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Developing Students' Mining and Geology Vocabulary Through Flashcards and L1 in the CLIL Classroom | Lidija Beko, Ivan Obradović, Ranka Stanković | Proceedings of the Second International Conference on Teaching English for Specific Purposes and New Language Learning Technologies, May, 22-24, 2015, Niš, Serbia, Faculty of Electronic Engineering, University of Niš | 2015 | |

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The Second International Conference on Teaching English for Specific Purposes
Faculty of Electronic Engineering
University of Niš, Serbia
May, 22nd to 24th, 2015.

Developing students' mining and geology vocabulary through flashcards and L1 in the *CLIL* classroom

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Abstract: This article addresses the standpoint of pedagogical appropriateness of teaching mining and geology terminology by means of flashcards and the aid of L1 in the *CLIL* classroom. Our original intent is to provide a method whereby a great deal of complex mining and geology terminology could be studied intensively, regularly and in a structured manner so that it could be learned with greatest possible precision. For this purpose, in the paper we will: (1) review the literature on vocabulary teaching and the use of L1 in the *CLIL* classroom, (2) review the literature on flashcards and discuss the use of it at home and in the classroom, (3) exemplify the complex mining and geology terminology and the difficulties the Serbian students face in terms of translation and comprehension, (4) discuss the findings of research and students perception on the above mentioned method.

Key words: L1, *CLIL*, flashcards, mining and geology terminology, students' perception

1. INTRODUCTION

The vocabulary of any language is huge and its acquisition takes time, even for a native speaker. Serbian language learners are not an exception to this rule and they are generally conscious of the fact that the limitations in their knowledge of vocabulary, and more specifically that of mining and geology terminology, may not only hinder their fluency in spoken and written language, but more dramatically, may affect their future career. Therefore, not infrequently, we saw our students trying to improve their

vocabulary with different techniques and heard them complaining about the difficulty of finding the best and most effective way to adopt demanding academic vocabulary and very challenging and complex engineering terminology. Vocabulary development of Serbian learners of English is additionally aggravated as the level of knowledge of our students is very low due to the quality of their exposure to English inside and outside the school.

We hypothesized that *CLIL* method will lead to better learning results compared with traditional foreign language learning method due to bigger and better opportunity to enlarge both receptive and productive vocabularies. On the other hand, *CLIL* instruction at tertiary level in Serbia is only at a pioneering stage and, since its pedagogy is not widely recognized in the national curriculum, the amount of research on vocabulary acquisition is relatively scarce (Beko 2013). Thus, our research was drawing on the benefits of *CLIL* pedagogy published and documented in the studies of Dalton-Puffer, Nikula and Smit (Dalton-Puffer, Nikula, Smit 2010)

Concerned both with the breath and the depth of the learners' vocabulary knowledge, as it has been calculated that minimum autonomy at the tertiary level starts at around 3000 words allowing a learner to read a text without the need to refer constantly to dictionaries or the teacher, we hypothesized that with the use of flashcards and judicious use of L1 in the *CLIL* environment, our students will have larger amount of quality foreign language input as well as simplified task of learning thousands of items in a meaningful, interesting and effective way.

2. EXPLICIT VOCABULARY TEACHING

Research has suggested that explicit vocabulary teaching along with flashcards should be a part of regular language classroom as an effective way to teach and memorize a great amount of words (Fitzpatrick, Al-Qarni, and Meara 2008, 239; Nation 2001). Explicit learning with flashcards falls into the category of deep strategies which take more time but ensure greater retention and ease retrieval memory (Nation 2003 22). By making extensive use of dictionaries and exposure to relevant items, this type of learning builds up deeper knowledge, and from a cost vs. benefit view, cost of teaching them is justified by the resulting benefit (Nation 1998, 203). Crick has suggested (Crick 1979, 220) that we have limited ability to process but a vast ability to store things in our brains. By having a huge store of ready-made language, available through flashcards, we are saving our limited processing capacity for dealing with other cognitive tasks.

If this position holds then computer assisted learning with computer flashcards has a considerable role to play.

3. FLASHCARDS

The original intent of our flashcard program is to provide a method whereby a great deal of vocabulary could be studied intensively, regularly, and in a structured manner so that it could be learned with the greatest possible economy and result in automaticity as well as grammar knowledge embedded within the lexis. In this way, the rules and patterns may be adapted and reconstructed in novel ways according to learners' needs, speed and fluency.

For this aim, it is of equal importance to find a suitable IT solution which would be user-friendly, enable students to fill in a ready-made form and allow the professor to check, give feedback and mark the answers. During the evaluation, the professor may also select the answers which are to be included into a central terminology database provided that they satisfy previously established quality standards. This allows the database to be continually enriched, always adhering to certain quality criteria. Our programming solution has been developed through Intranet, a php web application which students and professors may access by using a domain account, whereas assignments, flashcards, marks and feedback are located in a MySQL database. The professor can either create new flashcards, based on which students may study, or, alternatively, flashcards containing the requested term can be given to the students to fill in by using a wide range of dictionaries and appropriate sources, (Figure 1). Flashcards of sufficient quality may be added to the central terminology database of the Faculty.

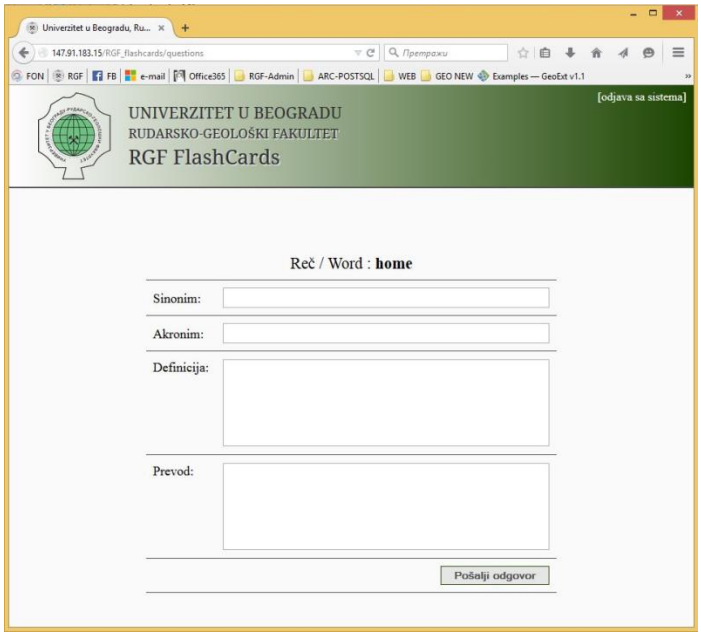

Figure 1. Example of the flashcard interface

The Faculty of Mining and Geology has recognized the significance of the development of terminology resources so that in a thesaurus of geological terminology has been developed in both Serbian and English with the definitions and bibliography of approximately 2800 words which is available on the webpage http://geoliss.mre.gov.rs/term/. (Stanković et al 2011). Additionally, a terminological resource dubbed RudOnto has also been developed, with the aim of becoming a reference resource for mining terminology in Serbian in an e-format. (Stanković et al 2012, RADMI). As the central terminological resource is an invaluable tool in the learning process, it is included in the blended learning approach through an export of its subsets to the Moodle e-learning environment. (Stanković et al 2012, e-Learning).

In search of acceptable flashcard system, we have opted for in-house development in order to incorporate all of the platforms used at the Faculty, such as Moodle and the terminology database RudOnto. The ideas and positive experiences gained by users of the Anki 2.0[1] tool have significantly defined further development. The Quizlet[2] system, with its outstanding interface, has also been tested. However, it was not possible to integrate it with the existing student accounts and LMS Moodle.

[1] http://ankisrs.net/docs/manual.html
[2] https://quizlet.com/mission

4. USE OF L1 IN *CLIL*

According to Lasagabaster (2013) "the use of the first language, if judicious, can serve to scaffold language and content learning in *CLIL* contexts, as long as learning is maintained primarily through the L2" (p.17). The supporters of periodical usage of L1 in the *CLIL* classroom (Auerbach 1993; Littlewood and Yu 2011; Guk and Kellogg, 2007; Storch and Aldosari, 2010; Swain and Lapkin, 2000) fully recognize the value of L1 in the *CLIL* classroom as a resource from introductory to upper-intermediate levels on a decreasing scale for the purpose of facilitating complex instructions, saving time and anguish, translating individual, abstract and complex words and during tense situations to make learning enjoyable and task possible. In the same vein, supporters of translation advocate that ties with L1 may stimulate deeper processing, facilitate negotiating of metalinguistic knowledge, foster understanding the meaning of the text, and enable vocalizing the thoughts of the learners (Llach, 2009; Lázaro and García Mayo, 2012; Storch and Aldosari, 2010).

The question of students' L1 usage in *CLIL* classes is of special relevance in the homogeneous environments such as Serbia, where the majority are monolingual and where most of the students are at low levels of English. Therefore, our general approach is to mix the L1 with the target language in order to clarify the meaning, to correspond the new words with the words they already know, to precise the choice of register, to appropriate the usage of L2 in translation, to find the new words in L1 for nonexistent terms, to build shared meaning through shared discussion, to create collaborative dialogue in order to build linguistic understanding. The chief medium of communication in the class is always English and as with any other classroom technique, the use of L1 is only a useful means or resource to the end of improving L2 proficiency.

5. MINING AND GEOLOGY TERMINOLOGY

Using authentic teaching materials, encompassing demanding language input and subject content, inevitably expose our students to complex mining and geology terminology. At the same time, many of the terms have not yet been translated into Serbian, therefore, looking up the equivalents in bilingual dictionaries is of no use, and very often the lexical task may be quite a challenge even for a professional translator. At university level, where language specificity is high, students realize that one-to-one relation between L1 and L2 does not exist and the habit of word-to-word translation leads to misinterpretation and material mistakes. Likewise, keeping away from translation and naturalization or simple assimilation of

foreign words is equally wrong. The Table 1 shown below reproduces the entries common in the textbooks which are "fully" translated in the Serbian language, unlike, Table 2, where loanwords dominate and illustrate the current trend of unprecedented and uncritical adopting of foreign words without translation.

Table 1: Fully translated words

English	Serbian
Bearing	ležište, osnova, nosač, ležaj
compound jaw crusher	udarna čeljusna drobilica
jig bed	posteljica mašine taložnice
dense-medium washer	uređaj za pranje u teškoj sredini
dewatering-tank	zgušnjivač, rezervoar za odvodnjavanje

Table 2: Fully adopted loanwords

English	Serbian
dragline	dreglajn (u značenju tip bagera koji se koristi za otkopavanje i prebacivanje materijala u otkopani prostor)
grader	grejder (u značenju mašine za nivelisanje ili ravnanje trasa)
spigot	spigot i spigotizam (sistem cevi u obliku češlja preko kog se vrši deponovanje hidromešavine)
NIMBY sindrom	nimbizam (nastao od: *not in my backyard,* sindorm označava otpor lokalnog stanovništva prema određenim intervencijama i izgradnji rizičnih objekata u okolini poput deponija otpada)
cradle-to-grave system	cradle-to-grave sistem (označava upravljanje opasnim otpadom od nastanka do uklanjanja, ovaj termin ostaje o original)

6. QUESTIONNAIRE

Questionnaires were distributed to 100 students of which 93 were returned. The respondents were freshmen who were specializing in Geology and Mining at the University of Belgrade. Their amount of time in L2 environment was 4 hours per week for 2 semesters, which amounts to about 130 hours of English instruction. All the statements were rated on the Likert scale of five possible answers: 1 – strongly disagree, 2 – disagree, 3 – not sure, 4 – agree, 5 – strongly agree. A questionnaire was divided into three parts: 1) the attitudes of students toward using flashcards; 2) the attitudes of students toward using L1; 3) the attitudes of students toward combined method of *CLIL*, flashcards and L1.

7. RESULTS AND DISCUSSION

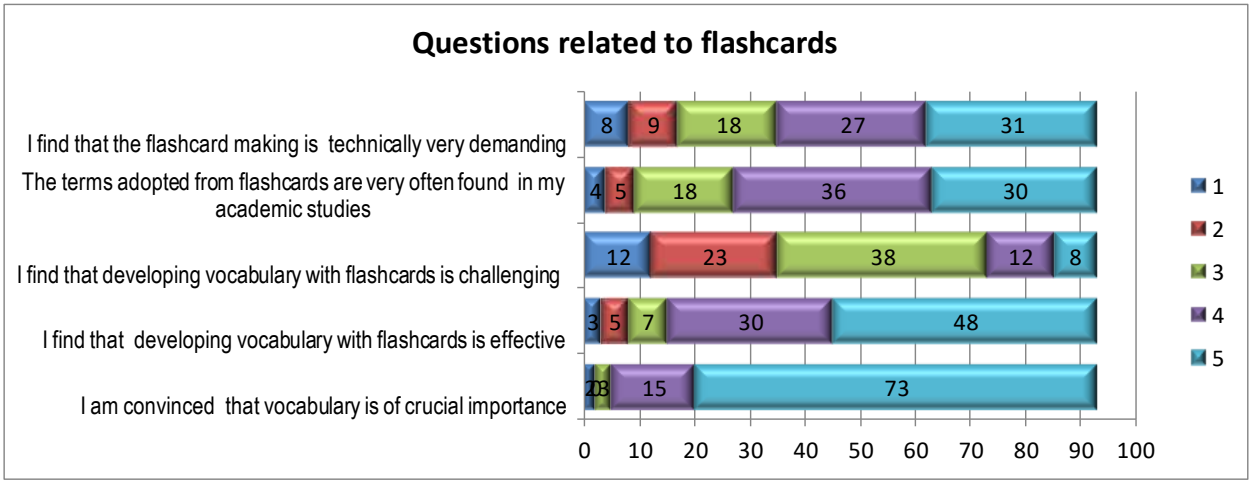

Figure 2 Questions related to flashcards

The Figure 2 shows: the students in the present day study are highly motivated to learn vocabulary (Q1) (78.49%), the students responded positively to the developing vocabulary by means of flashcards (Q2) (51.61%), in the opinion of students, on the average, the flashcards are not challenging (Q3) (40.86), the terms acquired from the flashcards fall into the category of high frequency words (Q4) (from 32.26% to 38.71%), the students find that the creating flashcards is not technically demanding and time consuming (Q5) (33.33%).

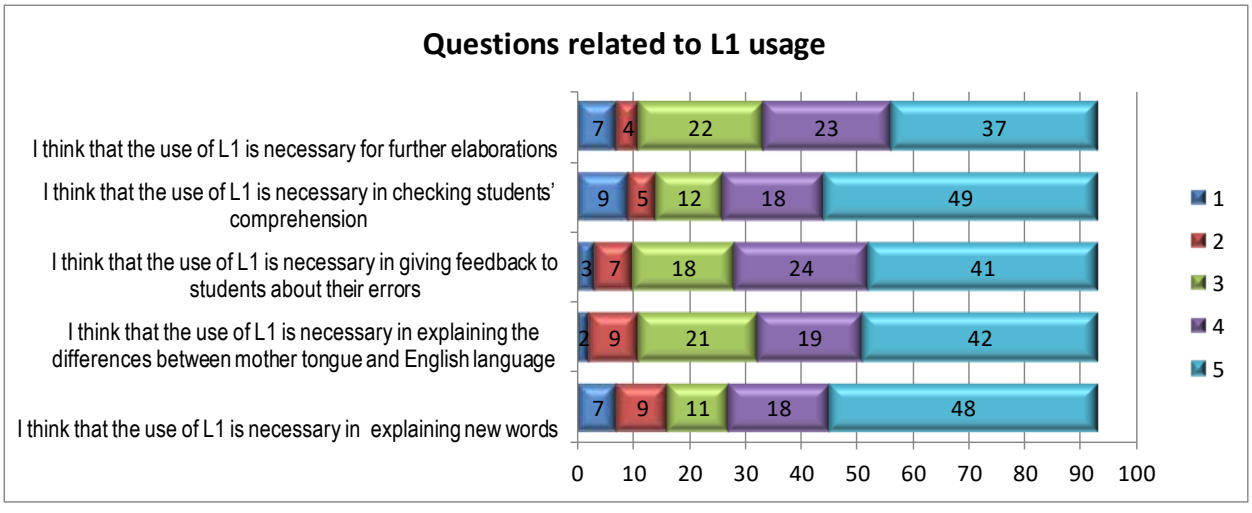

Figure 3 Questions related to L1 usage

Concerning why the use of Serbian was necessary, students answered as follows (see Figure 3): for explaining new words (Q1), majority think that L1 plays a facilitating role (51.61%), for explaining the differences between L1 and L2 (Q2), students responded that L1 has a more supportive role (45.16%), for giving feedback to errors (Q3), students generally prefer greater use of L1 (44.09%), for checking comprehension (Q4), students believe that the native language outweighs the foreign language (52.69%), for additional elaborations (Q5), students find that mother tongue provide more opportunities (37.63%).

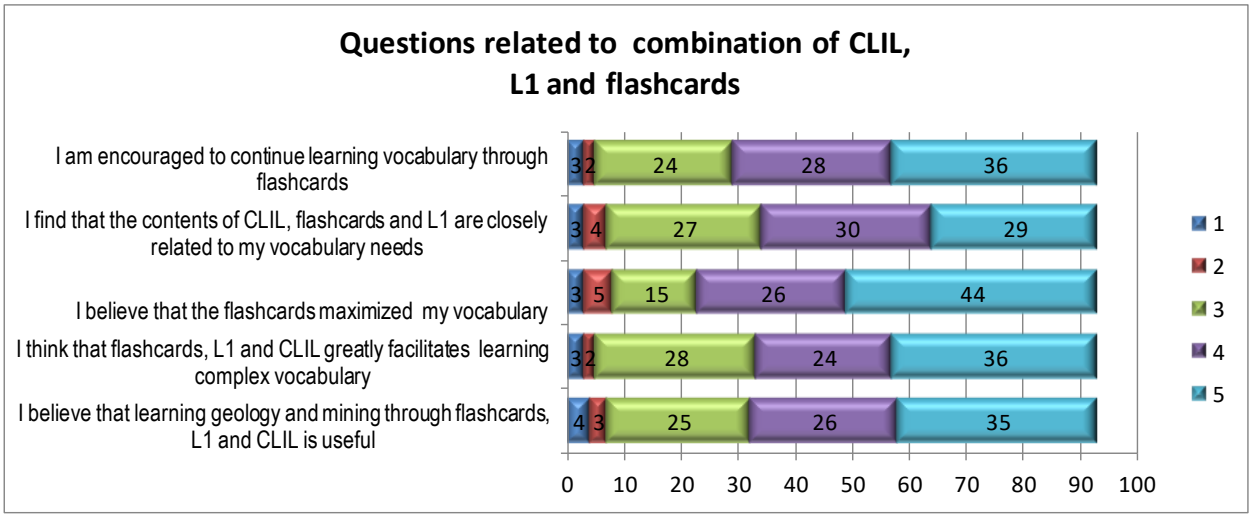

Figure 4 Questions related to combination of CLIL, L1 and flashcards

The Figure 4 shows that: the combined method of flashcards and L1 in the *CLIL* is useful learning method (Q1) (37.63%), which facilitates learning vocabulary (Q2) (38.78%), moreover, many of the students agree that the method maximized the lexical improvement (Q3) (47.31%), closely relating the lexical content and method with the current students' needs (Q4) (92.47%), only few (5.38%) labeled the method as discouraging.

The findings suggest that L1, flashcards and *CLIL* pedagogy, as a classroom technique tailored to help students' develop specific vocabulary, is highly effective, well balanced, and creating new language habits. This type of method slowly introduces elevated focus on different functions of and within the words, providing the students the opportunity to see the lexis in action, to strengthen connections, and to widen their general lexical knowledge.

8. CONCLUSION

The research illustrates the meaningfulness of a balanced use of L1 and flashcards in the *CLIL* classroom in teaching and learning the complex mining and geology terminology. The role of flashcards is neither overstated, nor advocated greater use of L1 in *CLIL* classes, but rather proven that L1 is justifiable and the only means to the end of acquiring and clarifying complex mining and geology terminology. Our suggestion is, therefore, the usage of the in-house FlashCards, RudOnto and GeolISSTerm combined as the optimal solution to enhance the acquisition of specific terminology and facilitate the usage of contemporary engineering literature.

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