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Human Intelligence (HI –*nous*) and Artificial Intelligence (AI) in ESP/EAP[1] teaching and editing of Inter-disciplinary Research for International Communication. Case Studies and Methods

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Abstract[2]

In this study the author will present how Human Intelligence (HI – nous), in co-operation with Artificial Intelligence (AI) – Internet can communicate his/her knowledge and interdisciplinary research to an international context (i.e., Erasmus exchange programs and/or international conferences). Having over a twenty-year experience of teaching ESP/EAP at a non-English University and over a twenty-five-year experience of editing research papers in English, the writer will present how a nous/student/researcher and an academic can use to his/her advantage IT tools, such as electronic dictionaries and forums. Finally, the author of this study will propose: (a) a couple of methods, which can be applied through AI (i.e., Google or any other search engines) so that the non-English nous/student/researcher/academic (a nous) will be certain that s/he communicates "correctly" and "appropriately" his/her research in an international context whose primary language of communication is English; and (b) a specific bilingual (or multilingual) knowledge management tool (i.e. an electronic TDB: Terminological Data Bank).

Keywords: *ESP, EAP, ELT, case studies, language forums, corpora, inter-scientificity, reverse inter-scientificity, Terminological Data Bank (TDB)*

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

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1. Introduction

In previous studies, the author has discussed what kind of methodologies she has been following in teaching ESP and EAP at a non-English University for twenty years (Nikolarea 2004a, b; Nikolarea 2019; Nikolarea 2020; Nikolarea, 2021).

In the present study, the writer will focus on problems that undergraduate and graduate students (i.e. Master's, Ph.D. candidates and Post-graduate Fellows) as well as academics face either when trying to transfer the knowledge they acquire from the international literature written in English into the language of instruction (Greek in our case) or when writing scientific papers in English to present them in Erasmus exchange programs or in international conferences, which they wish to publish in an international journal.

She will also focus on problems with using General English (or ELT)[3] and "terminology" in ESP and EAP, and how non-English university students and academics can solve them by using monolingual, bilingual and/or multilingual electronic dictionaries and other methods, so they can deal with the vexing issues of *inter-scientificity* and *reverse inter-scientificity* and communicate their research successfully at international level. The methods that the author of this study will propose can function as ***universals***, that is, they ***are applicable to any pair of languages*** (e.g., English: Spanish, English: French, English: German), as long as ***the HI (nous) or IT user can understand and handle the given pair of languages.***

2. A Simple Case Study and Methods related to General English or ELT

During her ESP and EAP classes for undergraduate students in diverse departments – such as: Geography, Sociology, Cultural Technology and Communication, Social Anthropology and History and Marine Sciences at a non-English University (i.e., University of the Aegean), the author realized that a good number of her students made repeatedly some very "silly"

[3] ELT: English Language Teaching.

mistakes on prepositions, as shown in **Figure 1** highlighted in yellow and corrected in red and underlined. When she discussed the issue with her students, their response was that they did not know what to do about it!

At that moment she decided to make an extra lesson in the Computer Lab, and show them how to use: (1) monolingual English electronic dictionaries; and (2) Language forums, so they can use the correct prepositions.

In national level a lot of work has been done At national level a lot of work has been done
[t]he first demographic transition in regional level. [t]he first demographic transition at regional level

Figure 1: "Silly" mistakes

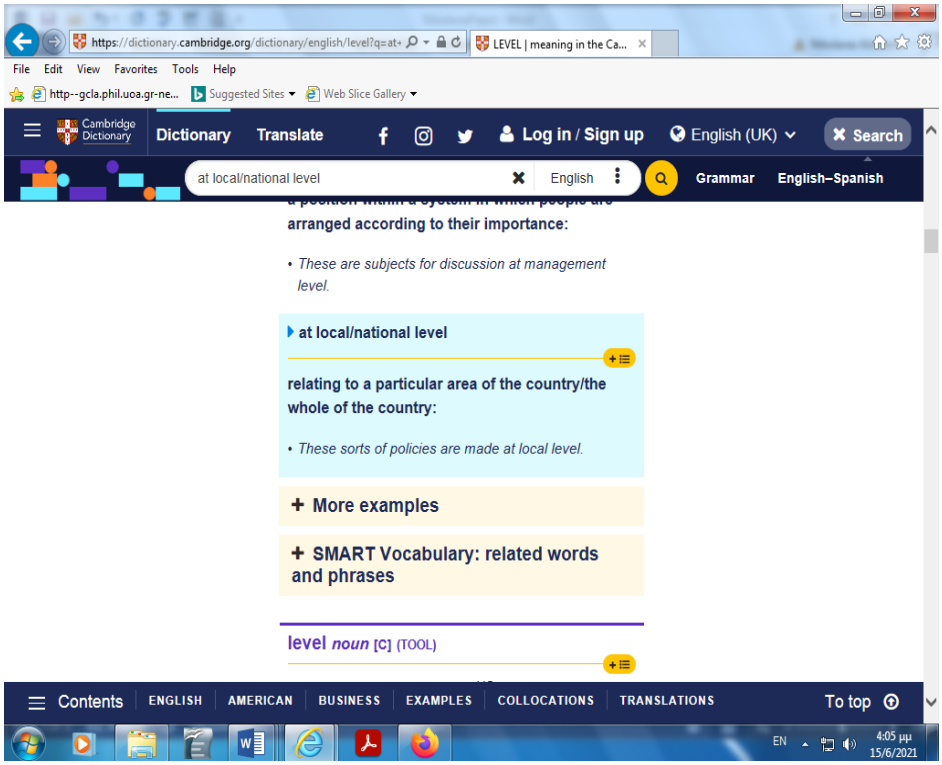
2.1. How to search for, find and use a monolingual electronic dictionary.

She advised her students to find a monolingual English electronic dictionary (e.g., Cambridge Dictionary), and type up "national level". When the site popped up on their screen, they should scroll down the cursor until they found what they were searching for "at local/national level"; see **Picture 1**.

2.2. How to search for, find and use Language Forums

The author also showed her students how to find and use language forums, using two steps.

Step 1- They should type up on "google", for example, "in international level" (if they think that the preposition was correct), and then see what appears on their screen.
Step 2 – They should click on the language forums that appear on their screens, and, then, after a quick look, they could choose one of them, as shown in **Picture 2**.

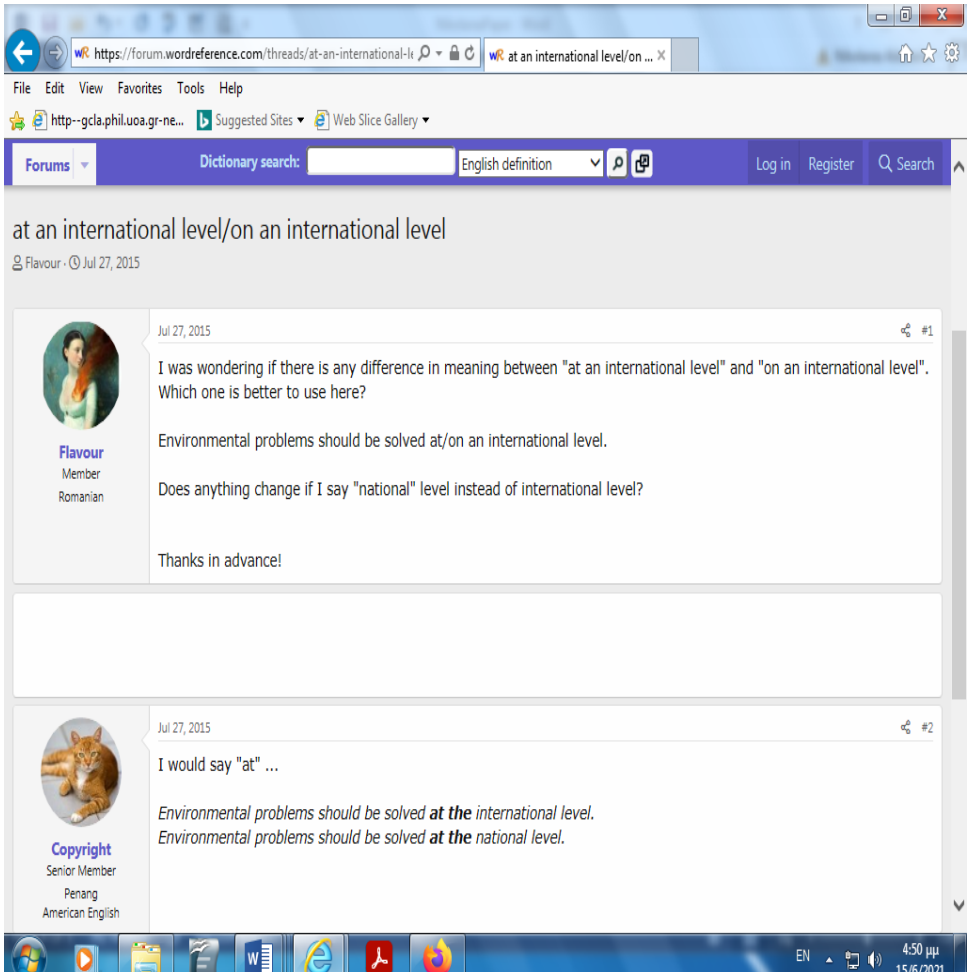


Picture 1: Cambridge University Dictionary

3. Case Studies and Methods related to *inter-scientificity*

The term *inter-scientificity* is a neologism, which was coined and introduced by the writer of this paper, first, in Nikolarea 2004a and 2004b and then was discussed more thoroughly in Nikolarea, 2006 and Nikolarea, 2019 and 2020.

Inter-scientificity indicates the application of linguistic methods and principles to solve problems of **untranslatability** or **linguistic asymmetries** in a pair of different linguistically discourses (i.e., English – Greek) that are usually created by the polysemy of (specialized) discourse in a *glocalised* context – that is, when the global [English] meets and interacts with the local [a language which is different from English].



Picture 2: WordReference.com Language Forums

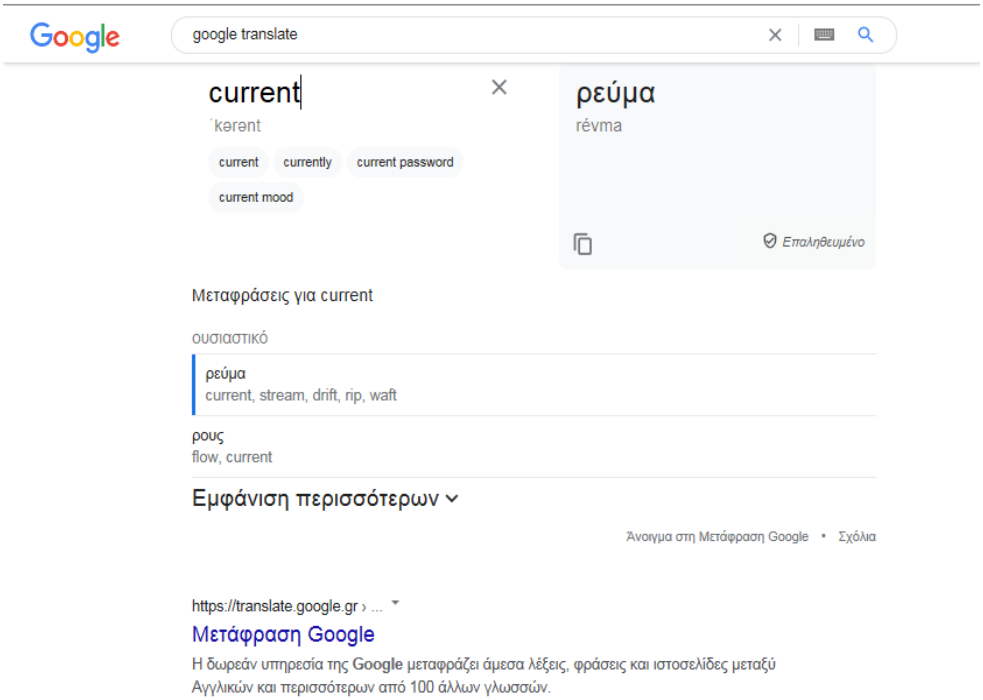
Therefore, inter-scientificity in a *glocalized* specialized environment is considered a skill / competence acquired by human *noes* (i.e., students, fellows, academics) who can distinguish between various readings of a polysemous terminological entity (or a polyseme), and can use this polyseme accurately in at least two linguistically different general and specialized discourses. In this way, human *noes* can communicate their research to an international scientific public.

3.1. A complex case of *inter-scientificity*

Having said that, the writer will present one complex case of *inter-scientificity* that she encountered when teaching ESP/EAP in the Department of Marine Sciences and what kind of methodology she used to

help students understand what this term meant in the specific scientific context.

3.1.1. "Current" in the expression "North Atlantic Current." Her students were not sure what the meaning of "current" was in the specific expression, since "current" in English is both an adjective and a noun. First, the author/teacher advised them to see whether there is a picture on their textbook. Indeed, there was a picture, which help them understand that "current" in the specific context must be a noun. Then, she asked them to get onto "google translate," type up the term and see the results. Once they did that, they had the following results as shown in **Picture 3**.



Picture 3: Current as a noun

Some students were confused by "currently," "current mood" etc. that appeared below "current", and thought that "current" is an **adjective**; their eyes did not go down the list. As **Picture 3** was on their computer screen, author/teacher advised her students to go down the list and see English synonyms of "current," such as "stream", "drift". At that moment, the students realized that "current" was a "sea current", and it is used as **noun** instead. Before they finished the lesson, the author exhorted her students to

click on "Εμφάνιση περισσότερων" (lit. Appearance of more [items]) to explore other uses of this term/word.

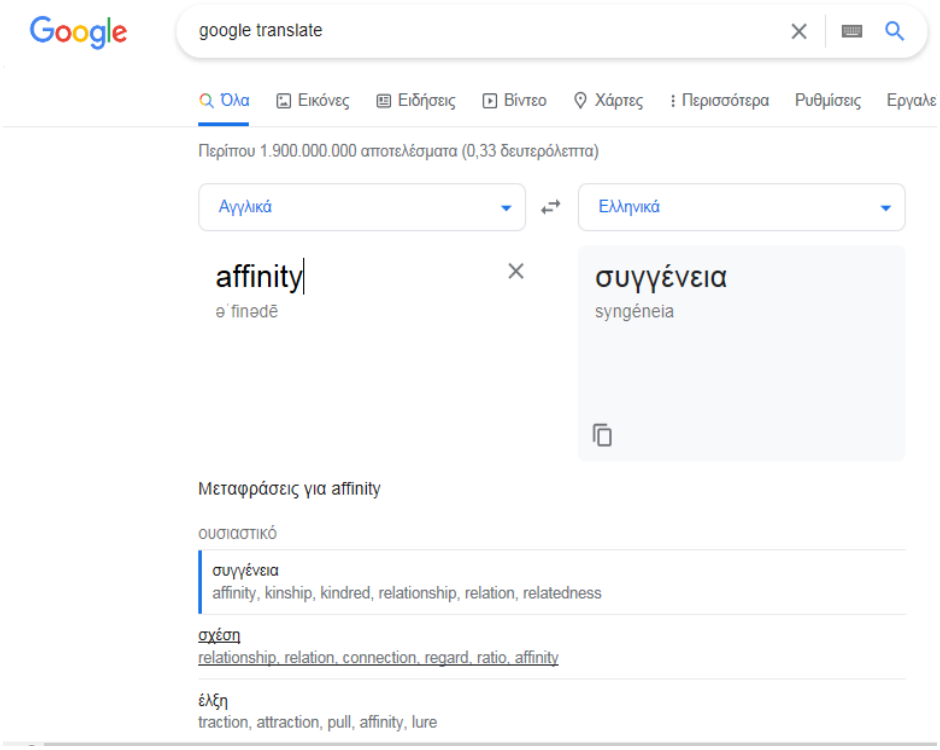
Should one think that ***this case is particular to Greek***, this is a **false assumption**! One can experiment with French, German or Spanish – that is, using "google translate", then on the left column one should indicate English and on the right column indicate French, German or Spanish; then, one will get the same amount of equivalent terms as one gets in Greek. **– A try will convince you!** And this the **"universality"** of *inter-scientificity* and the **proposed methodology**.

3.2. The most complex case of *inter-scientificity* – Electronic Dictionaries, Associative Thinking and Saving the knowledge acquired in a Terminological Data Bank (TDB)

Perhaps the most complex case of *inter-scientificity* is the anthropological term "affinity." Although "google translate" translates "affinity" as "συγγένεια" (**Picture 4**) and, gives "kinship" as a synonym down the list, **this is misleading**. And this is misleading because **"affinity" and "kinship" are <u>not</u> ideal synonyms**. In Anthropology, <u>both in English and in Greek</u>, on the one hand, **"affinity"** is "συγγένεια εξ αγχιστείας" – that is, a relationship by marriage, in-laws, or bonds other those of blood, and, on the other hand, **"kinship"** is "συγγένεια αίματος" – that is, "blood relationship" or "consanguinity".

The author of this study usually advises her Anthropology students to be careful with such kinds of terms,[4] and should not use only "google translate". Instead, they should take the following three steps:
Step 1: They should go "google" and type up "affinity", and when the term pops up on their screen, then
Step 2: They should scroll down the cursor until they find "affinity" in Dictionary.com., then
Step 3: They should click on "Affinity – Dictionary.com", and will get **Picture 5**.

[4] Unfortunately, there is <u>not</u> a bilingual (English: Greek) dictionary of Anthropological terms in the Greek market to help the students (or the readers) understand the difference.



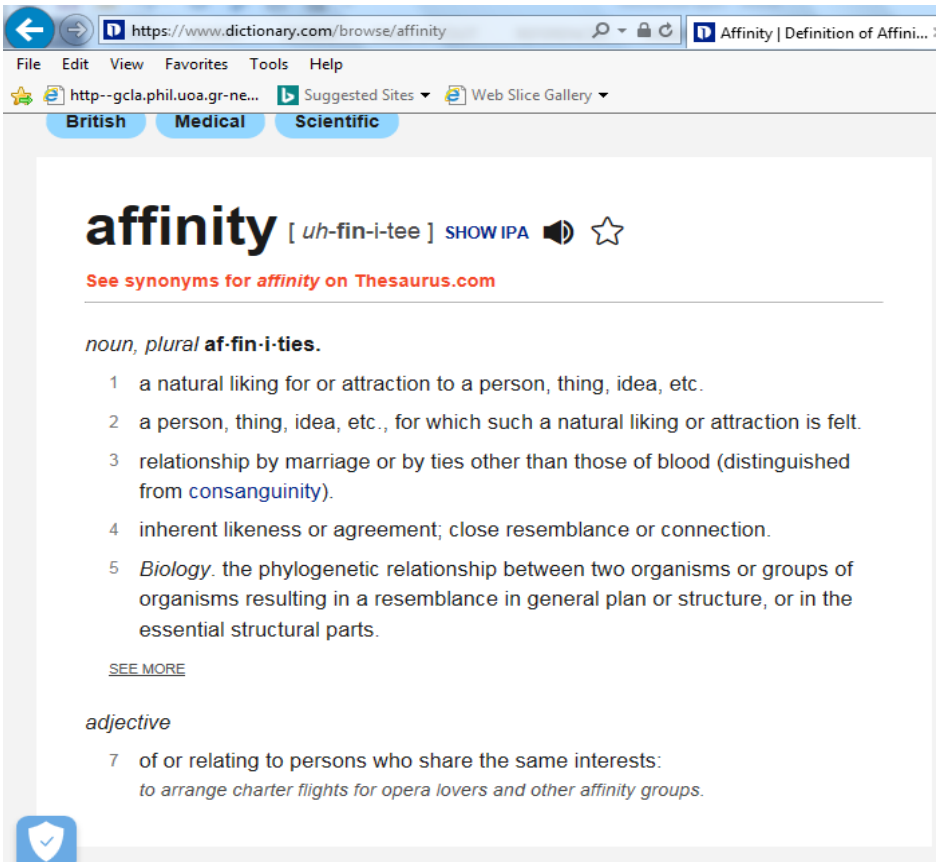
Picture 4: Affinity

Reading **Picture 5** carefully, the students soon realize that what they search for is in No 3, and, when clicking on "consanguinity", they understand that **"consanguinity" and "kinship" <u>are absolute synonyms</u>** (since they both indicate "blood relationship"), whereas "affinity" points to in-laws or non-blood relationship.

When the students and the author of this study reach at this point of research, the latter, as their teacher, usually gives them **two tips**.

(1) How to use Associative Thinking: The author of this study usually asks her students to think whether the instructor of the parallel class "Anthropology of Kinship" (who teaches it in Greek) has already given them any English terms besides the Greek ones, while teaching it. The answer is usually "yes". Then the author/teacher suggests them find the Greek term from their lectures and relate it to its English equivalent. Apart from the term "affinity", the author/teacher and her Anthropology students practice associative thinking with a couple of difficult and ambivalent in

Greek anthropological terms, such as: “aboriginal” [(1) *αυτόχθων;* (2) *ιθαγενής/ής/ές, γηγενής/ής/ές*], “altruistic act” [: *αλτρουιστική πράξη*], and “bifurcation” **[**(1) *Διχοτόμηση* (in Biology); (2) *Διακλάδωση* (in Anthropology)], to name a few.



Picture 5: Affinity – Dictionary.com

(2) How to compile a Terminological Data Bank (TDB): Then, the author/teacher shows her students how to compile and construct a TDB, so that they will not lose all this knowledge they acquired after so much effort, an issue that will be discussed in Section 5 and will be shown in **Picture 6** of this study.

4. Two Case Studies and methods related to *Reverse Inter-scientificity*

Having discussed that, we should mention two examples of *reverse inter-scientificity*, that is, Greek terms whose English equivalents confuse Greek students/researchers/academics (*noes*), either when using them in an essay they write for the author's EAP classes, different Erasmus schemes, graduate classes in an English-speaking country, or when presenting their research in an international conference whose working language is English.

The author of this study and ESP/EAP teacher has observed that in EAP classes her 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 2**. Thus, instead of saying/writing 'measurement instruments', they usually say/write 'measurement organs' [sic], with the consequence of a total breakdown of communication!

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 2: English polysemes of *Όργανο*.

Another example of *reverse inter-scientificity* that create serious problems of scientific misunderstanding and breakdown of communication between Greek Social Scientists (students and academics alike) and their English-speaking counterparts are when the former use wrongly the English polysemes of the Greek terms απόκλιση as shown in **Figure 3**.

There have been many times that the author's Sociology and Anthropology students, when presenting orally their essay in English, have used 'divergence' (**Figure 3, b**) for απόκλιση instead of 'deviation' (**Figure 3, a**), 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 3: English polysemes of *απόκλιση*

As it becomes conspicuous, the aforementioned erroneous uses lead to a total breakdown of communication with English speakers. *Greek noes' (i.e., undergraduates, graduates and academics') difficulty in using the right English lexemes or polysemes lies primarily in <u>two</u> different parameters*. <u>First</u>, they translate literally the Greek term όργανο into the English term 'organ', since the latter cognates from the former, thinking that these two terms in Greek and English are equivalent. Unfortunately, they are not. When this issue arises in international and inter-disciplinary communication is considered *faux amis* or *false friends* (Mounin, 1974: 139). More specifically, this issue refers to ***the existing linguistic similarity*** a word or expression in one language (i.e., Greek – όργανο) has with a word or expression in another language (i.e., English – organ), which, when being thought of carrying the same meaning, then ***the word or expression in the second language*** (English in our case) ***is used wrongly***, with the result of ***a total breakdown of communication***. <u>Second</u>, they ignore the linguistic, specialized and cultural contexts of the English terms, as shown in **Figures 2** and **3**.

4.1. A Method to overcome this issue: The use of electronic monolingual dictionaries.

In this case, the author of this study and teacher usually advises her students to be really careful and use <u>not only</u> "google translate" <u>but also</u> to consult both monolingual dictionaries (i.e., English and Greek) that they can find on the Internet so to make sure that they understand the scientific and cultural context of the term. ***This may be a frustrating and a time consuming process***, ***but there is no other way that a HI (nous) can achieve a 'proper' international communication of his/her research***.

5. Terminological Data Bank (:TDB) A knowledge management tool

But what does one do with all this knowledge of terms/phrases that one has acquired? How can one manage this knowledge so one does not forget or, even worse, lose it? There is a translation tool that can come to our help; it is a TDB – a Terminological Data Bank, which can be a mnemonic tool for knowledge management for life (Nikolarea 2003a and b).

The importance of this translation tool is multileveled and the benefits that its users/*noes* obtain are both short and long term ones. In a nutshell, when organizing their personal TDB, non-English undergraduates, graduates and academics (or *noes*) develop research skills, computer literacy, inter-scientific and reverse inter-scientific competence (or *inter-scientificity* and *reverse inter-scientificity*, as discussed earlier) as well as intercultural competence, thus acquiring a research tool for life and learner's independence.

How easy to construct a bilingual and/or multicultural TDB is discussed thoroughly elsewhere (Nikolarea 2003a and b), but how easy is for non-English *noes* to do it was presented by the author of this paper in some of her past publications: (1) one trilingual TDB in English: Greek: Russian (Nikolarea 2019, p. 30 and 2020, p. 10); (2) one trilingual TDBs in English: Greek: German (Nikolarea 2020, p.11); and (3) one trilingual TDB in English: Greek: Serbian (Nikolarea 2020, p. 10). All these trilingual TDBs were made by the author's former first-year university students, who were totally inexperienced in doing something like that.

Picture 6 is a more recent trilingual TDB in English: Greek: Albanian, and is presented just to show how easy not only for first-year university students but also for everyone is to construct a bilingual, a trilingual and or a multilingual TDB.

6. General remarks and conclusions

From her twenty-year experience in having implemented the aforementioned methods in her teaching ESP/EAP at a non-English

University, the author of this paper can claim that these methods and awareness of concepts (such as *inter-scienticity* and *reverse inter-scientificity*) can function as ***universals***, that is, they ***can be implemented in any pair of languages*** (e.g., English: Greek; English: Spanish; English: French; English: German; English: Russian; English: Arabic etc.), as long as ***the HI (nous) or IT user can understand and handle the given pair of languages.*** In this way, a HI (*nous*), with the help of AI, can be equipped with the necessary skills and:

- become a learner of any new learning situation and environment;
- develop uncertainty and stress tolerance for unknown terms; and
- make it a motivation factor for him/her and others so to explore the issues and risks involved in *inter-scientificity* and *reverse inter-scientificity*.

Terminology/ορολογία/ terminologji

Act /δρω/vepron
Actions of drugs /δράσεις φαρμάκων/ veprimet e ilaçeve
Administered /χορηγούμενα/të administruara
Adults /ενήλικες/ Të rriturit
Affinity /έλξη/tërheqje
Animal cells /κύτταρα ζώων/ qelizat shtazore
Animal experiments /πειράματα ζώων/eksperimente shtazore
Animal models /ζώα/ Modelet e kafshëve
Animal organs /ζωϊκά όργανα/organa shtazore
Animal subjects /ζώα/kafshet
Antibiotics /αντιβιοτικά/ antibiotikët
Aspirin /ασπιρίνη/aspirini
Aspirin-like drugs /φάρμακα σαν ασπιρίνη/ilace si aspirini

Picture 6: Part of a Trilingual (English: Greek: Albanian) TDB that was organized by Emanuela Kretsi, a first-semester student of in the Department of Social Anthropology and History (2019-2020); it is illustrated with the student's consent.

7. Limitations of the study

Although the author has taught students and discussed with post-graduate fellows and colleagues how to be *inter-scientific competent* in different

Departments and Undergraduate Studies Programmes for twenty-years, there are three (3) cognitive and educational limitations: one for the ESP/EAP teacher; one for undergraduate students; and one for post-graduate fellows and academics.

On the one hand, an ESP/EAP teacher should be trained in recognizing and being able to deal with issues such as '*inter-scienticity* and *reverse inter-scientificity*, as discussed in the present study, something that is difficult due to the fact there is not such a training at the Greek Universities, unless the teacher is trained to be a translation scholar, a translation practitioner and/or a lexicographer.

On the other hand, due to the fact that these competencies are taught to first-year students, students do not fully appreciate what they learn. It usually takes students 2-3 years of studies and a vast amount of bibliographical references in English to fully understand and practice what they learned in their first-year ESP/EAP classes.

Finally, post-graduate fellows and academics are disinterested in this kind of issues. They prefer to write a paper for prospective publication and pay to have it edited. As a consequence, they may have an international publication in English but, when participating in international conferences, they have hard time to communicate orally their research to an international audience.

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