GRAPHIC VISUALIZATION AS A TOOL FOR MEANING MAKING IN HIGHER EDUCATION CLIL

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ABSTRACT

A longitudinal study shows that CLIL introductory courses which integrate subject-specific content and a foreign language have a considerable potential for the creation of a favourable framework for the intensification of the academic domain-specific English language development. The task, however, is extremely challenging as the academic input is heavily dominated by theoretical concepts and generalizations. A two-semester experiment on using graphic visualization to scaffold meaning construction has been conducted in a large group of first-year university students. The article discusses the findings of the research that transforming written academic input into a graphic mode and learning how to apply questioning to elaborating abstract concepts is gradual but noticeable, and eventually benefits all the students.

Key words: meaning making, graphic organizers, CLIL, higher education.

RESUMEN

Un estudio longitudinal muestra que los cursos introductorios de CLIL que integran contenido y habilidades lingüísticas en una lengua extranjera poseen un considerable potencial para la creación de un marco favorable para la intensificación del desarrollo del inglés en ámbitos académicos específicos. Sin embargo, la tarea es extremadamente compleja ya que el discurso académico está fuertemente dominado por conceptos teóricos y generalizaciones. Un amplio grupo de estudiantes universitarios de primer año ha participado en un experimento en el que la visualización gráfica se ha puesto al servicio del andamiaje en la construcción de significado. El artículo presenta los resultados de la investigación y describe cómo la

transformación de input escrito a modelos gráficos y la formulación de preguntas en la elaboración de conceptos abstractos se produce de modo gradual pero significativo y beneficia a todos los estudiantes de lenguas extranjeras.

Palabras clave: construcción de significados, organizadores gráficos, CLIL, educación superior.

1. INTRODUCTION

The internationalization of higher education brings about new opportunities for students to participate in international mobility with a number of significant benefits of widening their academic, social, and cultural horizons. A rapid increase in the use of English as a medium of instruction in tertiary education appears a high barrier for most Russian non-linguistic students who enter home universities with the general English language proficiency level ranging from A2 to B1 (CEFR), which is considered insufficient for being used as the language of instruction.

In order to facilitate the development of academic English, a two-semester CLIL course on the essentials of economics integrated with academic English has been designed. A new topic is introduced every week through short authentic texts and biweekly lectures. The task, however, is extremely challenging as the students have no prior knowledge of economics and no experience in using English for learning a subject. Moreover, the academic input of the course is heavily dominated by theoretical concepts and generalizations. Practical observations of how students deal with new input have shown that they tend to apply a linear information processing strategy. When asked questions about a particular concept, even the linguistically ‘strongest’ students choose to rely on memorization of chunks from the texts. As to the ‘weaker’ students, they are mainly busy with the new words and language trying to achieve at least some degree of reading comprehension. Thus the question was how to facilitate cognition in learning academic content.

2. SCAFFOLDING MEANING MAKING IN CLIL

CLIL provides an appropriate environment for the active learning of both the field-specific content and L2 because "CLIL is not about the transfer of knowledge from an expert to a novice. CLIL is about allowing individuals to construct their own understandings and be challenged – whatever their age or ability." (Coyle et al, 2010: 54). Cognitive processes are, by definition, of a creative character and learners are expected to be 'creators'. However, they need sufficient scaffolding.

Cognitive psychologists are unanimous in considering meaning making in cognition as an active knowledge-constructive process, notably Vygotsky (1999) with his idea of the 'zone of proximal development' and Bruner (1977), who considers the learning act as a move 'beyond the information given'. A knowledge constructive approach to cognition suggests prerequisites for the learner to cross the line between the 'unknown' and the 'learned'. According to Vygotsky, one of them is scaffolding initiated by an expert/instructor helping learners overcome the difficulty barriers which, otherwise, may appear too high for them to move forward. Moreover, this requires a collaborative construction of meaning by asking questions and jointly looking for the answers. This also needs to be encouraged and modeled as learners are likely to avoid questioning or to ask factual questions and not the questions for reason and explanation. (Dalton-Puffer, 2007: 123).

An empowering scaffolding tool for the theoretical knowledge construction has been suggested by the developers of the theory of concept mapping. (Novak and Cañas, 2008). They argue that concept maps have properties which help learners organize and represent knowledge as concept maps allow to establish relationships between concepts thus forming the propositions or 'meaningful statements'.

The idea of concept mapping has been used to design a graphic organizer called 'Concept Flow Chart' (CFC) to scaffold economics students' knowledge construction using L2 in a two-semester experiment. The hypothesis was that the engagement in the graphic reconstruction of the textual input will not only help students better comprehend the text in L2 but also will increase the role of the

English language in structuring new conceptual input for the purpose of learning the basics of the economic theory. Like in concept maps, the CFC contains ovals/boxes with key concepts inside. The difference is that they are joined by arrows forming a tree diagram which unfolds downwards thus representing the logical development of a theory.

3. THE EXPERIMENT AND ITS RESULTS

The aim of the experiment was to observe how graphic visualization of the concepts supports students' understanding of content, conceptualization, and the presentation of the newly acquired knowledge in L2. After the process of drawing a CFC had been demonstrated by the instructor and the guidelines and the assessment criteria had been made clear, the transformation of the texts into CFCs became an integral part of the classroom activities. Students were encouraged to analyse the texts collaborating in pairs/trios and to share ideas of how to interpret the input and design CFCs. The instructor was an integral part of the learning process monitoring, commenting and asking questions.

A group of 55 first-year bachelor students participated in the experiment. 15 topical texts consisting of 7-8 paragraphs each were read and transformed in class. A collection of 649 CFCs drawn as drafts in class and completed for home work were analyzed. Five aspects were chosen for the assessment of students' skills development when constructing a CFC:

1. Structure of the concept map;
2. Logical linking by arrows;
3. Elaboration of key components;
4. Text transformation;
5. Exemplification.

The assessment of each of the five aspects was based on the answer whether a student mastered knowledge-organizing techniques and non-verbal devices to reconstruct the concept/theory in his/her

CFC. Three answers were used in the assessment: Yes – 2 points; Partly Mastered (PM) – 1 point; No – 0 point.

Aspects/ CFC	1.Structure	2.Logical linking	3. Elaboration of key components	4. Text transformation	5.Exemplification
CFC 1 'Demand' n=50	Yes: 18 PM: 18 No: 14	Yes: 13 PM: 17 No:20	Yes: 15 PM: 24 No:11	Yes: 13 PM: 26 No:11	Yes: 9 PM: 27 No:14
…					
CFC 15 'Banking' n=48	Yes: 30 PM: 9 No:9	Yes: 19 PM: 20 No:9	Yes: 15 PM: 25 No:8	Yes: 22 PM: 14 No:12	Yes: 22 PM: 20 No:6

Table 1. The results of the assessment of the participants' CFCs.

The results of the progress in drawing CFCs are summarized in Table 1. Two CFCs were selected: CFC 1 – one of the first topics of the course ('Demand') and CFC 15 (topic 'Banking') created five months later. The CFCs in between demonstrate quantitatively fluctuating results, but supporting the trends we can identify in Table 1. The columns show the numbers of students who got from 2 to 0 points for each of the five aspects.

The data show an increase in the number of the students with 1 or 2 points in all aspects excepting Aspect 3. The most significant improvement is in Aspect 1 (Structure). Almost two thirds of the students got 2 points for CFC 15 compared to just a third for CFC 1. With Aspect 2 (Logical linking), the number of students with 1 or 2 points also increased. This implies that an engagement in the CFCs creation contributed to the development of a skill to differentiate between the key concepts and the supporting details/categories (Aspect 1) and to identify the hierarchical links between them (Aspect 2.).

The students' answers to a questionnaire given to them some weeks after the beginning of the course shed more light on the beneficial effects of structuring verbal input. There were two questions:

Q1. Does drawing CFC help you learn economics? If yes, how?

Q2. Which do you prefer, to draw your own CFC or to use the teacher's template?

52 out of 55 students answered Q1 in the affirmative. All the students pointed at least to one or two benefits of drawing CFCs. According to the process-oriented comments, the CFCs help better/deeper/faster understand/comprehend/grasp the text/concept /information/topic (39 comments) and to structure/group/analyse /learn/memorize/put in order/systematize knowledge/facts/ideas (24 comments). These comments correlate with the improved results in Aspect 1 and 2 proving the hypothesis that the active engagement in the CFCs production benefits the conceptualization of a new abstract input.

An improvement in Aspect 5 (Exemplification) is even more noticeable: the number of students with 2 points more than doubled. It seems obvious that abstract concepts connected to an event of the real life are better conceived when the examples are used either from the text or as a result of the discussions. This correlates not only with the accumulation of domain-specific knowledge and of academic English, but also with their collaboration with each other and the teacher by sharing their personal experience in their everyday economic decision-making.

In Aspect 4 (Text transformation), the number of students unable to efficiently transform the verbal text into a non-verbal schematic form remained high (one in five students) though more students got 2 points (22 vs. 13). Students' frequent questions concerning text transformation suggest it to be one of the most challenging tasks. However, the more experience students gain by sharing with each other their findings of how to compress the text and use non-verbal symbols and cause-and-effect chains the more they succeed.

Little change in Aspect 3 (Elaboration of key components) throughout the course (not only in the selected CFCs in Table 1) may indicate that not all the students have an inclination to a detailed interpretation. When they achieve a certain level of understanding, the further elaboration of the concept may not look an important activity any more. Other students, on the contrary, seem to enjoy a more detailed analysis. They also tend to ask more questions when building

links between the concepts. This difference in interests and motives can be explained by differences in their personalities. Anyway, more research is needed to find out how personal attitudes to what and how one learns affect the learning outcomes.

Question 2 of the questionnaire was included because, for some of the texts, the students had been given a template which had a ready-made layout of the ovals containing categorical labels like 'types', 'function', 'characteristics', or 'example'. The template was primarily aimed at the 'weaker' students. The idea was to give them extra support in structuring the input and acquiring new terminology. Templates seemed to have been accepted with enthusiasm by the students, but after the analysis of the CFCs, the effects of the templates raised some doubts: the time on drawing CFCs definitely reduced, but the learning outcomes did not improve much and in some cases even worsened. Also, the answers to Q2 demonstrate that the majority (32 respondents) are in favour of drawing CFCs on their own without a template, and among these respondents are both linguistically 'strong' and 'weak' students. According to their comments, CFCs help develop their own understanding and ensure deeper analysis of the texts. For every fifth respondent, the process of creating their own CFCs is more challenging/exciting/interesting. Seven respondents emphasized the benefit of obtaining useful study/cognitive/logical thinking skills by drawing their own CFCs.

To sum up, graphic organizers appear to change the way students learn new content through a process of decoding meaning. Indeed, the creation of CFC can be considered complete only after students achieve a certain 'cognitive balance' by moving between the text and the graphic chart in a recurring deductive-inductive process. Some comments emphasize the benefit of having to return to the text multiple times when looking for an appropriate location for each concept in their CFCs.

The experiment took place in a large group of mixed-ability students who worked in pairs/trios to process the input and to draw drafts of CFCs. However, their CFCs were assessed as individual products. Obviously, students contributed to the outcome differently, some more, some less. Supposedly, some of them were more active and some were more passive accepting what was suggested by the

partner. So we have to use the data and statistics with caution and, probably, to use the information as a reference showing general development. Furthermore, informal talks with the students make us think that, in some cases, the quality of the CFCs reflected the time and effort students invested in the task rather than their actual skills. This also implies some reservations when interpreting the learning outcomes. A summative test could provide more credible evidence of the benefits of graphic visualization for every student.

4. CONCLUSION

The analysis of the CFCs and students' interviews about the effects of graphic organizers reveal that students with higher language proficiency seem to benefit more and faster. Understandably, it takes longer for 'weaker' students to feel more confident in visualizing conceptual knowledge and utilizing CFCs both for the cognitive purposes and for academic communication. The emerging ability to use graphic visualization for meaning construction correlates with the continuous accumulation of the domain-specific knowledge and of the English language of this domain. However, it appears obvious that the students who are actively involved in collaboration with each other by sharing ideas and asking each other and the instructor questions tend to feel more confident than those who avoid collaboration with other students and prefer to work alone using the templates provided by the teacher.

A CLIL course where graphic visualization is used as a guiding tool proves to be an appropriate framework for meaning making, as Ting (2010: 3) remarks: "In doing so [applying 50-50 Content-Language approach], CLIL automatically changes classroom dynamics: rather than downloading information onto passive learners, teachers guide learners towards deep-level understanding of concepts through interactive knowledge-construction processes. Such active learning processes are coherent with how the brain works." Ultimately, in CLIL the focus shifts from reading comprehension to a cognitive activity characterized by 'constructive modality'. This shift requires the use of various types of guidance and scaffolding to ensure the learners are sufficiently supported in a process of active meaning

making through L2. Using graphic organizers, they construct and reconstruct a new conceptually cohesive input by 'packing' the verbal text into a graphically organized knowledge map thus broadening their personal experience in being creative learners and thinkers.

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