A strategy to foster bilingualism (Spanish–English) in undergraduate Biological Sciences students at Universidad de los Andes: First stage

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“Without communication there would be no science” (Abelson, 1980, p. 60)
“Communication is an important part of scientific practice and, arguably, may be seen as constitutive to scientific knowledge” (Nielsen, 2013, p. 2067)

“There is an international push to improve the effectiveness with which scientists communicate” (Mercer-Mapstone & Kuchel, 2015, p. 1614)
“[Participants] found experimentation in science to be a more relevant type of evidence than communication in science” (Archila, 2015, p. 1219)
“Practically the entire scholarly community of the natural sciences reads English, and the vast majority publishes in that language” (de Swaan 2001, p. 73)
English is the global language of science, in written as well as oral communication

Scientific communication

“Without communication [in English] there would be no science” (Abelson, 1980, p. 60)
English and science

ENGLISH(ES) AND ACADEMIC PUBLISHING

Natural sciences: data based on Tsunoda (1983); Ammon (1998, pp. 137–62); Biological Abstracts; Chemical Abstracts; Mathematical Reviews; Index Medicus and Medline; Physics Abstracts

Ammon (2013, p. 1927)
“Students therefore need to be able to **read in English**, and faculty need to be able to **write** and **publish in English**. In this respect many non-English-medium programmes are increasingly bilingual” (Gardner, 2012, p. 257)
1. English has become “the” language of scientific publication
2. Education in English permits greater **international mobility** for staff and students.
3. Students coming up to university through bilingual and English medium school programmes expect to be able to continue their education in English

(Gardner, 2012, p. 257)
“Teaching mainstream courses in an [English as a Foreign Language] EFL context such as Colombia requires strategies in order not to lose content to language and actually simultaneously enhance the learning of both” (Bryan & Habte-Gabr, 2008, p. 2)
“Language and communication are essential elements in science learning” (Kelly, 2008, p. 329)
How could students read and yet not read?

Bernhardt (2005, p. 140)
“In order to understand Education, one has to understand two fundamental actions, the teaching action and the learning action, both in their conceptual structure and their empirical unfolding here and now”

(Sensevy, 2015, p. 11)
What **learning actions** do undergraduate Biological Sciences students use when they try to achieve comprehension and production (oral and written) in English at Universidad de los Andes?

What **teaching actions** do Biological Sciences professors use when they foster bilingualism at Universidad de los Andes?

The most crucial issue is how to design a **learning and teaching actions-based strategy** to foster bilingualism (Spanish–English) in undergraduate Biological Sciences students at Universidad de los Andes.
Biological Sciences: **Biology** and **Microbiology** undergraduate programs at Universidad de los Andes

- Biological Sciences students: 1st, 3rd, 5th and 7th semester
- Biological Sciences professors: 1st, 3rd, 5th and 7th semester
- Biological Sciences director and coordinators
Research plan

1.1 Diagnosis of undergraduate Biological Sciences students’ actions when they try to achieve comprehension and production (oral and written) in English

1.2 Diagnosis of Biological Sciences professors’ actions when they foster bilingualism

1.3 Diagnosis of Biological Sciences director’s and coordinators’ actions when they foster bilingualism

2 Design process of the strategy: (e.g. Reading guide, Lab report guide, Preview-Review methodology)

3 Implementation process of the strategy: This will be carried out in the usual courses taken by Biological Sciences students

4 Evaluation process of the strategy: This will be periodically (fortnightly)

April–October 2016 (7 months)

November 2016 – January 2017 (3 months)

February–October 2017 (9 months)

November 2017 – January 2018 (3 months)

Total months: 22
Analysis process will be enriched by documents such as laboratory reports, essays, readings, and workshops.

This type of documents are assumed to be class assignments in the sense that each one has educational implications (Garbett, 2007; Hand, 2007; Lederman and Lederman, 2012).
First phase: Students

Diagnostic instruments

- Questionnaire 1 on students’ actions
  - a sample of students from 1st, 3rd, 5th, and 7th semester

- Semi-structured interview guide
  - a sample of the students that answered the questionnaire

- Observation note taking guide
  - a sample of the students that participated in the Semi-structured interview

- Written productions (e.g. lab reports, essays) rubric
First phase: Professors

**Diagnostic instruments**

- Questionnaire 2 on professors’ actions
- Semi-structured interview guide
- Observation note taking guide
- Class assignments (e.g. readings, workshops) rubric

- A sample of professors from 1st, 3rd, 5th and 7th semester
- A sample of the professors who answered the questionnaire
- A sample of the professors who participated in the Semi-structured interview
First phase: Professors

Teachers need “to understand [....] how to implement pedagogical strategies which will allow all their students to make full use of their bilingual and multilingual repertoires” (de Mejía and Hélot, 2015, p. 279)
First phase: Director and Coordinators

Diagnostic instruments

- Questionnaire 3 on Director’s and Coordinators’ actions
- Semi-structured interview guide
Second phase: Design process

Students’ actions

Professors’ actions

Director’s and Coordinators’ actions

Reading guide, Lab report guide, Preview-Review methodology
Third phase: Implementation process

- **1st semester**: One professor
  - Experimental group: A sample of students
  - Control group: A sample of students

- **3rd semester**: One professor
  - Experimental group: A sample of students
  - Control group: A sample of students

- **5th semester**: One professor
  - Experimental group: A sample of students
  - Control group: A sample of students

- **7th semester**: One professor
  - Experimental group: A sample of students
  - Control group: A sample of students

Evaluation process: This will be periodically (fortnightly)

February – May 2017

July – October 2017
Fourth phase: Evaluation process

Evaluation instruments:

- Questionnaire
- Semi-structured interview guide
- Observation note taking guide
- Written productions
- (e.g. lab reports, essays) rubric
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