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# Technology-Mediated ESP Learning And Teaching (TESPLAT): from language learning theory to ICT integration principles

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*Technology-Mediated ESP Learning And Teaching  
(TESPLAT): from language learning theory to ICT integration  
principles*

ABSTRACT

The slow adoption of Information and Communication Technology (ICT) by teachers of Languages for Specific Purposes (LSP), and of English for Specific Purposes (ESP) in particular is worth noting and can probably be attributed to the lack of specific training received by LSP teachers, but it is certainly not due to the fact that LSP/ESP cannot benefit from ICT affordances. It is therefore worth examining how ESP can precisely benefit from ICT affordances, the combination of ESP and ICT leading to Technology-mediated ESP Learning And Teaching (TESPLAT), an emerging field of learning/teaching and research. The benefits identified can indeed serve as the basis to determine a set of principles for successful ICT integration in ESP learning and teaching, which is one of the objectives of this contribution. To this end, the characteristics of ESP will first be discussed and the predominant language learning theory in ESP teaching will then be examined in relation to ESP objectives. The “special relationship” between ESP and ICT will then be studied and key principles to successful ICT integration in ESP learning and teaching will finally be outlined, the goal being to match ICT affordances to pedagogical considerations in an attempt to design pedagogy-driven ESP courses rather than technology-driven ones.

Keywords: ICT affordances, ICT integration, ESP, teacher education

1. Introduction

The way Information and Communication Technology (ICT) has been integrated into language teaching and learning has evolved considerably since the 1980s (Leffa 2009), moving from Higgins’s 1988 conception of Computer-

Assisted Language Learning (CALL) as a metaphor for the magister to Bax's 2003 concept of technology "normalization", that is to say a stage of technological integration that is such that technology almost goes unnoticed (for example, using a videoprojector/beamer in the classroom). Still, the literature consistently points to the slow adoption of ICT by language teachers, be it teachers of Languages for Specific Purposes (LSP) (Zourou & Torresin 2019), and, more specifically, of English for Specific Purposes (ESP) (Kumar & Rani 2016, Li 2018). If this can probably be attributed to the lack of specific training received by LSP teachers (Howard 1997, Master 1997, Basturkmen 2014, Braud et al. 2015, Bruderermann et al. 2016), it is certainly not due to the fact that LSP/ESP cannot benefit from ICT affordances as several authors have noted to what extent LSP teaching can make the most of ICT integration (Delcloque 1997, Mamakou & Grigoriadou 2009, Belcher 2017, Li 2017, Muñoz-Luna & Taillefer 2018).

It is therefore worth examining how ESP can precisely benefit from ICT affordances, the combination of ESP and ICT leading to an emerging field of learning/teaching and research, that of Technology-mediated ESP Learning And Teaching (TESPLAT). To this end, the characteristics of ESP will first be discussed with special emphasis on the traditional – but outdated – dichotomy between ESP and what has been termed "General English (GE)". The predominant language learning theory in ESP teaching will then be examined as well as its methodological operationalization in relation to ESP objectives, before discussing the "special relationship" between ESP and ICT and outlining some key principles to successful ICT integration in ESP learning and teaching, the goal being to match ICT affordances to pedagogical considerations in an attempt to design pedagogy-driven ESP courses rather than technology-driven ones.

## 2. Characteristics of ESP

### 2.1. Defining characteristics of ESP

ESP must be seen as an approach not as a product. ESP is not a particular type of language or methodology, nor does it consist of a particular type of teaching material. Understood properly, it is an approach to language learning, which is based on learner need. The foundation of all ESP is the simple question: Why does this learner need to learn a foreign language?

(Hutchinson & Waters 1987: 19)

In their definition, Hutchinson & Waters (1987) clearly consider ESP as an approach to language learning, with strong emphasis on learner needs. A decade later, Dudley-Evans & St John (1998: 4-5) offered a more detailed definition which is comprised of absolute characteristics and variable characteristics and which does not really read like the definition of a construct but more like curricular guidelines aimed at ESP teachers. The focus therefore seems to be more on language teaching, this time. For example, the description of the language is only seen as a necessary step to the teaching of this particular type of language. From a French perspective, Petit's 2002 definition of ASP (*Anglais de Spécialité*) encapsulates the main differences with the formalisation of ESP in the English speaking world. In the French school of ESP, the specialised varieties of the language are objects of study in their own right because they exist independently from what we would do with them in the classroom. These views are summarised in Table 1 below.

Table 1. A summary of ESP definitions (Sarré & Whyte 2016: 149)

<b>Hutchinson &amp; Waters (1987)</b>	<b>Dudley-Evans &amp; St John (1998)</b>	<b>Petit (2002)</b>
ESP as an approach to language learning	ESP in terms of core characteristics and optional features of language teaching	ESP as a subdiscipline of English studies
Emphasis on learner needs	Emphasis on <ul style="list-style-type: none"><li>● learner needs</li><li>● methodological choices in relation to professional contexts</li><li>● linguistic aspects of specialised language</li></ul>	Emphasis on <ul style="list-style-type: none"><li>● the varied dimensions of specialised language: linguistic, discursive, cultural</li><li>● the teaching of this subdiscipline</li></ul>

Building on Petit's 2002 definition, Sarré & Whyte (2016) put forward the following definition of ESP in the French context:

The branch of English language studies which concerns the language, discourse and culture of English-language professional communities and specialised social groups, as well as the learning and teaching of this object from a didactic perspective.

(Sarré & Whyte 2016: 150)

As can be seen in this definition, ESP can be considered from two different perspectives which interact with each other: It is both “a research object aiming at characterising the language, discourse and culture of specialised communities and a learning and teaching object” (Braud et al. 2015: 49). In that respect, the French perspective on ESP is worth mentioning as it seems to be more inclusive than previous formalisations of the concept in the English speaking world, covering both linguistic descriptions of specialised varieties of English (SVE) in the field of linguistics (from a discourse and genre analysis approach) and the learning and teaching of these specialised varieties of English in the fields of applied linguistics/didactics and language education.

In addition, following the example of Dudley-Evans & St John (1998), a number of variable and absolute characteristics of ESP learning and teaching were put forward by Sarré & Whyte (2016):

**Absolute characteristics:**

- Interaction between language and content knowledge: content and/or methodologies are derived from specific disciplines or occupations, the specialist domain (Douglas 2010);
- Goal-directedness: the objectives of ESP learning and teaching are specific and directed towards particular skills and knowledge (language and culture) of a given discipline or occupation, learner ability to complete tasks as “real-world activities”;
- Needs analysis: the objectives of ESP learning and teaching are determined through careful needs analysis;
- Institutional constraints:
  - Student background and level: highly heterogeneous groups at university (slightly less so for more selective pathways – e.g. engineering schools)
  - ESP as a course requirement, which impacts student motivation
  - Group size
  - Contact time (very restricted)

**Variable characteristics:**

- Primacy of task completion (over language accuracy): performance vs. accuracy, ESP as an example of English as a *Lingua Franca* (ELF);
- Primacy of specific language skills development;
- Use of authentic materials;

- Use of specific methods: tasks (TBLT), project-based learning, CLIL;
- Use of language certification, specific ESP testing, development of ESP certification exams;
- Basic teacher training in ESP (often limited or absent) for non-research professionals.

(Sarré & Whyte 2016: 157)

## 2.2. Why teach ESP?

We can indeed wonder why we should teach ESP at all in Higher and Adult Education settings in particular. Besides the obvious need for the training offered in Higher Education to lead to successful integration in the world of work, which applies to language training as well (Braud et al. 2017), the first practical reason for teaching ESP is that learners in these settings often have a limited amount of time to learn the language: “As students in ESP classes often have restricted time to learn English, it makes sense to teach them only the bits of English they need” (Basturkmen 2006: 18). It is precisely because time is counted that ESP teachers need to be selective in what they want to teach: “As it is not possible to teach all of a language, teachers and course designers must be selective. Nowhere is this more so than in ESP teaching, with its emphasis on specific purposes and the limited duration of most ESP courses” (Basturkmen 2006: 23). In short, ESP teachers are faced with a sense of urgency and accuracy (Mangiante & Parpette 2004), which means that ESP teaching is usually geared towards “target language use situations” (Douglas 2001: 46).

## 2.3. Defining Specific Purpose Language Ability (SPLA)

Researchers in the field have noted the persisting discrepancies between the language skills developed and measured academically and the language skills most sought after by specialised communities (Zhang 2013 ; Hafner 2013). These discrepancies are also noticeable between the type of training offered to Higher Education students and the expectations of the industry (LEMP report 2015).

The specialised language skills needed by students is what has been termed Specific Purpose Language Ability (SPLA) (Douglas 2000). It is delineated by the common characteristics of different target language use situations and

defined by recurrent genres and registers, and it is framed by the specialist domain of the learners' diploma/training. Finally, SPLA also draws from English as a *Lingua Franca* (ELF) as ESP is considered by some authors to be “the English as a *lingua franca* of the learning and working world” (Master 2005: 112). This means that ESP invites us “to rethink the established notions of competence” (Cogo & Dewey 2012: 167) and to accept that teaching native-like proficiency level is not what matters but rather effective communication in the language in a given situation.

Braud et al. (2017: 38) consider that SPLA is a micro-skill which is part of a professional macro-skill and which comprises three components: (1) a domain/profession-specific competence, that is to say the specialised skills expected from the academic/professional communities (culture, values, references, terminology...), (2) the knowledge of specialised communication modes, that is to say the genres and registers specific to the specialist domain, (3) specialised social skills, that is to say the ability to interact within specialised discourse communities.

#### 2.4. Two opposing perspectives: ESP vs General English?

Some authors (Bloor & Bloor 1986) consider ESP as a mere extension of a basic or common core of general language. This notion of common core (Corder 1993) has been defined as “a general pool of language of high frequency items that predominates all uses of languages” (Basturkmen 2006: 16). In other words, this means that different varieties of a language are based on common linguistic features (grammar, lexis, etc.) which make up the common core of general language. Pedagogically speaking, this view of language implies that it is necessary for learners to master the common core of English before introducing ESP (Quirk et al. 1972, Coxhead & Nation 2001). And then only “when learners have mastered control of the 2,000 words of general usefulness in English, it is wise to direct vocabulary learning to more specialized areas depending on the aims of the learners” (Coxhead & Nation 2001: 252-253). This perspective therefore seems to offer a very limited view of LSPs as the main focus is terminology (i.e. specialised vocabulary). This view is implicitly adhered to by the authors of the CEFR if we closely examine the descriptors of proficiency levels on the global scale (Table 2).

Table 2. Common reference levels: Global scale from the CEFR (Council of Europe 2001: 24)

PROFICIENT USER	C2	Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations.
	C1	Can understand a wide range of demanding, longer texts, and recognise implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.
INDEPENDENT USER	B2	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.
	B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes & ambitions and briefly give reasons and explanations for opinions and plans.

We can see that, if level B1 makes no reference to specialised contexts, discourses or language, level B2 mentions the ability to take part in “technical discussions in his/her **field of specialisation**”, and, further up on the scale, level C1 mentions the ability to “use language flexibly and effectively for social, **academic** and **professional purposes**” (my emphasis). It is quite clear that, in this view, specialisation (in the form of language for academic and professional purposes) means complexity, since a learner’s proficiency level has to be higher to be able to deal with these specialised varieties of the language. Does this mean that (1) no specialisation is possible below level B1 or that (2) all academic and professional contexts require language learners to have a command of the language equivalent to level C1 for effective communication to be possible?

The second perspective on ESP contends the very opposite: in this view, there is no common core of language pre-existing to varieties; basic language is what is common to all varieties of English, and these varieties overlap (Bloor & Bloor 1986). Some authors take this argument one step further and claim that there is no “general purpose” language, no General English, which means that all language is specific purpose. In other words, and quite provocatively, there is no “English for no purpose” (Douglas 2010: 9). From a pedagogical point of view, languages are always learnt in a specific context:

All language learning is acquired from one variety or another, even if it's 'classroom English' variety. The language learner is as likely to acquire 'the

language' from one variety as from another, but the use of language, being geared to situation and participants, is learned in appropriate contexts.

(Bloor & Bloor 1986: 28)

In this respect, it is also interesting to note that the assumption that it is necessary to acquire a “common core” of the language before introducing language for specific purposes (LSP) is not supported by research (Hyland 2002: 388). In addition, the argument which links specialisation of a language with its complexity is unfounded: for example, Mangiante (2017) showed that there is no correlation between specialisation and complexity in the case of French for Specific Purposes, as specialised discourses made accessible to the general public are often more syntactically complex than the original (more specialised) discourses. In other words, this means that it is possible to teach and learn a specific variety of a language at any proficiency level and that there is no need to wait for learners to reach a certain proficiency level (B2, for example) to introduce ESP.

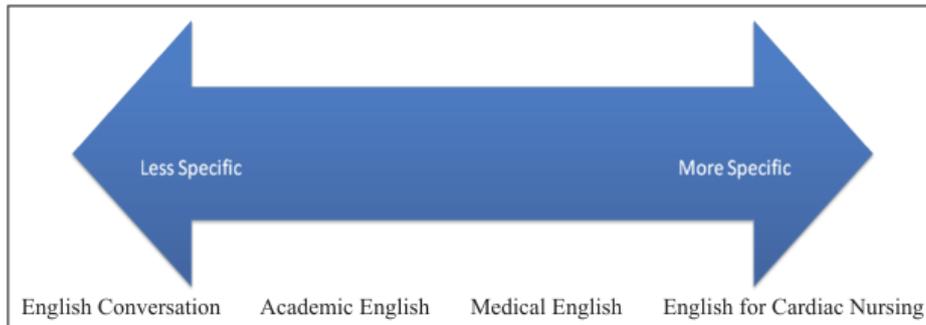
## 2.5. Towards a continuum of specificity

Today, the debate between the proponents of these opposing views seems somewhat outdated if we look at the evolving national curricula for languages in secondary education in different countries: for example, the latest revisions of the national curriculum in France<sup>1</sup> have introduced more possibilities than ever to teach the specialised varieties of a language through the promotion of Content and Language Integrated Learning (CLIL) at all levels of the education system... and these learners are definitely not all C1 students. As a result, it seems wiser and more in tune with today's changing world to consider language on a “continuum of specificity” (Douglas 2010 : 10) or continuum of specialisation, which would span from “English conversation”, to “Medical English” and to “English for Cardiac Nursing” in the case of ESP (Figure 1).

Figure 1. A continuum of Specificity (Douglas 2010: 10)

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1 See: <https://eduscol.education.fr/cid46517/sections-europeennes-langues-orientales-selo.html>



In this way, it is also possible to identify different grains of specificity within a given language, the continuum spanning from coarser grains to finer grains of specificity (Figure 2). As can be seen, specificity is not only determined by the type of language needed in a given context, but also by the familiarity of the learner with the context of use (hence why English for General Professional Purposes can be considered to be more specific than English for Specific Academic Purposes, for example).

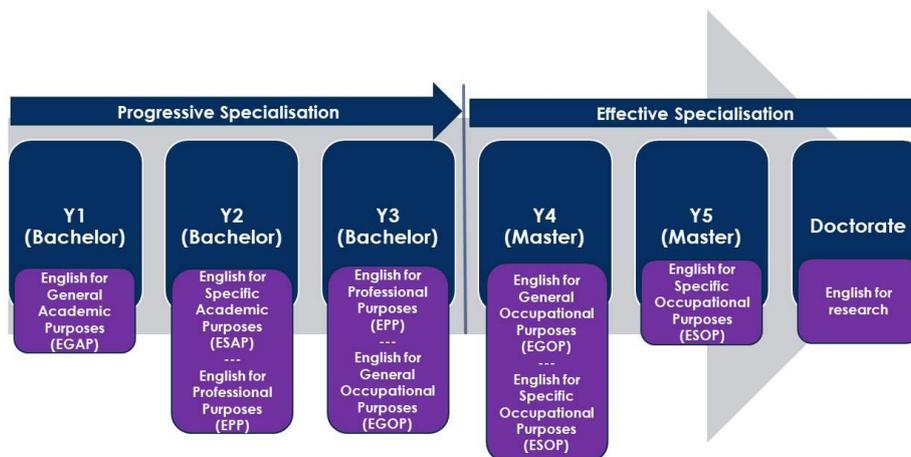
Figure 2. Different grains of specificity within ESP (Sarré 2018)



In Tertiary Education, the ESP curriculum could therefore make the most of these different grains, with each level of education being based on one (or more) of these in accordance with the degree of specialisation that is required at each level of study. Figure 3 gives the example of the ESP curriculum in the

French Higher Education system where course specialisation is very progressive in the first three years of tertiary education (Bachelor's level) and then becomes more effective in years 4 and 5 (Master's level), and totally built in at Doctoral level.

Figure 3. Different grains of specificity in the Higher Education ESP Curriculum (Sarré 2018)



The next question is to know what language learning theory predominates in ESP teaching and what methodology to use.

### 3. Teaching ESP: language learning/teaching theory and methodology

#### 3.1. Socio-constructivist ESP

When it comes to teaching ESP, socio-constructivism is claimed to be the most relevant language learning theory as it mirrors academic and professional contexts which often imply collaboration:

[T]he interpretation and construction of knowledge must be dependent on the cultural and social collaborative context. This is absolutely appropriate for adult learners that need to develop academic and professional/vocational discipline-specific language skills through a collaborative setting.

Socioconstructivism, therefore, proves to be the appropriate paradigm for ESP learning in tertiary education.

(Mamakou & Grigoriadou 2009: 463)

This more recent (and current) socio-constructivist view of ESP considers the language learner's experience as an active social process aiming at constructing knowledge through social interaction (Vygotsky 1978). The variety of language learning theories obviously impacts language teaching which can be viewed as "an integrative design process model that integrates the learning modalities dictated by various learning theories" (Mamakou & Grigoriadou 2009: 460). The most appropriate operationalization of the socio-constructivist paradigm is Task-Based Language Teaching (TBLT).

### 3.2. ESP and TBLT

ESP's status as an international language or a *Lingua Franca* in the industry has helped us redefine what *being competent in ESP* means through our definition of Specific Purpose Language Ability (SPLA) (in section 2.3.): our "conceptualization of expertise, or proficient specialist language use" (Belcher 2006: 150) is therefore redefined thanks to a "shift in focus away from proficiency to strategic communication" (Nickerson 2005: 369), that is to say through the development of communicatively effective strategies regardless of the ESP learner's proficiency level in the language. In other words, we have come to realise that "native speaker norms are not the most relevant in LSP" precisely because "formal linguistic accuracy is of little importance in any real-world context outside the language classroom" (Whyte 2019: 17). This is of particular importance to ESP teaching: it is therefore no wonder that its operational realisation has taken the form of tasks, i.e. pedagogical tools which are at the core of Task-Based Language Teaching (TBLT) and which are "centrally concerned with the learner achieving some purpose and outcome, and do not directly require the use of conformity-oriented language" (Skehan 2001: 167). The characteristics of tasks can be defined through the following three quotes:

1. Tasks are defined as pieces of work in everyday life with a specific objective, such as painting a fence, filling in a form, making an airline reservation. They are nonlinguistic units. (Basturkmen 2006 : 92)

2. An activity which requires learners to use language, with emphasis on meaning, to attain an objective. (Bygate, Skehan & Swain 2001: 11)
3. A workplan that requires learners to process language pragmatically in order to achieve an outcome that can be evaluated in terms of whether the correct or appropriate propositional content has been conveyed. (Ellis 2003: 17)

As a result, TBLT is specific about what learners need to communicate about and what actions they need to complete but not about what structures or vocabulary they need to use (Ellis 1998). If the acquisitional potential of tasks lies in the negotiation of meaning episodes that arise during task completion (cf. Interaction Hypothesis, Long 1983, 1996), it has been shown that tasks on their own are not as efficient as a “task + micro-tasks” sequence (i.e. post-task activities or pedagogical tasks) in order to help learners notice the gap in their knowledge/abilities (Robinson, Strong, Whittle & Nobe 2001). Generally speaking, it is possible to claim that ESP has strong natural affinities with tasks since ESP teaching often makes the most of the “deep-end strategy” (Dudley-Evans & St John 1998: 190): learners are first put in a situation where they need to use the language to communicate and perform some activity and afterwards it is possible to focus on the aspects of the language that were problematic for them; their performance while completing a task is therefore the starting point, followed by post-task activities meant to help them notice the gap in their knowledge and abilities. The question is now to know how Information and Communication Technology (ICT) can support ESP teaching.

#### 4. ESP and ICT: from ICT Affordances to ICT Integration Principles

##### 4.1. ESP and ICT: a “special relationship”

First, it is interesting to note that ESP and ICT seem to have a number of specific affinities, a phenomenon we could call a “special relationship”. Indeed, if we first focus on the most common ESP teaching and learning contexts, it has been shown that Higher Education and Adult Education settings offer teachers more freedom, that is to say more opportunities to experiment (with different ICT tools, for example) than other educational contexts as ESP teaching is sometimes qualified as “innovative” (Mémét & Petit 2001: 8; Hyland 2006: 35). Besides, in terms of specific constraints attached to ESP learning and teaching, large class size and the varying degrees of learner motivation (Sarré & Whyte

2016) call for a more pressing need for online or blended classes, which is one example of ICT integration. In addition, the typical ESP learner often has a more advanced proficiency level and is more autonomous (cf. the Higher Education and Adult Education settings), which means they are more able to cope with fewer face-to-face (F2F) sessions and can be offered more online/blended learning opportunities. When it comes to course objectives, ESP teaching can make the most of tools and environments that make it possible to recreate and simulate real-life work and academic environments and tasks. Finally, in terms of course content, using ICT in ESP teaching means it will be more in tune with the learners' specialist domains for those involved in computer science.

#### 4.2. ICT affordances for ESP Teaching

Put simply, ICT affordances can be defined as the “potential benefits that technology can bring to the process of teaching and learning” (Li 2018: 10). Generally speaking, it has been shown that ICT can support language learning in many different ways: it fosters lexical acquisition, improves writing, listening comprehension and grammar accuracy (Macaro et al. 2012, review article). More specifically, Computer-Mediated Communication (CMC) also helps develop communication skills, intercultural awareness and collaboration skills (Macaro et al. 2012). The question is to know whether ICT has specific affordances for ESP teaching and learning.

In their review paper of 55 studies on the use of ICT in ESP teaching, Dashtestani & Stojkovic (2015) have shown that ICT use in ESP is different to that in EFL (English as a Foreign Language) teaching: more interest seems to be shown in the use of CMS/LMS for online learning, corpora and wikis. In addition, they were able to report the positive impact on ESP learning of these three technologies: (1) CMS/LMS (Course/Learning management Systems) tend to increase the quality of ESP instruction and to promote the development of listening skills; (2) corpora (large collections of texts in electronic format combined with specific tools such as concordancers) increase ESP students' knowledge of specialized vocabulary and collocations and foster academic communicative skills; (3) wikis enhance ESP students' knowledge of academic writing through collaborative writing activities. Still, these authors also note the persistent lack of empirical studies on the impact of other technologies on ESP

learning (blogs, chat, discussion boards, IWBs, virtual worlds, social networking...) (Dashtestani & Stojkovic 2015).

Li (2018: 11-13) also outlines a number of potential affordances of ICT to ESP teaching and learning: in addition to the fact that ICT can support language learning by addressing learner needs (Table 3 below), it also facilitates the creation of authentic materials (digital web materials in particular), mediates thinking (in network-based learning and computer supported collaborative learning), provides a learning environment that makes interaction possible, facilitates self-directed learning (ICT offers learner the degree of control they need for self-direction), and motivates and engages learners.

Table 3. Affordances of ICT linked to ESP learner needs (Li 2017: 142)

<b>What learners need</b>	<b>How technology can help (examples)</b>
Communication skills	CMC tools (e.g., online discussion boards, emails and videoconferencing) can be used to engage students in real-life discourse
Academic writing skills	Corpus analysis of published academic work to identify how to use linking words, reporting verbs and tenses
Collaborative experience	Wikis, project-based CALL
Engagement and participation in a professional community	The use of social networking

#### 4.3. ICT Integration Principles

It is of utmost importance to make sure that ICT is *integrated* in ESP teachers' practice and not simply *used*, which calls for a set of integration principles. In other words, ICT integration principles are necessary to ensure that ESP courses are pedagogy-driven as opposed to technology-driven. Following in the footsteps of Li (2018), we have identified a set of four integration principles:

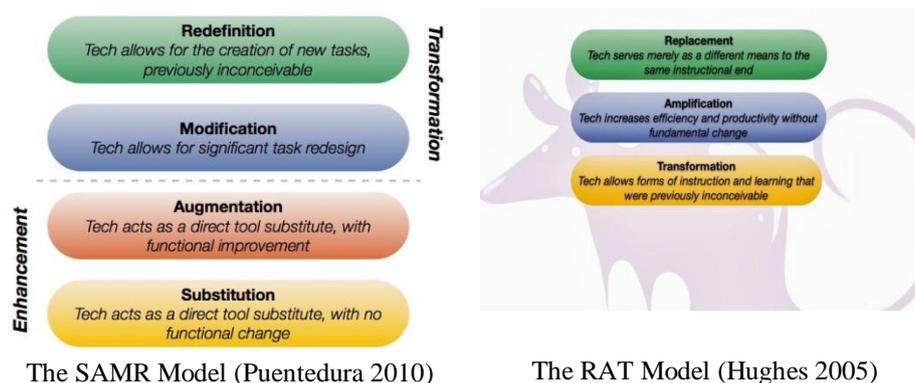
##### *P1 - Adopting a reflective approach to ICT integration*

The critical analysis of ICT integration is essential to ensure that ICT is not a simple add-on and that its added value is real. In other words, the ESP teacher should question their use of ICT by trying to answer the following question: with the introduction of technology in task development "what can I do differently that I couldn't do before?" (Holtzman 2009: 537). Does integrating

ICT mean doing the same things as before but differently or does it mean doing other things that I could not necessarily do before? The answer to this question will reveal the real value added of technology.

The “integration” of ICT can sometimes be detrimental to the type of pedagogical approach the teacher would like to adopt: the focus can indeed be too much on technology and not enough on pedagogy. In order to help ESP teacher analyse their integration of technology, a number of critical models can be used. Two such models are presented below: Puentedura’s 2010 SAMR model and the RAT model (Hughes 2005 (Figure 7)). The idea of these models is to help teachers assess the extent to which ICT has been integrated by providing three (RAT) or four (SAMR) degrees of integration associated with specific descriptors.

Figure 7. Two Critical Models for ICT Integration Analysis



Both models invite the teacher to reflect upon the role of technology in a given task: does it work as a substitute of existing tools commonly used in ESP teaching, with or without augmentation (enhancement level), or does it allow for a significant redesign of tasks (transformation level)? Obviously, the closer to transformation the role of technology is, the more value added it offers.

### *P2. Embracing the evolution of the ESP teachers' role*

ICT integration often leads to a redefinition of the ESP teacher's role, as shown by Li (2018) (Table 4). Each of the roles outlined below calls for the use of one specific tool/technology. However hard it may be to accept change for teachers, as is also the case in any human organisation or social group, ESP teachers

should accept that their main role is to support language learning and not necessarily control it.

Table 4. The evolving Teacher's roles (Li 2018: 16)

Teacher role	Activity	Technology
Organiser	Students work together on collaborative writing projects	Wikis
Audience/reader	Students present their views and opinions about topics in their field	Blogs
Guide	Students develop a vocabulary project for their discipline	Corpus
Participant/facilitator	Students initiate and participate in discussion	Online forum
Evaluator	Students produce oral and written work (with multimodal material)	Digital recording software and Microsoft Office package

*P3. Making the most of ICT affordances to promote authenticity (language, task)*

Promoting authenticity of the language and tasks in ESP can be achieved by (1) accessing authentic materials online to use as teaching materials, (2) using corpora of field-specific texts to uncover authentic patterns of language use, (3) using ICT environments to provide tasks and communication modes that are as close as possible to real-life work tasks (e.g. solving a problem as a team in a videoconferencing meeting).

*P4. Being innovative and daring*

ESP teachers should dare to experiment with different technologies and tools (teaching with social media, for example) and should never wait to master a tool's full potential (all functionalities) to integrate it. Chances are that the first few attempts at using a complex tool or technology (e.g. the Interactive White Board) are going to be rather low on the ICT integration models presented above simply because the most easy to use functionalities will be tried out at first. This is normal and should be expected as ICT integration is a progressive endeavour closely linked to the user's confidence with using a given tool.

5. Conclusion

To conclude, this contribution aimed at shedding light on the clear parallel between two components of Technology-Mediated ESP Learning and Teaching (TESPLAT): (1) the predominantly socio-constructivist paradigm of ESP teaching to promote active social learning and, consequently, the pedagogical approaches adopted in ESP classes (action-based, social tasks, real-world activities) and (2) the evolution of ICT tools and the Internet, from informative resources (tutor) to tools to communicate (collaborative/interactive environments). Indeed, both elements seem to converge towards more social practice, which highlights their high complementarity. This also means that ICT's affordances for ESP learning and teaching are real, but so is the need for ICT integration principles to ensure that the ESP courses designed are pedagogy-driven and not technology-driven.

However, and in spite of the convergence mentioned above, there is still a number of difficulties and concerns in ICT integration into language teaching, especially among ESP teachers (Li 2018). This can probably be attributed to ESP teachers' lack of awareness, more comfort with text environments, sometimes deficient computer literacy, and their contentedness that technology does not deliver educational success (Virkus 2008). As a consequence, ESP teacher education in ICT integration seems more necessary than ever, which explains why it is at the heart of some recent European projects (cf. the CATAPULT Project<sup>2</sup>) which will contribute to the provision of adequate LSP teacher continuing professional development courses.

Finally, a research agenda specific to TESPLAT should be set out as "research on technology and ESP instruction seems to be in its infancy" (Dashtestani & Stojkovic 2015: 451). Indeed, more empirical research is still needed today to investigate the efficacy of certain technologies in ESP learning and teaching: text chat and blogs, Interactive White Boards, e-portfolios, automatic speech recognition, to name but a few technologies whose impact on ESP learning and teaching still needs investigating. Besides, it has been noted that more quantitative and experimental studies are needed in TESPLAT as the majority of studies to date in the field are qualitative in nature. TESPLAT's research agenda therefore seems wide open.

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2      see <http://www.catapult-project.eu>

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