A contribution to the lexis of construction engineering textbooks: the case of *building* and *construction*

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Abstract

The integration of a genre-based and a corpus-based instruction in ESP learning (Swales, 1990; Tribble, 2000; Ferguson, 2001; Flowerdew, 2005) has proved to be a suitable theoretical framework for describing the lexis of construction and architecture university textbooks, such as the sample compiled in the Construction Textbooks Corpus (CTC). This paper is a contribution to the study of the formal and semantic profiles of the lexis of this particular genre type and, by way of illustration, focuses on the case study of the lemmas *build* and *construct*. From a formal standpoint, the CTC reveals that the noun *building* (the first content word in the CTC) is six times more frequent than the verb *build*, and the noun construction (third in frequency) is eleven times more frequent than the verb *construct*. Semantically, the corpus displays a prevalence of technical meanings which refer to *building* and *construction* as the activity or business of erecting edifices or structures. By observing the lexical profile of construction textbooks, this paper will finally consider possible teaching/learning implications.

Key Words: ESP, genre analysis, lexis, textbooks, construction engineering.

Resumen

Contribución al léxico presente en los libros de texto de construcción civil: el caso de "building" y "construction"

La integración del análisis de género y el análisis de corpus en la enseñanza de IFE (Swales, 1990; Tribble, 2000; Ferguson, 2001; Flowerdew, 2005) ha demostrado ser un marco teórico adecuado para describir el léxico de los libros de texto universitarios de construcción y arquitectura, como los capítulos de muestra recopilados en el Corpus de Libros de Construcción (CTC). Este

artículo pretende ofrecer una descripción de carácter preliminar del léxico de este género y, a modo de ejemplo, se centra en el análisis de concordancias de los lemas *build* y *construct*. Desde un punto de vista formal, el corpus CTC revela que el sustantivo *building* (la palabra más frecuente en el corpus CTC) es seis veces más frecuente que el verbo *build*, mientras que el sustantivo *construction* (la tercera más frecuente) es once veces más frecuente que el verbo *construct*. Desde un punto de vista semántico, el análisis del corpus demuestra la prevalencia de los significados técnicos que se refieren a *building* y *construction* como la actividad o el negocio de construir edificios o estructuras. Tras el estudio del perfil léxico de los libros de construcción, el presente artículo abordará las posibles implicaciones pedagógicas.

Palabras Clave: IFE, análisis de género, léxico, libros de texto, construcción civil.

Introduction

The integration of genre-based and corpus-based approaches to teaching/learning ESP has been one of the major pedagogical pillars in the past decades (Swales, 1990; Tribble, 2000; Ferguson, 2001; Flowerdew, 2005). Literature on the topic contends that understanding the genres of the discipline not only provides learners with insight into the lexical features of specific texts types, but also provides useful input as regards the discoursal and socio-rhetorical conventions of a given discourse community. From a social-constructivist perspective (Berkenkotter & Huckin, 1993; Jonassen et al., 1993; Wilson, 1997), learning the different genres or textual typologies of a specialized community allows ESP students to develop an understanding of how this community constructs and transmits disciplinary knowledge.

Together with a genre-based approach, instruction based on corpus data likewise proves to provide learners with both language knowledge and context-sensitive knowledge of language in use. As advocated by linguists such as Biber et al. (1999), Flowerdew (2005), Tribble (2000), Hunston (2002), Paltridge (2006), or Simpson-Vlach and Leicher (2006), among others, the recognition of models through corpus-based instruction favours a more inductive, and at the same time in-depth, approach to the genre-specific profile of lexical features in the different disciplinary discourses.

From the multifarious constellation of genres in ESP contexts, only a few authors have paid closer attention to the textbook genre (Myers, 1995; Swales, 1995; Hyland, 1999; Turner & Kearsey, 1999; Conrad, 2001;

Koulaidis et al., 2002; Ward, 2001; Moore, 2002). According to Dimopoulos et al. (2005) the specialized linguistic code of discipline-specific textbooks is objective and non-personal and it is characterized by the use of specialized terminology and notation, syntactic complexity, heavy use of the passive voice, the use of nominalizations, the reference to the taxonomy of various entities, the expression of complex information, the development of arguments and conceptual entities. However, no detailed lexical account of this specific textual typology can be found despite the fact that the textbook genre is most likely the first type of genre undergraduates come across in their university life.

The aim of this paper is to develop a corpus-based analysis of two near synonyms, *building* and *construction,* as used in a small-size corpus of 223,520 words from construction and architecture university textbooks, the Construction Textbooks Corpus (CTC). The concordancing analysis of the CTC corpus will determine the lexico-syntactic and semantic profile of two high-frequency words in construction and architecture, *building* and *construction* and the corresponding verbs *build* and *construct*, and will help define their domain-specificity as well as its semantically- and contextually discipline-dependence. Relying on the corpus-based observation of the lexical profile of vocabulary items in construction textbooks the paper will finally envisage possible teaching/learning implications for an upper intermediate ESP course such as that offered to construction engineering students at the University of Zaragoza.

Theoretical background of the study

The question of how members of a discourse community use the language is always the starting point of any genre analysis (Berkenkotter & Huckin, 1993; Bhatia, 1997 & 2002; Chapman, 1999; Bazerman et al., 2003; Hyland, 2003). Since genres provide information not only on the text but also on the activity sphere in which it operates, the relation of the members of the community, the audience roles or the uses of the text become a form of what Berkenkotter and Huckin (1993: 485) call "situated cognition", "a product of the activity and situation in which it is produced" because "writers acquire and strategically deploy genre knowledge as they participate in their field's or profession's knowledge-producing activities". The teaching/learning of genres enables learners to get immersed into the professional, academic and occupational communities (Swales, 1990; Bhatia,

1997; Dudley-Evans, 1997). Apprentices need to get to know the disciplinary and professional conventions of the language of the field and the way the genre is manipulated for rhetorical purposes by its users in order to be accepted in the discipline community and to achieve professional success. It is the lexico-syntactic and semantic profiles of specialized genres –and not simply specialized vocabulary– that distinguishes general vs. specialized discourse. ESP learners will develop genre consciousness as they become familiar with the texts these genres produce, with the conventions and rhetorical features that characterize the appropriate use of the language in specific disciplinary knowledge areas.

In the case of ESP learners, usually non-native English speakers with limited language skills, the teaching of the actual genres which they are likely to need in their future professional life is a most efficient approach. New trends, influenced by sociolinguistics, consider genres as cultural resources which are learnt through social contact (Miller, 1984; Chapman, 1999; Hyland, 2003). In a constructivist framework, and more specifically a social-constructivist one, instruction must help learners develop understanding of the conventions of the language as used in different communicative situations and for different communicative purposes. As stated above, since university textbooks are likely to be the first approach to professional genres for undergraduate students, they represent a good starting point to focus on the basics of academic and professional writing, the main rhetorical patterns, the generic features of the discourse, its content, textual forms, composing practices, and reading processes. In sum, the textbook acquires a socio-linguistic role which allows the presentation and dissemination of specialized knowledge and establishes a relationship between the reader and the author with a subsequent formative influence.

The first step in tackling the issue of corpus design will be to answer Tribble's question (1997, conclusion section, para. 2): "Which corpora [do] learners need –what are the right models for specific learners with specific (or general) needs?". In order to develop effective lexical profiles, considerations such as the size of the corpus, its length, the number of text samples, the range of text categories (or registers) that samples are selected from, the balance and integration of the corpus must be carefully considered (Biber, 1993a & 1993b; Curado Fuentes, 2001). A corpus should aim for adequate coverage, homogeneity, balance and representativeness of the language from which it is chosen. It should include a diversified range of registers of the language as a whole and thus, an adequate variety of

categories and texts from each category to avoid the prevalence of one category over the others while including the right varieties of the language for the intended uses of the corpus.

A digitalized corpus will be the source that will inform teachers' appreciation of linguistic usage and will help them make informed choices as to what vocabulary, grammar or discoursal aspects are to be introduced in the classroom. Thus, it becomes the source of relevant teaching materials based on empirical data rather than on intuition (Flowerdew, 1996; Nelson, 2000 & 2006; Godwin-Jones, 2001; Kennedy & Miceli, 2001; Curado & Edwards, 2003; Mudraya, 2006). Students need authoritative models for their own language behaviour and current, updated materials adjusted to the ever-changing scientific world, which will highly improve their motivation when studying professionally-oriented texts in connection with their interests.

Research methodology

The first stage of the present research was to compile a corpus of textbooks for construction and architecture: the Construction Textbooks Corpus (CTC). The texts were taken from the sample chapters offered for review by Elsevier Publishers (available at http://books.elsevier.com). The compilation of the CTC is an ongoing process (it currently accounts for about 1,000,000 words), with new samples being added for future research. The present preliminary study is based on a sample of texts from the CTC covering two areas and six subareas of knowledge: "Architecture and Built Environment" ("Design and Planning", "Sustainability", "Urban Design") and "Building and Construction" ("Conservation and Restoration", "Construction Management", "Services and Materials"), which amount to a total number of 223,520 words. It is worth noting that although the samples were chosen randomly, basically depending on availability, the selection turned out to be a balanced once, matching the distribution of knowledge areas taught in a construction degree (see Figure 1).

As specified in the introduction, the aim of this paper was to provide a preliminary contribution to a more extensive future description of textbooks at a lexical/lexico-syntactic level. Larsen-Freeman (2003) recommends that the interpretation of any linguistic unit should be characterized by the study of three dimensions: form, meaning and function. The present analysis is intended to cover the first two dimensions, form and meaning and,

therefore, represents a first step of a more ambitious study of the lexico-syntactic features of textbooks which should undoubtedly be based not only on lexical combinations but also on such notions as semantic prosody or textual colligation.

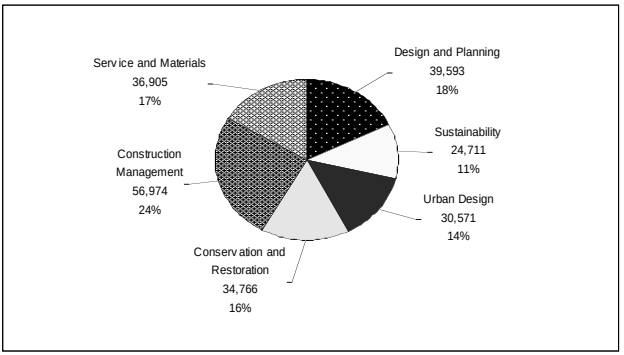

Figure 1. Total number of words.

The paper takes Hunston's (2002: 167) approach to "pattern grammar" defined as "an approach to language which maintains the generalising characteristics of grammatical descriptions while prioritising the behaviour of individual lexical items". Pattern grammar, being a link between lexis, grammar and meaning, is applied to the study variation in a technical register such as construction textbooks. The analysis relies on the study of the lexical profile of the nouns *building* and *construction,* and the verbs *build* and *construct*. *Building* and *construction* are the two most common nouns in the CTC and the two most relevant ones for a construction discipline. Together with statistical frequencies, the present study also looked at the form and meaning of *build/building* and *construct/construction*, eventually inferring the implications for language teaching.

The corpus-based analysis, generated with WordSmith Tools 4.0 (Scott, 1999) offered both qualitative and quantitative results associated with two near synonyms, defined by Xiao and McEnery (2006: 105) as "lexical pairs that have very similar cognitive or denotational meanings, but which may differ in collocational or prosodic behaviour." The analysis of the corpus will determine the patterns of usage of those two nouns and verbs focusing on their form and meaning. Adhering to Curado's claim (2001: 106) that "the main aim in terminology studies is to create specialised dictionaries that

reflect knowledge fields and concepts where these are related to the property of lexical use restriction" we will take the definitions offered by contemporary English dictionaries as a starting point, with the aim of determining which meanings of *build/building* and *construct/construction* are relevant for the construction discipline as reflected in the CTC corpus.

In a later stage we analyzed the lemmas *build* and *construct* assuming that these two near synonyms are not only the most frequent but the two most specifically relevant ones in a construction corpus. As seen in Table 1 *building* and *construction* are two of the three most frequent content words; the plural form *buildings* is the fifth one. Although *design* is the second most frequent content word, it must be pointed out that the 627 occurrences of *design* include both the uses as a verb and as a noun. The noun *building* is the most frequent content word in the CTC corpus with a frequency of 38.38 per 10,000 words whereas *construction* ranks third with a frequency of 22.95.

	Rank in freq.	Word	Freq. in corpus	Freq. per 10,000	Texts
1	23	building	858	38.38	34
2	30	design	627	28.05	34
3	36	construction	513	22.95	29
4	51	work	392	17.53	32
5	52	buildings	371	16.59	29
6	54	quality	353	15.79	26
7	58	used	329	14.71	35
8	59	urban	326	14.58	20
9	62	development	319	14.27	32
10	65	new	312	13.95	35

Table 1. Ten most common content words in CTC.

The analysis of the "key" and "key-key" words of the CTC corpus also proved the relevance of the nouns *building* and *construction*. A "key word" is defined by Scott (1997: 234) as "a word which occurs with unusual frequency in a given text", which "does not mean high frequency but unusual frequency, by comparison with a reference corpus" and "key-key-words" are "words which are key in a large number of texts of a given type" (Scott, 1997: 237). The comparison of the CTC frequency list with the British National Corpus (BNC) (Leech et al., 2001) shows that *building* and *construction* are the first two "key-key" words in the construction discipline (see Table 2).

	Key word	CTC freq.	CTC%	BNC freq.	BNC%*	Keyness
1	building	858	0.38	18,643	0.02	3,517.25
2	construction	513	0.23	6,289		2,650.22
3	design	627	0.28	12,852	0.01	2,637.71
4	buildings	373	0.17	6,581		1,673.02
5	urban	326	0.15	5,371		1,503.84
6	quality	353	0.16	16,223	0.02	964.20
7	procurement	117	0.05	285		943.97
8	climate	185	0.08	2,782		884.85
9	bricks	136	0.06	934		848.60
10	temperature	199	0.09	4,343		813.62

Table 2. Ten first key words in CTC and BNC (*only significant % are shown).

The following section describes the formal and semantic profiles of the lemmas *build* and *construct* in the selected sample of texts from construction engineering textbooks.

The case of *build* and *construct*: formal aspects

The nouns: *building* and *construction*

As Tables 3 and 4 show, the lemma *build* has a much higher frequency than *construct* (2.5 times more frequent):

Rank		Word	Frequency	%
23	noun	building	828	57.20
23	verb	building	30	2.07
52	noun	buildings	373	25.80
174	verb	built	131	9.05
800	verb	build	34	2.35
800	noun	build	2	0.14
1886	noun	builders	14	0.97
2.708	verb	rebuilt	9	0.62
2.789	noun	builder	8	0.55
3.282	verb	rebuild	7	0.48
4.801	verb	rebuilding	4	0.28
6.317	noun	buildability	2	0.14
6.318	verb	builds	2	0.14
8.743	noun	buildup	1	0.07
11.526	noun	newbuild	1	0.07
13.385	adjective	unbuildable	1	0.07
13.386	verb	unbuilt	1	0.07
			1,448	

Table 3. Lemma *build*.

Rank		Word	Frequency	%
36	noun	construction	513	89.40
1.016	verb	constructed	28	4.88
2.422	verb	construct	10	1.74
2.961	noun	reconstruction	8	1.39
4.403	verb	constructing	4	0.70
4.404	adjective	constructional	4	0.70
5.222	noun	constructions	3	0.52
9.142	noun	constructability	1	0.17
9.143	adverb	constructively	1	0.17
12.275	verb	reconstructed	1	0.17
12.276	verb	reconstructing	1	0.17
			574	

Table 4. Lemma *construct*.

The preference for nominalization in the discourse of construction textbooks, as in many other scientific and technical genres, explains that the verbs *build* and *construct* are far less common than the corresponding nouns *building* and *construction* as shown in Figures 2 and 3.

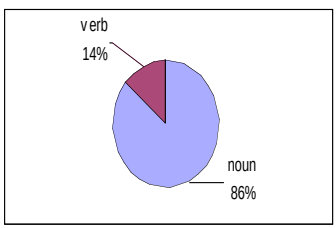

Figure 2. Occurrences as a verb or noun of *build*.

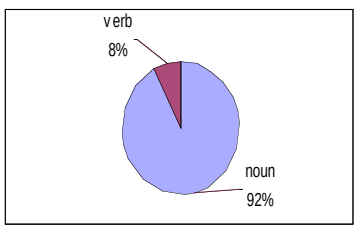

Figure 3. Occurrences as a verb or noun of *construct*.

Also the most common clusters in the CTC corpus show the higher frequency of the nouns (Tables 5 and 6):

		Cluster	Freq.
1	noun	of the building	106
2	noun	Building Act 1984	77
3	noun	the Building Act	47
4	noun	the building regulations	41
5	noun	of a building	35
6	verb	the built environment	18
7	noun	of historic buildings	17
8	noun	the building is	16
9	noun	the building in	14
10	noun	to the building	12

Table 5. Top ten clusters with *build* in CTC.

		Cluster	Freq.
1	noun	the construction industry	39
2	noun	design and construction	32
3	noun	of the construction	24
4	noun	the UK construction	22
5	noun	UK construction industry	22
6	noun	in the construction	21
7	noun	the construction of	16
8	noun	of lean construction	12
9	noun	the construction process	10
10	noun	construction industry is	9

Table 6. Top 10 clusters with *construct* in CTC.

A shown in Table 7, the noun *building* functions as a singular noun in 828 cases (68.94%) and as a plural noun in 373 cases (31.06%). 32.64% of the nouns are premodified by the articles *the* (279) and *a* (113) and 18.07% by 217 adjectives such as "historic", "tall", "new", "commercial", "dangerous". The noun *construction* is a singular noun in 513 (99.41%) occurrences and a plural one in 3 (0.58%) occurrences. 116 (22.48%) occurrences of "the" and 14 of "a" (2.71%) accompany *construction(s)*. They are premodified by 43 (8.33%) adjectives ("lean", "residential", "sustainable", "total").

Modifier	No. of cases	%	
the	279	23.23%	
a	113	9.40%	+ building(s)
adjective	217	18.07%	
the	116	22.48%	
a	14	2.71%	+ construction(s)
adjective	43	8.33%	

Table 7. Modifiers of *building(s)* and *construction*.

The verbs: *build* and *construct*

The most common verbs following the nouns *building* and *buildings* are frequently passive constructions, much more common in the present (83.33%) than in the past tense (16.67%). These verbs have both technical ("arranged", "built", "constructed", "designed", "maintained", "occupied", "overdesigned", "repaired", "secured", "situated") and non-technical meanings ("classified", "changed", "considered", "controlled", "discussed", "exposed", "given", "included", "involved", "perceived", "presented", "provided", "pulled", "reduced", "used"). *Building* and *buildings* are also followed by modals expressing obligation, necessity or recommendation

("must", "need", "should"), which, together with the high frequency of such noun phrases as "building regulations" or "building act", suggest the texts are being written to offer advice on what to do at the different sectors and stages of the construction business. Present passive verbs (76.92%) and past verbs (23.08%) ("consider", "begin", "remember", "continue" or "establish") also follow *construction(s)*. The use of the passive, especially frequent in expository prose, places the focus on the recipient of the action rather than on the agent, usually irrelevant or unknown. This conveys an objective, non-personal character to the scientific discourse (Biber et al., 1999; Dimopoulos et al., 2005). Future research will try to determine whether the preference for present passive constructions after the nouns *building* and *construction* is a generic feature which reflects the fact that textbooks report on facts, truths or processes not related with time, rather than on narrating events.

As a verb the most frequent verbal form of *build* and *construct* is the participle. "Built" is used as a participial adjective in 61 cases ("built environment", "built asset(s)", "built form") and "constructed" in 4 cases ("constructed products"). Participles also appear in "-ed clauses" that function as a postmodifying participle clause (15 "built" and 9 "constructed"). These clauses, more frequent in academic prose both in terms of frequency and proportionally (Biber et al., 1999: 606-631), correspond to the passive in finite clauses and can be paraphrased: "[b]uilt in 1740, these two rooms = These two rooms, which were built in 1740,"; "drains and cesspools constructed by the owner = drains and cesspools which were constructed by the owner".

Also common in the CTC are "-ing verb" forms (26 "building" and 4 "constructing") ("([b]uilding adequate sea defences around Bangladesh and many other such delta are …"; "perhaps by constructing larger or taller"), "to-infinitives" (15 "to build" and 8 "to construct") ("qualitative intuitive understanding on which to build"; "the materials to construct tall buildings") and the bare infinitive (11 "build" and 2 "construct") ("design build contractors and management contractors"; "to produce a design and construct package").

The corpus shows a significant predominance of the passive forms of the verbs *build* and *construct* (see Tables 8 and 9) ("the professionalism with which it was built, necessary for a building to be built"; "the vast majority of pipelines are constructed of carbon steels"). It is worth noting that, although present passive forms are more common with the verb *construct,* as with other

verbs in the CTC, past passive constructions of *build* are significantly more common.

Verb forms	No. of cases	%
built (participle)	76	38.60
Building	26	13.20
(was/were) + built	21	10.70
(be) + built	16	8.12
to build	15	7.61
build (bare infinitive)	11	5.58
(am/is/are) + built	8	4.06
build(s) (present)	6	3.05
built (past)	5	2.54
(have) + built	5	2.54
modal + build	4	2.03
(be) + building	4	2.03
	197	

Table 8. Verb forms of *build*.

Verb forms	No. of cases	%
constructed (participle)	13	33.30
to construct	8	19.00
(am/is/are) + constructed	6	14.30
(be) + constructed	6	14.30
Constructing	4	9.52
(was/were) + constructed	2	4.76
construct (bare infinitive)	2	4.76
	42	

Table 9. Verb forms of *construct*.

From these tables we can observe that the CTC corpus reveals high percentages of non-personal forms of the verbs *build* and *construct* as well as of passive constructions.

The case of *build* and *construct*: semantic meanings

This section looks into the contextual semantic meanings of the nouns *building* and *construction* and the verbs *build* and *construct* in the construction discipline. According to the Merriam-Webster's dictionary (1993) the verb *build* "stresses the fitting together of parts or materials to form the thing desired" whereas the verb *construct* "lays stress upon the problem or intricacy of the process of fitting the parts together, often implying more skill and intelligence than build." As the corpus itself reveals, "[c]onstruction is not

just building; civil engineering is a very important part of total construction activity in the UK" (Cartlidge, 2004: 20). The Merriam-Webster's (1993) and the Collins COBUILD (2000) dictionaries were used to produce a list of their meanings, both technical (T) and non-technical (N-T), in the CTC corpus. No technical glossaries were used for the analysis since they offer very basic definitions of the lemmas *build* and *construct* or they do not define the words at all. Glosses, other dictionaries, colleagues and native scholars helped corroborate our decisions in this semantic categorisation.

The nouns: *building* and *construction*

When compared to verbal semantic categories, the nouns *building* and *buildings* represent 86% of the total occurrences of the lemma *build*, all of them with technical meanings.

Meaning	building (n)	No. of cases	%
T	constructed edifice	486	58.70%
T	the business of assembling materials into a structure	228	27.50%
T	the act or practice of making, erecting, or establishing	104	12.60%
T	the art of fabricating edifices	10	1.21%
	Total	828	

Table 10. Distribution of semantic meaning of *building*.

The more common of the meanings of *building* designates "a constructed edifice" ("Le Corbusier described a building as a "machine for living in"") designed to stand more or less permanently ("[t]he degree of wear depends on the type of structure and material of the building"), occupying a space of land ("requirements for the location, the building, the rooms, the components of the building and the facilities to be provided in the building itself"); covered by a roof and more or less completely enclosed by walls ("with windows in it which forms the outer boundary of the building"; "the building form can be a solid and continuous barrier between inside and outside"; "the total area of the building, including all of the above plus the exterior walls"). It is designed for occupancy ("the end users, i.e. the actual persons who occupy and use the building"); and serves different uses ("give buildings a social meaning"; "[a] building can also represent something cultural – perhaps something religious"): as a dwelling ("absorb different residential building types from apartment buildings to terraced houses"), workplace ("commercial", "office", "the New York Life Insurance +

building"), or shelter ("building as protection against climate, enemies etc."; "how much shelter from the climate a building has to provide").

Scoring almost 30% of the total nominal occurrences, *building* is used to refer to "the business of assembling materials into a structure", which involves the management of people trades and activities ("building + act" (86 occurrences), "regulations" (68), "industry" (13), "contract(s)" (6), "procurement" (5), "contractor(s)" (4), "codes" (4), "quality" (4), "professionals" (2), "standards" (2)).

In 12.60% of the occurrences *building* means "the act or practice of making, erecting, or establishing" ("hundreds of experiments in the building of fortified towns and churches"; "this energy is used in the building of city structures"). It refers to the "building+site" (4 occurrences), "technology" (2), "project" (11), "components" (2), "elements" (4), "practice" (4), "work" (18) or "process" (6).

Finally only 10 instances of *building* designate "the art of fabricating edifices" ("the mediaeval manner of building was here never extinct"; "committed to re-establishing the relationship between the art of building and the making of community").

The noun "build up" appears twice in the corpus with the non-technical meaning that refers to "a gradual accumulation of something" ("which reduced the bass build up"; "the problem of a build up in static electricity").

The noun *construction* accounts for 92% of the occurrences of the lemma *construct* and, like *building*, its semantic meaning in the CTC is only technical.

Meaning	construction (n)	No. of cases	%
T	the business (trades, people and activities involved)	301	58.70%
T	the act of putting parts together	98	19.10%
T	the form or manner in which something has been put together	91	17.70%
T	the science or study of building or erection	22	4.29%
T	something built or erected	1	0.19%
	Total	513	100%

Table 11. Distribution of semantic meaning of *construction*.

More than half of the occurrences (58.70%) correspond to the meaning of "the business of building" ("construction is big business"; "construction is one of the most hazardous industries"). The "construction industry" (75 occurrences) involves trades ("the choices facing customers and managers involved in construction appear bewildering"), people ("the number of

people employed in construction as a proportion of the total workforce") such as "clients", "contractor(s)", "manager(s)", "supervisor", "professionals" and activities ("construction is a very diverse activity, operating at a variety of levels") which are financially and legally managed ("project(s)", "procurement", "construction firm(s)", "management", "contract(s)", and "enterprises").

Almost 20% of the nominal items refer to "the act of putting parts together" ("tenders were called and evaluated, the contract awarded and construction commenced"; "the different phases of construction of the building complex"); not only of different types of edifices ("home", "churches", "amphitheatres", "cathedrals") but also of "highways", "infrastructure", "columns", "a steel frame clad", "embankment", "dams", "sewers", "drains" or "steps".

With a slightly lower frequency *building* means "the form or manner in which something has been put together"; using particular materials ("the construction is of thick plaster and heavy wood with a deeply coffered ceiling"; "contemporary construction of a steel frame clad with a curtain wall"), tools and methods ("a specific challenge in construction is that every design has to meet multiple requirements"; "achieving efficient construction with available materials and techniques"). Another minor, very scarce meaning is "the science or study of building or erection" ("the move to a new theory based methodology for construction"; "the concept holds much promise for construction"). Only one instance of the meaning "something built or erected" was found in the CTC ("an entirely new construction").

The verbs: *build* and *construct*

Verbal semantic categories of *build* and *construct* represent comparatively lower percentages of occurrence (14% and 8% respectively). With a technical meaning in 82.20% of the occurrences as a verb, *build* conveys the meanings shown in Table 12.

Almost 35% of the verbal items mean "to construct an edifice by joining parts and materials together" ("a traditional brick-built house"; "a wall built in lime mortar"; "walling built with pre-cast blocks"); for a dwelling ("the poor man who was building a hut"; "a building to be built"; "purpose-built student living accommodation") or, more frequently, referring to large or massive structures such as cities ("one cannot easily build Charleston anymore"); elements in cities ("massive defence walls, the ancient ruins";

"adequate sea defences"), public buildings ("the Flavian amphitheatre"; "airport terminals"; "the Great Temple of Ammon").

Meaning	build (vb)	No. of cases	%
T	to construct an edifice	69	35.00%
	to be part of the physical surroundings	59	29.90%
	to be responsible for the business of building	33	16.80%
	(into) to make something part of a wall	1	0.51%
	Total	162	82.20%
N-T	to fashion, develop, cause	22	11.20%
	(up) to get bigger or higher	6	3.05%
	(on) to use as a base for further development	4	2.03%
	(into) to make it part of something	3	1.52%
	Total	35	17.80%

Table 12. Distribution of semantic meaning of *build*.

Scoring second in frequency (29.90%) the participle "built" is used as a synonym of constructed and refers to "that part of the physical surroundings which are people-made or people-organized"; from buildings and other major structures, roads, bridges and the like, down to lesser objects such as traffic lights, telephone and pillar boxes ("built+environment"; "form"; "heritage"; "infrastructure"). "Built assets" are possessions or resources having value.

With a lower frequency of occurrence (16.80%) *build* also means "to cause to be constructed" ("housing that had to be built […] for industrial workers") or "to be responsible for the building of something" ("building in seaside communities"; "build on in-fill or flood zones"); especially to be in charge of the business of the different trades involved in building: the development of the project ("design and build"; "a project is to be built in phases"), its quality ("excellent build quality", "build on a site that…"; "build cynically"; "building in value"), its financial management ("provided the financing"; "to build between…") or its security ("to be built safely").

The phrasal verb "build into" occurs once, meaning "to make it in such a way that all or part of it is inside the wall, rock, etc." ("the blocks were built into the north wall of the Acropolis").

Non-technical meanings of *build* represent only a 17.80% of the total occurrences. *Build* means "to fashion, develop or cause to develop according to a systematic plan by a definite process, or on a particular base" (11.20%)

("relationships"; "capacity"; "a successful business"; "an organization"; "collaborative working"); or "to increase or enlarge" ("awareness-building"; "value, wealth and enjoyment of nations"). Combining with particles (only in 6.60% of the total occurrences), it carries the following meanings: "build up" = "to gradually get bigger or higher as a result of something being added to it" ("gases are building up in the upper atmosphere"; "to build up deeper expertise"); "build on" = "to use as a base for further development" ("build on + the earlier work, the experience, previous chapters"); and "build into" = "to make it part of something" ("value is created and built into the product"; "building the costs of building evaluation into construction projects").

The verb *construct* represents 8% of total occurrences of the lemma. Technical meanings of the verb *construct* account for 95.20% of the occurrences.

Meaning	construct (vb)	No. of cases	%
T	to form, make or erect a building	40	95.20%
N-T	to create a building	2	4.76%
	Total	42	100%

Table 13. Distribution of semantic meaning of *construct*.

The most recurrent meaning is "to form, make or create a building" ("orchestral halls"; "salons"; "church"; "Theatro Farnese"; "Trinity Church"). It is sometimes a positively valued building ("massive aqueduct systems"; "tall buildings"; "a building larger or taller, good buildings"), parts of a building ("column"; "concrete pad"; "drains"; "cesspools"; "floor"; "walls"), or other constructions ("monuments"; "bridges") erected by putting together parts or elements ("constructed of fired clay bricks"; "of carbon steels"). The remaining 5% correspond to the meaning "to create" ("construct the work"; "construct the team").

Conclusions and pedagogical implications

The aim of the present study was to offer a contribution to the study of lexical features in one of the academic genres undergraduate students are most frequently exposed to: the genre of university textbooks. More specifically, the paper has concentrated on the analysis of the formal and

semantic profiles of the lemmas *build* and *construct* in order to understand the context-sensitive behaviour of specialized lexis in the construction engineering field.

As regards the formal aspects of these two lemmas, the CTC corpus has shown that the nouns *building* and *construction* are two of the three most frequent nouns in construction textbooks. The high frequency of nouns (*building* is 6.1 times more frequent than *build* and *construction* is 11.1 times more frequent) in our corpus, contributes to demonstrating that nominalization is a characteristic feature of scientific-technical textbooks (Dimopoulos et al., 2005), as it has been found in many other technical registers. The most frequent verbal categories of *build* and *construct* are non-personal forms, particularly participles. The recurrence of passive constructions suggests possibilities for future research.

On the other hand the semantic analysis described above yields the following preliminary observations. Firstly, the analysis of the lemmas *build* and *construct* suggests the absolute prevalence of technical meanings over the more figurative ones in the noun forms of these two lemmas. Quite similarly, the verbal categories of *build* and *construct* have displayed very low percentages of non-technical meanings. Findings suggest that the most common semantic meaning of *building* is that of "edifice" rather than that of "activity", while *construction* is almost uniquely "the act or business of erecting structures". As verbal categories both *build* and *construct* show a recurrence of the same technical meaning, "the business of". Although we are aware of the limited size of the sample of texts taken from the CTC, it is interesting to note that this meaning ("the business of") is not usually mentioned by dictionaries, which rather define those verbs as "the act of" or "the science of".

On pedagogical grounds this preliminary study shows potential for the teaching/learning of ESP, particularly of ESP reading comprehension skills. As this minor-scale study has evinced, we think that dictionaries offer many potential meanings of words, which sometimes appear to be ambiguous or indeterminate. However, it is the actual text that determines the meaning of a specific word or lemma. Thus, we agree with Stubbs (2001) that dictionaries offer fixed meanings, sometimes invisible, invented or decontextualized and based on the individual word. Since the contextual factors determine the actual meaning of the word, rather than on individual words, understanding the meaning of a word in context should be based on the combination of words. This is consistent with previous studies on the linguistic and professional constraints of specialized registers (Luzón Marco,

2000; Curado Fuentes, 2001; Sánchez Hernández, 2002; Cortes, 2004; Mudraya, 2006; Nelson, 2006). In addition, the meaning of words in a discipline, which sometimes shows considerable differences in use from a general register, can be discovered from observation of specialized lexis and identification of the patterns that are prevalent in that given register (Hunston, 2002). In the case of the CTC, the analysis of *build*, and particularly of *construct*, has shown the prevalence of technical meanings in spite of the fact that dictionaries offer a range of non-technical meanings.

The case study of the lemmas *build* and *construct* has intended to be just the first step to determine the lexical profile of the language of construction and architecture in the genre of textbooks. As such, it should obviously be followed by the analysis of the functional features (Larsen-Freeman, 2003). This will be the breeding ground of my ongoing research goals. In any case, the preliminary description of the lexis in construction engineering textbooks that this paper has sought to envisage will eventually help to make informed decisions for the improvement of teaching and learning procedures in an ESP course related to Construction Management and Civil Engineering. Students should be cautious in the use of dictionaries, translating texts, learning how to discriminate noun from verbal categories, identifying the most recurrent meanings and, most importantly, becoming aware of the context-sensitive use of words. The lexical approach taken by this paper would also be valid for other technical genres, for example, technical reports for construction management, for professional communication or for research goals. This, I believe, will contribute to better equip students for the use of genres in university settings.

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