for eliciting students' accounts on these issues. The findings reveal the learners' perceptions of the pedagogical intervention to evaluate its effectiveness and gauge their stance on this matter. Thereof, the findings from learners' voice could be interpreted in terms of their perceptions, be they positive or negative, CALL learning environment; contribution to EST learning, and development of their e-literacy skills.

5.2.1. Students' Reflection Logs

A purposive sample of fifty students was asked to keep logs of their computer-assisted EST learning experience. The logs were guided by question prompts, which are set out into four entries. The learners' perceptions towards the overall experience were recorded in the first log entry, while the second reported their thoughts on their experiences in CALL material development project-woks. The students reported their coping strategies for their choices regarding the materials they employed to create their digital products in the third log entry, whereas the last log entry elicits the informants' ideas and suggestions for improvement.

The garnered data were profoundly analysed and scrutinised to inductively derive meaning in the real setting, using a grounded approach. This includes investigating fifty (50) log narrations in great details to provide thick and rich information for the study. Using Nvivo 10, the data were grouped on a similar dimension called a node, and this node was given a name. These nodes were later grouped into categories forming the main themes that emerged from the data. Constant comparative analysis guided the data analysis

process following the same steps used to investigate teachers' data (see section 5.1.1 above). The emergent themes were classified under four main categories of perceptions of CALL experience, CALL learning environment, contribution to EST learning and suggestions for reviewing and amending the materials and project-works used during the intervention. In all of these central themes, motivation, autonomy, attitude change, self-actualisation, vocabulary building, are common themes. The following table is set out to reveal the themes and sub-themes evoked from the analyses of the logs; the elements of a motivating classroom environment are evident.

5.2.1.1. Students' Perceptions of their CALL Experience

Students' perceptions of the pedagogical intervention merit consideration in order to shed more light on the effectiveness and, or failure of the instruction. In this regard, the answers that the students gave can be organised into two categories; the first group, the vast majority, considered this a positive experience, and the second presents the reasons that make it a negative one.

Most of the students agreed that this method, especially the project-works is a new experience for them, "I like the projects, it is a new way of learning"; it was fun, enjoyable and motivating. They explained that although they found technical English hard and at times tedious, the presentation and discussions within the projects motivated them to participate and to exchange ideas with others. Others found that the exciting part of the projects is their themes (the students mentioned different topics according to their preferences). They considered the authenticity of the topics and their relevance to their field another aspect that made the experience a fruitful one; "I think that the different projects in technical English were very useful in my career like an engineer. I have learned a lot of things, especially the project of the Nomodo Trio". Examples of responses that support these claims are:

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"It's a great learning experience."

"I think they are purposeful because they play with a big part in our major and they make us communicate and give our opinion without shy."

"I liked the projects of the technical English of this year; they were so interesting."

Furthermore, they explained that the presentation of their creations in front of their classmates is something new and that it is motivating for this generation- the e-generation-, compared to traditional ones. In contrast, others mentioned digital products as a great source of motivation, *"I loved it! I hoped we start doing it at the first year, not the second one because I get much information and learn how to answer the questions of my friends"*. They further explained that playing the role of a real engineer is another significant positive aspect of this experience; they explained:

"The most enjoyable aspect was the presentation with the use and design of videos because it is clearer and more attractive to the topic."

"Present in front of my classmates look like a real presentation that I will do it in last year as an engineer."

"The most important aspect of the project-work was playing the role of an engineer, a real engineer".

"The projects in technical English are enjoyable because there was a competitive environment about the best product; I loved the video created by my friend and his team presentation. I don't get bored."

Consequently, their vivid participation and exchange of ideas moved to the classroom, where, over time, they became more engaged and motivated to interact and speak as already accounted for by the teachers.

However, other reasons have been demonstrated to explain negative perceptions of some learners. Some students showed a slight decrease in their acceptance of CALL materials and the project-works, especially at the beginning of the intervention. The main issues reported by the students can be summarised as follows:

- Problems of net connection in the campus; the learners waited until they went to the library to access the materials, or post their works or comments. This fact made access to the materials difficult, and the realisation of their project-works even harder; they find it time-consuming given their study-load. In this vein, a student wrote: *"we don't have access to the platform from our rooms, how can we access the materials? We must go to the library to do so."*

- Few students found working on CALL materials a challenging task as they must pay attention to many things, especially spelling; *"Miss! It's really hard; if you forget a letter, it's going to be wrong, and you'll score bad."*

- Some students found the project-works hard, especially that they suffer from a very high level of anxiety 'Debilitative Anxiety'; they cannot talk or even write because they are convinced that their level is too low, which makes them afraid of their teacher and classmates' opinions and judgements. Some comments included, *"when I presented my project, it is hard to do this job and the problem of people"*; *"I stop thinking when I face the audience."*

- Some students did not like the topics of the projects and explained that some of them are knotty and difficult to search and realise; *"some of the projects are complicated, you cannot give the necessary information"*.

- Some students claimed that they had more difficult subjects to focus on, which are mostly major-related ones; hence, they had no time.

- Studying the whole day and part of the evening (Tutorat) was another excuse that left neither time nor energy for learners to work on their projects or do extra exercises, which rendered the experience an overkill for them.

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- Two students claimed that technical English is tough to learn; that is why they needed more guidance and help from the teacher; working alone is a hard option for them.

By the end of the school year, the majority of these students agreed that they changed their attitude towards not only the method but technical English as well because they found it useful. One instance is a student who said:

"I asked myself: isn't the classwork enough! Why we need the platform and why we need to work on project-works; but after using it and presenting my topic, I found it very beneficial. I finally faced my fear and made a good presentation."

Nonetheless, significantly few students-especially boys- argued that they still think technical English is hard and boring to study. They maintained their negative attitude towards the method, and they did not prepare their projects or participate in discussions for that reason.

5.2.1.2. A Positive CALL Learning Environment

Many students reported experiencing distinctive advantages when learning in a CALL-supported environment. They stated that the interactive, participatory nature of the intervention made the lectures, especially the presentations, more interesting, lively and fun-filled. They explained that the project-works enhanced their enthusiasm and contributed to a positive learning atmosphere that was conducive to learning. The respondents identified different events that constitute and characterise this environment. These events were classified into different tokens and later grouped into two main sub-themes for a better presentation of the results, namely creating rapport and cooperative learning.

Table 17 below is set out to reveal the elements of a motivating learning atmosphere as evoked from the learners' reflections. The learners indicated, like the following participant,

that the ambience of the environment was comfortable enough to help them communicate and overcome their fears; *"The projects in technical English create ambience and are enjoyable; it was good for sharing information and to learn how to talk to other listeners and make them enjoy our presentation"*. Others described it as energetic compared to other approaches, which has boosted their engagement in the course as asserted by this student *"It's an energy[tic] course; it is more activating than others"*. The students enumerated other aspects that have created a favourable environment such as developing a sense of social awareness towards their classmates, a sense of security when facing their friends, a sense of belonging and a positive sense of competitiveness that pushed them to work harder and present better than their mates. The students further praised the ubiquity of the materials, which were at their disposal whenever they want, wherever they work. All these elements shaped a supportive and comfortable social environment that allowed the participants to be psychologically ready to communicate and exchange ideas using English with people who helped them to do well in learning, which resulted in building up more intimate, even personal, relationships amongst the group and the classroom as a whole.

Table 20

Creating rapport

Theme	Analysis	Type	Token
Social comradeship	a. **Psychological well being**	Communication	Exchanging ideas during presentations
			I wanted to finish the game to help my friends
		Social awareness	
	b. **Motivation enhancement**	Sense of security	It's comforting having your friends as an audience
		Sense of belonging	The spirit of the community that we developed in the classroom
			Showing off our skills as every student has a different thinking
		Sense of positive competitiveness	
	c. **learning anytime anywhere**	Ubiquity	Access to materials regardless of time & space
	d. **enjoyable learning environment**	Healthy humour	The best part is the fun part of it
	e. **More intimacy**	Camaraderie	I got to know them more, personally; we got each other's back

When reflecting on their teamwork experience, the participants enumerated the principal benefits originating from this cooperative learning, through which the influences of their learning process are disclosed. As it is apparent from table 18, the informants reported building up a sense of community or "team soul", as described by one of the students, which allowed to learn from each other and develop cooperative relationships that are based on communicative interaction and meaning negotiation. This idea is evident in the following quote:

"Every one of us has an idea, each one of us shares his idea. I learned something that we should work in a group because each one of us has a word when we do it together; we create a sentence."

Another benefit that learners expressed when discussing their group works was decreasing shyness, increasing self-confidence and moving forward from passivity to activity. They have further explained that they have learned not to judge people, to accept different ideas and to respect others as everybody has a distinct point of view. They claimed:

"We learned to share the work and also work as one."

"The most useful thing I learned from my team is self-reliance and that I can do what I want."

"When doing the project with my team, I learned to exchange ideas, teamwork and respect."

"It made me talking English again because I no longer speak it, especially since I joined this school."

The abovementioned quotes mirror learners' shared belief that they became more tolerant, open-minded, and they learned to accept others' ideas without trying to impose personal perspectives, or changing others' opinions; in this regard, a student claimed that:

"Disagreement was a problem within the team, but we agreed to disagree."

Learner's interaction with each other while preparing their projects brought them closer so that when they came to present, they felt ease to talk and express themselves, i.e. they are no longer afraid of making mistakes in front of each other. This idea can be easily inferred from the following:

"Even though we did not have enough time and we worked under pressure, we worked as a team, and we did it with success...we enjoyed the presentation; it helped me to improve my English."

"I think that working with my friends helped me, especially during the presentation, when I communicate with others using the English language."

"The most useful thing I have learned when we present the project is to not be shy in front of my teacher and my classmates and another day in front of my subordinates, even if when I make a mistake."

Some students agreed in their logs that they have learned to improvise in difficult situations to overcome deficiencies in thoughts or ideas. In terms of discovering and interaction, many students clarified that the topics pushed them to search and discover new information and even discover other sides of English that they were not aware of; the following statements are examples:

"I learned how to improvise in difficult situations (while presenting my topic)"

"Checking on new ideas in the industry was very useful since all the topics are attached to our speciality (engineering study)"

"In every project, we learn more and get information about a new topic."

"It was a chance to check new designs in the industry."

"Actually, I've discovered another side of English."

Furthermore, the learners articulated the different techniques they used for materialising their project-works together with the arguments as to which materials to utilize in these creations. These reflections show that the students turned to what technology can offer in terms of pictures, videos, charts, info-graphs, to help them, as captured by this student, to "individually customise the projects". Additionally, technology

provided the participants with new opportunities for presenting and sharing their thoughts with others, be they, teacher or students. Informants commented that technology is an assistive tool that enabled them to make less effort, attract and motivate their classmates to their work and open doors for mutual understanding and prolific communication. They agreed that unlike simplistic representations of the old era, modern technological representations of information are in a better position to easily transform this substantive information or knowledge into creative, dynamic and eye-catching presentations. They illustrated:

"It's a great way to properly organise and present your ideas. It makes it a lot easier. I think that PPP is the best learning tool because it often has all the others within."

"A presentation without photos and videos is boring; they help people to see our vision. We use them to give life to our ideas. Videos help better; we're students, we still make pronunciation and spelling mistakes, especially complicated words, so they help us fix that."

"I use these because I want to show people how my idea looks and to make them understand better."

"I guess it makes the work richer and easier to understand by the students."

"To make the project more credible and for involvement during the presentation; I use the most attractive ones."

Students are aware that the use of visual materials, images, videos, has a positive impact on their motivation, comprehension, interpretation, confidence, understanding, and creativity. They explained that their products are a reflection of their creativity that is open to other's opinions and is tolerant of their viewpoints. Moreover, the learners developed the competence to assess the appropriateness of the materials to their topic and audience. At the same time, several of them maintained that the use and development of these resources and materials were beneficial for several reasons, the least of which is a better organisation and presentation of ideas.

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Table 21

Collaborative Learning

Theme	Analysis	Type	Token
Participatory approach	**a. Accounting for active involvement**	Playing the role of an engineer	I never did a real project so serious before
	b. Lowering teacher domination	Peer learning	I learned to work in a team, improve my language via games and my way to program
	c. Reverse position	Moving forward from passivity to activity	It raised our curiosity for research and forces us to improve our language skills
		developing a feeling of self-importance and confidence	I've learned facing people and how to speak to them with no shame
	d. Generating a sense of accomplishment	Incarnation role-shift	The vocabulary game I designed will facilitate learning technical English to students.
	e. Accidental mistake	Boosting Confidence	Speaking with confidence; presenting without fear
		Empathy	I loved seeing my colleagues make an effort to introduce and explain their ideas. It encouraged me
	f. Naturalizing the procedure of language learning	Improvising while presenting	I learned how to improvise in difficult situations (while presenting my topic)
		Bonafide topics	The project topics are interesting; it is a new way of learning
	f. Active thinking	Imaginatively/visual simulation	Working on creative digital products using different types of realia and justifying their uses.
	g. Prolific collaboration among participants	Voluntarism	Taking responsibility for my learning

5.2.1.3. Contribution to Learning

The learners explained how their learning was improved throughout the pedagogical intervention. Presumably, the CALL project enhanced not only their EST knowledge, but it also fostered their e-literacy competence as revealed in their reflection logs.

In terms of the four skills, the students agreed that the speaking skill took the lion's share. They stated that the method helped them develop their speaking; their speaking became better because they never had a speaking assessment test before. Explaining how the method helped them to be better speakers, students mentioned different justifications; these could be organised as follows:

- It was helpful in terms of pronunciation; they paid attention to what they say because their teacher would listen to them, together with their friends. They wanted their pronunciation to be useful to be able to convey their messages and be understood appropriately. This idea is evident in the following quote: *"when I did the project, I revised what I will say, I realised that it may not be clear... I correct pronunciation by listening to the video shown."*

- It gave them the chance and time to check the spelling and pronunciation of words.

- Listening to their friends, learners learned new vocabulary and language structures.

- They developed the ability to self-reflection; they learnt to correct their mistakes, recognise the mistakes of others, they write, read aloud, compare with their peers, then edit as a way of peer feedback

- They refreshed their memories; activated their background knowledge from the lectures, and generated new ideas through the presentations and discussions

- They explained that in class, they often miss the opportunity to speak and listen to what other mates say, but in the project, they see each other's' presentation and also have the chance to correct their and others' pronunciation mistakes. Clarifying more the latter, students clarified that peer correction took place first within their teams while working on the projects and then extended to the whole classroom during presentations *"before the presentation, I asked Amira about something, she said... correct your mistake first."*

- They agreed that the project works in technical English pushed them to speak English in different authentic situations most relevant to their major, instead of talking about an imaginative selected topic as the case in traditional classes.

- They had the chance to create picture dictionaries and vocabulary games, which gave them time to look for the meaning of new words and to use them in authentic

settings. "I have looked for words that contained the same letters and known the meaning and later introduce these words into the game; it is really instructive".

- The feedback they made or received is *"eternal",* on the word of one of the students, as it helped them remember their faults and avoid them to speak better in the future;

   "When you work on the project, you will not forget what you did, so that improves your English."

- The method helped the students to evaluate themselves, comparing their speaking to that of their classmates. As a result, they began looking for different solutions to help them do better in their presentations.

- They developed presentation skills in academic and vocational contexts, i.e., they learned to introduce a new topic, idea or project, how to use

- It was helpful in terms of arranging ideas.

- Learners claimed that they could benefit from others' errors, i.e. when they listen to mates' comments; they used to pay attention to their mistakes and then attempted to avoid them in their speech.

Concerning the writing skill, learners agreed that the experience online did not help them to develop this skill directly, since they did not use online chat messaging online or any other writing assignments. However, they manifested that it helped them develop this skill indirectly; it helped develop their writing as they have to write their speech before coming to class and present their work, get familiar with different types of writing, learn how to write a presentation notes, how to write a design brief, know others' levels and learn from them. Learners' contributions in the logs varied to point out this skill:

"I used my production to present my project because it necessitated the creation of a game that can only be presented if it is convenient personally, which helped me enrich my vocabulary and writing."

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"We use the production of a student when he is good in English, but we learned from them as we worked as a team."

Students further explained that they acquired the new technical vocabulary they had learned from theirs and others' projects and used them in class, and with time they became more fluent. This has rendered the once complicated vocabulary building easier, more rewarding, more persistent, and everlasting. More to the point, speaking and listening are two intertwined skills, so that, the enhancement in one skill affects positively the other.

Concerning the reading skills, learners agreed to found themselves reading online articles and online information while surfing the net for appropriate knowledge about particular new topics, to get some ideas that might help them for realising their project-works. Additionally, they claimed that, at times, when they started reading about a particular topic, they found themselves eager to know more about its related aspects, without noticing or even getting bored. They further explained that they discovered that the language skills are interlinked to each other, and that working on one skill forces to work on the others, which results in progress to all.

Last but not least, learners practised listening through listening to the videos and, or podcasts that presented some topics or project themes and started working on associated exercises, tasks or project-works, which they found extremely useful and enjoyable. It helped "see language in practice", as claimed by one of the students, which improves not only their listening skill but their speaking as well. Some students claimed that it also helped them have an idea about how specific machines and mechanisms function as they could not figure it out themselves from texts or diagrams. Some students looked for videos themselves to enrich their presentation, which forced them to listen to a couple of these to choose the best to serve their purposes. Others, on the other hand, have created their videos

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and were always listening to them for adjustments in content, pronunciation and mistakes correction. Hence, they all agreed that they benefited a lot regarding listening skill.

In addition to enhancing the four language skills, the participant students reported that their e-literacy skills also improved throughout the course. They have learned to search for, select and employ the information they find on the web. They further manifested that they discovered new e-learning tools that they used for the first time, such as online dictionaries, Google translation and vocabulary games. Besides, they revealed that it helped develop their way of programming, discover how to use PowerPoint by themselves, and learn how to edit and mount videos and above all how to use technology to learn EST. Learners agreed that working on digital materials themselves allowed them to develop their learning to learn skills via their authentic language input. Their comments in the logs varied to point out these benefits:

"I learned to search for the information that I need."

"I learned to use games for learning English and improve my way of programming."

"I learned to use and montage des videos."

"I learned how to online dictionaries and translation to look for new words."

They have also expressed that they are planning to continue

They further explained that technologically-oriented project-works and the supplemental online CALL materials provided in this EST program had promoted their awareness of the importance of using technological affordances in their learning and enhanced their ability to incorporate different CALL tools in their EST learning. Learners' reflections indicate that the CALL materials that were provided offered to scaffold that these learners needed to boost their EST learning through technology.

All in all, learners were of the opinion that the course-be it a mixture of online and inside classroom instruction- tapped at the four skills because what they did online or in their project-works was not isolated but related to the class. However, the four skills are not the only area that the learners benefited from; the course was also helpful for raising their curiosity, information search potential and e-literacy skills.

5.2.1.4. Problems and Shortcomings

Even though technology offered new exciting experiences for EST learning to our students, they reported some challenges they faced when learning EST through technology or while working on their project-works. The problems to which learners referred can be listed in six main points:

1- The platform is only accessed at the school; this fact has led to having a limited access platform that is less ubiquitous compared to more omnipresent ones.

2- Lack of adequate involvement by some of the students. They participated just for the marks, and this was reflected in their presentations. They just read aloud their notes and left the scene without any attempts to interact with their classmates or respond to their questions or posts on the platform.

3- Technical problems either while accessing the course materials, preparing their materials or when presenting their works. These problems range from the bad internet connection, lousy diaporama operating systems to introducing technical words into the game as the program was complex.

4- Lack of time was a recurring theme in students' reflections; they explained that they did not have enough time to study English or even prepare their projects adequately given the difficulty and overwork related with their major.

5- Some students found technical English extremely difficult, whereas very few of them argued that the topics were too technical; they suggested topics, which are less technical and less formal.

6- Very few students claimed that their level of English was a major challenge for them; it is too weak to allow them to work independently on the online materials, not to mention presenting in front of their classmates.

5.2.1.5. Further Suggestions

In addition to the information that made the previously stated themes, other related information cropped up in the reflection logs, and which should not be neglected. This information appeared in the form of suggestions or comments.

First, students claimed that idea of developing CALL materials to solve their and their mates learning problems would be very beneficial, but for those who took it seriously, not those who participated just for the mark, or evaluation. As future engineers, some declared, they might consider developing educational applications as part of their professional work.

Second, the learners shared their positive feelings towards the CALL project; they felt that the course is good as it is, and there need not be any reason to change any of its aspects. It helped them overcome their anxiety, develop presentation skills and fluency.

Third, although the mark was the main motive behind their participation, some students claimed that they enjoyed the experience, especially the feedback and discussion from their teacher and friends. Hence, they, later on, participated in learning. They suggested removing the marks, but keeping the discussion and the feedback; a student demonstrated this by saying:

"It is fun; it makes us discuss new ideas every time... feedback and critics are enough... no marks."

Moreover, the teachers' role is restricted to launching materials and lectures and monitoring classroom discussions. In line with that, some- despite that they loathed being forced to participate by incorporating evaluation; they revealed an awareness that assessment is a strategy to spawn their participation and to push them to contribute properly.

Fourth, some students argued that this project gave them an idea about the possible uses of technology for education; consequently, they started looking for some of these CALL materials to enrich their EST knowledge. Furthermore, the classroom presentations were rated as very beneficial in terms of language and content; they learned how to defend their ideas and behaviours with the language. They also asserted that they learned that preparing a speech is different from working on a piece of writing.

Fifth, some learners suggested that the projects could be used the same way with students given more freedom; they could work on ideas and topics of their choice but with the teacher's custody. They argued that they could discuss different points of view through debates and heated discussions, i.e., they would be more open to defend their ideas and question those of others.

5.2.2. Students Data Discussion

The results described in the previous section depict learners' reflections in their logs along with the CALL project. These reflections were guided with prompts designed to be a bit general to avoid restricting informants' answers and to avoid presumptions of what learners think to be more appropriate. Said differently, although this phase of the research aims to investigate the extent to which the learners benefited from the pedagogical intervention, the prompts used in the logs were indirect; they did not point the required

behaviours directly. The main intention behind this endeavour is to avert the formation of assumptions (what is proper or not) that may bias the results.

Filtering learners' reflections, we can infer that the activities, tasks and project-works used in this graduate EST course not only enhanced students' EST learning, but it also enhanced the learning environment of the participants. The findings reveal that CALL materials and project-works in EST materials development, provided in this EST program, have promoted learners' awareness of the importance of technology in their EST/EFL learning and augmented their ability to utilise technology in their EST and overall learning.

This pedagogical intervention provided practice using materials development activities through different technological tools. As inferred from the participants' reflections, these activities, especially project presentations, provided an excellent forum for the exchange of ideas, issues, challenges and experiences. They have created a comfortable learning atmosphere that reconciled the participants with the course so that the teachers' and learners' objectives were easily objectified. In light of this proper rapport, learners developed a sense of belongingness, personal and social identity. This sense of security alongside peer solidarity, a feeling of friendship, significantly eased the procedure of giving presentations for learners and, consequently, their EST learning. Peer solidarity, or social comradeship, developed through group work changed the classroom environment into a small community whose members were the students, who, interestingly, are part of a social network. Hence, they learned better in settings where they were watched over, and; in which, their social growth is supported. As a result, the vast majority of learners appreciated this journey and the resultant friendly, intimate atmosphere, where a tenable exchange of ideas and information is mixed with fun, pleasure, and delight, and in which creativity was always unchained and triggered.

In light of the above, the learning atmosphere became more stress-free, more comfortable and fun-filled to the learners who became highly motivated by their involvement in CALL activities and, or projects. Likewise, the teacher's role decreased and became more of a moderator and advisor, and the learning process turned out to be more pleasing and enjoyable in the eyes of learners. Henceforth, all concerned parties, be they teachers or learners, had the opportunity "to put their heads together to make enlightened decisions for getting most out of learning" (Ameri & Jafari, 2015, p. 33).

According to Brown (2001), rapport created in the classroom leads to students' feeling capable, competent and creative. Like so, learners' reflections indicate that they moved forward from being passive to have more active roles in the classroom. Acting as an engineer made participants take responsibility to solve their learning problems, which persuaded listless others to cooperate as well. Even though the participants expressed developing a sense of competitiveness, they worked and laughed together, not against each other. In this situation, positive competitiveness grew together with constructive cooperation, which allowed them to share ideas and learn from each other. Meanwhile, the participants developed a sense of self-worth and self-esteem in them. This self-worth boosted their best to the course, which has bred a sense of accomplishment in the learners.

Furthermore, all the learners, who kept reflection logs, agreed that they developed the ability to value, respect and tolerate mistakes, be they theirs or others mistakes; individuals act according to their best knowledge, they have the right to make mistakes. They explained that this had brought the negative influences of affective filter to a minimum; they overcame their shyness and fear of mistakes. In this sense, it can be determined that these learners developed empathy with their classmates, which gave rise to their feeling of confidence. Learners further demonstrated a keenness to learn from others- they frequently cited friend's preferred projects, ideas, or creative products- and seeking chances to

collaborate with them. Henceforth, learners expressed a development in their attitudes but with a slight variation between good and slow learners.

In light of the facts mentioned earlier, improvisation became prominent; learners had the chance to exercise creativity, which carried unplanned tasks or talks to give over during class presentation. According to Sawyer (2000), four concepts shape the process of improvisation, "creative process, collaboration, problem-finding, and communication". In the pipeline of a project-work, coming up with an event-learning problem-, and making excellent use of it to encourage the participants to learn via solving it, created dynamism in the classroom. Also, inventive, open-ended tasks triggered their thoughts; focusing learners' attention on digital materials as final products of their project-works, allowed them to both discuss orally and write several lines in conjunction with their creations. Like so, they gave presentations in a simple structured framework, using the technical vocabulary they had acquired, which allowed them to move from creative and active thinkers to creative writers and presenters who were leaning collaboratively in a team. Correspondingly, learners having an exceptional opportunity to share their ideas and findings with their friends engaged in stimulating discussions that turned out to be pretty significant to result in maximum criticality in both their thoughts, digital products and their presentations, as already discussed by their teachers.

Reviewing learners' reflections, we can conclude that all the reflections recorded the benefits of developing one's speaking and writing skills through acquiring new technical vocabulary, language structures together with e-literacy skills and interaction process. Henceforth, it can be assumed that learners benefited from the project in terms of developing the linguistic and sociolinguistic skills, the other skills were also discussed by learners when they claimed that they became aware that their four skills polished while working all along with the project. Accordingly, progress in spelling, pronunciation,

vocabulary, speaking and writing mechanics was impeccably visible. Learners' salubrious bash at speaking English and criticality in both speaking and writing were other primary outcomes of this humble practice of teaching EST through technology.

To this end, learners found the method a new innovative method that is motivating, on the one hand, and inventive and enjoyable, on the other hand. Shy, slow and uninspired learners found it a means to put across their ideas, and a way to raise their self-esteem and confidence that paved their path towards more involvement in the class. Besides, it has brought them closer to each other and to the teacher, which resulted in a comfy environment that is conducive to learning. Regarding that many people believe that technology is a waste of time, learners reported that the EST project-works incited utilising their e-literacy skills and hobbies to work on educational tasks and practise the language; it raised their interest in the course. Moreover, learners agreed that this method helped raise their awareness on how new technologies could be an effective means to solve their learning problems and develop their language proficiency; developing educational applications is something they might consider in their future jobs as engineers.

However, some limitations need to be addressed. The main points raised by students can be linked to the functionality of the Chamilo platform or software, subject matter and, or proficiency in English. First, the technical problems of operating systems and software, limited access to the platform and internet requirement were the most stated problems of the CALL project. Second, a few students found this treatment arduous and time-consuming; it is not easy to prepare a project-work that can be fancied by their classmates. Finally, the low level of some students was reflected in their way of participation; they did not attempt to discuss their projects with their friends or respond to their questions. These behaviours were further carried outside the classroom; they rarely accessed the CALL materials or got the activities/tasks on the platform done.

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Conclusion

This chapter has provided a detailed description and presentation of the information that emerged from the reflection logs, both teachers and learners. It has presented the findings of how the participants, be they teachers or students, changed their knowledge, beliefs and attitudes through CALL materials development with the support of technology. It also provides an account of how this change facilitated teacher engagement in materials renewal-enrichment-, together with learners' EST learning. Helping the teachers and learners understand the affordances and applications of technology through action is a catalyst for change in their knowledge and understanding of CALL materials. Further discussion of the results and implications are offered in the concluding chapter, and discussions of how the findings directly answer the research questions are presented.

Chapter Six: Discussion and Implications

Introduction

The present chapter unfolds through two sections and aims to draw conclusions from what has been presented and discussed regarding the process, product and participants'- teachers and students- perceptions and reflections on the CALL project. The first section attempts to discuss the results and to confront the findings to draw up a global acumen and understanding. The latter is needed to answer the research questions enquired at the beginning of the present work. Following this discussion, the research limitations are indicated. The second section sheds light on the main contributions of the study, provides some pedagogical implications and paves the way for further research.

Section One: Discussion of the Findings

After presenting and discussing the data gathered via the different research instruments throughout the different research phases, it is of paramount importance to draw direct links between all the findings and set forth the study limitations, for which this section is devoted.

6.1.1.   General Discussion: Pulling the Strands Together

This research has focused on the design, implementation and evaluation of a CALL support system for EST students in NPSES; the project was called the CALL project with Chamilo. This latter provided the tools for teachers to design diverse activities, tasks and project-works, and the students to solve and practice through the designed tasks/activities and to share their contributions. Moreover, the system allows for peer and teacher feedback in a way that allows the teacher to monitor and assess the learners' progress and contributions. The system is used as a form of 'blended learning' that combines digital media with a class course. It aims to upgrade the calibre of students' experience, both

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inside and outside the classroom. The exploratory action research process afforded the needed framework, time, and support for this to occur.

The project's design is based on an exploratory study conducted prior to its implementation. The findings from this study showed that teachers hold a positive stance towards the use and development of CALL materials for their language classes. The data gained through the questionnaire indicate that our population hold positive attitudes towards CALL materials with an overall mean score of 3.20 on a four-item Likert scale. Data obtained through the questionnaire were echoed and supported by the findings from the interview. Moreover, our teacher population demonstrated some positive signs that designate their likelihood to use/develop CALL materials if circumstances are favourable, the provision of appropriate hardware, suitable training and significant learner e-literacy, are amongst their main recommendations. Besides, teachers' basic digital literacy skills-finding, evaluating, using authentic resources- combined with their positive perceptions of CALL materials utility, ease of use and positive social impact are chief indicators of future CALL integration.

The students, on the other hand, demonstrated better acquaintance with digital tools and materials and disclosed an affinity and willingness towards their design and development. Students' logs analysis showed that our sample population are already using these materials as support tools for their classroom learning, even if for subjects other than language learning, and that these proved to be a useful learning medium elsewhere (e.g. mathematic). Nevertheless, these uses are mostly informal learning activities, which are not usually backed up by the teachers, as they remain under-explored in formal learning practice. Additionally, students' frequent use of digital resources is a significant indicator of their positive perceptions of CALL usefulness and a good predictor of future acceptance. Similarly, our student population demonstrated some relatively well-developed skills in

finding, sharing and creating content using technology- skills that can help them in their language learning pursuit if offered a proper pedagogical modelling and productive engagement. Likewise, harnessing learners' e-literacy skills for a variety of academic and real-world tasks within a practicum project may result in better attainment, engagement and final grades enhancement.

The implications from the exploratory study sparked an all-inclusive vision of the CALL project as both an ambitious professional development practicum and a meaningful CALL learning experience that draws on participants'- teachers and learners- e-literacy strengths to create content specific tools and applications mostly responsive to their contextual needs. This vision was conceptualised through focus group discussions and implemented as action research.   Focus groups reported the findings of how the English teachers, vocational teacher- both as a digital expert and content teacher-, the students and the researcher (as a coordinator) designed CALL materials collaboratively.

The findings from the reflective logs and focus groups revealed that the collective contribution to materials development invigorated the process. The teachers reported that the support of the digital and content expert for CALL materials development entrusted them (as EFL teachers) to play a role as agents of pedagogical change. This interdisciplinary collaboration also interceded the creation of significant EST materials. Moreover, collegial training and chronic mentorship amongst the participants, including the researcher, through professional dialogue and expertise exchange facilitated participatory CALL materials development. This collaborative action all along the project implementation has allowed critical reflection on enrichment ideas and has contributed to the development of new understandings, acumens, and practices in materials development. Furthermore, the process empowered faculty members and assisted with the development of CALL integration capacity to all.

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The project allowed the teachers at NPSES to respond to the expressed needs of students in fighting fear, disinterest, struggle, and apprehension associated with an EST course. They created a supportive learning atmosphere that led to a substantial increase in success rates and significant changes in learners' attitudes; a fact confirmed from teachers' observations and participants' reflection logs. Further, unlike other projects detached from context, where the student is perceived as a one-way information receiver, the CALL project takes advantage of the students' e-literacy skills to engage them in real-life situations to overcome their learning difficulties. This has assured, as informed by participants, their active participation and engagement, which created a reciprocal lore flow, where learners are real knowledge contributors.

According to the data, learners achieved enhancements in the four subcomponents of 21st-century skills, communication, collaboration, creativity and critical thinking. The results from teachers and learners' reflections suggest that the project works allowed the students to display knowledge, employ information and express their ideas compellingly. Evidence demonstrates that learners learned to synthesise and communicate information coming from different online sources, work collaboratively to create genuine digital materials (games, picture dictionaries, documentaries) to solve their learning problems and develop new knowledge and competencies through the creative use of various technologies. The qualitative evaluation and comparison of students' products-presented in chapter 4- by the overall portrayal and comparative assessment with reference to specific examples from the students, confirms and reinforces the results from the reflection logs and provides the reader with objectively achieved conclusions.

To boot, the results also indicate improvements in learners' linguistic and sociolinguistic skills as their overall language skills- reading, listening, speaking and writing- polished while working on their project works. The teachers confirmed that

progress in spelling, pronunciation, vocabulary, speaking and writing mechanics was impeccably visible. Nonetheless, the four skills are not the only zone that benefited from the pedagogical intervention; this latter also assisted in raising learners' curiosity, information search potentials and overall e-literacy skills. This routinely promoted an awareness of the importance of using technologies for language learning and elevated their ability to integrate different CALL tools in their EST learning. Learners' salubrious bash at speaking English and criticality in both presenting and writing their projects were other reported outcomes of participating in the CALL project.

The feedback from the logs revealed that the participants, be they teachers or students, appreciated the pedagogical intervention and the research approach. Although some teachers at the beginning of the intervention were sceptical and looked at it as an extra-burden in a busy teaching schedule, their attitudes changed, and they rated this experience as re-energising and worthwhile. The teachers indicated that being part in action research helped them become better informed about their students' and their challenges, and made them more aware of their responsibilities in teaching. They also recognised the need for ongoing self- and professional development, the value of collegial collaboration and paying better attention to helping learners with difficulties to create learner-sensitive instruction. Further, they agreed that their significant investments lead to their steady professional growth and the improvement of their students learning.

These results mainly coincided with results conveyed by other researchers, mainly those of Widodo (2015) and Dikilitaş & Yayli (2018); they argued that collaborative action research and materials development raised teachers' awareness of their context and assisted to the development of a climate of trust and comfort with individualised instruction. The findings of this study also support the claims that interdisciplinary collaboration between English instructors and content teachers facilitate the

design/development of meaningful language materials as reported in other studies by Kong (2014), Lo (2015), Martin-Beltran & Peercy (2015) and Widodo (2015). However, the study at hand does not only extend the current research on interdisciplinary cooperation in language materials development but also demonstrates teacher/researcher collaboration in understanding the integration of technologies and developing CALL knowledge through participatory action learning.

The students, on their own, found the experience fascinating, valuable and are not only willing to try it again but also to consider it in their future careers as engineers. The majority of students esteemed the experience, particularly expressing their opinions, contributing to the development of learning materials, taking ownership, and developing learning-awareness and confidence. Students' final products, the reflection logs, and teachers' weekly observations suggest that the resultant digital pedagogical tools contributed to learners overall positive learning experiences, both individual and collective, by promoting a creative and productive environment. These digital pedagogical tools sparked learners' curiosity in peers' creative works while spurring them to devise their original, creative products and development strategies.

When discussing the digital tools and the associated pedagogical experience, the students were more prone to the active creation of digital tools than to the passive reception of online content. The feedback from them signposts that the overwhelming majority of learners believe that the project-works were the most significant part of the CALL project; they were valuable and resulted in richer teacher/learner experiences. The key observations arising from the students relate to the development of a climate of trust and comfort that changed learners' attitudes towards the course. These ubiquitous information builders felt comfortable when participating in these ULEs that foster collaboration, discussion, and production of knowledge independent of time and space.

The improvements in grades and the data from the reflection logs bear witness to a deep sense of achievement and satisfaction felt by most learners regarding the enhanced quality of their language proficiency and communication skills.

In this respect, the teachers appreciated learners' participation and engagement in the course; they explained that the use of appropriate digital tools employed within the designed ULE elevated the motivation and skills of these EST learners, who, simultaneously, have reckoned reflection on their lived learning experiences an effective learning practice. Moreover, the participants, especially the teachers, found learner contribution a strength of this pedagogical intervention that not only raised participation rates but also led to improvements in the quality of output as the course progresses, both in terms of the quality of talks and digital products. Authentic contribution of teachers and learners with instructional materials improvement led to the development of a culture and ethos amongst all the project participants that first recognises the benefits of teachers/learner participation; second, understands the meaning of 'learner participation' fully and so provides ample opportunities for 'learner contribution' to take place in their context.

All in all, the findings above have strongly avouched the necessity and utility of promoting more transformational learning environments that encompass reflection, ubiquitous knowledge building and contributions (both learner- and teacher-generated) so that participants, be they, teachers or students, partake in active teaching/learning scenarios. The results also indicate the need and, above all, the importance of designing ubiquitous CALL support systems that align with the course upshots but also respond to the needs and interests of the students, so that higher education learners, in general, and EST learners, in particular, foster successful learning experiences utilizing appropriate project-works and the appropriate enactment of competences. Eventually, student-centred approaches based

on the proper use of multimodal tools, participatory learning projects and reflective assessment are positively connected to the enhancement of the EST learning environment in this higher education community.

6.1.2. Answering Research Queries

After having a global vision of the whole research findings, this section summarises and discusses the findings drawing on the questions raised at the beginning of the work at hand. Nevertheless, it is worth to mention that question one, and two answers are based on and discussed in the exploratory study presented in the third chapter; whereas the last three questions are answered through the data analysis conducted in chapters four and five, and are discussed in the current section. It is worthy to remind the reader of the three questions that will be tackled respectively:

- To what extent can the integration of CALL experience address the different EST educational challenges to create a useful course that responds to the needs, wishes, interests, and character of the students?
- To what extent does the CALL project-works designed for this study help EST learners develop their 21st-century skills?
- What changes were observed in teachers' knowledge and practice in the design and use of CALL materials through collaborative action research?

The engineering students who participated in the CALL project entered the course with feelings of inadequacy, clumsiness and ineptness and used words such as "disinterest", "apprehension", "hard", "anxious" and "monotonous" to describe their attitude towards the EST course. However, the development of a supportive learning environment reduced disinterest and apprehension associated with EST while resulting in improved pass rates and quality output. The assignment of the project-works by teachers and they having an

interest in helping students with their learning difficulties were cited as key to competency building. The projects were assigned since early deliveries of the course, which strengthened creating relationships early in the first semester; thereby reducing the initial high levels of anxiety with which the students entered the course. The participatory team approach to digital materials development strengthened the teaching/learning aptitude of both students and teachers in this setting.

Authentic participation with digital resources has placed the onus on the students, as they were encouraged to contribute resources that they find appropriate. This has allowed them to foster their digital literacy skills especially the evaluation of resources concerning relevance and reliability to their English learning, which they lacked before the intervention as reported in the exploratory phase of this research. Besides, they developed the ability to use/create content in an academically appropriate way. Moreover, focusing the project-works on learners' diurnal digital activities made them more aware of the potential these have to offer for deliberate learning; they have benefited from having this link made explicit, which validates informal learning practices. Developing such awareness, towards the use of technology, resulted in more effective uses and better learning outcomes. Further, working hand in hand with the teachers to create digital materials acknowledging their differentiated abilities and incremental successes have brought them closer, have positively influenced learners' motivation, and eased their confidence building. To this end, the students developed a positive self-image that paved their way towards more involvement in the course.

Developing 21st-century skills, be it of the main objectives of the study, was reported by the results of the reflection logs collected by the end of the pedagogical intervention. Even though the students did not participate with the same regularity and potential, taking part in the project allowed the vast majority of them become more goal-oriented,

independent and creative students aspiring to achieve their full potential. They succeeded to develop their communication abilities compared to their level when they entered the course. Observing learners' discussions, including lower-level students, during the mini-presentations could be a good sign of their improvement, involvement and engagement in the course. They became, over time, more active in class. Participants, be they teachers or students, confirmed this finding in the reflection logs. They appreciated the chance given to lower-level students to improve their English and communication through collaborating in the project-works in an error-forgiving environment. Like so, the learners became more confident with their communication, which boosted their participation.

The team approach to project-works strengthened the bonds between the team members and the whole classroom. Although the learners expressed a sense of competitiveness, peer solidarity, or social comradeship, developed through group work turned it into an enabling factor that grew together with constructive cooperation that facilitated ideas exchange and allowed them to learn from each other. Like so, collaboration is one of the skills this study proves to facilitate the most. The students have learned to work together to solve problems and answer questions, to work efficiently and deferentially in teams to achieve a shared goal, to tolerate one's and others' mistakes, and to assume shared responsibility for completing the project.

Innovating is an ability tightly related to the knack to connect with others and a facility for communication and collaboration. In this respect, the learners were engaged in collaborative problem-solving projects to make tangible contributions to their learning. Participants have indicated how the project-works promote creativity by "experiencing something new", thinking "outside the box", "improvising", and by encouraging students to take responsibility for their learning. Besides, students exercised creativity when determining the 'type/size' their final product is going to look like and discovering how to

"learn from their or other's mistakes". Similarly, the learners employed their inventive thinking when applying information technologies in complex and sustained situations and understanding the consequence of such uses. Like so, the notion of tolerating and learning from mistakes, students making choices and decisions, and taking ownership of their learning are reported strengths of taking part in these CALL-based project works, as indicated by the participants, be they, teachers or students.

The teachers indicated how the project-works promote critical thinking, as the students make 'choices' when they see 'learning difficulties/mistakes' and problem-solve to fix them and through promoting 'metacognitive awareness' and 'reflection'. Similar to creativity, the students were allowed to choose the topics to pursue, make connections, and problem-solve to fix their mistakes and solve their learning problems. In the same way, metacognitive awareness is seen in learners' trials to revise, critique and make looked-for adjustments to attain the desired outcome. Lining up with creativity again, comes the notion that the students see the projects/ideas from various viewpoints and, hence convey them in a variety of formats, which is apparent in the diversity of the resultant digital products (games, picture dictionaries, documentaries, simulations). Reflection logs allowed the learners to reflect critically on their CALL learning experiences and processes, and to assess, generate and use information coming from various sources, and judge the products of their thoughts and creative work. Eventually, they appreciated their gained autonomy in decision making, thinking beyond their comfort zones, and responding/generating output in alternative or non-traditional ways.

The last question aimed to document the change in teacher knowledge and beliefs about CALL materials development and EST pedagogical practices. The data, including focus group discussions, observations, and reflection logs, demonstrate a case of positive teacher agency; principally in technology integration. The teachers considered

collaborative CALL materials development as a platform for personal and professional development. They indicated how their active engagement in action research has contributed to the development of new beliefs, understandings and practices that are closely related to in-house digital materials development. They have refined their disciplinary and interdisciplinary CALL knowledge, developed the capacity to technically design activities/materials (instructional knowledge), and the ability to develop context-sensitive- or learner-centred materials (contextual knowledge). The teachers needed all three types of knowledge to teach English across vocation or discipline via technology. This change is perceived as a collaborative action learning process that was proved influential in several studies on in-service teacher professional development (e.g., Banegas, 2011; Hung a Yeh, 2013; Widodo, 2015). This challenges traditional views of professional development as one-shot assemblies like conferences and workshops, participatory EAR can assist teachers in developing a sense of responsibility, and better practical and pedagogical knowledge.

All in all, this research provides empirical evidence of how the English teachers and the students sustained and engaged in the design and use of EST digital materials development informed by their e-literacy strengths. The contributory social nature of the intervention defies established views of learners as mere 'consumers' of materials, thereby subverting the vertical top-down development of materials and opening out new possibilities for the bottom-up and horizontal frameworks. The findings of this study underline two crucial elements: the contributions the students can make to materials development and technology integration, and participatory materials development as curricular enrichment through collaborative EAR.

In light of that, it can be claimed that the hypotheses of the study are confirmed, and the aims of the research are attained. Said differently, the study at hand hypothesised that if

teachers engaged in the collective creation and use of CALL materials, they would improve their CALL knowledge and materials development skills, and unclog their professional development. In this respect, the teachers who participated in the CALL project were able to enhance their CALL integration capacity, improve their design and development skills, and grow professionally. The second hypothesis assumed that if teachers engaged learners in CALL materials development through problem-based CALL projects related in content to technical themes, they would meet their needs and help them develop their 21st-century skills. The student participants identified four apparent enabling factors that reduced anxiety and improved their attitude towards the course, rapport in the classroom, social comradeship, positive competitiveness, and teachers' interest in their learning difficulties, which resulted in better success rates. In light of these factors, the learners were able to achieve an enhancement in their 21st-century skills, language proficiency and e-literacy skills. This claim was reported in their reflection logs and echoed in their teachers' classroom observations and reflection narratives.

6.1.3. Research Limitations

As any research in the fields of language teaching and educational technology, especially those dealing with complex constructs like 21st-century skills, the present study met some limitations. First, the study took place in a single higher education (HE) institution, in a particular context EST/ESP. Hence, it only explored CALL materials development in this area. Besides, the homogeneity of the study sample is another limitation of the study because all the participants were either faculty members or students from the same HE institution. Besides, the logs were conducted with a relatively small ($n =$ 50) and standardised (i.e. primarily male students with an average age of 20) group of students. As such, the applicability of our findings will be limited; however, they can provide an understanding on how to imbibe 21st-century skills, in particular, and integrate

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technology, in general, in teaching/learning materials and overall classroom practice. Finally, a broader perspective on learners' achievements would have been gained If NPSES authorities accepted Exam results to be used as data in the study. Even though the study findings are not generalisable in the conventional sense, the richness of the collected data strengthened their robustness and credibility (Lincoln & Guba, 1985), so that, if wished, the research can be duplicated and transferred to other contexts. Examples of such transferability will be discussed in the following section.

Section Two: Suggestions and Implications

Recognising inherent research limitations, this section offers some suggestions and implications for researchers and teachers working in the field of language teaching and learning, in general, and the field of CALL in particular.

6.2.1. Implications for Practice

6.2.1.1. Implications for CALL Materials Development

Throughout this research, there has been a focus on a principled approach to the design and development of CALL language teaching/learning materials, in general, and EST in particular. It explored the notion of digital enrichment in the context of EST and followed a principled approach to textbook digital enrichment. The rational of a CALL support system entailed the development of learning objects that can stand on their own and integrate both content and language, which is essential in EST programs. The interlocking relationship between content and language is given prominence in the analysis of input because engineering students who learn EST must review and deepen their content knowledge of the discipline, enhance their communication and overall language skills both receptively and productively, build up their cognitive skills and develop an awareness of various perspectives, from which to approach certain concepts of the subject. All this has been realised via the enclosure of a variety of activities/tasks/projects and resources using

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Chamilo tools, besides other digital content creation means, making knowledgeable use of modern technological affordances. It is thus crucial that teachers move beyond focusing on technology per se to understand and use it as a means for merging language and content in a way that showcases how content is mediated by language and depicts how content is presented in the input (be it a text, video, audio).

The methodical selection, design and creation of extra-curricular digital materials from a principled approach have led to a more personalised kind of teaching and has helped overcome some language and content hardships by offering activities/projects, which match students' informal internet activities and that every student can carry out at their own pace. The generated materials have the following characteristics:

Relevance to Students

It is recommended that input materials (articles, texts, conversations) be of an appropriate length to students' basic level of proficiency. In the case of heterogeneous classes, differentiation is advised. Differentiation is also recommended in targeted learning styles, interests and integrating possibly motivating elements, which may be part of learners' everyday activities but not found in printed textbooks.

Relevance to Major Area

Captivating relevance generates better-quality motivation. It is suggested that supplementary materials can include tasks pertaining to students' future career development. Besides, explanations of technical terms and phrases related to learners' major area are desired and supported with various digital resources such as glossaries, dictionaries, grasping the advantages of hyperlinking and multimodality. At the same time, activities/tasks that encourage learners to employ them productively would be helpful.

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Scaffolding

Backing be provided whenever possible! Language support can be provided for students to learn the language they need to convey their ideas in meaningful tasks better. Grammar summaries, example sentences, writing apps, can be added in order for learners better to understand the usage of new words and language structures.

Cognitive and metacognitive development

The plan argues for the development of project-works that foster the development of cognitive, inventive and metacognitive thinking, and call for the use of both Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS).

The allure of the materials

Despite the quality of content, the materials must be appealing to students in order to increase learning motivation. Useful visual materials such as virtual tours can be added; texts must deal with most recent topics that students find helpful for their future career, while conversation sections such as forums could be enlivened with exciting topics and attractive titles

This research has made these aspects explicit. It presented some of the ways of the interactivity employed in the digital EST materials, as well as the ways content knowledge is delivered through the resultant materials. Teachers, researchers, along with educational technology specialists can use, apply, and modify, where necessary, these measures to enrich their context and practices.

6.2.1.2. Teacher Agency in Technology Integration

The current study presents a picture of teacher positive agency in technology integration; in essence, the capacity to exploit e-literacy strengths to act on curriculum

pedagogical practices. It highlights the role of the teacher in interpreting the curriculum and facilitating learning and illuminates the role of collegial collaboration in understanding the integration of technologies and developing CALL knowledge through EAR. Collaborating to develop and use digital materials contributed to teachers' sense of agency in integrating CALL in their teaching. They became more sensitive to the need to curate, adapt, and create digital materials most relevant to their EST context, and the necessity to engage in personal/professional development through ongoing learning.

The study argues that teachers are key contributors to the educational system where they work. Tailoring the materials to the benefits of their EST students, the teachers deployed functional meta-language analysis as a means for meaning-making within input materials, which requires an understanding of the way language functions within disciplinary content knowledge and the capability to put this understanding into practice. This demonstrates the complex interplay of teachers' abilities as individuals and the role they can play to actively mould their pedagogical practices to alleviate the constraints they encounter successfully. This implies that collegial collaboration initiatives can have a vital role to play in achieving the hybrid goals of content and language integrated courses.

It became apparent throughout this research that technology integration in Algerian EFL classes, be they middle, secondary or tertiary, faces some hurdles that impede CALL normalisation on the national level. This has exacerbated teachers' low motivation, low self-confidence and technology avoidance, and, consequently, narrowed down their CALL usage to materials presentation. The idea of synergy in coordination teams, where individual abilities and technology-related expertise of the teachers are shared, and where the focus is on collegial learning and assistance, may instigate enhancements and facilitate change. The participatory team-teaching approach adopted at other tertiary institutions may

also assist the teachers to become more involved in lesson planning, context-sensitive materials development and their implementation.

Evidence has proven that central authorities cannot prescribe one-size-fits-all educational experiences suitable for all situations. Most top-down initiatives emanated from the successive Ministries of National Education and Higher Education and Scientific Research since 2002 failed to respond as adequately as necessary to the highly-contextualised needs of learners and teachers. Hence, little change and less success in CALL integration have been made on the ground (for a detailed situational study on CALL normalisation in the Algerian context see Bouchefra, 2017). This fact and the findings from this study necessitate a decentralisation of decision making and call for increased bottom-up agendas where teachers are associated with all the steps in reform projects from the start. Henceforth, rather than further compel teachers by prior mandated decisions, it is more appropriate to recognise their professionalism and support their roles in effecting educational transformations to better encounter the need of our time.

To this end, a refreshed approach that recognises and supports teacher agency would be highly recommended. Nevertheless, this places more responsibility on the teachers than less; they are committed to take more pedagogical risks and act as designers, mediators, conciliators, advisors and problem-solvers. It also requires more from those responsible for shaping the conditions for teacher agency; the least of which is encouraging teacher voice with a collective vision and the provision of resources that enable action to be initiated and sustained. Collaborative spaces and crowdsourcing facilitated by networked ICT can also contribute to sharing experiences and resources of communities of teachers among themselves. Online repositories of teaching/learning resources may serve as spaces for the analysis of already existing materials, and elaboration of new authentic ones (both traditional and digital ones). Peer feedback in these virtual spaces is a

significant professional experience that may assist in generating adequate methodologies and appropriate pedagogical procedures in the implementation of both EST and EFL courses at all levels.

6.2.1.3.   Encouraging Student Voice and Contribution

Changing the balance of agency for a contributory culture and deeper democracy has positively impacted students' motivation and learning and has increased both their content and language knowledge related to their engineering majors in this research. Along with this, they have developed a strong sense of agency in EST that allowed them to exert a measure of control over their learning through co-creating learning materials and to put into practice their linguistic and e-literacy skills in genuine contexts. This has empowered them to be frontrunners of their language learning and to develop/use appropriate learning strategies to overcome learning difficulties. Key to this success is recognising learners' potentials and the contribution they can make to the quality of their learning.

This finding implies that a shift in approach is required to increase the focus on learners' engagement and involvement in their educational journey in a variety of ways. This entails a movement away from:

- Teaching the target language to teaching literacy skills
- rote learning of specialist vocabulary to content and language integrated learning
- focusing on providing language input to promoting learner voice and participation
- From what technology can do for students to what the students can do with technology
- From attending to final products and being mere consumers to students as contributors to their own and others learning.

- From preparing merely for exams to empowering students to evaluate and enhance their educational contexts besides their local and broader communities.

These six principles provide an alternative perspective for EST teachers to promote effective learner participation and engagement for a proactive transformation of their education. This alternative view assists EST teachers to move beyond providing linguistic input and rote learning of discipline-specific vocabulary. It allows them to teach the way language operates within disciplinary knowledge and focus on promoting active participation and engagement in the classroom through learner voice and contribution. As it recognises the crucial role learners' technology-related expertise is to play in the success (or failure) of any technology uptake and help them better articulate this expertise and in the evaluation process of their learning materials and educational settings; by offering anchors for reflection at different phases of a course to aid them to identify themselves on their learning paths.

These principles aim to change the focus of EST learning from mere mastery of language rules and memorisation of vocabulary items towards viewing EST learning as a means to achieve literacy in the 21st-century. They also aim to leverage the use of CALL from its primordial support function to more innovative ways and cogent methodologies. These latter permit personalising learning experiences; offering better chances for active learning; fostering students' agency, autonomy, and project-based learning; and promoting a self-fulfilling prophecy of contributory learning, student voice and community consciousness. Likewise, taking more account of student's potentials, voices and possible subsidies can upsurge the worth of what we do professionally-teach and learn.

6.2.1.4. Teacher Professional Development through EAR

This study provides an instance of an autonomous continuous professional development endeavour primarily initiated and managed by the teachers to alleviate the constraints in their context. The results of implementation approve the assumptions of the research and the positive impact of the hypotheses and bear out the efficacy of collaborative action as a research method in the integration of technology. It similarly demonstrates the valuable role action research can play in the continuous professional development of teachers.

The collegial nature of participatory EAR research allows the participants to receive support from colleagues and exchange ideas and expertise for their professional growth. Professional talk, of this nature, helps to establish a culture of inquiry, risk-taking, acceptance and support, which caters for both teachers' professional needs as well as the needs of their students. This action equally supports individual teacher agency in constructing their identities by affording new means for research-based development of one's work. It also boosts teacher autonomy by building up his ability to make informed decisions and to act professionally to respond to his contextual challenges.

Arguably, professional learning in situ is a conspicuous enabler for teachers' CALL integration to improve and transform learning and teaching. The teachers need not feel wary of reconstructing their knowledge and instructional patterns through a process of trial and error to most effectively integrate technology in their curriculum and create a culture of interdisciplinary and collaborative learning among the staff and with their students for a rewarding CALL implementation experience. In this vein, interdisciplinary and technical assistance plays a significant role in facilitating and supporting the development of digital materials, which help decrease teacher resistance to change as well as to technology integration. The teachers can also trigger their students' agency through various project

works that call upon their technology-related expertise and language skills to contribute to their learning.   Through this collaborative action, all are involved in negotiated CALL materials development. Likewise, EAR serves as a platform for participatory language materials development and technology integration.

By taking the initiative to build up their scheme for technology integration and instructional materials development regardless of time or content-specific strategies, educators are embracing the idea of life-long learning and creating their designs and action plans to improve the conditions of their context. To this end, teacher education should instil in future teachers an attitude that acknowledges and strives for life-long learning and, at the same time, confect their capacity to manage their professional development.

6.2.1.5.   Implications for Teacher Training and Education

One of the main implications of this research is that it advocates a new practical model for teacher training (for both pre-and in-service teachers) in CALL and materials development. This model indicates the need for in-service training to be grounded in the reality of teachers' context, collaboration with colleagues in the same context, sustained follow up, and exploratory action research pedagogy where teachers can reflect on their practice. A process-oriented model, such as the one undertaken in this study, can have a long-lasting positive impact on the knowledge and practices of the teaching body.

A collaborative and reflective context, if provided, acts as a platform for the in-service teachers to engage in training, share resources and build a collaborative learning community. Action-oriented approaches provide faculty with the time to critically reflect on their practice of CALL and empower them to make changes in their teaching materials and general teaching practice, and even introduce new materials and activities, if deemed necessary, because of acquiring new understandings and views on CALL. To this end, the

teachers will develop a more explicit rationale for technology integration, learning tasks/projects and strategies; gain a better command of their classroom management, develop their materials, be they traditional or digital, and may even underwrite their textbooks for a larger group of learners, in the long run.

In teacher education, the focus need not be on theoretical courses only; student teachers crave for practical training that links theory to practice and brings about opportunities for reflection. Placing teacher education within an experiential learning theory and collaborative action paradigm can contribute to student teachers' knowledge development in CALL. In this respect, students learn CALL through materials development (learning CALL module through digital materials development) and in this process, students learn of the new options available for teaching/learning through technology and sort out the elements they employ in their learning.

Senior Student teachers at teacher training schools like Ecole Normale Superieur, (ENS) have field training where they can develop e-learning materials for the particular needs of their group of learners and implement them in their teaching. Following this hands-on work, the students can engage in critical reflection with the support of their mentor and peers, which is the basis of this experience. Creating solutions to authentic problems and group reflection on these latter renders the knowledge development process a context-sensitive dialogic one. This model fosters a student-centred approach that allows the students to choose the tools to sustain their teaching and determine what CALL materials learners are exposed to and how they are using them.

Hence, a context-sensitive and practice-lead approach should be encouraged among all teachers to advance their knowledge, even teacher-trainees and beginning teachers (e.g., Balalman & Sert, 2017; Sert & Li, 2017). Noticeably, this brings the role of teacher

trainers to the fore, as student teachers' CALL knowledge development requires observant planning, supervision and a particular focus on knowledge development. While pedagogical knowledge is basically at the instructional level (Sert & Li, 2017), explicit CALL pedagogy is highly recommended in training. This could be realised by uniting the computer course that teacher-trainees are receiving with the materials design and development one (MDD). As such, instead of teaching things like word and excel, it would be more beneficial to introduce the students to activity and material development authoring tools (e.g. hot potatoes), LMS, and online courses tools.

Tutoring beginning EST teachers has been recommended and institutionalised at the NPSES through teaching teams headed by coordinators, who act as tutors for recruits. The framework for this responsibility of tutoring can be realised via timely pedagogical guidance and custody to help them better comprehend and articulate their expertise. One concrete way to achieve this is understanding the role and significance of the course and negotiating its content, challenging their views and any position they have already given themselves based on their limited experience. Like so, coordination meetings will serve as a space for supervision and a workshop for the evaluation of adopted materials and creation of authentic in-house ones. Inherently, the teachers then become accountable for and capable of participating in the design of their courses and teaching materials. This can strengthen their sense of agency and involvement in the course as well as help them become more productive, which might enhance their expertise and professional image. This is the formula of agency that is needed in diverse language teaching contexts today.

6.2.2. Suggestions for Further Research

The suggestions on this section are directed to this research team and other researchers working in the field of language learning, in general, and EST, in particular, with interest in CALL and educational technology and making their best to bring out new ways and materials to help and to engage their learners.

6.2.2.1. Possible Design

This study has attempted to show how to design and integrate appropriate digital systems and relevant instructional materials guided by a set of principles executed through different EAR cycles. However, we further recommend other methodologies (e.g. experimental design, design-based research (DBR)) as this would provide sustainable evidence to support the proposition that participatory CALL materials development facilitates 21st-century skills development and success and ultimately teachers' professional growth.

Although reflection logs proved to be an invaluable resource to understand the development of CALL knowledge and 21st-century skills, the use of other research tools (e.g. questionnaires, interviews) may reveal more profound findings. Henceforth, studies that employ various tools to assess CALL knowledge and 21st-century skills are highly recommended.

The study was conducted with participants from a single HE institution with an EST focus, with whom the results of the pedagogical intervention were positive. Other replicate studies are recommended to firm up the findings of the research at hand. These may redo the process with other teachers and, or learners at other contexts to assess their inclination to being part of such projects, and the extent to which it would facilitate their CALL knowledge and 21st-century skills development.

The design principles followed in this study are primarily applicable to CALL learning activities/tasks that are presented on an LMS, Chamilo, with technical support available to participants, both teachers and students. Other CALL projects would have been designed using the attributes offered by LMS other than Chamilo. However, it is recommended to find out about the participants' e-literacy skills and internet activities when setting the project rationale. Without some basic skills, the participants would be loath to participate. Comparisons with findings from this research may be fruitful. In this respect, the selection of another LMS (e.g. Moodle, Docebo, LearningPool) would facilitate the design and development of types of instructional materials different from those Chamilo have made possible. The selection of Chamilo in this study was incidental as it was the one adopted at the school.

6.2.2.2. Assessment

Though active critical reflection permitted focusing on the participants' experiences than a regular collection of end-course feedback and classroom observation would have, without proper implementation and evaluation, the efficiency, relevance and worth of the resultant materials in this environment, remain questionable. Nevertheless, it was out of the scope of this study to evaluate the suitability of the created materials. Hence, further investigation is required to certify validation of the generated materials as well as to establish their efficiency. Such evaluation provides valuable data for the refinement of these materials.

Even though the research findings reveal the interplay between contributory learning and key constructs of the 21st-century, namely communication, collaboration, creativity and critical thinking, this conclusion is based on the illustrative data drawn from the participants' reflections. Therefore, other performance-based assessments that encourage the students to demonstrate their knowledge and skills are highly recommended.

Other studies focusing on summative assessment are also required to gain a snapshot of learners' achievements during the project; the gained results can be compared and correlated with the data emerging from the logs for greater validity of findings.

Conclusion

Teachers' and learners' autonomy can be attained in a free, democratic and horizontal framework that depends enormously on the contributors'-teachers- response to the changing profile and needs of the so-called consumers-learners. Teachers' autonomy is a state of cognizance that can only be attained if teachers take a critical look at their teaching styles, instructional materials, at hand technologies, how compatible these are with the ever-changing nature of societies, technologies, and learning systems, and they planning to change accordingly. The knowledge gained in this process forms the basis for becoming true professionals. Learner's autonomy is a state of participant satisfaction-cognitive and metacognitive purposeful contribution- to the learning process. Arguably, in contrast to the premises of traditional views, recognising the agency of students as participants is essential to enlisting them as 'contributors' to the ongoing transformation of the learning process through the application of CALL. This duality represents the iterative process of educational development and is the right formula for the verbalisation of educational transformation in a time of fast and variably dispersed technological change.

General Conclusion

The current research is an attempt to determine the impact of CALL on instructional materials design and development at the intersection of two major areas of modern education, namely EST and CALL. Interest in the study stemmed from the crucial role these materials play in a resource-scarce environment such as EST, where commercial textbooks may fail to respond to the highly-contextualised needs of teachers and learners. CALL was seen as a solution to this exigent situation and a means to meet global standards and changing educational demands. Hence, this study is carried out to confirm or reject the hypotheses stating that collaborative CALL materials development enhances learners' achievements in EST and their 21st-century skills development and unclogs teachers' professional development by developing their CALL knowledge and overall materials design expertise.

EAR process provided the basic framework and support for the above task. While the theoretical review provided the rationale for the practicum project, the exploratory study provided insights on teachers' stance towards and skills in CALL materials use and development, and unveiled students' modern technology uses and promising digital expertise. This information helped set the action plan undertaken in the second phase of the research. The generated plan was implemented as a practicum project and reflected upon during the last two phases of the EAR process.

Data from the different cycles of the research was gathered through a combination of qualitative and quantitative data collection tools. In the first cycle, exploration, questionnaires, interviews, and internet use logs were employed to gather data for the first two research questions, aiming at setting sate of the art of the Algerian CALL materials situation and exploring students' informal CALL learning activities. The practicum project was orchestrated via focus group discussions and implemented in the classroom. Reflection

logs were used to elicit the participants' perceptions of the implementation and overall teaching/learning experience.

Analysis of the collected data unveiled that the employment of the participants' e-literacy strengths in the CALL project had a positive impact on their perception of the EST course, and gave a new sense to the whole teaching/learning process. The EST students who participated in the project reported enhancements in the four sub-components of 21st-century skills and EST achievements and praised some attributes of the intervention (such as creating rapport, building confidence and tolerance, constructive collaboration with peers, positive competitiveness), which raised their motivation and alleviated their attitudes towards the EST course. The teachers, on their part, witnessed improvements in their ability to analyse, select, and evaluate existing materials and learned to develop authentic ones. They have also developed their technical skills and overall CALL knowledge.

It is clear that the CALL project has some limitations, stemming partly from the conditions under which it was conducted (e.g. technical problems, internet hiccups, learners' proficiency level, nature of EST), and partly from the time and exertion limitations applied. However, based on the reported results, the findings strongly reinforce the conclusions reached; thus, the objectives of the project were achieved, thereby fulfilling the aims of the research. Nevertheless, it is worth noting that measures to overcome the noticed limitations in future cycles of the project were discussed. These include earning support from school authorities, solving Chamilo technical and management problems, creating rewarding systems for participants, creating interdisciplinary and collaborative research, and providing staff with time and financial resources.

Conclusively, this EAR has proven that CALL is a purely instrumental tool that is only useful if set in a cogent methodology. It has also shown that while exploring obstacles is essential, finding solutions is supreme. If this turned to be the predominant attitude of the majority of teachers, the best technology becomes the one you know, understand and are capable of using. While too much has been the demands on teachers' getting up to cope with the current ever-changing educational technology (EdTech) tools, they can, equally well or even better, achieve their pedagogical objectives, despite tech hiccups and limited CALL expertise, if they focus more on how far they can go with whatever technologies they have at their hands. This hunch by no means invalidates the need for teacher (re-) training; the knowledge gained along the process constitutes the basis for being true professionals.

References

Agamba, J. J. (2015). Optimizing Blended Teaching and Learning in Brick-and-Mortar Institutions. In Keengwe, J., & Agamba, J. J. (Ed). *Models for improving and optimizing online and blended learning in higher education*. IGI Global.

Ahmed, Z. (2004). The role of computers in facilitating the academic writing of undergraduate students. Central Institute of English and Foreign Languages.

Al-Busaidi, S. & Tindle, K. (2010). Evaluating the impact of in-house materials on language learning. In B. Tomlinson & H. Masuhara (Eds.), *Research for materials development in language learning* (pp. 137-149). Bloomsbury Publishing.

Alexander, S. (1995). Teaching and learning on the World Wide Web. Paper presented at the Aus Web, The First Australian World Wide Web Conference, NSW.

Allen, J.P.B. & Widdowson, H.G. (eds.) (1973-1978). English in focus. Oxford University Press.

Allwright, L.R. (1981). What do we want teaching materials for? *ELT Journal*, 36,

1, 5-18.

Allwright, D. & Hanks, J. (2009). The developing language learner: An introduction to exploratory practice. Basingstoke.

Alpitkin, C. (1993). Target language culture in EFL materials. *ELT Journal*, 47, 2,

136-143. Oxford: Oxford University Press.

Anderson, P., 2007. All that glitters is not gold- Web 2.0 and the librarian. *Journal of Librarianship and Information Sciences*, 39, 195-8. Association for Experiential Learning. http://www.aee.org/

Ayden, S. (2013). Teachers' perceptions about the use of computers in EFL teaching and learning: The case of Turkey. *Computer Assisted Language Learning* 26(3), 214-233.

Babocock, M.J. (2007). Learning Logs in introductory literature courses. *Teaching in Higher Education*. 12(4), 513-523.

Balaman, U. & Sert, O. (2017). Development of L2 interactional resources for online collaborative task accomplishment. *Computer Assisted Language Learning.* http://dx.doi.org/10.1080/09588221.2017.1334667

Banegos, D.L.(2013).Teacher, What Page Today? A look at materials development. In A. Leceta & R.I Cuneo (Eds.), *V jornads en actualizacion de la ensenaza delinglés* (pp. 6-13). Universidad Nacional de San Juan.

Barnard, R., Zemach D. (2003). Materials for specific purposes. In B. Tomlison (ed.) *Developing materials for language teaching* (pp.306-323). Continuum.

Basturkman, H. (2006). Ideas and options in English for specific purposes. Lawrence Erlbaum Associates.

Basturkman, H. (2010). Developing courses in English for specific purposes. Palgrave Macmillan

Bax, S. (2003). CALL: Past, present and future. *System*, 31, 13-28.

Beatty, K. 2003. Teaching and researching computer-assisted language learning. Pearson Education Limited.

Beckett, G.H. & Chamness, Miller, P. (2006). Project-based second language and foreign-language education: Past, present, future. Information Age Publishing.

Belcher D. D. (2006). English for specific purposes: Teaching to perceived needs and imagined futures in worlds of work, study, and everyday life. *TESOL Quarterly* 40 (1), pp. 133-56.

Belcher D.D. (2012). What ESP is and can be: An introduction. In D.D. Belcher (ed.). *English for specific purposes in theory and practice* (pp. 1-20). University of Michigan Press

Bell, F. (2005). Comprehension aids, internet technologies and the reading of authentic materials by adult second language learners. *PhD Dissertation*. Department of Modern Language and Linguistics, Florida State University.

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Belouahem, R. (2008). The suitability of the first-year secondary school coursebook ' At the Cross Roads' to the Algerian teaching environment. Unpublished Doctorate Thesis. Mentouri University.

Belz, J.A., 2005. Intercultural questioning, discovery and tension in Internet-mediated language learning partnership. *Language and Intercultural Communication*, 5(1), 3-38.

Blake, R. (2000). Computer-mediated communication: A window on L2 Spanish interlanguage. *Language Learning and Technology*, 4(1), 120-136.

Blin, F. (2004). CALL and the development of learner autonomy: Towards an activity-theoretical perspective. *ReCALL*, 16(2), 377-395.

Blin, F., & Jalkanen, J. (2014). Designing for language learning: Agency and languaging in hybrid environments. *APPLES: Journal of Applied Language Studies*, 8 (1), 147-170. http://apples.jyu.fi/ArticleFile/download/433

Bocanegra-Valle, A. (2010). Evaluating and Designing Materials for the ESP Classroom. In M.F, Ruiz-Garrido, J.C., Palmer-Silveira & I., Fortanet-Gómez (Eds.). *English for Professional and Academic Purposes* (pp. 141-165). Amsterdam: Rodopi.

Bolter, J.D. & Grusin, R. (1999). Remediation: Understanding new media. Cambridge, Mass.: MIT Press.

Borg, S., 2010. "Language teacher research engagement." *Language Teaching*. 43 (4):391- 429.

Bosher S., Smalkoski K. (2002). From Needs Analysis to Curriculum Development: Designing a course in health-care communication for immigrant students in the USA. *English for Specific Purposes* 21, pp. 59-79.

Boucherfa, M. & Baghoussi, M. (2017). Algeria EFL university teachers' attitudes towards computer-assisted language learning: The case of Djilali Liabes University. *International Journal of Education and Literacy Studies*. 5(2), 132-139

Boulmerka, S. (2016). Internet use in EFL classrooms: Teachers attitudes and concerns. *El Tawassol, Langues et Litérature*. N46, pp. 253-261, Juin 2016. University of Annaba/Algeria.

Bouzidi, H. (2009). Between the ESP classroom and the workplace: Bridging the gap. *English Teaching Forum*, 3, 10-19.

Bowns, S. (2010). From VLEs to Learning Web: The implications of web 2.0 for learning and teaching. *Interactive Learning Environments*, 18(1), 1-10.

Breen, M., Candlin, C. & Waters, A. (1979). Communicative materials design: Some basic principles. *RELC Journal*, 10, 1-13.

Breen M.P. (1985). Authenticity in the language classroom. *Applied Linguistics* 6, 60-70.

Breen, M. & Candlin, C. (1987). Which materials? A consumer's and designer guide. In L.E. Sheldon (Ed.), *ELT textbooks and materials: Problems in evaluation and development*. (13-28). London: Modern English Publications.

Brown, C.A.S. (2010). The globalized community of practice: A phenomenological case study. http://getd.libs.edu/pdfs/brown_carol_a_2010058edd.pdf

Buck Institute for Education. (2003). Project-Based Learning Handbook. A Guide to Standards-Focused Project Based Learning for Middle and High School Teachers. (2nd ed). Hong Kong: Quinn Essentials Books & Printing, Inc.

Bullock, D., Rebolledo, P. & Smith, R. (2016) (eds.). Champion Teachers: Stories of exploratory action research book. London: British Council.

Campbell, C. (2014). Problem-based learning and project-based learning. Australian Council for Educational Research, ACER.

http://www.teachermagazine.com.au/articles/problem-based-learning-and-project-based-learning

Cameron, L. (1997). The task as a unit for teacher development. *ELT Journal*, 51, 345-351.

Canale, M. & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics* 1 (1), pp. 1-47.

Canniveng, C. & Martinez, M. (2003). Materials development and teacher training. In B. Tomlinson (ed.), *Developing materials for language teaching* (pp. 479-489). Continuum Press.

Celce-Murcia, M. & Olshtain, E. (2000). Discourse and Context in Language Teaching.

Chang, A. (2014). ELL student engagement in computer-assisted language learning. Unpublished PhD thesis. Washington State University

Chapelle, C. (1998). Multimedia CALL: Lessons to be learned from research on instructed SLA. *Language Learning & Technology*, 2(1), 22-34

Chapelle, C. (2001). Computer applications in second language acquisition: Foundation for teaching, testing and research. CUP

Chapelle, C. (2003). English language learning and technology: Lectures on teaching and research in the age of information and communication. John Benjamins Publishing.

Cirocki, A., & Farrell, T. S. C. (2017a). Reflective practice in the ELT classroom [special issue]. *The European Journal of Applied Linguistics and TEFL*, 6(2).

Cirocki, A., & Farrell, T. S. C. (2017b). Reflective practice for the professional development of TESOL practitioners. *The European Journal of Applied Linguistics and TEFL*, 6(2), 5– 23.

Chun, D.M. (2008). Computer-mediated discourse in instructed environments. In S.S. Magnan (Ed.), *Mediating discourse online* (pp. 15-45). John Benjamins Publishing.

Clendening, C.P. & Davies, R.A. (1983). Challenging the gifted: Curriculum enrichment and acceleration models. R.R. Bowker Company.

Cohen, L., Manion, L. & Morrison, K. (2007). Research methods in education (6th ed.). Routledge.

Collis, B. & Moonen, J., 2006. The Contributing Student: Learners as co-developers of learning resources for reuse in web environments. In D. Hung & M.S. Khine (eds.), *Engaged learning with emerging technologies.* (pp. 49-67). Springer.

Commander, N.E. & Smith, B.D. (1996). Learning logs: A tool for cognitive monitoring. *Journal of Adolescent & Adult Literacy*. 39(6), 446-453.

Conole, G. (2007). Describing Learning Activities: Rethinking pedagogy for a digital age. *Designing and Delivering E-learning*, 81-91

Conole, G. (2010). Facilitating New Forms of Discourse for Learning and Teaching: Harnessing the power of web 2.0 practices. *Open Learning* 25(2), 141-151.

Crawford, J. (2002). The role of materials in the language classroom: Finding a balance. In J.C. Richards & W.A. Renandya (Ed.), *Methodology in language teaching* (pp.80-91). Cambridge University Press.

Crystal, D. (1997). The Cambridge Encyclopedia of the English Language. CUP.

Croker, R.A. (2009). An introduction to Qualitative Research. In J. Heigham and R.A. Croker (eds.). *Qualitative Research in Applied Linguistics* (pp. 3-24). Palgrave.

Cunnigsworth, A. (1995). Choosing your textbook. Macmillan Heineman.

Curtis, D., Lebo, D., Cividanes, W., Carter, M. (2013). Reflecting in communities of practice: A workbook for early childhood educators. St. Paul, MN: Red leaf Press.

CALL and Materials Design and Development

Dahlstrom, E., de Boort, T., Grunwald, P., & Vockly, M. (2011). The ECAR national report of undergraduate students and information technology 2011 (Research Report). EDUCAUSE Centre for Applied Research. http://www.educause.edu/ecar

Dalby, T. (2009). Adapting your coursebook: Becoming skilled in the art of manipulation. *TESOL Review*, 1, 145-166.

Darling-Hammond, L., Zielezinski, M. & Goldman, S. (2017). Using technology to support at-risk students' learning. SCOPE: Standard Center for Opportunity Policy. http://edpolicy.stanford.edu/sites/default/files/scope-pub-using-technology-report.pdf.

Dashetestani, R. (2012). Barriers to the implementation of CALL in EFL courses: Iranian EFL teachers' attitudes and perspectives. *The JALT CALL Journal* 8(2), 55-70.

Dashtestani, R. (2014). EFL teachers' knowledge of the use and development of computer-assisted language learning (CALL) materials. *Teaching English with Technology*, 14(2), 3-26.

Davies, G. (1997). Lessons from the past, lessons for the future: 20 years of CALL. In A.K. Korsudd & B. Rüschoff (eds.). New technologies in language learning and teaching (pp. 27-51). Council of Europe.

Davies, G., Walker, R., Rendall, H. & Hewer, S. (2012). Introduction to computer-assisted language learning (CALL). *ICT4LT*. Thames Valley University. http://www.ict4lt.org/en/en_modl1-4.htm.

Dede, C. (2008). A Seismic Shift in Epistemology. *EDUCAUSE Review*, 43(3), 80-81.

Dell'Aria, C. & Nocchi, S. (2010). Will second life® help me survive in Italy? In *ICT for Language Learning*, Florence, Italy, 11-12 November 2010.

Deutchman, M. & Vu, M. (2015). Computer Assisted Language Learning in Language Education: An overview of theories, methods, and current practices.

Dewy, J. (1916). Democracy education: An introduction to the philosophy of education. Macmillan.

Dikilitaş, K. & Yayli, D. (2018). Teachers' professional identity development through action research. *ELT Journal, 72/4, 415-424*. OUP. http://doi.org/10.1093/elt/ccy027

Donaldson, R.P. & Haggström, M.A. (2006). Changing language education through CALL. Routledge.

Dopper, S. & Dijkman, B. (1997). Action learning appropriate for part-time students. *Research in Education.* 23, 57-59.

Doughty, C.J. & Long, M.H. (2003). Optimal psycholinguistic environments for distance foreign language learning. *Language Learning and Technology*, 7(3), 50-80.

Dubin, F. & Olshtain, E. (1992). Course Design. Cambridge: CUP.

Dudley-Evans, T. and M.J. St John (1998). Developments in English for specific purposes: A multidisciplinary approach, Cambridge: Cambridge University Press.

Dudeney, G, & Hockly, N. (2012). ICT in ELT: How did we get here and where are we going? *ELTJ*, 66(4), 533-542. http://doi.org/10.1093/elt/ccs050

Dunkel, P. (1991). The effectiveness of Research on CAI and CALL. In P. Dankel (Ed.) *Computer-assisted language learning and testing: Research issues and practice.* Newbury House, 5-36.

Education Exchange. (fall 2004). Incorporating technology in the classroom. A publication of the School of Education: Syracuse University.

Egbert, J. L. (2005). Conducting research on CALL. In J. Egbert and G. M. Petrie (Eds.) CALL research perspectives (pp. 3-8). Lawrence Earlbaum.

Egbert, J., Akasha, O., Huff, L. & Lee, H. (2011). Moving forward: Anecdotes and evidence guiding the next generation of CALL. *International Journal of Computer Assisted Language Learning and Teaching.* 1(1), 1-15.

Eliadou, A. (2007). Responding to student diversity: Two cases in Cyprus, MEd Special & Inclusive Education. School of Education, University of Manchester.

Ellis, R. (1997). The empirical evaluation of language teaching materials. *ELT Journal*, 51 (1), 36-42.

Ewer, J. & Latorre, G. (1969). A Course in Basic Scientific English. Harlow: Longman.

Farrell, T. S. C. (2012). Reflecting on reflective practice: (Re)visiting Dewey and Schön. *TESOL Journal*, 3(1), 7-16. Available at: https://doi.org/10.1002/tesj.10

Farrell, T. S. C. (2013). Reflective practice in ESL teacher development groups. From practices to principles. Basingstoke: Palgrave Macmillan.

Farrell, T. S. C. (2015). Promoting teacher reflection in second language education. A framework for TESOL professionals. Routledge.

Feng, W.Y. (2005). Conceptions of enrichment. Paper presented at the *Cambridge Symposium on Education Research (Cam ERA)*. University of Cambridge, UK.

Fischer, G. (1998). Email in foreign language teaching. Tübringen: Stauffenburg Medium.

Fotos, S. & Browne, C. (2004). The development of CALL and current options. In S. Fotos & Browne, C. (Eds). *New.* Lawrence Erlbaum Associates. (pp. 3-14).

Freebairn, I. (2000). The coursebook- Future continuous or past? *English Teaching Profession*, 34, 3-5.

Fried-Booth, D. L. (2002). Project Work. (2nd ed.). Oxford University Press.

Gajewska E. & Sowa M.(2014). LSO, FOS, Fachsprache… Dydaktyka języków specjalistycznych. Werset, Lublin.

García Mayo M. del P. (1998-1999). The development of ESP: Language description and its influence on pedagogical materials. *Revista de Lenguas para Fines Específicos* 5 & 6, pp. 204-28.

Garton, S. & Graves, K. (2014). Materials in ELT: Current issues. In S. Garton & K. Graves (Eds.). *International perspectives on materials in ELT*(pp. 1-15). Palgrave: Macmillan.

Gilmore, A. (2004). A comparison of textbooks and authentic interactions. *ELT Journal* 58 (4), pp. 363-74.

Glassman, M. &Kang, M.J. (2010). Pragmatism, connectionism and the Internet: A mind's perfect storm. *Computers in Human Behaviour*, 26, 1412- 1418

Godwin-Jones, R. (1999). Web course design and creation for language learning. *CALICO Journal*, 17(1), 43-58

Godwin-Jones, R. (2005). Emerging Technologies: Skype and podcasting: Disruptive technologies for language learning. *Language learning and Technology*, 9(3), 9-12

Gónzalez-Lloret, M. & Ortega, L. (Eds.). (2014). Technology-mediated TBLT: Researching Technology and tasks. John Benjamins Publishing.

Goodnough, K. 2010. The role of action research in transforming teacher identity: Modes of belonging and ecological perspectives. Educational Action Research. 18(2):167-182.

Grant, M. (1987). Making the most of your textbook. Longman.

Graves, K. (2000). Designing language courses: A guide for teachers. Heinle & Heinle.

Gray, J. K. (2002). The global coursebook in English language teaching. In D. Black & D. Cameron (Eds.). *Globalization and language teaching* (151-167).Routledge.

Guemide, B. & Benachaiba, C. (2012). Exploring ICT and e-learning in teachers' professional development in Algeria: The case of secondary school teachers. *Turkish Online Journal of Distance Education- TOJDE*. 13(3), pp. 33-49

Guerretaz, A.M. & Johnston, B. (2013). Materials in the classroom ecology. *The Modern Language Journal.* (97) 779-796.

Hamada, H. (2007). *The impact of information processing strategies and discourse functions on materials design. Unpublished doctorate thesis*. Mentouri University.

Hamdy, A. (2007). ICT in education in Algeria. In Survey of ICT and Education in Africa: Algeria Country Report. http://www.infoev.org

Hampel, R. (2006). Rethinking task design for the digital age: A framework for language teaching and learning in an asynchronous online environment. *ReCALL*, 18, 105-121.

Han, W. (2009). Benefits and barriers of computer-assisted language learning and teaching. *US-China Foreign Language*, 6(9), 40-43.

Hardwood, N. (Ed.). (2010). English language teaching materials: Theory and practice. Cambridge: CUP.

Harmer, J. (2001). *The practice of English language teaching (3rd ed.)*. London: Longman.

Harrison, R. (1998). The evolution of networked computing in the teaching of Japenese as a foreign language. *Computer Assisted Language Learning*, 11(4), 437-452.

Haycroft, J. (1998). *An introduction to English language teaching*. Longman.

Heift, T. & Schulze, M.(2007). Errors and intelligence in computer-assisted language learning: Parsers and pedagogues. Routledge.

Hemche, H. (2007). The Design of ESP teaching material for first-year post-graduate Students of physics: University of Abou Bakr Belkaid –Tlemcen. Unpublished Magister Thesis: University of Tlemcen.

Henry, A. (2013). 'Digital games and ELT: Bridging the authenticity gap.' In E. Ushioda (Ed.), International perspectives on motivation: Language learning and professional challenges, 133-155.

Herbert, A.J. (1965) The Structure of technical English, Longman.

Hockly, N. (2011). The digital generation. *ELT Journal*. 65(3), 322-325. http://doi.org/10.1093/elt/ccr041

Hong, K. H. (2010). CALL teacher education as an impetus for L2 teachers in integrating technology. *ReCALL, 22*(1), 53–69.

Horsley, M. (2001). The future of textbooks: Emergent trends of research. TREAT.

Hubbard, P. (1996). Elements of CALL methodology: Development, evaluation and training. In M. Pennington (Ed.), *The power of CALL* (pp. 15-32). Athelstan.

Hubbard, P. (2008). CALL and the Future of Language Teacher Education. *CALICO Journal* 25(2): 175-188.

Hubbard, P. (2009). General introduction. In P. Hubbard (Ed.). *Computer-assisted language learning: Critical concepts in linguistics.* Routledge.

Hussin, B. (2002). An ESP program for students of nursing. In T. Orr (ed.). *English for Specific Purposes* (pp. 25-39). TESOL.

Hutchinson, T. & Torress, E. (1994). The textbook as an agent of change. *ELT Journal*, 48 (4), 315-328.

Hutchinson, T. & Waters, A. (1987). English for specific purposes: A learning-centred approach. CUP.

Hutchinson, T. & Waters, A. (2010). English for specific purposes: A learning-centred approach. CUP.

Hyland, K. (2002). Specificity revisited: How far should we go. *English for Specific Purposes* 21 (4), pp. 385-95.

Hyland, K. (2004). Genre and second language writing. Ann Arbor: University of Michigan Press.

Hyland, K. (2006). English for academic purposes. An advanced resource book. Routledge.

Hyland, K. (2008). The author replies. *Teaching English to Speakers of Other Languages Quarterly* 42, pp. 113-14.

Hymes, D.H. (1966). Two types of linguistic relativity. In Bright, W (Ed.), *Sociolinguistics* (pp. 114-158). Mouton.

Jenkins, H. (2006). Convergence culture: Where old and new media collide. New York University Press.

Jewitt, C. (2002). 'The move from page to screen: The multimodal reshaping of school English.' Visual Communication 1/2: 171-195.

Jimoyannis, A., Tsiotakis, P., Roussinos, D. & Siorenta, A. (2013). Preparing teachers to integrate Web 2.0 in school practice: Toward a framework for pedagogy 2.0. *Australasian Journal of Educational Technology*, 29(2), 248- 267

Johns, A.M., Paltridge, B., & Belcher, D.D. (2014). Introduction: New directions for ESP research. In D.D. Belcher, A.M, Johns, & B. Paltridge (eds.) *New directions in English for Specific Purposes Research* (pp 1-4). University of Michigan Press.

Jolly, D. & Bolitho, R. (2011). A framework for materials writing. In B. Tomlinson (ed.). *Materials development in language teaching (2ⁿᵈ ed.),* (pp. 107-134). CUP.

Jonassen, D.H., Peck, K.L. & Wilson, B.G. (1999). Learning with technology: A constructivist perspective. Prentice-Hall.

Jones, A. (2004). A Review of the research literature on barriers to the uptake of ICT by teachers. *British Educational Communications and Technology Agency* (Becta), 1(June), pp. 1–29.

Jordan, R.R. (1997). English for academic purposes. A guide and resource book for teachers. Cambridge University Press.

Kalantzis, M. & Cope, B. (2015). Learning and new media. In Scott, D; & Hargreaves (Ed.), *The sage handbook of learning*. SAGE

Kamasa V. 2014. Techniki językoznawstwa korpusowego wykorzystywane w krytycznej analizie dyskursu. Przegląd. Przegląd Socjologii Jakościowej 10 (2), pp. 100-17.

Karpova L.V. (1999). Consider the following when selecting and using authentic materials *TESOL Matters*, 9 (2), p. 18.

Kearsly, G & Shneiderman, G. (1998). Engagement theory: A framework for technology-based teaching and learning. *Educational Technology*, 38(5), 20-24.

Kern, R. & Warschauer, M. (2000). Theory and practice of network-based language teaching. In R. Kern & M. Warschauer (Eds.). *Network-based language teaching: Concepts and Practice*. (pp. 1-9). New York: CUP.

Kersaint, G., Horton, B., Stohl, H., & Garofalo, J. (2003). Technology beliefs and practices of mathematics education faculty. *Journal of Technology and Teacher Education*, 11(4), pp. 549-577.

Kervin, L. & Derewianka, B. (2011). New technologies to support language learning. In B. Tomlinson (ed.), *Materials development in language teaching* (pp. 328-351). CUP.

Kheirzadeh, S., & Sistani, N. (2018). The effect of reflective teaching on Iranian EFL students' achievement: The case of teaching experience and level of education. *Australian Journal of Teacher Education*, 43(2). http://dx.doi.org/10.14221/ajte.2018v43n2.8

Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers & Education, 49*, 740–762.

Kolb, D. (1984). Experiential learning: Experience as the source of learning and development. Prentice-Hall.

Kramsch, C., A'Ness, F. and Lam, E. (2000). Authenticity and authorship in the computer-mediated acquisition of L2 literacy. *Language Learning & Technology,* 4 (2): 78-104.

Kvale, S. (1996). Interviews. London: Sage

Lancaster, L. C. & Stillman, D. (2002). When generations collide: Who they are, why they clash, how to solve the generational puzzle at work. Harper Collins.

Lave, J. & Wenger, E. (1991). Situated learning: Legitimate peripheral participation, CUP.

Lee, W. (1995). Authenticity revisited: Text authenticity and learner authenticity. *ELT Journal* 49 (4), pp. 323-28.

Lee, K.W. (2000). English Teachers' barriers to the use of computer-assisted language learning. *The Internet TESL Journal*, 6(12). http://iteslj.org/articles/Lee-CALLbarriers.html

Leguteke, M.K. (2010). Projekte und szenarien. In H. Wolfgang & F.G. Königs (Ed.). *Handbunch fremdsprachendidaktik*. (pp. 207-10).

Leguteke, M.K. & Howard, T. (1991). Process and experience in the language classroom. Longman.

Lemke, J. (1998). Metamedia literacy: Transforming meanings and media. In D. Reinking, M.C. McKenna, L.D. Labbo & R.D. Kieffer (Eds.), *Handbook of literacy and technology: Transformations in a Post-typographic World* (pp. 312-333). Lawrence Erlbaum.

Lesiak-Bielawska, E.D. (2015). Key aspects of materials selection and design. *ESP World* 46, 1-26

Leow, R.P (1995). Modality and intake in second language acquisition studies. *Second Language Acquisition*, 17, 79-89.

Levin, B. (2000). Putting students at the centre of educational reform. *Journal of Educational Change*, 1 (2), 155 -172.

Levy, M. (1997). Computer-assisted language learning: Context and conceptualisation. Clarendon Press.

Levy, M. (1999). Computer-assisted language learning. Oxford University Press.

Levy, M. & Kennedy, C. (2005). Learning Italian via mobile SMS. In A. Kukulska-Hulme & Traxler, J. (Eds.). *Mobile learning. A handbook for educators and trainers*. Routledge (pp. 76-83).

Levy, M. & Stockwell, G. (2006). CALL dimensions: Options and issues in computer-assisted language learning. Lawrence Erlbaum Associates.

Liang, M.-Y. (2011). 'Foreign ludicity in online role-playing games.' Computer Assisted Language Learning, 25/5: 455-473.

Lin, T. (2012). Student engagement and motivation in the foreign language classroom. Unpublished dissertation. Washington State University.

Lin, W-C, Huang, H-T, & Liou, H-C. (2013). The effects of task-based SCMC on SLA: A meta-analysis. *Language Learning & Technology*, 17(2), 123-142.

Lincoln, Y.S. and Guba, E.G. (1985). *Naturalistic inquiry*. Sage.

Littlejohn, A. (2011). The analysis of language teaching materials: Inside the Trojan horse. In B. Tomlinson (ed.). *Materials development in language teaching (2nd ed.)* (pp. 179-211). CUP.

Lomicka, L. (2006). Understanding the other: Intercultural exchange and CMC. *CALICO*, 5, 211-236.

Long, M.H. (2005). The second language needs analysis. CUP.

Long, V.N. (2008). Technology-enhanced EFL syllabus design and materials development. Massey University.

Luo, T. (2013). Web 2.0 for Language Learning: Benefits and challenges for educators. *International Journal of Computer Assisted Langauge Learning and Teaching*, 3(3), 1-17.

Lv, J. (2017). A study of the correlation between English learning motivation and autonomous learning competence in a web-based environment: A case study of non-English major postgraduates in Central China Normal University, (Unpublished Master's dissertation). Central China Normal University.

MacDonald M.N., Badger R., Dasli M. (2006). Authenticity, culture and language learning., *Language and Intercultural Communication* 6 (3/4), pp. 250 – 61.

Masuhara, H. (2006). The multi-dimensional awareness approach to content teaching. In J. Mukundan (ed.). *Focus on ELT Materials* (pp. 1-11). Pearson/ Longman

Martin, A.J. & Dowson, M. (2009). Interpersonal relationships, motivation, engagement and achievement: Yields for theory, current issues, and educational practice. *Review of Educational Research*, 79, 327

Mathews-Aydinli, J. & Elaziz, F. (2010). Turkish students' and teachers' attitudes toward the use of interactive whiteboards in EFL classrooms. *Computer Assisted Language Learning* 23(3), 235-252.

McDonough, J. & Shaw, H. (1993). Materials and methods in ELT: A teacher's guide (1st ed.). Blackwell.

McDonough, J. & Shaw, H. (2003). Materials and methods in ELT: A teacher's guide (2nd ed.). Blackwell.

McDonough, J., Shaw, H. & Masuhara, H. (2013). Materials and methods in ELT: A teacher's guide (3rd ed.). Blackwell.

McGill, I. & Brockbank, A. (2004). The action learning handbook: Powerful techniques for education, professional development and training. Routledge Falmer: Abingdon.

McGrath, I. (2002). Materials evaluation and design for language teaching. Edinburg University Press.

McGrath, I. (2013). Teaching materials and the roles of EFL/ESL teachers: Practice and theory. Bloomsbury.

McLoughlin, C. & Lee, M.J.W. (2007). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 area. http://ascilite.org.au/conferences/singapore07/procs/mcloughlin.pdf

McLoughlin, C., & Lee, M. J. W. (2008). The 3 P's of pedagogy for the networked society: Personalization, participation, and productivity. *International Journal of Teaching and Learning in Higher Education,* 20(1), 10–27.

McLoughlin, C. & Lee, M.J.W. (2010). Personalized and self-regulated learning in the Web 2.0 Era: International exemplars of innovative pedagogy using social software. *Australian Journal of Education Technology*, 26(1), 28-43

Merrill, M.D. (2002). First principles of instruction. *Educational Research and Development*, 50(3), 43-59.

Mishan, F. (2005). Designing authenticity into language learning materials. Intellect Books.

Mitsikopoulou, B. (2014). Materials design for the digital enrichment of the Greek EFL textbooks. *RPLTL. Research Papers in Language Teaching and Learning*, 5(1), 48-69.

Mitsikopoulou, B. (2015). Digital textbooks and the politics of content enrichment in EFL Textbooks. In X.L. Curdt-Christianen & C. Weninger (Eds.), *Language, ideology and education: The politics of textbooks in language education*. Routledge.

Moore J., Munévar T. (1979-1980). Reading and thinking in English. Oxford University Press.

Morton, T. & Gary, J. (2010). Personal practical knowledge and identity in lesson planning conferences on a pre-service TESOL course. *Language Teaching Research*.

Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? *The Internet and Higher Education*, 18, pp. 15-23.

Moterram, G. (2011). Developing language learning materials with technology. In B. Tomlinson (Ed.), *Materials development in language teaching* (pp. 303-327). CUP.

Motteram, G. (2013). Innovations in learning technologies for English language teaching. British Council, UK.

CALL and Materials Design and Development

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: A review of the literature. *Journal of information technology for teacher education*, 9(3), pp. 319-342.

Murray, D., McPherson P. (2004). Using the Web to support language learning. Sydney: National Centre for English Language Teaching and Research.

Murray, D. (2005). Technologies for second language literacy. *Annual Review of Applied Linguistics*, 25, 188-201.

Nguyen, L.V. (2008). Technology-enhanced EFL syllabus design and materials development. *English Language Teaching*, 1(2), 135-142.

Nunan, D. (1988). Syllabus design. CUP.

Nunan, D. (1989). Designing tasks for the communicative classroom. CUP.

Nunan, D. (1991). Communicative tasks and the language curriculum. *TESOL Quarterly*, 25(2), 279-295.

Nunan, D.(2007). Standard-based approaches to evaluation of ESL instruction. In J. Cummins & C. Davison (eds.), *International handbook of English language teaching*. Springer.

Nunnally, J. C., Bernstein, I. H., & Berge, J. M. T. (1967). Psychometric theory (Vol. 226). McGraw-Hill.

O'Dowd, R. & Ware, P. (2009). Critical issues in telecollaborative task design. *Computer Assisted Language Learning*, 22(2), 173-188.

Ogata, H. & Yans, Y. (2004). Context-aware support for computer-supported ubiquitous learning. In BTIEEE International Workshop on Wireless and Mobile Technologies in Education. *IEEE Computer Society* (pp. 27-34).

O'Neil, R. (1982). Why use textbooks? *ELT Journal*, 36(2), 104-111.

Ono, Y.A & Morimora, K. (2007). Effective methods for teaching technical English to Japenese engineering students: a Case study at the school of engineering. *The University of Tokyo, Professional Communication Conference*, 2007. *IEEE International*, 1-7,

O'Reilly, T. (2005). What is Web 2.0? Design patterns and business models for the next generation of software. http://www.oreilly.com/web2/archive/whatisweb-2.0.html.

Palletieri, J.L. (2000). Negotiation in cyberspace: The role of chatting in the development of grammatical competence. In M. Warschauer & R. Kern (eds.), *Network-based language teaching: concepts and practice* (pp. 59-86). Cambridge: CUP.

Panichi, L., Deutchman, M. & Molka-Danielson, J. (2010). Virtual worlds for language learning and intercultural exchange: Is it for real? In S. Guth & F. Helm (eds.). *Telecollaboration 2.0*, Bern: Peter Lang (pp. 165-95).

Peacock, V. (1939). Effective enrichment of the textbook in a foreign language. *The School Review*, 47(1), 24-31.

Pica, T., Kanagy, R. & Falodun, J. (1993). Choosing and using communication tasks for second language research and instruction. In G. Crookes & S.M. Gass (Eds.), *Tasks and second language learning* (pp. 9-34). Multilingual Matters.

Piggot, J. (2004). Mathematics enrichment: What is it, and who is it for? Paper presented at the BERA annual conference at the University of Manchester, 15-18 September 2004. http://www.leeds.ac.uk/educol/documents/00003649.doc

Prensky, M. (2001). Digital natives, digital immigrants, part 1. On the Horizon, 9(5), 1-6. Available at: http://bit.ly/IMBu0j

Prensky, M. (2009). Homo Sapiens digital: From immigrants and digital natives to digital wisdom. *Innovate* 5/3.

Quarshoa, S.H. (2013). The Role of internet technology in EFL syllabus design. *Asian Journal of Education and E-Learning*, 1(4), 184-198

Railsback, J. (2002). Project-based instruction: Creating excitement for learning. Northwest Regional Educational Laboratory.

Ramirez, L.L. (2010). Empower English language learners with tools from the Web. Crowin

Rao, V.C. (2014). English for Science and Technology: A learner-centred approach. *ESP World* 42(15) 1-10

CALL and Materials Design and Development

Reeves, T. C., & Reeves, P. M. (2012). Designing online and blended learning. University teaching in focus: a learning-centred approach, pp. 112-127.

Reily, P. (2012). Understanding and teaching Generation Y. *English Teaching Forum*. 1, 2-11.

Reinders, H. (2005). Non-participation in a university language programme. *JALT Journal*, 27, 209-226.

Reinders, H. (2007). Big brother is helping you. Supporting self-access language learning with a student monitoring system. *System* 35, 93-111.

Reinders, H. & White, C. (2010). The theory and practice of technology in materials development and task design. In N. Harwood (Ed.), *English language teaching materials: Theory and practice* (pp. 58-80). Cambridge: CUP

Richards J. C. (1993). Beyond the textbook: the role of commercial materials in language teaching. *RELC Journal*, 24(1), 1-14.

Richards J. C. (2001a). Postscript: The ideology of TESOL. In R. Carter, D. Nunan (eds.) *The Cambridge guide to teaching English to speakers of other languages* (pp. 213-17). CUP.

Richards J. C. (2001b.) Curriculum development in language teaching. CUP

Richards, J.C. (2001c). The role of textbooks in a language program. Oxford: OUP.

Richardson, V. (1996). Teacher change and the staff development process: A case in reading instruction. Teachers College Press.

Richardson, W. (2006). The read/write web. In Richardson, W. (ed.), *Blogs, wikis, podcasts and other powerful web tools for classrooms* (pp. 1-16). Corwin.

Robinson, P.C., (1991). ESP today: A practitioner's guide. Prentice-Hall International.

Rogers C., Medley F. Jr. (1988). Language with a purpose: Using authentic materials in the foreign language classroom. *Foreign Language Annals* 21, pp. 467-78.

Rossi, P.H et al. (1998). Evaluation: A systematic approach (6th Edition). Sage Publications

Sands, D.I., Lydia, G., Laura. S. & Alison, B. (2007). Including student voices in school reform: Students speak out. *Journal of Latinos and Education*, 6(4), 323-345.

Sankey, M. D., & Hunt, L. (2013, December). Using technology to enable flipped classrooms whilst sustaining sound pedagogy. In Proceedings of the 30th Australasian Society for Computers in Learning in Tertiary Education Conference (ASCILITE 2013), pp. 785-795. Macquarie University.

Sawhill, B. (2008). The Changing role of the language teacher/technologist. *The IALLT Journal*,40(1) http://ialltjournal.org.apa/doc.xhtml?id=isllt_40_01_sawhill

Seaborn, K., & Fels, D. (2014). Gamification in theory and action: A survey. International Journal of Human-Computer Studies, 74, 14–31.

Selevičienė, E. & Burkšaitienė, N. (2015). University students' attitudes towards the usage of web 2.0 tools for learning ESP. A preliminary investigation. *Societal Studies, 7(2), p. 270–291.*

Sert, O. & Li, L. (2017). A qualitative study on CALL knowledge and materials design: Insights from pre-service EFL teachers. *International Journal of Computer Assisted Language Learning*. 7(3). 73-87. http://doi.org/10.4018/JCALLT.2017070105.

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Research*, 27(2), 4-13

Shawer, S. et al. (2008). Student cognitive and affective development in the context of classroom-level curriculum development. *Journal of the Scholarship of Teaching and Learning*, 8, 1, 1-28.

Shawer, S. et al. (2009). Learner-driven EFL curriculum development at the classroom level. *International Journal of Teaching and Learning in High Education*, 20(2), 125-143

Sheldon, L.E. (1998). Evaluating EFL textbooks and materials. ELT Journal, 24(4), 237-246.

Shield, L. (2003). MOO as a language learning tool. In F. Uschi (Ed.). *Language learning online*. Swets & Zeitlinger, 97-122.

Shirazifard, H. (2016). The role of CALL and internet technology in the development of language learning materials. *Journal of Fundamental and Applied Sciences*. 8(3s), 1699-1710.

CALL and Materials Design and Development

Silberman (2007). The handbook of experiential learning. San Francisco: John Wiley & Sons Inc.

Simons, P.R.J. (1999). Three ways to learn in a new balance. *Lifelong Learning in Europe*, IV (1), 14-24.

Skehan, P. (1998). A cognitive approach to language learning. OUP.

Smith, R. & Rebolledo, P. (eds.). (2018). A handbook for exploratory action research. British Council.

Snyder, I. (Ed.) (1998). *Page to screen: Taking literacy into the electronic era.*Routledge.

Spratt, M. & Pulverness, A. (2008). Teaching knowledge test course. CUP.

Stanley, G. (2006). Podcasting: Audio on the Internet comes of age. *TESL-EJ*, 9(4)

Stanley, G. (2013). Language learning with technology: Ideas for integrating technology in the classroom. CUP

Sturn, M., Knenel, T., McBride, R. & Kelly, M. (2009). The pedagogical implications of Web 2.0. In M, Thomas (Ed.), *Handbook of research on web 2.0 and second language learning* (pp.367-384). Information Science Reference

Stoller, F.L. (2006). Establishing a theoretical foundation for project-based learning in second and foreign language contexts. In Beckett, G.H, & Chamness Miller, P. (eds.), Project-based second and foreign language education: Past, present, and future (pp. 19-40). Information Age Publishing

Stoller, F.L., B. Horn, W. Grabe and M.S. Robinson (2006) Evaluative review in materials development. Journ*al of English for Academic Purposes* (5) 3: 174-192.

Surowiecki, K. (2004). The wisdom of crowds. Boubleday.

Svenson, P. (2003). Virtual worlds as arenas for language learning. In U. Felix (Ed.). *Language learning online: Towards best practice*. Lisse, Swets & Zeitlinger (pp. 123-142).

Svedkauskaite, A., Reza-Hernandez, L. & Clifford, M. (2003). Critical issue: Using technology to support limited English proficient (LEP) students' learning experiences. North Central Regional Educational Laboratory. http://www.ncrel.org

Swain, M. (1995). Three functions of output in second language learning. In G.Cook & B. Seindlhfer (Eds.), *Principle and practice in applied linguistics: Studies in honour of William E. Rutherford* (pp. 125-144). OUP.

Swales, J.M. (1985). Episodes in ESP. Pergamon Press.

Swales, J.M. (2002). Integrated and fragmented worlds: EAP materials and corpus linguistics. In J. Flowerdew (Ed.), *Academic discourse* (pp. 150-164). Longman.

Swales J.M. (2004). Research genres: Explorations and applications. CUP

Swales J.M. (2009). When there is no perfect text: Approaches to EAP practitioner's dilemma. *Journal of English for Academic Purposes* 8, pp. 5-13.

Sykes, J.M, Oskoz, A. & Thorne, S.L. (2008). Web 2.0, synthetic immersive environments, and mobile resources for language education. *CALICO*, 25(3), 528-546.

Taylor, L. (2005). Washback and impact. *ELT Journal*, 59, 2, 154.

Tella, S. (1996). Foreign languages and modern technology: Harmony or hell? In M. Warschauer (ed.), *Telecollaboration in foreign language learning*. University of Hawaii: Second Language Teaching and Curriculum Center (pp. 3-18).

Thomas, P. (2010). Research methodology and design. *Research Methodology and Design*, pp. 291 – 334.

Thornbury, S. (2005). How to teach speaking? Longman.

Thorne, S. &Payne, J. (2005). Evolutionary trajectories, internet-mediated expression, and language education. *CALICO*, 22(3), 371-397

Thorne, S.L. (2008). Transcultural communication in open internet environments and massively multiplayer online games. In S.S. Magnan (Ed.). *Mediating discourse online*. Amsterdam: John Benjamins (pp. 305-27).

Thornton, P. & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of Computer Assisted Learning*, 21, 217-228.

Tomlinson, B. (Ed.). (1998). Materials development in language teaching. CUP.

Tomlinson, B. (2001). Materials development. In R. Carter & D.Nunan (eds.), *The Cambridge guide to teaching English to speakers of other languages* (pp. 66-71). CUP.

Tomlinson, B. (2003). Developing materials to develop yourself. *Language Learning*, 5(4). http://www.htlmag.co.uk/jul03/martjul031.rtf

Tomlinson, B. (2008). Language acquisition and language learning materials. In B. Tomlinson (Ed.). *English language teaching materials: A critical review* (pp. 3-14). Bloomsbury.

Tomlinson, B. & Masuhara, H. (2009). 'Playing to learn: A review of physical games in second language acquisition.' Simulation & Gaming, 40/5:645-668.

Tolmlinson, B. (2011). Materials development in language teaching (Second edition). CUP.

Tomlinson, B. (2012). Materials development for language learning and teaching. *Language Teaching,* 45, 143-179.

Tomlinson, B. (2016). The Importance of materials development for language learning. In M. Azarnoosh et al. (Eds.). *Issues in materials development* (pp. 1-9). Sense Publishers.

Tsui, A.B. (2003). Understanding expertise in teaching: Case studies of ESL teachers. CUP.

Turgut, Y. & Irgin, P. (2009). 'Young learners' language learning via computer games.' Procedia – Social and Behavioral Sciences, 1/1: 760-764.

Ulitsky, H. (2000). Language learner strategies with technology. *Educational Computing Research*, 22, 285-322.

Upton T. A. (2012). Current issues in ESP materials. *Taiwan International ESP Journal* 4 (1), http://tiespj.tespa.org.tw/current-issues-in-esp-materials/

Van den Branden, K. (2006). Introduction: Task-based language teaching in a nutshell. In K. Van den Branden (Ed.). *Task-based language education: From theory to practice*. CUP. (pp. 1-16).

Velazquez A.C., Redmond M.L. 2007. The use of authentic texts in the K-12 Spanish program. McCoy L.P. (ed.) *Studies in teaching 2007 research digest. Research projects presented at Annual Research Forum* pp. 133-38. Winston-Salem. http://files.eric.ed.gov/fulltext/ED503269.pdf

Von der Emde, S., Scneider, J. & Kötter, M. (2001). Technically speaking: Transforming language learning through virtual learning environments (MOOs). *Modern Language Journal*, 85(2), 210-225.

Vygotsky, L. (1978). Mind and society. Harvard University Press

Wang, Y. (2007). Task design in videoconferencing-supported distance language learning. *CALICO Journal*, 24, 657-673.

Wang, T. P. (2008). The difficulties and challenges of teachers' integrating computer-assisted instruction into teaching. *The Journal of Human Resource and Adult Learning*. 4(2), pp. 134-141.

Wang, C.X, Jaeger, D., Liu, J., Guo, X. & Xie, N. (2013). Using synchronous technology to enrich student learning. *TechTrends*, 57(1), 20-25.

Warschauer, M. (1996). Computer-assisted language learning: An introduction. In S. Fotos. (Ed.). *Multimedia Language Teaching*. Logos International. (pp. 3-20)

Warschauer, M. & Healy, D. (1998). Computers and language learning: An overview. *Language Teaching* 31, 57-71.

Warschauer, M., Meskill, C. (2000). Technology and second language learning. http://www.gse.uci.edu/person.warschauer_m/tslt.html

Warschauer, M. (2003). Technology and social inclusion: Rethinking the digital divide. MIT Press.

Warschauer, M. (2004). Technological change and the future of CALL. In S. Fotos & C. Browne (Eds.). *New perspectives on CALL for second language classrooms*. Lawrence Erlbaum Associates. (pp. 15-25).

Warschauer, M. (2006). Literacy and technology: Bridging the divide. In D. Gibbs & K.L. Krauss (Eds.), Cyberness 2: Languages and cultures of the internet (pp. 163-174). James Nicholas.

Weiner, B. (1972). Attribution theory, achievement motivation and the educational process. *Review of Educational Research*, 42(2), 203-215.

Weiner, B. (1985). An attributional theory of achievement, motivation and emotion. *Psychological Review*, 92(4), 584-573. http://dx.doi.org/10.1037/0033-295X.92.4.548.

Wenger, E. (1998). Communities of practice: Learning, meaning and identity. CUP.

Wheeler, S, Yeomans, P. & Wheeler, D. (2008). The good, the bad and the wiki: Evaluating student-generated content for collaborative learning. *British Journal of Educational Technology*, 39(6), 987-995.

White, C. (2006). State of the art article: The distance learning of foreign languages. *Language Teaching*, 39, 247-264.

Widdowson, H. (1979). Explorations in Applied Linguistics. Oxford University Press.

Widdowson, H. (1998). Context, community and authentic language. *TESOL Quarterly* 32 (4) pp. 705-16.

Widodo, H.P. & Savora, L. (2010). The Lincom guide to materials design in ELT. Lincom Europa.

Widodo, H.P. (2015). The development of vocational English materials from a Social semiotic perspective: Participatory action research. Doctorate Thesis. The University of Adelaide.

Widodo, H. P. (2018). Needs assessment in professional development (PD). In J. I. Liontas, M. DelliCarpini, & J. C. Riopel (Eds.), *The TESOL Encyclopaedia of English Language Teaching* (pp. 1–7). Wiley & Sons.

Widodo, H. P., & Ferdiansyah, S. (2018). Engaging student teachers in video-mediated self-reflection in teaching practice. In K. J. Kennedy & J. C-K. Lee (Eds), *The Routledge handbook of schools and schooling in Asia* (pp. 922–934). Routledge.

Willis, J. (1996). A framework for task-based learning. Longman.

Wu, P.N., Marek, M. & Wu, W.V. (2009). Enriching the EFL literature classroom in Taiwan with videos and blogs from a native speaker. In G. Siemens & C. Fulford (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2009*. (pp. 2339-2342). Chesapeake, VA: AACE. http://www.editlib.org/p/31803

Zhao, Y. (2005). Research in technology and second language education. Developments and Directions. Information Age Publishing.

Appendices

Appendix I: Research Instruments

Appendix I.1: Teachers' questionnaire

Appendix I.2: Internet-use Logs

Appendix I.3: Teacher Reflection Prompts

Appendix I.4: Student Reflection Prompts

Appendix II: SPSS Output Data

Appendix III: Coursebook content Page

Appendix IV: Teacher book content Page

Appendix V: Workbook content Page

APPENDIX- I. 1: Teachers' Questionnaire

The following questionnaire is part of a research project in Pedagogy carried by Pr. Riad BELOUAHEM and Mme. Nadjat KHENIOUI. It investigates English as a foreign language (EFL) teacher's knowledge of the use of the internet and computer-assisted language learning (CALL) materials. Whatever your qualifications and experience in the field, your answers will be of great help to us. Your responses will be treated in strict confidence. Please answer the questionnaire as accurately as possible. Thank you very much for your time and contribution.

1. **Information Background**

Demographic information

  a. Name of institution/university/school:
  b. University major:
  c. Educational degree:
  d. Position: EFL teacher...............   teacher trainer.................   teacher educator: ....
  e. Years of teaching experience:
  f. Age:
  g. Years of job experience:

ICT Facilities and CALL Experience

Items	Questions	Yes	No
1	Do you have an internet connection and networked computer at your institute?		
2	Do you have an internet connection and a networked computer at home?		
3	Do you use technology when preparing your teaching materials?		
4	Are there any computer/internet facilities in your institute for students?		
5	Have you ever had any ICT skills training?		
6	Do you integrate CALL in your classroom?		
7	Have you ever taught using CALL applications?		
8	Does the syllabus you teach contain any CALL materials		

2. **Attitudes toward the use of CALL materials and their development**

What is your opinion about the following statements? (Please circle a number from 1 to 4; **1 means 'strongly disagree'** …. **4= 'strongly agree'**)

Items	Statements	strongly disagree…..strongly agree
1	EFL teachers should be able to develop CALL materials for their teaching	1 2 3 4
2	CALL materials are more authentic than traditional EFL materials	1 2 3 4
3	CALL materials are more engaging, attractive and motivating than traditional materials	1 2 3 4
4	CALL materials are more accessible than traditional materials	1 2 3 4
5	CALL materials encourage interaction in EFL classrooms	1 2 3 4
6	CALL materials can cater to different learning styles and preferences	1 2 3 4
7	CALL materials can be easily developed	1 2 3 4

8	Producing CALL materials requires spending low costs	1 2 3 4
9	Immediate feedback can be provided using CALL materials	1 2 3 4
10	Using CALL materials provides greater chances for learners' autonomy	1 2 3 4
11	CALL tasks provide greater chances of collaborative learning	1 2 3 4
12	Using CALL materials facilitates teaching	1 2 3 4
13	Producing CALL materials facilitates the process of teacher development	1 2 3 4

3. Perceptions of the challenges to developing CALL materials by EFL teachers

What is your opinion about the following statements? (Please circle a number from 1 to 4; **1 means 'strongly disagree'** …. **4= 'strongly agree'**)

Items	Statements	strongly disagree…..strongly agree
1	EFL teachers do not have the expertise to develop CALL materials	1 2 3 4
2	EFL teachers do not know to integrate CALL materials into their curricula	1 2 3 4
3	EFL teachers do not have time to produce CALL materials	1 2 3 4
4	There is not enough funding for EFL teachers to develop CALL materials	1 2 3 4
5	There are cultural resistances to the use of CALL materials in the Algerian EFL context	1 2 3 4
6	No sufficient training on CALL materials development for EFL teachers	1 2 3 4
7	EFL teachers are not required to use CALL materials by their educational supervisors (e.g. inspectors) and institutions	1 2 3 4
8	Necessary tools for CALL materials development/use by teachers are sufficiently provided in Algerian EFL courses/ institutes	1 2 3 4

4. Perceptions of CALL materials development skills

How do you rate yourself according :(please circle one number from 1 to 5; **1 means 'not proficient'** ....**5= 'very proficient'**)

Items	Skills	Not proficient ..... very proficient
1	Your ability to extend your teaching of a coursebook and/ or in-class tasks with CALL materials	1 2 3 4 5
2	Developing/adapting CALL materials for an online course	1 2 3 4 5
3	Developing/adapting CALL materials for your EFL courses	1 2 3 4 5
4	Knowing the principles and theories of CALL materials	1 2 3 4 5
5	Your ability to adapt the use of CALL materials to your teaching plans and styles	1 2 3 4 5
6	Your computer literacy to develop CALL materials	1 2 3 4 5
7	Your knowledge about new CALL materials/software	1 2 3 4 5
8	Your ability to evaluate the usefulness of CALL materials	1 2 3 4 5

5. Recommendations for Training

In your opinion, what areas do EFL teachers need to develop more? (Please circle a number from 1 to 4; **1 means 'least urgent'** …**4= 'most urgent' classify from 1to 5**)

Items	Statements	Least urgent……………….. most urgent
1	Teachers' electronic literacy	1 2 3 4 5
2	Teachers' technology integration	1 2 3 4 5
3	Teachers' materials development/evaluation skills	1 2 3 4 5
4	Teachers' CALL materials development/evaluation skills	1 2 3 4 5
5	CALL materials curricular integration	1 2 3 4 5
6	Other? (please specify)	

Other recommendations to improve EFL teachers' technology integration and CALL materials development

………………………………………………………………………………………………………

……………………………………………………………………………………………………

………………………………………………………………**Thank you for your collaboration**

APPENDIX- I. 2: Internet-use Logs

Instructions: Please complete the record page about your internet activities either at home or at school. This includes if you are accessing the internet by cell phone, computer, or any other digital device.

Age: … gender: male ☐ female ☐	Level:
1. What do you generally do on the internet? (Choose by frequency 1, 2, 3, etc.) ☐ Social activity ☐ Learning ☐ Search for information ☐ Check the news ☐ Downloading films & music ☐ Playing games ☐ Writing comments ☐ blogging	2. How many hours do you spend on one activity per day? ☐ 0-2 Hours ☐ 3-5 Hours ☐ 6-9 ☐ Hours 10 and more What device do you usually use? (Choose by frequency 1, 2, 3, etc.) ☐ Computer ☐ Mobile ☐ iPad/iPod ☐ Other (please specify) …………………… …

3. Are there any specific goals for your use of the internet? If so, please write them below.	4. Please list the websites you often log onto and the
…………………………………………………... …………………………………………………... …………………………………………………... …………………………………………………... …………………………………………………... Who gave you the goal stated above? (mark one or more answers) ☐ It is my own goal ☐ It is my teacher's goal ☐ It is someone else's goal	URL of the website Lang
	language of the site

APPENDIX- I. 3: Teacher Reflection Prompts

Tell me about your CALL project experience:

1) What did work best for you?
2) What did not work best for you?
3) What did you enjoy along this journey?
4) How do you perceive yourself as an engaged materials writer using CALL in terms of your involvement in analysing, planning, designing and implementing these materials?
5) What successes did you achieve in designing EST materials?
6) Any other successes when designing CALL materials?
7) What successes when designing EST project works for your students? What did they enjoy performing? What did they find difficult? Have they helped students solve their learning difficulties?
8) Any other successes when designing CALL projects for your students? What did they enjoy performing? What did they find difficult?
9) What challenges did you encounter when taking part in the CALL project?

APPENDIX- I. 4: Student Reflection Prompts

Dear Student, thank you for completing this questionnaire about the impact of the projects on your learning. The information you provide here will be used in full **confidentiality** for research purposes only.

Please put a √ next to the right answer about you.
Age: 18-20 … 21-23….   Gender: Male…… Female….

1. What is your perception about the projects in technical English?

2. What was the most enjoyable aspect of the project? Why?

3. What was the most useful thing you learned by doing the project?

4. From the presentations, I found that you like to use (images, videos, PPP, and production of your own, etc.) to complete your projects. Why do you do so?
   d. How do you choose them?
   e. Which of these materials helped you learn better or easier English?

5. How did the project help you improve your English?

6. What did you learn from your team while doing the project?

7. In your opinion, what are the main advantages of the project?

8. What problems did you encounter when doing the project? Please explain.

9. What would you like to change about the project? Why?

APPENDIX- II: SPSS Output Data

Frequencies

Notes

Output Created		01-MAY-2019 23:31:36
Comments		
Input	Data	F: assim. sav
	Active Dataset	DataSet0
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	105
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=institution DEGREE position experience age I1 I2 I3 I4 I5 I6 I7 I8 I21 I22 I23 I24 I25 I26 I27 I28 I29 I210 I211 I212 I213 I31 I32 I33 I34 I35 I36 I37 I38 I41 I42 I43 I44 I45 I46 I47 I48 I51 I52 I53 I54 I55 I56 /ORDER=ANALYSIS.
Resources	Processor Time	00:00:00,03
	Elapsed Time	00:00:00,04

Statistics

		Name of institution	Educational degree	position	Years of teaching experience	age
N	Valid	102	98	102	101	97
	Missing	3	7	3	4	8

CALL and Materials Design and Development

Statistics

		Do you have an internet connection and networked computer at your institute?	Do you have an internet connection and a networked computer at home?	Do you use technology when preparing your teaching materials?	Are there any computer/internet facilities in your institute for students?	Have you ever had any ICT skills training?
N	Valid	102	105	105	105	104
	Missing	3	0	0	0	1

Statistics

		Do you integrate CALL in your classroom?	Have you ever taught using CALL applications?	Does the syllabus you teach contain any CALL materials	EFL teachers should be able to develop CALL materials for their teaching	CALL materials are more authentic than traditional EFL materials
N	Valid	103	105	102	105	104
	Missing	2	0	3	0	1

Statistics

		CALL materials are more engaging, attractive and motivating than traditional materials	CALL materials are more accessible than traditional materials	CALL materials encourage interaction in EFL classrooms	CALL materials can cater to different learning styles and preferences	CALL materials can be easily developed
N	Valid	104	103	102	104	103
	Missing	1	2	3	1	2

Statistics

		Producing CALL materials requires spending low costs	Immediate feedback can be provided using CALL materials	Using CALL materials provides greater chances for learners' autonomy	CALL tasks provide greater chances of collaborative learning	Using CALL materials facilitates teaching
N	Valid	101	104	104	99	104
	Missing	4	1	1	6	1

Statistics

CALL and Materials Design and Development

		Producing CALL materials facilitates the process of teacher development	EFL teachers do not have the expertise to develop CALL materials	EFL teachers do not know to integrate CALL materials into their curricula	EFL teachers do not have time to produce CALL materials	There is not enough funding for EFL teachers to develop CALL materials
N	Valid	104	104	104	104	99
	Missing	1	1	1	1	6

Statistics

		There are cultural resistances to the use of CALL materials in the Algerian EFL context	No sufficient training on CALL materials development for EFL teachers	EFL teachers are not required to use CALL materials by their educational supervisors (e.g. inspectors) and institutions	Necessary tools for CALL materials development/use by teachers are sufficiently provided in Algerian EFL courses/ institutes	Your ability to extend your teaching of a coursebook and/ or in-class tasks with CALL materials
N	Valid	104	104	101	104	104
	Missing	1	1	4	1	1

Statistics

		Developing/adapting CALL materials for an online course	Developing/adapting CALL materials for your EFL courses	Knowing the principles and theories of CALL materials	Your ability to adapt the use of CALL materials to your teaching plans and styles	Your computer literacy to develop CALL materials
N	Valid	100	105	102	104	105
	Missing	5	0	3	1	0

Statistics

		Your knowledge about new CALL materials/software	Your ability to assess the usefulness of CALL materials	Teachers' electronic literacy	Teachers' technology integration	Teachers' materials development/evaluation skills
N	Valid	102	104	104	105	104
	Missing	3	1	1	0	1

Statistics

		Teachers' CALL materials development/evaluation skills	CALL materials curricular integration	Other? (please specify)
N	Valid	104	103	0
	Missing	1	2	105

Frequency Table

Name of institution

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	school	42	40,0	41,2	41,2
	university	56	53,3	54,9	96,1
	pr school	4	3,8	3,9	100,0
	Total	102	97,1	100,0	
Missing	System	3	2,9		
Total		105	100,0		

Educational degree

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	Licence	26	24,8	26,5	26,5
	master	20	19,0	20,4	46,9
	magister	45	42,9	45,9	92,9
	doctorate	7	6,7	7,1	100,0
	Total	98	93,3	100,0	
Missing	System	7	6,7		
Total		105	100,0		

position

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	teacher	67	63,8	65,7	65,7
	trainer	30	28,6	29,4	95,1
	educator	5	4,8	4,9	100,0
	Total	102	97,1	100,0	
Missing	System	3	2,9		
Total		105	100,0		

Years of teaching experience

CALL and Materials Design and Development

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	under 5 years	26	24,8	25,7	25,7
	6 - 10 years	44	41,9	43,6	69,3
	10-15 years	2	1,9	2,0	71,3
	15-20 years	9	8,6	8,9	80,2
	over20years	20	19,0	19,8	100,0
	Total	101	96,2	100,0	
Missing	System	4	3,8		
Total		105	100,0		

age

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	under 30	24	22,9	24,7	24,7
	30-50	62	59,0	63,9	88,7
	above 50	11	10,5	11,3	100,0
	Total	97	92,4	100,0	
Missing	System	8	7,6		
Total		105	100,0		

Do you have an internet connection and networked computer at your institute?

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	YES	63	60,0	61,8	61,8
	NO	39	37,1	38,2	100,0
	Total	102	97,1	100,0	
Missing	System	3	2,9		
Total		105	100,0		

Résumé

Encadrée dans une recherche-action exploratoire, cette étude examine l'impact de l'apprentissage des langues assisté par ordinateur (CALL) sur le développement du matériel pédagogique conçu par les enseignants et les apprenants dans un contexte limité en ressources le cas de l'anglais pour la science et la technologie (EST). Il rend compte d'un projet collaboratif de développement de matériaux CALL sur un programme d'anglais dans une école préparatoire des ingénieurs à Alger, qui vise à développer le seuil de connaissances des enseignants sur la conception des matériaux CALL et les compétences des élèves du XXIe siècle. En examinant la question, on a constaté que les compétences de base en littératie numérique des enseignants - trouver, évaluer, et utiliser des ressources - combinées à leurs perceptions positives de l'utilité des matériaux CALL, de leur facilité d'utilisation et de leur impact social positif sont des signes prometteurs de l'intégration future de CALL. Les étudiants, quant à eux, acquièrent de solides compétences dans la recherche, le partage et la création de contenu numérique qui peuvent les aider dans leur apprentissage d'anglais, s'ils leur offrent une modélisation pédagogique appropriée. Ces conclusions ont été tirées via une combinaison d'outils de recherche quantitatifs et qualitatifs en utilisant des questionnaires, des entretiens et des journaux d'utilisation d'Internet. Compte tenu, une intervention pédagogique est réalisée, dans le cadre de la logique théorique, avec une action collaborative, coordonnée via des groupes de discussion, du personnel enseignant de la langue anglaise et des étudiants de deuxième année pour développer un système de soutien numérique au cours EST. Pour comprendre les effets de cette expérience sur les participants, des données ont été collectées via des journaux de réflexion. Les résultats montrent que l'action collaborative par la pratique réflexive, les forces de la littératie numérique avec une assistance interdisciplinaire et technique améliorent le pouvoir des enseignants et leur autonomie dans la sélection, la

conception et le développement de leur matériel pédagogique CALL. Les résultats révèlent également que l'apprentissage expérientiel fourni aux étudiants les aide à mieux performer dans leurs cours d'EST, à améliorer les divers attributs qui constituent les compétences du XXIe siècle et à surmonter les obstacles des méthodes traditionnelles. À cette fin, tous les participants se sont engagés dans une synergie motivationnelle déclenchée par un changement de pratiques d'enseignement/apprentissage compte tenu du nature contributif de l'intervention. Désormais, l'apprentissage contributif et par action son recommandés comme une entreprise saine qui allie le meilleur de la technologie et de la pédagogie et combine la croissance professionnelle et l'apprentissage tout au long de la vie.

ملخص

تتناول هذه الدراسة، التي تم وضعها في إطار بحث عملي استكشافي، تأثير تعلم اللغة على تطوير مواد التدريس التي صممها المعلمون والمتعلمون في (CALL) بمساعدة الحاسوب وهو يعنى بمشروع تعاوني (EST.) سياق محدود الموارد كاللغة الإنجليزية للعلوم والتكنولوجيا بمدرسة وطنية تحضيرية لدراسات مهندس، والذي يهدف EST لتطوير وسائل التدريس لبرنامج ومهارات القرن الحادي والعشرين لدى CALL إلى تطوير حرفية المعلمين في تصميم مواد الطلبة. عند استكشاف هذه المسألة وجدنا أن مهارات الإلمام الرقمية الأساسية للمعلمين- سهولة CALL، واستخدام المواد- إلى جانب تصوراتهم الإيجابية عن فائدة مواد إيجاد، تقييم في المستقبل. CALL استخدامها وأثرها الاجتماعي الإيجابي هي علامات واعدة على تبني من ناحية أخرى، يملك الطلاب مهارات رقمية قوية في العثور على المحتوى الرقمي ومشاركته وإنشائه يمكن أن تساعدهم في سعيهم للتعلم إذا وجدت النمذجة البيداغوجية السليمة. وقد استخلصت هذه الاستنتاجات من خلال مزيج من أدوات البحث الكمية والنوعية باستخدام الاستبيانات والمقابلات وسجلات استخدام الإنترنت. في ضوء هذه النتائج، يتم تنفيذ مشروع بيداغوجي تعاوني يضم هيئة تدريس اللغة الإنجليزية وطلاب السنة الثانية لتطوير لفهم آثار هذه التجربة على المشاركين، تم جمع البيانات عبر EST. نظام دعم رقمي لمقياس سجلات التأمّل إذ تبين النتائج أن العمل التعاوني ونقاط القوة الرقمية مع المساعدة التقنية والمتعددة التخصصات يعزز معرفة المعلمين واستقلاليتهم في اختيار، تصميم وتطوير المواد التعليمية الخاصة بهم. تكشف النتائج أيضا أن التعلم عن طريق التجربة يساعد الطلاب على أداء أفضل في فصولهم الدراسية، تنمية وتعزيز مهارات القرن الواحد والعشرين لديهم والتغلب على عقبات الطرق التقليدية. في ظل هذه النتائج انخرط جميع المشاركين في تآزر تحفيزي ناجم عن تغيير في طرق التدريس/التعلم نظرا للطبيعة المساهمة للتدخل البيداغوجي. والعمل كمنصة صحية على هذا الأساس، يوصى بالتعلم القائم على أساس المساهمة للتعلم إذ تجمع بين أفضل ما في التكنولوجيا والبيداغوجيا كما تجمع بين النمو المهني والتعلم مدى الحياة.