

Keyword Analysis: A Case Study of Research Trends in the *English for Specific Purposes Journal Abstracts*

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Abstract

The advents of globalization and trans-border education have been catalyzing changes in research trends. The goal of this paper is to examine the main clusters of topics presented in the abstracts of ESP Journal in two times settings. A total of 89 abstracts published from 1986 to 1987 and 2015-2016, were collected and taken as the node corpus data. Using the corpus linguistics software *AntConc* (Anthony, 2017), the collected abstracts were analyzed to identify the absolute frequencies of words. The two sets of data were compared to examine similarities and differences in trends, and the relative frequencies of the obtained keywords were expressed as log-likelihood values, and the words with high log-likelihood values are considered keywords. The keywords are compared against the topics presented on the website of the journal to identify the ESP research trends as presented on the *English for Specific Purposes Journal*

Keywords: *English for Specific Purposes, keywords, research trends*

1. Introduction

The advents of globalization and trans-border education have been catalyzing changes in research trends. Generally, a trend is a conception of what is currently appropriate. It is a process of social acceptance related to the fashion, education, and economics. In other words, people could notice what items are needed to be improved or advanced for covering the needs of daily life. A more succinct definition of trend is that it is the general movement over time of a statistically detectable change (Merriam-Webster Dictionary, 2017). The definitions indicate that trends are important since they show the dynamics of information from one period of time to another such as changes in trends.

Changes in trends may have repercussions to related fields of endeavor. For instance, the field of English for Specific Purposes (ESP), changes in trends may alter the way the field is perceived, the commonly accepted views of ESP, and the way the field is represented in the literature (Crawford, Pollack & England, 2005).

Some evidences of changes in trends in ESP have been recorded. For example, there was a shift towards identifying learners' needs and describing problems of specific learners in specific contextual learning processes and situations (e.g. Belcher, 2004; Bawarshi, 2003; Connor & Upton, 2004; Swales, 2004; Flowerdew, 2004, pp.11-13; Flowerdew, 2005, pp. 321-332) until recently when corpus-based research approaches that look at macro-structures have become the trend (e.g. Boulton, Carter-Thomas & Rowley-Jolivet, 2012; Pérez-Paredes, 2014; Boulton, 2016). These observations of trends can be confirmed, partly, by comparing them against the journals where these academic papers are published.

2. Related Research

Most previous studies focused on identifying current and future directions in ESP (Belcher, 2009; Belcher, Johns & Paltridge, 2011; Starfield, 2014). These researchers identified trends that focused on genre, the use of corpora to carry out studies of ESP language use, and the use and place of English as a lingua franca in ESP settings. Belcher *et al.*, (2011) argued further that topics such as disciplinary language and ESP, needs analysis and ESP, and critical discourse analysis and ESP were also examined. In a keynote, Paltridge (2015) grouped the developments in ESP research into five categories of trends as shown in Table 1 below:

Table 1 Related research

Categories	Sample Studies
1. Genre and ESP	Paltridge (2013), Paltridge (2014)
2. Ethnographic Perspectives on ESP	Handford & Matous (2011), Chun (2015), Paltridge & Starfield (2016), Paltridge, Starfield & Tardy (2016)
3. ESP and English as a Lingua Franca	Mauranen (2011), Nickerson (2013), Jenkins (2014)
4. ESP and Advanced Academic Literacies	Ravelli, Paltridge, & Starfield (2014); Starfield <i>et al.</i> , (2012, 2014); Lillis and Curry (2010) and Li (2006a, 2006b, 2007); Curry & Lillis (2013)
5. Identity, Learner Needs and ESP	Norton & Toohey (2011); Kanno & Norton (2003); Belcher & Lukkarila (2011)

Casanave (2014) keenly noted that much of the ESP papers published employs qualitative approach. Among these qualitative analyses, the most common type of studies found was the investigation of written discourse, together with research studies using ethnographic methods (Gollin-Kies, 2014). By contrast, however, she found only a few experimental studies and very little large-scale empirical studies were conducted in the years she investigated. She also especially noticed that the use of corpus tools to analyze written discourse has gained momentum. Despite this momentum, the focus remained to be more qualitative than quantitative. This paper addresses that gap by examining empirical data using mixed methods; i.e. using the statistical measure of log-likelihood for the identification of relative frequencies or keywords (quantitative analysis) and iterative thematic analysis of themes (qualitative).

In this paper, the framework was drawn from Crawford *et al.*, (2006). To examine trends project management, they examined the abstracts (which includes the title, the abstract and the keywords) published in the International Journal of Project Management for 10 years. Their analysis employed is corpus-based and used corpus linguistic tools to examine the data (e.g. Hunston, 2002; McEnery, Xiao & Tono, 2006; Baker, 2010; Kennedy, 2014). This study does not only differ in terms of the source of data but most especially in terms of statistical treatment. They employed χ^2 (chi squared) while this paper used log-likelihood. Since the current study is its early stages, the data used, although similar in nature to that of Crawford *et al.*, (2006); i.e. examining abstracts, the size of their data is much bigger than the size of data employed in this study. Thus, using log-likelihood as the statistical measure is more appropriate since the results are not affected by the size of data (Rayson & Garside, 2000). The findings are interpreted against the category of topics posted on the website of the ESP Journal.

3. Methodology

3.1 Data

The study collected 89 abstracts from the ESP Journal. These two sets of data were saved as plain text files and were called Data 1(1986-1987) and Data 2 (2015-2016), respectively. All components (title, abstract and keywords), except the personal information in the abstracts were considered as data. The research study looked at the abstract partly, not only because of their manageable length and compact presentation of information, but mainly because the abstracts are generally highly indicative of the content of articles (Hyland, 2005). Moreover, “abstracts tend to be of a similar length, and as such, there is less likelihood of the results being skewed due to an entry being of exceptional length” (Crawford *et al.*, 2006, p. 178).

3.2 Analysis

The paper examined the trends in the field of English for Specific Purposes (ESP) using a technique developed in the field of corpus linguistics. Granger (2002) posited that using technology (e.g. AntConc) enables faster, convenient and an analysis that is less prone to human error.

3.2.1 Absolute frequency

To identify the absolute frequency of words in the abstracts, the plain text files saved earlier as data sets were uploaded into the software called *AntConc* and it does the counting. It should be noticed, *AntConc* is a multiplatform tool available for free download at <http://www.laurenceanthony.net/software/antconc/> (Anthony, 2017). Words with frequency of 10 and higher were the words with high absolute frequencies and were examined in the next section to identify keywords.

3.2.2 Keyword analysis

Keywords are examined by comparing the data in question against a benchmark using the statistical measure, log-likelihood. Log-likelihood “compares the relative frequencies of a word in two data sets as a proportion of the total number of words in each set with higher log-likelihood values showing that a word is more salient in that set” (Carreon, Todd & Knox, 2011, p. 176; see also Rayson & Garside, 2000) for an explanation on log-likelihood use). The statistical measure of log-likelihood is used in the computation of relative frequencies because of its ability to produce reliable results even if the size of corpus is quite small (Rayson & Garside, 2000).

Both Data 1 and Data 2 served as node and benchmark corpus. So the comparisons are Data 1 vs. Data 2 and the backward comparison Data 2 vs. Data 1. Using the statistical tool, log-likelihood, words from Data 1 with absolute frequency of at least 10 are compared with the words in Data 2, and vice-versa, to show the relative frequency of each word in each data set. Log likelihood is computed using the following formula:

$$-2 \ln \lambda = 2 \sum_i O_i \ln \left(\frac{O_i}{E_i} \right)$$

The words with log-likelihood (LL) values of at least 10 are considered keywords and are iteratively categorized into themes. High LL values or the highly positive LLs are indicative of the strong presence of words. On the other hand, low or negative LL values are indicative of weak presence or absence of a word.

3.3 Iterative thematic analysis

To identify the research trends, the keywords with LL values of at least 10 were iteratively categorized into themes (Krippendorff, 1980; Krippendorff, 2004) using co-text in

the respective concordance of each keyword as guide. This qualitative analysis was checked for reliability using Cohen's kappa, which is an index that measures inter-rater agreement for categorical items (Gwet, 2008). The themes in this study are the topics mentioned on the ESP Journal website (<https://www.journals.elsevier.com/english-for-specific-purposes/>) as follows:

1. Second language acquisition in specialized contexts (SLA SC)
2. Needs assessment (NA)
3. Curriculum development and evaluation (CDE)
4. Materials preparation (MP)
5. Discourse analysis (DA)
6. Descriptions of specialized varieties of English (DSVE)
7. Teaching and testing techniques (TTT)
8. The effectiveness of various approaches to language learning and language teaching (EVALLLT)
9. The training or retraining of teachers for the teaching of ESP (TRTT)
10. Identify aspects of ESP needing development (IND)
11. Areas into which the practice of ESP may be expand (APE)
12. Possible means of cooperation between ESP programs and learners' professional between ESP programs and learners' professional or vocational interests (CLP PV)
13. Implications that findings from related disciplines can have for the profession of ESP (IDP)

4. Findings and Discussion

4.1 Absolute frequency

Data 1 is composed of 3447 words while Data 2 has 5768. The top five words with the highest absolute frequencies in Data 1 and Data are presented in Table 2 below.

Table 2 Top 5 Absolute frequencies of Data 1 and Data 2

Data 1	Frequency	Data 2	Frequency
the	196	the	367
of	172	and	237
in	139	of	225
and	98	in	189
to	80	to	143

The top five words in Data 1 and Data 2 indicate some initial implications. All those words are function words which are common in general language use. For instance, the article *the* is commonly found in long as component of writing long running sentences in English to signal cohesion and specificity of the noun that comes after it (e.g. *the academic discipline*). The preposition *of*, *in* and *to* are also main components of English writing such as possession (e.g. *of paragraph*) and showing a goal (e.g. *to a particular genre*). The conjunction *and* is commonly used in a set in a series of the same kind (e.g. *style and activity*). However, they may not depict the main content of the abstracts in the ESP Journal. Thus, there is a need to examine the relative frequencies of these words which are computed by comparing the absolute frequencies of these two data sets using the statistical measure log-likelihood (LL). Table 3 below presents the keywords in Data 1 and Data 2 with LL values of 10 and higher. These keywords are independently categorized by each author, and the inter-rater agreement is calculated using Cohen's kappa, which showed a substantial level of inter-rater agreement at 0.796. The interpretation of Cohen's kappa inter-rater agreement (Landis & Koch, 1977) is shown below:

< 0	Poor agreement
0.01 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

Table 3 Positive Keywords: Data 1 vs. Data 2 and vice-versa

Data 1 vs. Data 2				Topic (%)	Examples	Data 2 vs. Data 1				Topic (%)	Examples
No.	Keywords	f	LL			No.	Keywords	f	LL		
1.	interlanguage	12	23.63	SLA SC 8.33%	interlanguage & esp	1.	medical	18	16.89	DA 57.14%	English for medical purpose
2.	course	21	23.13	CDE 25%	course design & course evaluation in esp	2.	nursing	17	15.95	DA 57.14%	English for nursing purposes
3.	appropriate	10	19.68	MP 16.66%	technology & language & materials appropriate	3.	corpus	15	14.07	MP 28.57%	esp & corpus studies
4.	competence	10	19.68	DA 50%	Sociolinguistic & discourse & strategic & culture & grammatical competence	4.	genre	25	13.13	DA 57.14%	genre & English for specific purposes
5.	lsp	10	19.68	DA 50%	language for scientific purposes research	5.	words	12	11.25	MP 28.57%	words & English for specific purposes
6.	scientific	13	19.33	DA 50%	scientific communication & scientific writing	6.	implications	11	10.32	IFDP 14.28%	implication & English for specific purposes
7.	est	9	17.71	DA 50%	est discourse & program & writing	7.	move	11	10.32	DA 57.14%	move research & English for specific purposes
8.	design	14	17.38	CDE 25%	course design in esp & materials design						
9.	interest	8	15.74	CDE 25%	ELT course design & interlanguage & esp program design						
10.	materials	8	15.74	MP 16.66%	materials design & learning materials for international teaching assistants & materials writers						
11.	scientists	8	15.74	DA 50%	scientists' english & non-native scientists' publishing in English						
12.	problems	14	15.57	DA 50%	Macrolinguistic problems & writing problems & educational - language- policy problems						

Table 3 shows the keywords when Data 1 was compared with Data 2 and vice versa. The positive keywords in Data 1 and Data 2 depict the topic of the abstracts of the articles

published. These keywords show research are commonly published under these topics or areas. The first comparison (Data 1 vs. Data 2) yielded 12 keywords with LL values of 10 and higher. The second comparison (Data 2 vs. Data 1) yielded only seven keywords. Most of the keywords in Data 1 are those that are related to the topic *Discourse analysis* (50 %) and the following topic is *Curriculum development and evaluation* accounting for 25%; the later topic are *Materials preparation* (16.66 %) and the topic *Second language acquisition in specialized contexts* (8.33%). When Data 2 is compared with Data 1, the topics most commonly found were *Discourse analysis* (57.14%) and *Materials preparation* (28.57%) and *Implications that findings from related disciplines can have for the profession of ESP* (14.28%).

It is also interesting to know which of the topics or areas are under published or under represented. This can be done by identifying the negative keywords as presented in Table 4 below.

Table 4 Negative Keywords: Data 1 vs. Data 2 and vice-versa

Data 1 vs. Data 2				Data 2 vs. Data 1							
No	Keyword	f	LL	Topics	Examples	No	Keyword	F	LL	Topics	Examples
1.	genre	2	-13.13	DA	Genre of journal articles	1.	course	4	-23.13	CDE	EMP course and EMP course design
2.	word	4	-10.21	DSVE	word omission	2.	scientific	1	-19.33	DA	Scientific communication
3.	texts	1	-6.95	DA	Abbreviated texts	3.	design	2	-17.38	CDE	design of ESP courses
4.	based	2	-6.38	DSVE	cognitive style of the specific purpose	4.	Problems	2	-15.69	DA	engineers English language
5.	linguistic	2	-6.38	SLA SC	Linguistic-pragmatics	5.	learner	1	-10.4	DSVE	specialized English
6.	analyses	5	-5.68	DA	EST discourse	6.	processes	1	-10.4	DA	science and engineering
7.	lexical	2	-5.68	SLA SC	acquisition of lexical system	7.	areas	1	-8.68	DA	Content areas
8.	development	1	-5.4	ND	esp development	8.	cognitive	1	-8.68	CDE	an evaluative and interpersonal function
9.	study	1 2	-4.93	IDP	academic discipline of the specific purpose	9.	tense	1	-8.68	SLA SC	Lexicology-grammatical features
10.	field	1	-4.64	DSVE	field of education in the widest sense.	10.	foreign	6	-7.51	SLA SC	EFL

The analysis of negative keywords depicts topics that were written on the website of the ESP Journal but rather underrepresented or under researched or not much paper on these topics were published in the ESP Journal. Due to space constraints, we are limiting the analysis of negative keywords to the top 10 words with the lowest LL values. The top 10 negative keywords in Data 1 depict under researched topics or areas such as the topic *Descriptions of specialized varieties of English* (e.g. genre; LL= -13.13), *The effectiveness of various approaches to language learning and language teaching* (e.g. texts; LL= -6.95), and *Second*

language acquisition in specialized contexts (e.g. analysis; LL=-5.68). For Data 2, the top 10 under researched areas or topics were Discourse analysis (e.g. scientific; LL= -19.33), Curriculum development and evaluation (e.g. course; LL=-23.13), and Second language acquisition in specialized contexts (e.g. areas; LL= - 8.68).

Aside from these findings, there were also topics or areas presented on the ESP Journal website that were not found at all in Data 1 and Data 2 as shown in Table 5 below.

Table 5 Categories of topics and other topics on English for Specific Purposes Journal website. (<https://www.journals.elsevier.com/english-for-specific-purposes/>).

(“✓” indicates covered; “×” indicates not covered)

No.	Topics	Data 1 (1986- 1987)	Data 2 (2015- 2016)
1.	Second language acquisition in specialized contexts	✓	×
2.	Needs assessment	×	×
3.	Curriculum development and evaluation	✓	×
4.	Materials preparation	✓	✓
5.	Discourse analysis	✓	✓
6.	Descriptions of specialized varieties of English	×	×
7.	Teaching and testing techniques the effectiveness of various	×	×
8.	Approaches to language learning and language teaching	×	×
9.	The training or retraining of teachers for the teaching of <i>ESP</i>	×	×
	Other Topics		
1.	The <i>ESP</i> needing development	×	×
2.	Areas into which the practice of <i>ESP</i> may be expanded	×	×
3.	Possible means of cooperation between <i>ESP</i> programs and learners' professional or vocational interests	×	×
4.	Implications that findings from related disciplines can have for the profession of <i>ESP</i>	×	✓

Some topics *Materials preparation* and *Discourse analysis* in the two sets of data. This shows the possibility that these two topics that was carried over from 1986 to 2016.

They were two areas topics in data 1 (1) Second language acquisition in specialized contexts and (2) Curriculum development and evaluation, but were eventually dropped in Data 2. This may suggest that these topics might already have lost their appeal or simply because they are no longer interesting to the researchers and so indicating a downward trend since they may no longer support any burning pedagogical issues and theorizations as well as the socio-educational context prevalent during that period. Only one topic Implications that findings from related disciplines can have for the profession of ESP was not seen in Data 1 but eventually came up in Data 2. This may indicate a growing interest or an upward trend on that topic or area. On one hand, table 5 shows that in Data 1 or from the articles published between 1986 and 1987, the topics (1) Descriptions of specialized varieties of English, (2) Needs assessment (3) Teaching and testing techniques, (4) the effectiveness of various Approaches to language learning and language teaching, (5) The training or retraining of teachers for the teaching of ESP, (6) ESP needing development, (7) Possible means of cooperation between ESP programs and learners' professional or vocational interests, (8) Descriptions of specialized varieties of English, and (9) Implications that findings from related disciplines can have for the profession of ESP were not found. On other hand, in Data 2 or from the articles published between 2015 and 2016, the topics (1) Second language

acquisition in specialized contexts, (2) Needs assessment, (3) Curriculum development and evaluation, (4) Descriptions of specialized varieties of English, (6) Teaching and testing techniques, (7) the effectiveness of various Approaches to language learning and language teaching, (8) The training or retraining of teachers for the teaching of ESP, (9) The ESP needing development, (9) Areas into which the practice of ESP may be expanded, and (10) Possible means of cooperation between ESP programs and learners' professional or vocational interests were absent.

5. Conclusion and Implication for Future Research

This research paper is the pilot study of a bigger research project being conducted in fulfillment of the requirement of a graduate study that specializes in Professional Communication. The main objective of this paper is to examine the topics in the ESP journal in two-time periods, with Data 1 covering 1986-1987 and Data 2 from 2015-2016 and comparing them to the topics presented on the ESP Journal website. Overall, on the one hand, the high relative frequencies of some words in the abstracts of the ESP Journal depict that topics related to these words received much attention and indicate highly researched areas or topics in two comparisons, such as *Discourse analysis* and *Materials preparation*. The results were same as the previous papers (Belcher, Johns & Paltridge, 2011; Paltridge & Starfield, 2013; Paltridge & Starfield, 2014). The topics only appeared in one data, such as *Second language acquisition in specialized contexts*, *Curriculum development and evaluation*, and *Implications that findings from related disciplines can have for the profession of ESP*. This may be due to decreased number of publications in these areas secondary to socio-educational or socio-actions influences as mentioned earlier. Due to the results, the ESP scholars should notice that two topics were interested by English for Specific Purposes Journal. The publishers could design a research that related to these topics in further. On the other hand, the words with negative frequencies indicate under researched areas or areas that were probably not interesting. For example, “(genre, LL:-13.13)” was not popular in Data 1 and “scientific, LL:-19.33)” was not interested by Data 2. It reminded ESP scholars the researches topics has been changed with the social action. Due to the limited of technology, few papers look at genre analysis through corpus, and scientific was the hot topic in Data 1 but was lost interested by Data 2 (e.g. Boulton, Carter-Thomas & Rowley-Jolivet, 2012; Pérez-Paredes, 2014; Boulton, 2016). In Data 1, the needs of social forced scholars to share their work in an international setting. Finally, these topics that were not found at all may suggest that no research or very little research studies were conducted on these topics such as Possible means of cooperation between ESP programs and learners' professional or vocational interests. While these findings are already useful in determining which of the topics are commonly researched and which ones are quite undermined or under researched, there is still a need to push further the enterprise to examine diachronic data, preferably from the initial publication in 1986 until the present. Future research studies should also examine full papers of the ESP Journal not just the abstracts or conduct a comparative analysis of topics published in different English for specific purposes journals. While most research studies rely on statistics to show trends, we hope that our investigation shed some light on how corpus-based analysis can be used in examining topic trends in journal publications.

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