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Evolution of Priorities in Scientific English for Geology Students

Evolución de las Prioridades en Inglés Científico para Estudiantes de Geología

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ABSTRACT

The current work represents the first longitudinal research portraying the students' shift in ESP topics preferences for Scientific English for Geology. The study comprises the statistical analysis from two extemporary cohorts—student generations—4 years apart. Convenience sampling was applied on both occasions (the entire population at the time of the study), and an Independent Student-T test was used to test the change hypothesis. The results reflect that the latter cohort (the most recent generation) has more interest in learning Scientific English than the previous generation.

Keywords: Scientific English, ESP, Geology

RESUMEN

El trabajo actual representa la primera investigación longitudinal que retrata el cambio de los estudiantes en las preferencias de temas de ESP para el inglés científico para geología. El estudio comprende el análisis estadístico de dos cohortes extemporáneas, generaciones de estudiantes, con 4 años de diferencia. En ambas ocasiones se aplicó un muestreo por

conveniencia (toda la población en el momento del estudio), y para probar la hipótesis de cambio se utilizó la prueba T de Student Independiente. Los resultados reflejan que la última cohorte (la generación más reciente) tiene más interés en aprender inglés científico que la generación anterior.
Palabras clave: Inglés científico, ESP, Geología

INTRODUCTION

The English language is considered a new kind of *lingua franca* (Seidlhofer, 2008) for both, trade and the transmission of knowledge. In Spanish-speaking countries, Spanish is predominant, with English often demoted to second place, but this trend is gradually changing. The internationalization of knowledge and globalization have brought labor competition internationally, with English being a decisive factor in the choice of candidates for positions.

In Panama, the English language is established as a second language under the protection of Law No. 2 of January 14, 2003 (Gaceta Oficial, 2003), which establishes the compulsory nature in the teaching of the English language for official and private educational centers of the first and second levels of education. In the higher education arena, Article 6 of the same law mandates that official and private universities shall establish the mechanisms and the necessary programs for applicants to any university degree, in addition to Spanish, to have the knowledge of English or another language of international use necessary for their professional practice.

English language learning is a must for engineering students in geology, but, like all learning in general, it depends on the learner. The students must discern (and conclude) that their goal ought to be becoming professionally competitive in their study area. The scope of your decision will be reflected in their future eligibility. Students' motivation is the fuel that drives them to excel, and beyond their university career, it will be the engine that might drive them to learn a new language.

The factors influencing English language learning are diverse and vary subjectively within individuals and groups. However, as a common denominator in learning English, many factors intervene, such as:

The basic level of English

In the case of the Faculty of Engineering, one of the admission requirements is to pass an English proficiency exam with a basic level, that is, to understand basic concepts and express specific ideas. It should be noted that students who study engineering careers—including Geology, have subjects of their specialty in English from the third year of their career (Facultad de Ingeniería, 2015).

Acoustic acuity

Also known as the ability to distinguish sounds, it is a feature that allows people who better differentiate language phonetics (sounds) to move faster than others (Liu & Yan, 2007), and this varies from person to person (Lee et al., 2018). Similarly, Casanny et al. (2008) present acoustic acuity—listening—as an opportunity to master a second language, which triggers peer learning. In other words, acoustic acuity is presented as a reinterpretation of communicative learning within the naturalistic approach. With this view to the approach from Krashen and Terrell (1998), it is shown how the second language in a classroom can develop in a similar way as it does in real life, starting with a silence period until the production stages: preproduction, early production, emergence, intermediate fluency, and advanced fluency (Krashen & Terrell, 1983).

Age and ease of study

It should be noted that the younger you are, the more accustomed you are to studying. However, the older, the greater the degree of maturity, perseverance, and discipline in the study. For young adults, it means placing them in a balanced study regime is a must.

The ability to express oneself in public

It represents the actual ability to communicate. Being able to express through casual communication with strangers—forcing distancing from the comfort zone—is a challenge for many people, specifically English for Specific Purposes (ESP). In Scientific English, where casual communication is not a topic of the curricular program, it depends somewhat on the student if they want to practice, along with the teacher, if they are willing to support the students' motions.

Time spent studying and practicing the language

English classes, specifically ESP, aim to focus English to the occupation area within the career. For the current study, Scientific English for Geology is framed as a non-fundamental subject of four hours per week, 2 theoretical and 2 practical class hours.

However, it is impossible to detach the responsibility of the students in the course to complete the activities in the stipulated times and deliver the assignments on the scheduled dates. The idea behind the assignments is to seek a mechanism of practice outside of classroom interactions (classes, talks, question and answer sessions, among others).

The environment

To master the English language, some authors advocate the advantages of language immersion represents an opportunity to learn the target language in a natural environment of a country where the target language is spoken. (Fortune & Tedick, 2007; Knell et al., 2007; Caldas & Caron-Caldas, 2010). Additionally, Supriyono et al. (2020) call for experiential learning, developing affective, cognitive, and behavioral attitudes, and formal instruction through active participation. However, language immersion is not the only way. Even living in an English-speaking country, you can find Spanish-speaking communities and almost entirely avoid contact with the language. To maximize contact, it is necessary to increase the exposure to the target language, that is the basis for actively learning English. Four hours a week is inadequate to generate fluent English during a cycle.

It is necessary to emphasize that the College of Engineering considers English as a tool for communication and professional success as established within the graduate profile (Facultad de Ingeniería, 2015). Within this framework, it should be noted that applicants to the Engineering College must pass an English exam as part of the admission process, albeit with a basic level or greater.

With full knowledge of their career requirements and objectives, Geology Engineering students can take optional side courses for conversational English (offered by the university); however, these courses cannot be considered part of the GPA. When faced with Scientific English for Geology, a disparity is shown between students who are fluent in conversational English and those who maintain a basic level. While between these two groups, some students handle geological terminology (jargon) in English, and others with intermediate-advanced oral skills have vague or no notions of geological vocabulary. In this regard, the study from De Leon (2021) developed an analytical program for Scientific English for Geology and was intended to level the odds for students taking the studied ESP subject.

The current work represents the first longitudinal study of student perception in the Geological Engineering career at the University of Panama (UP). For the present study, the same instrument, after being validated and applied in a control group (pilot test), was used among two groups with an interval of 4 years (2016 and 2020) to document the change of interests between extemporaneous cohorts of geology students following the estimated time of promotion. That is, at the time of completion of studies of one generation of students.

The project consists of the statistical verification of the results of the two tests, which allows their empirical validation. It is feasible as the researcher covers all costs without the need for institutional investment from the university; however, it generates data that can serve as a theoretical foundation for the technical and scientific area regarding student subjectivity in the study of scientific English at the UP.

In the absence of references to the student preference for the curricular contents of Scientific English for Geology, it is considered necessary to carry out the present research to interpret the variation in priorities for the ESP learning applied to geological engineering for two extemporaneous cohorts of students dealing with the Scientific English for Geology and propose corrective measures to the program in response to the possible needs.

The hypotheses were developed:

H_1 - Geology engineering students will be more interested in learning scientific English in their area after the generational increase.

H_0 - Geology engineering students will have the same interest in learning scientific English in their area after the generational increase.

METHODOLOGY

The unit of analysis is the Department of Geology of the Faculty of Engineering, Campus Harmodio Arias Madrid, UP. The study is considered a *non-experimental*, *longitudinal* trend design because, according to Hernández-Sampieri et al. (2014), the subjects in both cohorts are not the same. However, both groups belong to the same broader population of geological engineering students avoiding causality in design.

The same data collection instrument (survey) served the two applications four years apart. In both cases, the survey was applied to all Geology Engineering students during the second cycle (May-August) of each of the two years of study (2016 and 2020).

It should be noted that, during the first application, all the groups that made up the career were physically visited—face-to-face—in their different Harmodio Arias Madrid Campus, UP classrooms. However, during the second application, given the distancing measures in force after the state of emergency following the COVID-19 outbreak was declared (Gaceta Oficial, 2020), the application of non-presential using Microsoft Forms® of an institutional account was required. In both cases, the anonymity of the participants was preserved.

The measuring instrument consisted of three parts. A sociodemographic data section with four non-binding questions, ten closed questions based on the Likert scale, and a section for open-answered observations. The survey aims to collect information regarding students' perception about the subject of Scientific English in their career—Geology—in terms of developing their English language skills and their application to their professional career.

A five-point Likert scale with nominal variables (words) is used and converted into ordinal variables (numbers) for analysis in the PSPP statistical software[1], as shown in Table 1.

Table 1

Likert scale used.

Value	English	Español
5	Almost always	Casi siempre
4	Often	Con frecuencia
3	Sometimes	Algunas veces
2	Seldom	Rara vez
1	Almost never	Casi nunca

Source: Author.

PROCEDURE

The values collected in both applications (2016 and 2020) are entered into the statistical analysis software PSPP. The value averages of the first application are compared

[1] PSPP is a freeware for the statistical analyses of sampling data without a corresponding acronym. It is known for being a free-of-cost equivalent to IBM SPSS (Statistical Package for the Social Sciences).

with the value averages of the second application using a Student-T test for two groups. A 95% confidence level is used for the test.

RESULTS

The application of Student's T for independent samples reflects similar relationships despite the difference in sample numbers between applications, as in Table 2.

Table 2

Student-T test for independent samples

Item	Survey No.	N	Mean	Std. Dev.	Std. Error Mean
Do you consider the subject "English Scientific for Geology" relevant to your career?	1	15	4.93	.258	.067
	2	4	4.50	.577	.289
Do you think that the topic "Citing and referencing in written works" can be applied outside of English class?	1	15	4.20	.676	.175
	2	4	4.00	.816	.408
Do you consider knowing the different types of soils in English useful for your career?	1	15	4.93	.258	.067
	2	4	4.75	.500	.250
Do you believe practicing conversations related to units of measurement will improve your English competence level?	1	15	4.07	.458	.118
	2	4	4.00	1.414	.707
Using words and expressions in English applied to geology might help the understanding of texts in your career. (I.e., glossaries, short readings, among others.)	1	14	4.29	.825	.221
	2	4	4.50	.577	.289
Does differentiating English forms and scientific reports, and popular science articles help?	1	15	3.27	1.033	.267
	2	4	4.00	.816	.408
Will explaining differences between scientific names, their origin *(Latin), and their* term *(English) help in understanding the origin of the terms for your career?*	1	15	2.67	.816	.211
	2	4	3.75	.957	.479
Will learning to extract the primary and secondary ideas from detailed texts about volcanic activity and tsunamis increase your reading comprehension in English and Spanish?	1	15	3.47	1.356	.350
	2	4	4.00	.816	.408
Will reading English scientific articles with probability scales aid in relating cause and effect equivalences from English and Spanish?	1	15	3.67	1.047	.270
	2	4	4.50	.577	.289
Will covering English writing and formatting for dates, names, and titles improve the text understanding for your career?	1	15	4.13	1.125	.291
	2	4	4.75	.500	.250

Source: PSPP data compiled by the author.

ANALYSIS

It is considered that the values of the means between the two applications show values with a tendency to increase measuring from the first to the second cohort, as Table 3 explains.

Table 3

Median values within the cohorts.

No.	Item		Value
1	*Do you consider the subject "English Scientific for Geology" relevant to your career?*	↑	+0.43
2	*Do you think that the topic "Citing and referencing in written works" can be applied outside of English class?*	↓	-0.20
3	*Do you consider knowing the different types of soils in English useful for your career?*	↓	-0.18
4	*Do you believe practicing conversations related to units of measurement will improve your English competence level?*	↓	-0.07
5	*Using words and expressions in English applied to geology might help the understanding of texts in your career. (I.e., glossaries, short readings, among others.)*	↑	+0.21
6	*Does differentiating English forms and scientific reports, and popular science articles help?*	↑	+0.73
7	*Will explaining differences between scientific names, their* origin *(Latin), and their* term *(English) help in understanding the origin of the terms for your career?*	↑	+1.08
8	*Will learning to extract the primary and secondary ideas from detailed texts about volcanic activity and tsunamis increase your reading comprehension in English and Spanish?*	↑	+0.53
9	*Will reading English scientific articles with probability scales aid in relating cause and effect equivalences from English and Spanish?*	↑	+0.83
10	*Will covering English writing and formatting for dates, names, and titles improve the text understanding for your career?*	↑	+0.62

Values based on the difference from the first application (2016) to the second application (2020) of the measuring instrument. Source: Author.

The working hypothesis is tested, and it is concluded that the second cohort of engineering students in geology, the generation to complete studies from the 2021 school year onwards, has more interest in learning scientific English in their area.

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