Prioritizing Digital Competences in the Engineering Students’ Foreign Language Curriculum

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Abstract: The present paper gives primacy to digital competences regarded as crucial competences that mediate overlapping of both discipline-specific competences and linguistic competences in dynamic learning environments, capable of empowering future engineers with valuable functional/transversal competences that successfully help them face the currently emerging socio-professional challenges.

Key-Words: digital competences, engineering students, ICT-based foreign language instruction

1 Introduction
Acknowledging that in order “to ensure the best match of skills, individuals should acquire combination of transversal core skills with the specific skills needed for a job as soon as possible and develop them further throughout life (Skills supply and demand in Europe: medium-term forecast up to 2020 (2010)), the present research argues in favour of embracing a refreshed perspective on the engineering students’ foreign language curriculum in terms of digital competences viewed as effective enablers of mergeable competences (engineering field-specific competences, linguistic competences, cross-curricular competences) in more enriched and outcome-oriented learning settings.

The paper is structured in two broad sections, of which the first gives several insights into the author’s previous theoretical and empirical research in foreign language curricular design customized for engineering students and ICT-based foreign language instruction, justifying the digital competence prioritization, whereas the second section deals with the proper delineation of those digital competences that showcase overlapping of engineering discipline-specific competences and linguistic competences, and, implicitly, generation of genuinely productive blended learning environments. Equal attention is paid to highlighting the main advantages of integrating specific e-competences in the engineering students’ foreign language curriculum.

2 Research Background
The importance of including ICT in the foreign language curriculum has long been emphasized by both researchers and practitioners (Chester, 1987; Levy, 1997; Davison, 2005), whereas its core application to foreign language teaching for specific purposes (LSP teaching), is twofold, as remarked by Arnó Macià et al. (2006), inasmuch as ICT has significantly changed the language learning context and manner. Firstly, irrespective of their geographical location, field of activity and linguistic background, professionals are nowadays networking via English, regarded as the lingua franca of professional settings, or internationally influential languages such as French, Spanish, German, whose deployment is vital for career development and internationalization. Secondly, the ICT rapid progress and availability have provided language speakers with enhanced language immersions, undoubtedly superior to those provided by traditional learning materials, in which professionals as speakers of a certain foreign language “must enter into not just a general linguistic community (e.g., of English speakers) but rather a highly specialized one (e.g., of English-speaking mechanical engineers)” (Arnó Macià et al. 2006: 14).

The author’s current interest comes naturally as a further step in a research work focused on the development of a foreign language curriculum customized for engineering students within a rather chaotic academic context characterised by the absence of some specialised reference tools or unanimously-accepted practices among technical university language teachers. So far this endeavour has materialized in two articles whose findings have established specific criteria for foreign language
curricular design customised for the engineering field (cf Pop & Tănase-Robescu (2009)) and have envisioned a common reference framework for foreign language teaching in Romanian technical universities (cf Tănase-Robescu & Pop (2010)).

Featuring both an external dimension imprinted by the educational policies currently enforced at the European level as well as an internal dimension derived from the internal documents issued by the university decision-makers and the quality standards enforced at the national level, foreign language curricular design customized for the engineering field entails at least three overriding criteria:

- the modularity criterion whose adoption enables the structuring of the content according to the varying stages of linguistic training;
- the criterion of specificity of curricular objectives and related competences, implying that there should be a higher degree of specificity in the formulation of curricular objectives so that they are oriented to job-specificity related competences and their actual and tangible acquisition;
- the flexibility criterion pointing to a three-fold flexibility embedding linguistic training programs which should flexibilize and turn secondary education-acquired competences into transversal and transferable competences applicable in the subsequent study of the language(s) provided by the university programme, especially when the secondary education language is different from the higher education language; secondly, university language programs should be flexible enough to showcase intra-disciplinary competence transfer and integrated learning experiences (task conception and assignment should give students the opportunity to deploy intra-disciplinary competences with a view to enhancing their flexibility in balancing and mixing discipline-specific competences and linguistic competences so that the target language becomes a mediating tool for the accomplishment of specialism-specific tasks); thirdly, the flexibility of foreign language curricula in terms of learning support upgradability is vital given the short ‘life expectancy’ of the learning materials used in LSP seminars (foreign language curricula should be flexible enough to allow a regular insertion of updated learning supports that keep up with the rapid technological changes characterizing our globalised work environments).

The above criteria have further shaped a fertile mindset for the conception of a matrix-shaped common framework for foreign language teaching in Romanian technical universities in terms of three touchstones: the context of language use (specifying the professional area in which the user will function, analysing the learning/teaching situation), formulating more specific engineering student-oriented language competences and identifying possible stages in the linguistic training program and describing the content of each stage.

Briefly put, the observations of the Common European Framework of Reference for Languages (CEFIR, 2001) with respect to the occupational domain (cf. CEFIR, 2001: 48) are also applicable in the special purpose language teaching, whereas the identified engineering student-oriented competences fall into specific linguistic competences (e.g. adjectives describing shapes, dimensions, verbs describing stages of a process, faults, equipment maintenance), sociolinguistic competences realizing work-generated socio-cultural interactions (e.g. business etiquette, non-discriminating and non-sexist language, establishing international contacts), functional competences overlapping discipline-specific competences (e.g. expressing numerical information in percentages, assessing equipment reliability), generic competences (problem-solving skills) and digital skills (e.g. widgetizing, podcasting) and enabling achievement or simulation of practical actions characteristic of engineering environments.

Equally important in the advanced common framework is the stage-based framework for the engineering students’ linguistic training consisting of the stage of general training (intended to homogenize the group level, with specific emphasis on general communication), the stage of specialised training with two components: the stage of initiation into specialised communication (vocabulary/structures characteristic of the general technical discourse) and the stage of further development of the technical and specialized domain-related communication in close relation to the specialism specificity and the stage of socio-professional training oriented towards the development of techniques of written and oral communication required by the current professions.

At this stage of research the author’s interest is focused on pinning down engineering students’ functional competences in relation to the stage of specialised training which requires most customized input.

Similarly with the previous research, the principles underlying the author’s view build on the currently emerging approach to foreign language teaching – the action-oriented approach (the Common European Framework of Reference for Languages 2001) – centred on the development of the language user’s functional competences in a given field of activity and on the user’s social
interaction, the European employment strategy advocating European citizens’ increased employability through acquisition of mixed-nature functional competences (cf New Skills for New Jobs: Anticipating and matching labour market and skills needs, (2008), acknowledging that “across sectors, generic skills such as problem-solving and analytical skills, self-management and communication skills, ability to work in a team, linguistic skills and digital competences are more and more valued on the labour market”), last but not least awareness of idiosyncrasies of the Romanian higher education as emphasised by Vasiu et al. (2006), such as the Romanian students’ increased interest in e-learning and preferred topics for online delivery.

Three sensitive issues related to language teaching for specific purposes, namely the rapid outdatedness of traditional LSP learning materials, students’ insufficient exposure to quality LSP instruction in traditional learning environments and students’ insufficient motivation, or even worse, demotivation, which is a cross-curricular teaching challenge nowadays, and the outcomes of an interuniversity cooperation project – the LLP project ViCaDis, (http://www.vicadis.net/) – have sparked and empirically validated the prioritization of digital competences.

Emphasizing students' digital literacy in achieving better academic performance and advancing information and communication technologies as well as social software as instructional methods, the ViCaDis virtual learning campus has showcased the piloting of a web-based Technical English Course designed as an add-on e-learning support envisioned to tackle and overcome the above-mentioned LSP pitfalls. Students were assigned both individual tasks (creating one’s own entry blog to speak about technical problems/faults, uploading newly-encountered technical terms and their definitions in the Technical English Glossary, uploading recordings of one’s own web-based interaction in a distinct blog) and team tasks (creating wikipages on topics such as IPhones - advantages and disadvantages, GPS accuracy enhancement, Deutsche Telekom’s acquisition of Greece’s OTE, etc., preparing PowerPoint presentations on subjects related to company structure, development and research projects), which were successfully carried out with various (a)synchronous e-learning tools.

Students’ achievements, active involvement, and feedback retrieved in pre and post-piloting questionnaires have clearly pointed to blogging, wiki-page and glossary developing as effective enablers of mixed-nature competences merging engineering field-specific competences, linguistic competences and generic competences. The blogging creation, for instance, has generated a genuinely meaningful learning network whose content was built, upgraded, owned and shared by students and only ‘shadowed’ by the teacher in terms of content, language accuracy and space constraints and has provided a stimulating and thought-provoking content (ViCaDis’ Technical faults blog has had 299 total visits) in which students developed, upgraded and exchanged technical fault-related knowledge and concepts, practised and developed technical fault-related language and applied and developed analytical and on-line research skills. The screenshot below extracted from a long chain of blog entries providing pertinent explanations/solutions to a large variety of technical faults (browsers, smartphones, operating systems, hardware, software bugs, backup issues, credit card cloning, car manufacturing, aviation, naval disasters, etc.) is a case in point:

![Figure 1](image)

The next section suggests five digital competences (blogging, wikipage creation, glossary creation, widgetizing, podcasting) and discusses their major advantages in terms of language proficiency, specialism-related knowledge development and functional competence development.

3 Digital Competences in the Engineering Students’ Foreign Language Curriculum

3.1 Blogging
Built by students, therefore quite time-saving for teachers, who can allot more time on students’ monitoring and ensuring that functional competences such as online research skills, linguistic skills, analytical skills, and problem-solving skills are thoroughly practised, blogging creation showcases permanent language immersion that students cannot enjoy in traditional learning environments. Furthermore, it allows them to choose the research content according to their language proficiency, therefore it is more effective than a mixed-ability-oriented traditional lesson.

Blogging creation also comes as the perfect incentive for students demotivated by the content suggested by teachers or for internet-addicted students who have forgotten the pleasure of book reading, turning their addiction into a positive goal-oriented action.

3.2 Wikipage creation
Wikipage creation stands as a highly effective alternative to traditional learning supports whose upgradability cannot keep pace with the rapid technological progress and economic changes characterizing current socio-professional environments whereas such environments feature real-time upgradability with easily-upgradable web-based content. Supporting real-time upgradability, ease of content adjustment according to engineering students’ actual interests, wikipages not only overcome this major pitfall of paper-printed learning supports but they also enable “active, social, contextual, engaging and student-owned” learning experiences (Wikis in Higher Education, an exploratory report issued by the University of Delaware (2008)) and, more importantly, they are highly interactive and collaborative learning facilitators.

Additionally, wikis are team work-supporting environments that allow teachers a better supervision of each team member’s contribution to the final output.

3.3 Glossary creation
Glossary creation and updating goes hand in hand with wikipage creation and can be envisioned as a vocabulary preview/simultaneous/follow up activity that forces students to record and make available technical terms and concepts encountered before or while searching ideas and arguments to shape wikipage content.

Their main advantage is the wealth of information available to and upgradable by all students enrolled in the course, whose collaborative work requiring individual contributions is highly productive and time-saving. If a group of 20 students is required to create a glossary of computer engineering terms with each student inserting 20 terms, then a 400-word glossary is born within a very short time interval and with minimum efforts.

3.4 Widgetizing
The wealth of technical concepts can be complemented by widgets as regular providers of updated specialism-related knowledge. In terms of knowledge updatedness and easy access, they seem to be the most efficacious tools given the high number of technical sites providing widgetizing facilities. Additionally, widgetizing literacy can be exploited as a steady authentic technical language immersion-tool and reading skill-consolidator as widgets can easily incite users to access original informational resources. Their attractiveness is increased by the fact that they can be personalised thus students are given enforced control over their learning content and interests.

3.5 Podcasting
Podcasting displays similar advantages as widgetizing, the only difference being the different skills practised, i.e. speaking and listening. Getting students accustomed to listening but also producing podcasts is very productive. On the one hand, the lack of insufficient exposure to quality authentic language can be overcome by assigning students podcast-listening tasks outside the classroom given their extensive availability, whereas creating podcasts can be a very attractive form of project-based learning in which students review various
recording software programs and retrieve online information for the proper podcast content. Overall, it is essential to point out that all of the above-mentioned digital competences develop students’ ability to get informed and expand specialism-related knowledge while performing various tasks which points to a further research step regarding the exploration of their potential in terms of building learner’s autonomy and teacher-independence as lifelong-learning assets. Such a perspective envisions a long-term learning outcome which involves the student’s taking responsibility for managing his/her own professional development.

4 Conclusion
On the whole, all the advanced digital skills exploit the incentives of experiential, learn-by-doing learning which seems very appealing and motivating for today’s generation of engineering students who are prone to assess learning program efficiency in terms of the opposition ‘invested time vs. achieved amount of knowledge/competences’. All of them showcase integrated learning experiences that facilitate cross-curricula competence transfer, yet, in varying degrees (e.g. wikipage creation maximizes consolidation of technical knowledge and analytical and team-working skills) which points to the necessity of combining and complementing them, generating thus more enriched and productive learning settings.

References: