FROM GENOTYPE TO PHENOTYPE: A TEACHER-LED EXPLANATION, WHOLE-CLASS EXPERIENCE IN AN UPPER-SECONDRAY CLIL SCIENCE CLASSROOM[12]

DE GENOTIP A FENOTIP: UNA EXPERIÈNCIA D'UNA EXPLICACIÓ LIDERADA PEL PROFESSOR EN UNA DISCUSSIÓ AMB TOTA LA CLASSE EN UNA CLASSE AICLE DE CIÈNCIES EN BATXILLERAT

JILL SIMON AUERBACH
jill.simon@e-campus.uab.cat
UNIVERSITAT AUTÒNOMA DE BARCELONA

Keywords: teacher-led explanation, content-obligatory language, density, opacity, guidance strategies, diagrams
Paraules clau: explicacions liderades pel professor, llenguatge de contingut obligatori, densitat, opacitat, estratègies de guiar, diagrames

One of the main difficulties that teachers encounter in upper-secondary CLIL classrooms is the quantity and density of the content in the syllabi. Teachers may respond to this difficulty by simplifying the topic or by employing methodologies more appropriate to monolinguistic classes, such as the lecture. It is necessary, therefore, to develop didactic strategies in these classrooms that permit the target language to be used extensively without a concomitant simplification of the subject domain.

The appropriate use of teacher-led explanations with upper-grade high school students is a means by which to fully develop the subject material while preparing students for future higher education methodologies in which L2 use is becoming more

[12] This study has been carried out within R+D+i EDU2010-15783 project funded by the MICINN.

prominent. Teacher-led explanations (Escobar Urmeneta, 2011) differ from those of lectures in that the former give a prominent role to student participation, while the latter are principally teacher-centred.

This experience forms part of a broader action research investigation whose focus is the effective use of teacher-led explanations in upper-secondary CLIL high school classes. Among the objectives of this investigation are: first, to determine how topic-related, learner-centred activities undertaken prior to teacher-led explanations can help students deal with the *opacity* and *density* (Berthoud & Gajo, 2005; Gajo, 2007) of the topic under discussion; second, to explore how diagrams can be effectively used to clarify explanations; and third, to identify and analyze teacher guidance strategies (Mercer, 1995) that encourage the co-construction of knowledge during the explanation. The experience will be illustrated by means of student production, teaching materials, and video screenshots and excerpts of students and the teacher at work.

The subject of the study is two groups of eleventh grade students in a CLIL science class entitled *Ciències pel món contemporani* ('Science for the Modern World'). The school is located in a suburb of Barcelona and the experience took place over a period of three classroom periods in November, 2011. One group, consisting of thirty-two students, follows scientifically-related itineraries ('the scientific group'), whereas the other group of twenty-seven students follows a mixture of humanistic, economic and technological itineraries ('the humanistic group').

A teacher-led whole-class explanation was used to establish the relationship between genotype and phenotype. The explanation was supported by an interactive digital board diagrammatic presentation. Over a period of two classes prior to this explanation, students were introduced to basic concepts and terminology of genetics through learner-centred activities. These activities consisted of a web-based interactive task, a whole-body class simulation of meiosis (only the humanistic group), a dragon genetics simulation task, and a combined follow-up/warm-up activity in groups about concepts previously introduced and those to be developed in the teacher-led explanation. During these activities, the teacher's role was to set up the tasks, provide spontaneous class explanations where needed, and resolve the doubts of individual students in carrying out the activities.

The activities placed prior to the more complex and formal explanation activated students' preconceived notions, familiarized students with *content-obligatory* (Gajo, 2006; Snow, Met & Genesee, 1989) and *content-embedded language* (Gajo, 2006) and permitted students to begin acquiring curricular knowledge that served as the starting point from which to further develop more advanced concepts during the explanation. Reducing opacity allowed students to focus on the conceptually dense aspects of the explanation. Full development of a dense discourse also benefited from students prior work on certain underlying concepts.

The discourse in the classroom during the explanation revolved around the diagrams prepared for this purpose. Their use marked the direction of the discussion and allowed a full development of the curricular content. Linguistically, the iconic symbols acted as an additional channel of communication together with those of the oral, aural, written and body-language. As part of an action research program, certain aspects of the explanation were modified between one class and the next. In the first class, the diagram was presented as a finished product quite complex in nature, whereas in the second, a more simplified version was developed in collaboration with the students. This last alternative was found to be more effective in promoting student participation.

The teacher-led explanation was characterized by guidance strategies that encouraged learner participation and co-construction of knowledge. These strategies included eliciting relevant knowledge, offering a variety of feedback to student contributions, and describing shared experiences (Edwards and Mercer, 1987; Mercer, 1995).

One difference which emerged between the two groups of students involved the amount of teacher intervention needed to set up the dragon genetics simulation task. Whereas the scientific group quickly understood what was expected of them, the humanistic group required a longer explanation to be able to carry out the task. A more structured teacher-led explanation in this group at this point could help students acquire the required terminology and conceptual knowledge necessary to complete the activity with more ease.

The results of this experience, though encouraging as far as pointing to alternative methodologies to develop the content and linguistic domains, are limited in scope. Many questions need to be explored regarding the use of teacher-led

explanations in upper-secondary school CLIL classrooms. Is content fully developed in these types of situations? What is the best length? What is the optimal point in a lesson for a teacher-led explanation? What types of activities prior to a teacher-led explanation are most effective in preparing students for the explanation to come? How do students evaluate the use of iconic symbols in the form of diagrams in explanations? What are the most effective scaffolding techniques during these explanations? Does student note-taking during explanations help or hinder their understanding of the content? These questions will be investigated as part of the action research cycle of which this experience is a first part.

References

Berthoud. A.C., & Gajo, L. (2005). Traitement des arguments et de leur mise en texte dans le processus de rédaction conversationnelle: continuité entre objets linguistiques et non linguistiques. In R. Bouchard & L. Mondada (eds.), *Le processus rédactionnel.* Paris: L'Harmattan.

Edwards, D., & Mercer, N. (1987). *Common Knowledge. The Development of Understanding in the Classroom.* London: Routledge.

Escobar Urmeneta, C. (2011). *Teacher-led explanations* (personal communication). Bellaterra: CLIL module in Màster i Doctorat en Didàctica de la Llengua i la Literatura de la Universitat Autònoma de Barcelona.

Gajo, L. (2006). Types de savoirs dans l'enseignement bilingue: problématicité, opacité, densité. *Education et Sociétés Plurilingues,* 20, 75-87.

Gajo, L. (2007). Linguistic knowledge and subject knowledge: how does bilingualism contribute to subject development? *The International Journal of Bilingual Education and Bilingualism,* 10(5), 563-581.

Mercer, N. (1995). Guidance strategies. In N. Mercer, *The Guided Construction of Knowledge* (p.21-43). Clevedon: Multilingual Matters.

Snow, M.A., Met, M., & Genesee, F. (1989). A conceptual framework for the integration of language and content in second / foreign language instruction. *TESOL Quarterly,* 23(2), 201-217.