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Challenges in ESP/EAP Teaching at a Greek University: 'Inter-scientificity' in interdisciplinary fields

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This study aims to answer the question how Greek undergraduate students - who are required to read lots of specialised materials in English and use the knowledge they acquire in their Greek parallel classes and/or write essays in English in Erasmus schemes - can achieve a good use of scientific discourse in an ESP/EAP course. Issues of interdisciplinarity, 'inter-scientificity' and culture involved in designing an ESP/ EAP course taught at a Greek university are also addressed. First, this paper identifies and defines 'inter-scientificity' in English and Modern Greek, which is one of the most problematic areas of interdisciplinary fields - such as Geography, Cultural Technology and Communication, Social Anthropology and History, Sociology and Marine Sciences. Second, it provides six examples of the interrelationship between 'inter-scientificity' and intercultural competence and discusses how 'inter-scientificity' can be incorporated in ESP/EAP teaching so that Greek undergraduate students of any field can reach a good use of specialized language across disciplines in English and Greek. Finally, drawing on her eighteen-year teaching experience, the writer would claim that an ESP/EAP teacher at a Greek University should not only use his/her knowledge of specialized English and Greek but also be familiar with methodologies of Translation Studies and Lexicography.

Key words: 'glocal', 'glocalisation', unidirectional transfer, reverse unidirectional transfer, bi-directional transfer, directionality, interdisciplinarity 'inter-scientificity', 'reverse inter-scientificity' 'evolving' bilingualism, polysemy, polysemes.

1. The academic context

Greek undergraduate students usually have to search for and read a substantial number of references written in English (the global language) and use the knowledge acquired through extensive reading in oral presentations and essays written for their parallel courses whose language of instruction is Greek (the local language). Moreover, some of

these students are strongly interested in participating in Erasmus schemes, where they should perform totally in English.

Therefore, how can ESP/EAP[1] teaching in Departments such as: Geography, Cultural Technology and Communication, Social Anthropology and History, Sociology and Marine Sciences help Greek undergraduate students move with ease between global and local or *glocal*[2] knowledge-based environments?

1.1. Student practices

During our English classes in Departments such as: Geography, Cultural Technology and Communication, Social Anthropology and History, Sociology and Marine Sciences, we have observed that students read and comprehend specialised English texts and then transfer their acquired knowledge to spoken and/or written Greek in their parallel classes. Regardless of their level of language competence, the main sources of our students' difficulty in understanding ESP texts seem to be the polysemy of a variety of terms and the lack of bilingual specialised dictionaries.

As soon as our students understand a difficult text, they usually re-elaborate it in Greek in three forms: a summary, which they include in their essays; an oral presentation; and/or a translation. All three forms of transfer are 'unidirectional' and are illustrated in Figure 1 where English represents global (scientific) communication (*g*) that is transferred to Greek, the means of local communication (*l*).

English → Greek

Figure 1: *Unidirectional* transfer *g: l*.

The term 'unidirectional transfer' implies the concept of 'directionality', a concept of Translation Studies.[3] Within this context, we can claim that during a 'unidirectional' transfer the global language (English) meets and interacts with the local language (Greek) in a *topos/locus* that carries signifiers of both languages, scientific discourses and assumes a new *glocalised* identity.

Nevertheless, during their undergraduate and postgraduate studies (in Erasmus schemes, for example) as well as during their career, Greek students and prospective professionals (or academics) will encounter a challenge of opposite directionality; that is, they will have to transfer their knowledge from Greek (the local language) into English (the global language) in order to communicate local (national) situations (*l*) to global (international) contexts (*g*). In this case, the directionality of this transfer is reverse as shown in Figure 2.

[1] ESP: English for Specific Purposes and EAP: English for Academic Purposes.

[2] For the notion of *glocal* and *glocalisation*, see R. Robertson (1994, 1995, 2004, 2006 and 2013). In the present context, the concept of *glocalisation* is understood as diverse types of interrelationship and interdependency between local and global linguistic and cultural processes, which reveal the impact of the global (English as *lingua franca*) upon the local (Greek).

[3] Directionality' relates to whether translators/interpreters work from their mother tongue into the foreign language or the other way. For a discussion of the issues and debate surrounding the concept of 'directionality' in Translation Studies, see Hatim 2001: 164-168.

Greek → ENGLISH

Figure 2: *Reverse unidirectional* transfer *l: g*.

Of course, students, if forced by circumstances, may have to move back and forth between two, at least, different linguistic, scientific and cultural systems (i.e. between Greek and English), thus in a *glocalised* academic and/or business environment. Then, we talk about a *bi-directional* transfer presented as follows:

ENGLISH ↔ GREEK

Figure 3: *Bi-directional* transfer *g: l: g*.

In all students' real and potential interactive situations – that is, within Greek parallel classes, ESP/EAP classes and in Erasmus schemes situations, when students are made to move between local and global (scientific) situations as presented in Figures 1-3 - *English* encounters *Greek* forcing students to develop an *evolving bilingualism* (Nikolarea, 2014). This kind of bilingualism has been very conspicuous in a union of states like the European Union (EU), and needs to be dealt with by member-states, institutions, teachers and learners, if they want to communicate, interact and thrive in an ever increasing globalised world. Fortunately, the Council of Europe deals with this 'evolving' bilingualism in that it has recognised that European citizens should develop and be examined upon their 'mediation' skills, because the latter allow the former to *mediate* and *move* between their own language, scientific domain and culture and those of other European citizens' (*Common European Framework*, 2001, esp. Chapter 8).

2. Teaching ESP/EAP for various scientific fields: An interdisciplinary challenge

2.1. The interdisciplinarity of various fields

Geography, Social Anthropology and History, Cultural Technology and Communication, Sociology and Marine Sciences are interdisciplinary fields of study that combine Social and/or Natural Sciences in the study of a broad variety of social and environmental phenomena, such as urban, regional and rural development, tourism development, migration, social exclusion, globalisation, geopolitical conflicts, land degradation, desertification in a historical context. Thus, the undergraduate students of these fields must be equipped with the necessary knowledge, expertise and skills to analyse and recommend feasible and sustainable solutions to contemporary spatial, social, economic and environmental problems (Gerber and Lidstone, 1996; Kneale, 2003).

2.2. A challenge for ESP/EAP teachers and Greek undergraduate students of various interdisciplinary fields

It is precisely the interdisciplinarity of Geography, Social Anthropology and History, Cultural Technology and Communication, Sociology and Marine Sciences that become a multi-leveled challenge for ESP teachers and Greek undergraduate students alike. First, the lack of

bilingual dictionaries or glossaries for these disciplines points to the fact that either an official terminology has yet to be established or it is still being developed. Second, if Greek undergraduate (and postgraduate) students have to read bibliographical references in English and then reproduce the knowledge they acquire in Greek, how can they do so if there are no specialized bilingual dictionaries or glossaries? Last but not least, the aforementioned fields, as interdisciplinary fields, draw upon different disciplines and their terminology is now being re-contextualized to meet their specific needs.[4]

3. From intedisciplinarity to 'inter-scientificity' and 'reverse inter-scientificity' – their methodological *novelty* explained

We shall now examine some specific cases of polysemy in order to illustrate that the interdisciplinarity of fields such as: Geography, Social Anthropology and History, Cultural Technology and Communication, Sociology and Marine Sciences requires that both ESP/EAP teachers and Greek undergraduate students develop 'inter-scientificity' (or 'inter-scientific competence'). The terms 'inter-scientificity' or 'inter-scientific competence' are neologisms, which were coined and introduced by the writer of the present article, first, in 2004 (Nikolarea, 2004a) and then were discussed more thoroughly in Nikolarea 2006.

Although the second compound of the term is 'scientificity', this term is not used in a positivistic way but rather to indicate the application of linguistic methods and principles *either* to overcome problems of 'untranslatability' of scientific or domain-specific terms *or* to solve the problem of linguistic asymmetries between a pair of different linguistically scientific fields – for example, English: Greek, English: French, Arabic: Greek etc. The problems of 'untranslatability' or linguistic asymmetries are usually created by the *polysemy* of scientific discourse in a *glocalised* context – that is, when the global meets and interacts with the local. They are also common issues in Translation Studies that should be dealt with by translation scholars and practitioners (Maginot, 2015), and solution should be found if 'scientific' communication between two different linguistically scientific discourses (thus, '*inter*-scientific') can be achieved. Nevertheless, what is common practice in Translation Studies is almost totally unknown in ESP/EAP teaching at non-English (and Greek) universities, due to the fact that ESP/EAP teachers are not trained (as translations practitioners are) to recognise these issues.

Therefore, in an ESP/EAP non-English teaching context, 'inter-scientificity' is meant teachers and students' ability to move with ease between at least two linguistically different scientific contexts and comprehend inter-scientific differences not only across disciplines but also across different linguistic systems and cultures, without de-contextualising scientific discourse from its respective linguistic, socio-political and cultural context(s). On the contrary, they should explore the interrelationship between scientific and general language as well as other aspects of human life and experience, at a time when interdisciplinary and multidisciplinary approaches to socio-political, economic and environmental issues are of first priority for the students and scholars of these scientific fields. Thus, 'inter-scientificity' can be considered a skill acquired by those ESP/EAP teachers and Greek (or any other non-English) students who can distinguish between various readings of a polysemous terminological entity (or *polyseme*) and can use this *polyseme* accurately in at least two linguistically different scientific discourses.

[4] A similar claim is made by an ESP teacher of Marine Studies in Italy; see Reguzzoni 2006: 13-16.

To illustrate what 'inter-scientificity' means in actual use and how complex and challenging it is in ESP/EAP teaching at Greek universities, we will offer three examples of 'inter-scientificity' (Figures 4, 5 and 6) and three examples of 'reverse inter-scientificity' (Figures 8, 9 and 10), with their explication, which we have repeatedly encountered them in our ESP/EAP classes for the last eighteen years. We will also discuss briefly some of the issues involved.

3.1. Examples of 'inter-scientificity'

In our first ESP/EAP classes in Geography, Social Anthropology and History, Cultural Technology and Communication, Sociology and Marine Sciences at the University of the Aegean some years ago, when stating that "Geography / Social Anthropology and History / Cultural Technology and Communication / Sociology / Marine Sciences is a discipline", the students were stupefied; they could not understand what this statement meant. Although they were allowed to use general bilingual dictionaries (e.g. Stavropoulos and Hornby, 1989), which had all the Greek equivalents of the word *discipline*, they still could not extract the correct meaning.

At that point, we realized that we had been too presumptuous. We had assumed that the students would know the three Greek equivalents of this frequently-used English term, and that they would be able to select the correct equivalent by matching their respective meanings with the specific context in which the word occurred.

Thus, our students' stupefaction made us aware that this frequent word in English scientific discourse is polysemic in Greek, as shown in Figure 4.

Discipline: (1) *πειθαρχία.* (2) *επιστημονικός κλάδος, τομέας γνώσεων.* (3) *(πειθαρχική) ποινή.*[5]

Figure 4: Greek polysemes of *discipline*

We can see that in Greek there are three polysemes for the term *discipline*. The first polyseme signifies "behavior in accord with rules of conduct" and "a set or system of rules and regulations" (*Webster's,* 1983: 409, nos: 5 and 6 respectively). The second polyseme is literally translated as "a scientific field, a branch of knowledge". The third polyseme is literally translated as "corrective punishment" (adapted from *Webster's,* 1983: 409, no. 3).

A further difficulty is that, whereas in English *discipline* can also be used as a verb in a specific linguistic and scientific environment, in Greek it cannot. Therefore, the term *discipline* proved to be a complex case characterized by multi-leveled interpretations and uses in both languages as well as by grammatical and syntactical asymmetries across languages.

Furthermore, we sensed that there were two more issues involved:

(1) The linguistic context (oral and written) did not necessarily help our students understand the meaning of *discipline*.[6]

[5] Adapted from Stavropoulos and Hornby 1989: 144-145.

(2) Despite the fact that the students consulted a general bilingual dictionary, they could not select the right meaning either because they did not know how to use a bilingual dictionary or because they only looked at the first equivalent, as presented in Figure 1.

In one of our classes in the Department of Geography, Social Anthropology and History, and Sociology, we also came to realize that the students of these departments usually face another difficulty; it was the term 'fieldwork', as shown in Figure 5. We can see that, whereas in English one single term or the lexeme 'fieldwork' denotes field research being conducted outside of a laboratory, library or workplace setting, in Greek two different terms, lexemes or polysemes are used; that is: (1) *Επιτόπια έρευνα*, which literally means "Research *in situ*" and denotes social scientists' field research (Human Geographers included), such as informal interviews, direct observation, participation in the life of a group etc.; and (2) *Έρευνα πεδίου*, which literary means "Research in the field, out in the environment" and denotes environmental and marine scientists, biologists and other scientists (Physical Geographers included).

Fieldwork: (1) *Επιτόπια έρευνα* (lit. Research *in situ* that is used in fields of social sciences such as (*human) geography*, anthropology and sociology). (2) *Έρευνα πεδίου* (lit. research in the field, out in the environment] (used in *physical geography*, environmental sciences, biology, marine sciences).

Figure 5: Greek polysemes of *fieldwork*

So, students of Social Sciences and Environmental and Marine Sciences alike, first, should know that 'fieldwork', when used in different linguistic and domain specific environments, has two equivalents in Greek (Figure 5, 1 and 2) and, second, they are able to identify which meaning this term acquires in the given scientific environment; that is, if 'fieldwork' is used either in Social Sciences (Figure 5 1) or in Environmental and Marine Sciences (Figure 5, 2). Greek students' ability to distinguish the difference and then choose the right lexeme and transfer it to their language of instruction (i.e. Greek) appropriately is an issue of 'inter-scientificity.' At this point, we should mention that this issue becomes more poignant in the discipline of Geography. It is known that when geography students deal with English texts related to Human Geography, 'fieldwork' acquires the meaning of Figure 5, (1), whereas, when they deal with English specialist texts related to Physical Geography and the environment, 'fieldwork' acquires the meaning of Figure 5, (2). If Greek Geography students (or Greek geographers, in general) render 'fieldwork' wrongly in Greek, then they could be totally misunderstood by their Greek audience or their readership!

In different ESP class situations – one with Geography students and one with Cultural Technology and Communication students – we encountered the issue of 'inter-scientificity' of the term 'graphic representation'. As we can see in Figure 6, whereas in English one single term or the lexeme 'graphic representation' is used in a variety of subject fields, such as Computer Science, Cartography, Mathematics, and Statistics, in Greek it is rendered in two different ways according to the scientific field it refers to. One expression is used in Computer Science (ΠΛΗΡΟΦ) and Cartography (ΧΑΡΤ) (Figure 6, 1), and another in Mathematics (ΜΑΘ) and Statistics (ΣΤΑΤ) (Figure 6, 2). So if Greek students of fields such as

[6] Bell (2006), an ESP teacher, has come to the same conclusions.

Geography, Mathematics, Computer Science, Informatics, Statistics and Cultural Technology and Communication are unaware of these differences and use one of the Greek terms instead of the other, there may be a breakdown in communication with their instructors of their parallel classes who will either misunderstand or fail to understand what the students mean. The issue of 'inter-scientificity' becomes poignant for Geography students once more, since Cartography, Informatics and Statistics are some of the core subjects in the Undergraduate Studies Programmes in the Departments of Geography in Greece; that is, at the University of the Aegean (Lesvos) and Harokopio University.

Graphic representation: (1) *Γραμμική απεικόνιση, αναπαράσταση*. (ΠΛΗΡΟΦ, ΧΑΡΤ). (2) *Γραφική παράσταση*. (ΜΑΘ, ΣΤΑΤ).

Figure 6: Greek polysemes of *graphic representation*

3.2. Examples of 'reverse inter-scientificity'

Having discussed that, we should mention three examples of 'reverse inter-scientificity' or 'reverse inter-scientific competence', that is, Greek terms whose English equivalents confuse Greek students, either when using them in an essay they write for our EAP classes, different Erasmus schemes, post-graduate classes in an English-speaking country, or when presenting their research in an international conference whose working language is English.

We have also observed that in EAP classes our Marine Sciences students, when presenting orally their essay in English, have repeatedly used the English lexeme 'organ' instead of 'instrument', for the Greek term 'όργανο', as shown in Figure 7. Thus, instead of saying 'measurement instruments', they usually say 'measurement organs' [sic], with the consequence of a total breakdown of communication! Our students' difficulty in using the right English lexeme or polyseme lies in the fact that *either* they translate literally the Greek term όργανο into the English term *organ*, since the latter cognates from the former – and, thus to both terms can be considered *faux amis* or *false friends*, as they are called in Translation Studies (Mounin, 1974: 139)[7] – *or* they ignore the linguistic, domain specific and cultural context of the English term, as shown in Figure 7.

Όργανο: (1) *Organ* (a) an organ of a human body (general meaning and a medical term); (b) 'a means of enforcement' in the sentence "the police force is an organ of the government; and (c) a big church musical instrument. (2) *Instrument*: an apparatus, an appliance (general meaning and a scientific term).

Figure 7: English polysemes of *Όργανο*.

Another two notorious examples of 'reverse inter-scientificity' that create serious problems of scientific misunderstanding and breakdown of communication between Greek Social and/or Marine Sciences students and their English-speaking counterparts are when the

[7] *Faux amis* or *false friends* are considered to be a word or expression in one language that, because it resembles one in another language, is often wrongly taken to have the same meaning.

former use wrongly the English polysemes of the Greek terms απόκλιση and θέμα, as shown in Figures 8 and 9 respectively.

There have been so many times that our Sociology students, when presenting orally their essay in English, have used 'divergence' for απόκλιση instead of 'deviation' (Figure 8), with the consequence of a total breakdown of communication, once again!

Απόκλιση: (1) *Deviation*, (a) with its social and psychological meaning. (2) *Difference* or *variability* in Statistics. (3) *Divergence*, as used in mathematics, environmental sciences and sciences in general.

Figure 8: English polysemes of *απόκλιση*

Similarly, our students of all the Departments we teach ESP and EAP – that is, in the Departments of Geography, Social Anthropology and History, Cultural Technology and Communication, Sociology and Marine Sciences – have repeatedly used the polyseme 'theme' for θέμα instead 'topic', as shown in Figure 9. One explanation of this pitfall may be that 'theme' is closer to θέμα, since it cognates from it or because both terms can be considered *faux amis* or *false friends*, as explained in Figure 7.

Θέμα: (1) *Topic* of an essay. (2) *Theme*, as in 'thematic units'. (3) *Issue*, as in "there is an issue here".

Figure 9: English polysemes of *θέμα*

3.3. Inter-scientificity and Independent Learning

As it is conspicuous from the above, when Greek students, ESP/EAP teachers and scientists alike are not aware of the existence of the three different English terms for the single Greek terms απόκλιση and θέμα or, even worse, they know that there are three different English terms for each of them but they do not know *how* and *where* to use them, they are led to total breakdown of communication due to the fact that the English polysemes of απόκλιση and θέμα are not interchangeable, despite the fact they look similar to a Greek user of English domain specific. Thus, during our ESP and EAP classes we try to make our students aware of the 'inter-scientificity' of certain English terms in Greek or the existing 'reverse inter-scientificity' of certain Greek terms in English.

To the best of our knowledge, this is *a novel approach to ESP and EAP teaching* in Greece, which helps our students become *independent learners* and incorporate their knowledge in papers they present in international conferences or when they follow an academic/professional career in an English-speaking country.

At this point, we should mention that, although there are references to this difficulty in ESP/EAP (Akbarian, 2010; Nikolarea 2004a, 2004b, 2006; Reguzzoni, 2006, 13-16) in the international literature and the need of non-English (or Greek in our case) undergraduate students to participate in international conference using English as a medium of communication (Belcher, 2004; Benesch 2001), there has been discussion about *neither* how Greek (or non-English) university students (both undergraduate and post-graduate) can deal

with the use of such specialised terminology and how they can incorporate it in their own academic discourse *nor* how an ESP/EAP teacher can handle this terminology and teach it to his/her students. The false assumption for the former case is that students always use a translator (Akbarian, 2010), something that may be partly true but hinders students from becoming *independent learners*. In the latter case, the assumption is that the ESP/EAP teacher will ask for a specialist's help and solves his/her learning problem (Belcher, 2004; González, 2012). How false this assumption is we elaborated in our most recent publication (Nikolarea, 2017), where we discuss what we did when a specialist colleague in the Department of Marine Sciences claimed totally *ignorant* as to how "waves of translation" can be rendered in Greek. Consequently, we had to take action, carried out a thorough research and find the Greek equivalent. Through this experience, we came to realise, first, that our previous specialisation in Translation Studies came to our help, and, second, despite the fact that we are supposedly ESP/EAP teachers, we ourselves should become learners (i.e. put ourselves in our students' shoes) and become *independent learners* or *self-directed learners*, as Bojović (2006) claims.

4. Towards New ESP/EAP Methodologies

Bearing in mind what we have discussed in Sections 1, 2 and 3, we have come to understand (1) that there must have been a paradigm shift in ESP/EAP teaching at Greek (and non-English) universities (Nikolarea, 2003b) due to the pressures that globalization and the status of English as a *lingua franca* have put on the local Greek scientific community and the Greek language; and (2) that we should develop new ESP/EAP methodologies to help our students become aware of the polysemy of scientific terminology and reach a solid understanding of English and Greek interdisciplinary domain-specific discourses (English ↔ Greek), so they can move with ease between these two linguistically different scientific discourses and be able to respond successfully to the new requirements of global and local scientific communities and markets as they have been emerging in the wider EU context.

These methodologies are part of a wider four-step integrated ELT approach (Nikolarea 2004a, 2004b and 2005) and can be summarized as follows:

(1) using general ELT materials (in our ESP classes);
(2) using printed or electronic 'authentic' specialist materials written in English (as part of modules on Research Methodology and Computer Literacy) (in our ESP classes);
(3) teaching reading techniques and strategies (as part of modules on Study Skills and Research Methodology) (in our ESP and EAP classes);
(4) teaching *where to* find and *how to* use the available bilingual (English: Greek) or multilingual specialist dictionaries in printed and in electronic form – that is, CD-ROMs, such as Odyssey®, and e-dictionaries (IATE) (as part of Research Methodology and Computer Literacy in our ESP and EAP classes (see also Nikolarea, 2003a, 2004b, 2005);
(5) teaching *how to* construct and maintain a personal bilingual (English: Greek) Terminological Data Bank (TDB) (in our ESP classes; see Nikolarea, 2003a, 2004a, 2004b, 2005);
(6) teaching *where to* find and *how to* use Internet-based engines of machine translation so that students may get an overall understanding of a difficult specialist text written in English, when needed (Nikolarea, 2004c, esp. 234-235);

(7) teaching and practising *how to* paraphrase, rephrase and, finally, summarize highly specialised English texts in English and Modern Greek (as part of classroom activities, homework, and the final assignment), so that our students develop and enhance their bilingual communication skills (in our ESP and EAP classes);

(8) note-taking of University lectures in English and summarizing them in English, so that our students develop and enhance their advanced listening and writing skills in English scientific discourse (in our ESP and EAP classes; see also Kneale, 2003; Nikolarea 2004b; Wallace, 2004);

(9) essay writing (in EAP classes), including *how to*:
   a. carry out research in the library and/or on the Internet (Nikolarea 2005);
   b. write a synthesis of a research piece (Kneale, 2003; Wallace, 2004); and
   c. *how to* cite from English and Greek bibliographical references and how to write references, following international Translation standards.[8]

This four-step integrated ESP/EAP methodology is implemented in either in two or four 14-week semesters for 3 hours a week, depending on the Department (Nikolarea, 2004a, 2004b).

5. Development of 'inter-scientificity'

From the discussion up to now, it becomes evident that inter-scientificity cannot be acquired unless one becomes aware of it, gets trained in it and, finally, practises it.

5.1. ESP/EAP teachers' awareness of 'inter-scientificity'

As we have discussed in Section 2 of the present study, ESP/EAP teachers of interdisciplinary fields - such as Geography, Cultural Technology and Communication, Social Anthropology and History, Sociology and Marine Sciences - encounter the issue of 'inter-scientificity', despite the fact that sometimes they may not be fully aware of it, and try to deal with it the best way they can (Mićić, 2005; Nikolarea, 2004a, 2004b, 2004c; Reguzzoni 2006). It is also evident that ESP/EAP teachers of interdisciplinary fields at Greek Universities (and possibly all ESP teachers at non-English Universities) face challenges that their counterparts at English Universities do not (Bell 2006; Nikolarea 2003b, 2004a, 2004b). These challenges derive primarily from new academic requirements and market demands that force Greek (and non-English) undergraduate students to move back and forth between global and local or *glocal* knowledge-based environments.

More specifically, ESP/EAP teachers of Greek (and non-English) deal with the challenge of 'interdisciplinarity' in a *glocal* context. As a consequence, not only should ESP/EAP teachers know that frequent terms assume one or more meanings according to the discipline or science in which they are used, but they should also know how these terms are rendered in the language of instruction (Greek, in our case) if they wish to make ESP/EAP teaching functional in a Greek (or a non-English) scientific environment.

[8] In our EAP classes, we teach: (1) how to cite from one language to another (i.e. through paraphrasing, summarising and/or inserting a direct translation from English into Greek and vice versa); and (2) how to write and list bibliographical references when these references are from two different writing systems (i.e. English and Greek). At this point, it should be noted that what is applicable to the Greek writing system, when one writes references, is also applicable to any writing system which differs from the Latin one. For example, the Cyrillic alphabet or the Arabic and the Chinese writing system are as different from the Latin alphabet as Greek is, and so they conform to the same international Translation standards for citing and writing references.

As was discussed in Section 3, a one-to-one equivalence between the terms of two linguistically different scientific discourses is the exception rather than the rule. The rule is that there are multi-levelled asymmetries. Therefore, one of the pressures that 'glocalisation' puts on ESP/EAP teachers at Greek (and non-English) Universities is the demand for 'inter-scientificity,' a competence which can only be acquired through training.

Therefore, we claim that would-be ESP/EAP teachers, while they are undergraduate and/or post-graduate students in the English Departments at Greek (and non-English) Universities, should be trained in how to carry out research into:

(1) authentic materials written in English so as to develop very advanced analytical and combinatory skills;
(2) scientific bilingual terminology (Burdon 1988; Sager 1990), which demands:
    a. very advanced analytical skills;
    b. very advanced synthetic skills;
(3) machine translation (Nagao 1989) and more particularly Internet-based machine translation, which demands both very advanced analytical skills, comparative and contrastive skills. The use of Internet-based machine translation also requires 'inter-scientific competence' if the ESP/EAP teacher is to help his/her students to assess and correct the machine-translated text and use it in their assignments.

ESP/EAP teachers should therefore be trained by translation and terminology scholars (Baker 1997; Burdon 1988; Sager 1990) and lexicographers in co-operation with specialists of the specific scientific domain. Training in 'inter-scientificity' requires an interdisciplinary and multidisciplinary approach, which will equip ESP/EAP teachers with the necessary skills and understanding to:

- become explorers and learners of their new learning situation and environment;
- be flexible in the use of authentic materials composed in English, since they will be able to assess what the specific classroom situation and profession demands;
- develop uncertainty and stress tolerance for unknown scientific domains and understand better their students' anxiety and risk of failure in making an effort to acquire and develop scientific discourse(s) in two different linguistic systems; and
- be aware of their students' general and scientific knowledge and make it a motivation factor, so that the students are willing to explore the issues and risks involved in 'inter-scientificity'.

5.2. ESP/EAP University students' awareness of and training in 'inter-scientificity'

From our experience, students are initially unaware of the issue of 'inter-scientificity'. Nevertheless, as soon as they become aware of it, they are eager to deal with it.

In Nikolarea 2003a, 2004b and 2005, we discussed in detail how three translation-based teaching methods – (1) compiling and maintaining a bilingual TDB; (2) summarizing texts in both English and Greek (or any other language of instruction); and (3) finding and using internet-based machine translation can help students reach such a level of inter-scientificity that they are able to write well-structured essays in English on topics which are related to their scientific domain and which they themselves have selected. So, in this case, ESP

overlaps with EAP teaching, and the overlapping space is a *topos/locus* where 'inter-scientificity' is developed and, eventually acquired.

Finally, the participation of students in the ESP/EAP classroom is crucial, because students' questions, difficulties, comments and observations can make ESP/EAP teachers explore 'new' ways of implementing 'traditional' ESP/EAP teaching, and bring new ESP/EAP methodologies into being (Nikolarea, 2004b).

5.3. The educational institution

By referring to educational institution, we have in mind both the ability of an educational institution to provide teaching facilities (e.g. properly-equipped classrooms, computer laboratories) for ESP/EAP teaching and the willingness of the academic staff of a specific field and Department to guide ESP/EAP teachers. Specialists can make very good suggestions as to what bibliographical references ESP/EAP teachers should incorporate in their syllabus. They can also provide ESP/EAP teachers with reading materials, and give them information on which websites to use in their English classes.

6. Final remarks

Considering the complexity of the 'inter-scientificity' involved in ESP/EAP teaching at Greek (and non-English) Universities, we conclude by expressing our wish that ESP/EAP stops being Anglo-centric (Bell 2006, 35) and becomes broader in scope, bringing ESP/EAP teachers at English, Greek and other non-English Universities, specialists of a variety of specific scientific domains, translation scholars and lexicographers together so that a wide range of specialists become aware of the semantic differences and nuances of the same terms in different disciplines – that is, the existence of 'inter-scientificity' - and the interdependence of their disciplines and scientific discourses in an increasingly *glocalized* academic world.

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