International Conference for International Education and Cross-cultural Communication. Problems and Solutions (IECC-2015), 09-11 June 2015, Tomsk Polytechnic University, Tomsk, Russia

Learning Terminology in the Age of Higher Education Internationalization: Problems and Solutions

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Abstract

The internationalization of higher education brings particular changes to the learning process at universities. The most prominent of them is the increased use of English as a language of professional discourse. As students should use both their native language and a foreign one there is an essential problem of terminology interference. To solve the problem and to facilitate the professional communication and integration of students in global dimension it is necessary to carry out the work on terminology standardization. The most suitable form for such work is an information thesaurus.

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Peer-review under responsibility of the organizing committee of IECC 2015.

Keywords: Internationalization of higher education; professional discourse; terminology; communicative competence; information thesaurus.

1. Introduction

Today internationalization is an essential part of higher education. It is described as the process of integrating an international, intercultural and global dimension into the purpose, function or delivery of higher education at the institutional and national levels (Knight, 2008). The process is aimed both at national and international students.

In the case of national students the internationalization is promoted by a lack of educational opportunities in their home countries, while attracting international students is the way to raise additional money or obtain high-level human resources (Wächter & Maiworm, 2008).

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The process takes two forms: internationalization at home and internationalization abroad. The internationalization at home can help students develop their international role and acquire the necessary skills of intercultural communication. The internationalization abroad takes the forms of education across borders and mobility (De Witt, 2010). According to statistics, by 2005, 2.7 million students studied away from their country of origin. This is a sharp increase from 600,000 in 1975 (Wächter & Maiworm, 2008).

In many cases, internationalization means an increase in the use of English in teaching at universities. Today many universities in countries where English is not a native language offer courses or complete programmes in English, and this amount is growing rapidly (Wächter & Maiworm, 2008). The courses are offered either as content and language integrated learning (CLIL) or in the form of parallel language courses. In such courses, students can attend lectures in a native language (L1) and then have reading assignments in a foreign language (L2). This may be combined with additional language training (Pecorari, Shaw, Irvine et al., 2011).

There is one particular feature that unites most of the programmes, especially in the engineering field. It is the use of specialized discourse and specialized terminology. During the course, students are exposed to a double load: they should learn terminology in their L1 and acquire the same terminology from L2. Moreover, learning terminology is different from learning the general vocabulary as students should learn both a term and a concept designated by this term, establishing the knowledge structure (Mežek, 2013). Learning correct terms is particularly important, as they contribute to knowledge production and knowledge transfer in the specialized context. The way students learn terminology is of great interest today especially in the scope of English for specific purposes (ESP). However, some aspects in the process of learning terminology lack attention. One of them is terminology interference when learning terms in two languages simultaneously. Currently, new terms appear so fast and come from so many sources that a huge amount of polysemy and synonymy is inevitable. When transferred to other languages one term may acquire different translations and equivalents that makes the situation even worse (Shchitova, 2012). This process is not standardized or regulated, which brings in a particular terminological chaos, thus interfering with communication.

The aim of this article is to define the role of terminology and specialized discourse for technical students (engineering majors) and to observe some complications connected with learning terminology and the ways to overcome these.

2. The importance of learning terminology

The importance of specialized communication is clearly stated in some international certification standards established for engineering education. One of the most important standards for engineering disciplines is established by European Network for Accreditation of Engineering Education (ENAEE). This standard pays special attention to forming such qualities as global and critical thinking, effective communication (both written and oral) and establishing a system of knowledge. For example, according to the standard, engineers should have '*the ability to analyze new and complex engineering products, processes and systems within broader or multidisciplinary contexts … interpret the outcomes of such analyses; the ability to conceptualize engineering products, processes and systems; the ability to identify, formulate and solve unfamiliar complex engineering problems; the ability to conduct searches of literature, to consult and critically use databases and other sources of information; critically evaluate data and draw conclusions; the ability to function effectively in national and international contexts, as a member or leader of a team*' (ENAEE Standard). All the above-stated indicate that communicative and cognitive competences are among the most important components in the identity of a professional engineer, and they are closely related to each other. One of the methods that can contribute to effective development of such competences is terminological training. This is due to the fact that the cognitive side of a term is represented by the opportunity of conceptualization and building a system of thought. At the same time, the communicative side accounts for knowledge transfer (Cabré, 1999).

A term can play several roles connected with its communicative and cognitive sides. These roles may include knowledge fixation, knowledge discovery and transmission (Grinev-Grinevich, 2008). Each of the roles can have different functions. Inside the knowledge fixation role there are ***instrumental function*** (the ability to use notion, when an image becomes a subject of thought) and ***knowledge level fixation function***. The latter function is connected with the development of knowledge by means of conceptual paradigm change (Grinev-Grinevich, 2008).

According to the existing theory, the development of knowledge happens when the old notions, expressed in terms, start to be improved or reviewed. As a result of this process there is a necessity for introduction of new notions, which in turn gives an impulse for transferring to the new level of scientific knowledge.

The transmission of knowledge is represented by *educational* and *information functions*. Performing the latter function terms in technical and scientific texts creates a particular system of notions. This allows retrieving information from texts (Grinev-Grinevich, 2008).

One of the most important functions of terms belongs to the development of knowledge. *Heuristic functions* allow for consistent knowledge organization, ordering and creating a particular view of the world. Here also belong *classifying function* and *analogic (modelling) function.* The first function allows specifying the existing notions; the second one allows for creating new notions by analogy with already existing ones (Grinev-Grinevich, 2008). The classifying function can be subdivided into specifying and differentiating functions of term synonyms, including the foreign terminology (Shchitova, Savilova, 2014).

Thus, the term *идентификатор (Identifier)* can obtain more specific meanings in such terminological combinations as *идентификатор виртуального канала (Virtual Channel Identifier), идентификатор виртуального пути (Virtual Path Identifier)*. The term *идентификатор (Identifier)* can also be specified through the use of another networking term *адрес (address)* 'a unique identifier given to a network or a networking device in order for the other networks and devices to recognize them for information exchange'.

The differentiating function can be manifested in such examples as *цифровая петля (Digital Loopback)* and *аналоговая петля (Analog Loopback)*. The term *петля (Loopback)* means 'the routing of electronic signals back to their source'. However, *цифровая петля (Digital Loopback)* means 'the routing of electronic signals back to their source with converting and reconverting signals into the digital form' and *аналоговая петля (Analog Loopback)* means 'the routing of electronic signals back to their source without converting from original form'.

Thus, knowing and using terminology appropriately will allow students to gain abilities corresponding to the world standards in the spheres of information analysis, notion conceptualization and solving engineering tasks.

3. Terminological interferences

For the appropriate use of terminology in university courses, it is necessary to solve several problems. The terms that are used should have unambiguous correspondence with the notion, (the absence of polysemy and synonymy); the meaning of a term should correspond to the notion expressed by the term; a term should be constituent and concise, have derivational ability and linguistic accuracy. By contrast the increase in polysemy and synonymy, ambiguity in meaning indicate the critical state of terminology (Grinev-Grinevich, 2008). This is the situation that is seen nowadays (Deniko, 2012). The terminological standards have become less obligate and the process of creating terminological units is described as chaotic (Grinev-Grinevich, 2008). This is due to the uncontrolled spread of foreign language information in the Internet and uncontrolled process of borrowing foreign words. The situation is becoming more complicated because of lack of specialized training and knowledge among specialists who create new terms. This leads to the variability of terms when several terms correspond to one notion at the same time and their use is not fixed in standard dictionaries.

The variability can manifest itself on different levels and sides of a language. First of all, there are many **graphic variants** of one and the same term that appeared as the result of representing in written speech a single notion using different graphical means. This can be connected with writing a term using Russian and foreign graphics: *бэкап – backup* 'the process of copying and archiving computer data so it can be restored in case of loss', *фронтенд – frontend* 'program code which works with a user', *бэкбон – backbone* 'principle data route or a core route of the Internet'; *роутер – router* 'a networking device used to transmit data between computers', *байт – byte* 'a group of 8 bits', модель *клиент-сервер – client-server model* 'a model used to describe the relationships between the providers of services and their recipients', *дисторсия – distortion* 'an unwanted change in the form of a signal when it is transmitted between two nodes of a communication system', *мультиплексор – multiplexer* 'a device allowing transmitting several signals over one communication line simultaneously'. Another type of graphic variants is connected with hyphenation or lack of hyphenation in complex words: *кросплатформенный – кросс-платформенный* (cross-platform) 'able to work on different platforms', *спамбот – спам-бот* (spam-bot) 'a computer program which automatically sends advertising messages over a network', *клиент-сервер –*

клиентсервер (client-server), *кибердиск – кибер-диск – кибер диск* (cyber disk) 'a storage of user files deployed in the Internet'; *кибер-стратегия – кибер стратегия* (cyber strategy) 'a strategy for planning cyberattacks'; *кибер-угроза – кибер угроза* (cyber threat) 'a threat of cyberattacks'. The full classification of foreign language units can be seen in Butakova, Shchitova (2014).

Besides graphic modifications of terms, there are also **phonetic** variants: **phonemic** and **accentual**. Phonemic modifications differ in pronunciation. They can be connected with soft or hard pronunciation of consonants before vowels. For example: *ф[р'е]йм – ф[рэ]йм* [fr^j'ejm] – [fr'ɛjm] (frame) 'a piece of data transmitted over a network', *до[м'е]н – до[мэ]н* [dom^j'en] – [dom'ɛn] (domain) 'a part of the name hierarchy in the Internet'. Accentual modifications are connected with changes in the accentuation place. Here in the examples the stressed syllable is indicated with capital letters. For example: *бэкбОн – бЭкбон* [bɛkb'on] – [b'ɛkbon] (backbone) 'principle data route or a core route of the Internet', *домЕн – дОмен* [dom^j'en] – [d'omɛn] (domain). In these pairs of accentual variants a normative variant takes the first place, while the second place is given to a colloquial variant used in vernacular speech.

Some term variants can have more than one type of modification. They are called **complex** variants. There are different types of complex variants. The first one combines both graphic and phonetic features. For example: graphic variants *бекбон – бэкбон* 'principle data route or a core route of the Internet' reflects phonetic variation *[б'е]кбон – [бэ]кбон* [b^j'ekbon] – [b'ɛkbon] in writing. Another type of complex modifications can combine both morphological and accentual changes. Morphological changes can be connected, for example, with changing endings that indicate a case. For example: *дрАйверы – драйверА* [dr'ajv^{j}ɪr+] – [drajv^{j}ɪr'a] 'a computer program that controls devices attached to a computer'.

Another widely functioning group is comprised by **word building variants** that differ in word constituents while being semantically similar. For example: *мегабайт**н**ый – мегабайт**ов**ый* [m^{j}I≅#b'ajtn+j] – [m^{j}I≅#b'ajtov+j] (suffixes н- and ов- are used to form two adjectives with the same meaning in this case) 'something measured in megabytes, something taking megabytes in computer memory' (*megabyte* 'a unit of information amount measurement'), *диагности**ка** – диагности**рование*** [d^{j}I#≅n'ost^{j}Ikə] – [d^{j}I#≅n#st^{j}Iirəvən^{j}Ijə] (troubleshooting) 'procedures and systems used to detect and isolate errors and malfunctioning devices, networks and systems', ***мульти**задачный – **много**задачный* [mul^{j}t^{j}Iz#d'a⇕n+j] – [mnə≅əz#d'a⇕n+j] (multitasking) 'able to perform several tasks at the same time'. Both мульти- and много- are used for forming complex nouns.

Another problem with terminology training is connected with the fact that the language of professional communication is not homogeneous. Several layers can be distinguished in it including the terminology itself, oral professional lexis, professional slang, specialized abbreviations. For example: *электронная почта – мыло* [Il^{j}Iktr'on:əjə p'o⇕tə] – [m'+lə] 'electronic mail. These words are differentiated according to such styles as «literary» / «colloquial». *Приложение – апп* [pr^{j}Il#∩' 8 n^{j}Ijə] – ['ap] (application) 'a computer program allowing a user to perform a particular task on a computer, like word-processing or working with electronic spreadsheets'. The word *апп* is used in professional sphere, especially when referring to mobile platform applications. It can be described as "professional lexis" in relation to the term *приложение*. *Вложение – аттач* [vl#∩' 8n^{j}Ijə] – [at'a⇕] (attachment) 'an attached file sent with an e-mail'. These variants are differentiated according to "ordinary" / "professional slang" contrast. Terms that are to be used in terminology training should be separated from slang or colloquial words.

4. Proposals on solving the interferences

All the indicated problems demonstrate the necessity of terminology standardization work for their unambiguous understanding and eliminating the terminology barrier. It is necessary to unify and internationalize terminology to provide effective communication for professional engineers on the international level. This in turn will considerably facilitate the internationalization and integration of scientific research.

One of the suitable forms for these aims would be a bilingual or multilingual information thesaurus for a particular subject field. Thesaurus is a type of a dictionary that regulates specialized lexis in the frame of a particular information system. Thesaurus has some advantages over terminological standards: it can be continuously updated and revised in some periods (Grinev-Grinevich, 2008). The same specialists usually carry out this work, which gives it a continuous character. Modern information technologies will allow placing a thesaurus in the network and providing open access for users. A thesaurus can include many languages and there is no need to republish it as all the work is done in a digital form.

The creation of a thesaurus includes the following steps: delimitation of topic area; selection of wordstock that reflects topics of subject field and preparation of wordlist; creation of classifying schemes of notions in the subject field; alignment of a wordlist and classifying schemes with their mutual updating; building an alphabetic and other parts of a thesaurus; experimental testing and modification; creation of thesaurus updating rules (Grinev-Grinevich, 2008).

Such a thesaurus with unified terminology of a particular subject field can become a basis for building professional communication competence among future technical specialists.

Modern international educational standards put forward strict requirements for technical universities' graduates. These requirements demand professional thinking and communication as one of the main components in future engineer. This should be manifested on both national and international level. Terminology training can become a basis for the development of such competences, but there is a need in unification and normalization of terminology.

5. Conclusion

The internationalization of higher education brings some changes to the learning process at the universities. In particular, while learning specialized vocabulary students become exposed to notions both in native and foreign language. Only knowing the exact equivalents in both languages will make professional communication effective. However, the growing amount of polysemy and synonymy in terms seriously impedes this process. There is a need for standardization work that can be done in the form of information thesaurus.

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