ภาษาอังกฤษที่วิศวกรใช้และภาษาอังกฤษที่สอนในชั้นเรียน : มีอะไรเหมือนกันหรือไม่?

LanguageUsed by Engineers and Language Taught in Classroom: Is there Anything in Common?

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บทคัดย่อ

งานวิจัยมีจุดมุ่งหมายเพื่อศึกษาเอกสารที่วิศวกรใช้ในชีวิตประจำวัน เพื่อเปรียบเทียบกับเอกสารประกอบการสอน มหาวิทยาลัยเทคโนโลยีราชมงคลอีสาน วิทยาเขตขอนแก่น การศึกษานี้ใช้ทฤษฎี Systemic Functional Linguistics เพื่อเพิ่มความเข้าใจด้านภาษาศาสตร์ เพื่อช่วยให้สามารถเตรียมการสอนได้ตรงกับความต้องการของผู้เรียนมากที่สุด ข้อมูลที่ศึกษาประกอบด้วย หนังสือเรียนวิชาภาษาอังกฤษเทคนิค (01-320-003) และเอกสารที่วิศวกรอ่าน เขียน หรือเกี่ยวข้องในการทำงานประจำวัน จากการวิเคราะห์พบว่าเอกสารที่วิศวกรต้องอ่านหรือเขียนจะเน้นหนักการบอกวิธีทำ การรายงานงานที่ทำการแลกเปลี่ยนข้อมูล สำหรับบทเรียนที่ใช้ในห้องเรียน นักศึกษาอ่านเอกสาร เพื่อความเข้าใจและตอบคำถามต่าง ๆ นอกจากนี้ในขณะที่หลักการเน้นการอ่านแบบกว้างขวาง วิศวกรมีโอกาสได้อ่านบทความที่ยาว ๆ น้อยมาก ดังนั้นจึงสรุปได้ว่าเอกสารที่นักศึกษาต้องอ่าน หรือเขียนกับเอกสารที่วิศวกรต้องเกี่ยวข้องในที่ทำงานมีความไม่สอดคล้องกัน

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Abstract

This study focuses on the analysis of engineering workplace texts and the evaluation of in-house materials used with engineering students at Rajamangala University of Technology Isan, Khon Kaen Campus. Thailand. This study was based on the belief that the use of systemic functional linguistics increases language educators' capacity to be explicit about what to teach. The language data collected for this study were the course book for engineering students at RMUTI, KKC (01-320-003 Technical English), and texts that engineers have to read, write or complete in their daily work. The analysis of workplace texts showed that the main functions of text types in the workplace are limited to giving instructions, reporting jobs done and exchanging information. For classroom texts, students had to read for comprehension and give short responses. In addition, while the emphasis of RMUTI's program was on reading extensive discourse, engineers in the workplace seldom engaged in reading lengthy texts. Therefore, it can be concluded that there are some mismatches between texts used in the classroom and texts found in the workplace.

Keyword : English use, engineer

INTRODUCTION

This study focuses on the analysis of engineering workplace texts and the evaluation of in-house materials used with engineering students at Rajamangala University of Technology Isan, Khon Kaen Campus. Thailand. This study was based on the belief that the use of systemic functional linguistics increases language educators' capacity to be explicit about what to teach. The language data collected for this study were the course book for engineering students at RMUTI, KKC (01-320-003 Technical English), and texts that engineers have to read, write or complete in their daily work.

The research questions

The study set out to investigate:

- What are the salient features of English that engineers encounter in the workplace settings?
- What are the strengths and weaknesses of materials used with engineering students at RMUTI, Khon Kaen Campus?

• What are the mismatches between spoken and written texts engineers encounter in the workplace and in EFL classroom?

LITERATURE REVIEW

Introduction

The analytical approach taken was mainly drawn from the work of major modern linguist Michael Halliday, in particular, the model of grammar set out in An Introduction to Functional Grammar (Halliday, 1994). The work of other linguists working in the same tradition was also significant for the analysis of this study (Bloor & Bloor, 1995; Butt et al., 2000; Gerot & Wignell, 1994, 2001).

The definition of genre

The working definition suggested by (Swales, 1990) has been found useful by many genre analysts and has become the best known. According to (Swales, 1990), genre involves:

• A class of communicative events

• Principal criterial features that turn a collection of communicative events into a genre that has some shared set of communicative purposes

• Exemplars or instances that vary in their prototypicality

• A background rationale to establish constraints on allowable contributions in terms of their content, positioning form and functional value

• Frequent exploitation by the expert members of the discourse community to achieve private intentions within the framework of socially recognised purposes.

The notion of discourse community

Although communicative purpose becomes a determining aspect of communicative events in categorising their fit within a particular genre, the most important aspect in establishing the purpose(s) of communicative events is probably the concept of discourse community. (Swales, 1990) notes, '… genre belongs to discourse communities, not to individuals, other kinds of grouping or to wider speech communities' (p. 9). The fact that Swales uses this term three times in his working definition of genre provides further evidence of the importance of this term in his concept of genre. For (Swales, 1990) discourse communities are specified as sociorhetorical networks, each consisting of 'a group of people who link up in order to pursue objectives that are prior to those of socialisation and solidarity'. This is made possible because 'they share similar educations and professional initiations, because they have absorbed the same technical literature and drawn many of the same lessons from it, because they share goals and professional judgements, and because their communication is full' (Flowerdew, 2000). In this sense, discourse community consists of a group of people with similar backgrounds, expertise and

goals who establish a particular way of communication in order to achieve their goal. (Johns, 1997) suggests that the concept of 'discourse community' focuses on texts and language, and the genres and lexis that enable members throughout the world to maintain their goals, regulate their membership, and communicate effectively with one another (p. 51).

RESEARCH METHODOLOGY

Data collection procedures

There were two sets of research data collected in this study. The first was the data taken from engineering workplaces. The second data source was the course book for Technical English 1 (01-320-003) for engineering students at the bachelor degree level.

Data collection included documents, and interviews. The interviews were conducted in Thai, the first language of the respondents and the researcher. After the interviews, the respondents were asked to bring English texts they mentioned having to read or write as part of their work. The aim of the interviews was to discover those issues that a researcher cannot directly observe (Patton, 1990). The interviews were semi-structured.

Data analysis procedures

The text analysis processes followed step-by-step procedures. After reading each text to gain overall understanding of

Table 1 A functional systemic model for analysing workplace texts (cf. Butt et al., 1995; Halliday, 1994)

Context of culture	Context of situation	Contextual variables	Lexicogrammar
GENRE	METAFUNCTIONAL COMPONENTS	REGISTER	SYSTEM & STRUCTURES
	Ideational (experiential)	Field	Transitivity - Processes - Participants - Circumstances
	Interpersonal	Tenor	Mood - Modality - Modulation - Clause types
	Textual	Mode	Theme Theme/ Rheme

meanings and purposes, the workplace texts were grouped according to their communicative purposes. After the texts were grouped, the next stage focused on the language features of each text type. Then the text analysis process advanced to identifying the common rhetorical patterns in the English written workplace texts in Thai engineering workplaces.

As described previously, the researcher used systemic functional analysis (Halliday, 1994) as the framework for analysing the workplace texts (Table 1). In the course book analysis, the researcher adopted an evaluation framework for course development (Gall et al., 1996; Graves, 1996, 2000) and materials development (Cunningworths, 1984; Tomlinson, 2001, 1998).

WORKPLACE TEXTS

This study represented a feature analysis for later use as input to program development. It was motivated by the potential of genre as a tool for analysing and teaching the language required of non-native speakers in academic and professional settings (Hyon, 1996).

The discourse communities

1. Company 1

Company 1 was a Thai-German joint venture under the management of the Board of Investment. It manufactured truck bodies, trailers and semi-trailers. This company had one German supervisor who could speak Thai. Since the company was pushing to be the leading company in the region, with the goal to become international, engineers in this company needed to be competent users of English, as their manager pointed out:

We want to go internationally that's why our company wants to improve the employer's English skills… The employees are required to read and reply email using correct grammar, can communicate in English, and having sales skill, such as presentation skills (Manager 1, Company 1).

2. Company 2

Company 2 was a company established under Thai-Indian cooperation with Indian and Thai managers and Indian engineers on site. It manufactured pulp and paper. The policy of the company was that the language of communication was English and Thai, both for writing and speaking, as could be seen from their circulars and other texts. As the researcher noticed during company visit, all signs, directions and company policy were both in English and Thai. The company exported to 17 countries and the main markets were Taiwan, France, India and Indonesia (personal communication).

3. Company 3

Company 3 was a privately-owned Thai brewery with German imported technology, and was one of the largest breweries of the country. The head office of this company was in Bangkok. This

brewery was established in the region so that the company could reduce the cost of transportation from the brewery in the central region. The company itself relied on machinery for their production and all the instructions and protocols were in English. The brewery was adopting technology from Germany and other overseas countries. The manager on site was German. Engineers in this company reported the use of English in reading and writing. Since there was only one foreign manager on site, the use of English for spoken communication was very rare. Engineers had to work more with documents than in speaking.

Communicative purposes in the workplace texts

The most common types of workplace texts collected from the engineering workplaces were reports, procedure texts, and memorandums.

Reports

Reports were one of the most common genres engineers had to write as part of their daily work. Typically, workplace reports described jobs done over a certain period. This could be monthly, weekly, or daily. Since reports described what happened in the past, each was usually written in past tense. In the reports, the Participants, as defined by (Halliday, 1994) as peoples and things, were parts or name of the machines attended by engineers.

The reports were transactional: they explained what jobs engineers did during a specific period of time. Most of the reports collected were written by site engineers for supervisors who needed to keep up with what was happening in the divisions or for colleagues in different work shifts. In completing the reports, engineers had to write details of the job done, tick boxes, and/or provide figures and comments. To write effective reports, engineers had to understand the conventions for writing each type of report. Each company had a standard format for each type. After observing details and overall context of their work, engineers had to organise chunks of essential information sequentially, then present them chronologically.

Some reports were more difficult to write than others. In some, all information had to be fitted in one column, whereas for other reports, job faults had to be written in a separate column; whereas actions taken were numbered, and all pieces of related information had to be writtenin different columns and numbered.

Procedures

The purpose of the procedural texts collected was to explain to or direct engineers how a particular job should be done. Most of them typically formed a list of activities that needed to be undertaken in order. They were used

for thestandardisation of particular tasks in the production processes and in the service areas. The purposes of procedures were threefold: to control work activity, to ensure consistent outcomes or products, and to ensure safe working practices (Prince, 1992a, 1992b). The simplest type of procedure consisted of a series of steps telling engineers how to operate a piece of technology and produce a commodity (Feez, 1998; Rose et al., 1992a).

For this text type, the use of templates was pervasive as a means of communication in the workplace, particularly in the form of a job list or checklist. Engineers had to read, perform the jobs, and fill out the forms in relation to the tasks involved. Most of the information required was the condition of the machine, and/or what was to be done during the work shift. Some procedural texts emphasised machine parts to be serviced and the departments responsible for the jobs. There were sometimes further tasks that engineers were instructed to carry out.

Memorandums

The memorandums from these engineering workplaces functioned as requests. They contained the background to the request and what was requested. In this study, memos were written by engineers at the levels of operation to request permission for change and to request support on the work under their responsibilities. The memos were directed to the higher rank position for approval and support. Memos are often written and communicated upward in an organisation to those who have more authority than the writer. Politeness strategies, therefore, were evident, for example, the use of 'Khun' which Thai people use for addressing others, similar to Mr or Mrs in English. A special closing is used when a memo is directed to higher rank personnel. Sometimes the request was not engineering related but was company related. This implies that the scope of jobs engineers had to do was far more than technological work.

Workplace memorandums are writerresponsible texts, where the writer has to summarise relevant background information, inform on action taken or ask for action, provide reasons, invite further communication and contact, then end politely. In other words, everything the reader needs for the meaning of a memorandum to be clear, unambiguous and polite has to be provided by the writer.

Another type of memorandum that engineers encountered in their daily work was quotation. A quotation is written for four purposes: making an enquiry about products; following up an order; advising updated status; and clarifying order queries. Some

quotations were full of technical abbreviations, engineering related knowledge, and codes known among concerned parties.

Many of the quotations were fax forms or email documents. The presentation of the message was in upper case letters; as Li So-mui remarks this is a legacy from 'telex-speak' days (Li So-mui & Mead, 2000). Sometimes the information was presented in numbered points for easy reading, and appropriate tone of the message could facilitate an effective relationship between the merchandiser and the customer. The innovations of fax and email have made other business paper work obsolescent (Eustace, 1996). For example, a fax is a legal document, and like email, can be printed off. In other words, fax and emails are transmission modes which provide written modes because both can be, and often are, printed out. They are, therefore, accepted as legal written documents.

To read and write quotations, the engineers had to possess business writing skills and understand conventions for writing in business. For example, they should not write more than one page because a brief clear message is more essential than length. This implies that to meet the demands for greater effectiveness in engineers' writing, teachers have to follow two parallel tracks: text structure and effective, economical use of language.

Range and complexity of communicative tasks

The corpus of texts can be grouped according to the language skills involved: texts engineers have to read and write, texts they have to read only, and texts they have to write for their own purposes. Overall, engineers were expected to read and understand a text, and perform a task or write accordingly. However, there were some texts that engineers had to read and perform tasks without responding in writing. Their degree of comprehension could be assessed from their performance of the task. These texts were job lists and instructions. For yet other tasks, engineers had to integrate reading and writing skills as well as engineering skills.

Summary

In the analysis of workplace texts, the researcher applied a simple form of Systemic Functional Grammar. It was found that the two language functions that engineers used most were writing reports and giving instructions, and that language used in the workplace texts was full of abbreviations, ellipsis, and ungrammaticality.

CLASSROOM TEXTS

This section analyses a course book for Technical English 1 (01-320-003) which is used with engineering students at Rajamangala University of Technology Isan (RMUTI), Khon Kaen campus (KKC). The purpose is to compare the textual features of classroom materials with the texts engineers encountered in the workplace (analysed in the previous section).

RMUTI KKC and its English programs

The English curriculum in RMUTI iscentralised with a set of course teaching outlines that operate as functional syllabuses. RMUTI teachers of English are responsible for designing their own materials following the course descriptions provided. The aim of the courses is to provide students with basic skills in English necessary to operate effectively in the workplace with their Non-Thai speakers as well as to read texts written in English such as instructions, manuals, reports, directions (Chunthawithet, 1997).

Course book analysis

In this analysis of the course book, the researcher was influenced by a materials evaluation framework suggested by (Tomlinson, 1998).

The aims of the course cover necessary skills of language learning (listening, speaking, reading and writing) and appropriate professional skills. Curriculum guidelines reflect a skills-based approach (Hall and Crabbe, 1994). RIT course book designers have to follow criteria in selecting contents from students disciplines, professional issues, and professional situations which include English communication at work. It is stated in the guidelines that to achieve aims, the learners must be given opportunities to practise:

- reading different articles, documents, magazines, and texts related to students' disciplines
- speaking in different situations related to students' disciplines
- listening and reading for main ideas, interpretations, and conclusion
- writing and presenting professional issues
- using appropriate English in different professional situations

Thus, the selection criteria and language learning objectives are very broad, and students can read any articles, documents, or texts as long as they are related to their own discipline. As mentioned earlier, since RMUTI offers a wide range of disciplines, this outline is the guide for language teachers who are responsible for each discipline to design their own teaching materials. In practice, what has happened at KKC, from the researcher's observation,

is that to lessen the burden of teachers having to prepare the lessons individually and clearly present the same language functions to every discipline, it is more convenient for the division to have the same textbook for every discipline, but individual teachers can add any supplementary materials relevant to their students' specialisations.

The course book

The course book was designed for engineering students undertaking Technical English 1 (01-320-003), under the bachelor degree program at RMUTI, Khon Kaen Campus. The length of the program is one semester, 16 weeks with three credit-hours per week (180 minutes). The preface of the book states that the contents of this book 'represent knowledge of English through technical knowledge and knowledge of the world'. The potential application of this book is very broad since it has to cater for students from different specialisations: civil engineering, mechanical engineering, industrial Engineering, and electronics and electrical engineering.

The book consists of six units, and each unit is divided into different sections: Lead In, Input, Gathering Information, Language Study, and Practic. In some units, there are tasks. Although instructions in the book are directed to students, using pronoun 'you', the sections in this textbook appear to be intended for teachers.

The activities sequence in the course book shows that this course book puts considerable emphasis on using English and therefore satisfies teachers that it helps students to use language effectively for their study purposes. All structures are learned in context so that students understand them and know how to use them.

The entry or exit level of the user is not mentioned; it is assumed that learners must have adequate general knowledge of English as well as specialist knowledge. The context of the material is engineering and the Western world and the book has an international flavour. Since the material is taken from different sources, there is a combination of American English and British English in the texts.

The initial presentation is through the Lead In section. In this section, teachers can lead the students to the content or language point of that unit by familiarising the students with some activities or topic for discussions, pair work, or activities which need students' general knowledge: for example, signs or notices widely available in their daily lives, or the comparison between the

functions of eyes and a camera. Then, in the Input section, students are given reading passages or other language activities which include language focus or contents introduced in the Lead In section. However, the Lead In section does not always contain examples of new structures. Sometimes, the activities are there for warm up purposes only. In the next section, Gathering Information, students have to do various tasks, and all of the tasks respond to the Input Section.

The learners are intended to learn the language inductively. First, students are presented with a number of examples and exercises which embody the rules. Learners then have to identify or notice similarities between examples so that they can hypothesise what they think the rules might be and try to do the exercises. The learners then have to seek confirmation from the next section. Then comes the Language Study section in which students learn about language rules introduced in the unit. Language rules presented in this section ensure that students are exposed to different types of activities, because they have to do a lot of tasks in Practice sections.

After students are introduced to the functions of language in each unit, it is time for them to learn about the language features presented. In this part, students have to attend to explanations about language rules. Unit 3 is about Signs/ Notices, their functions, and language patterns. The Language Study section summarises the structures presented in the unit. Then learners have to produce the structures by using language rules given earlier to do the exercises. This provides the students with practice in the manipulation of language forms presented. After students are exposed to the language features and forms they have to know, they have to do exercises in the Practice section, including numerous steps to check their understandings.

How RMUTI students are prepared to deal with engineering workplace texts

The aim of this analysis is to compare the language structures in the course book with the structures of workplace texts. The analysis indicates that the structures introduced to engineering students in the English language classroom are quite dissimilar to workplace texts they will encounter in their future workplace. In Unit 1 of the course book, traditional grammar terms are introduced (Table 2).

Table 2 Language study and traditional grammar

Unit 1	Language study
Sentence Structure	Partsofspeech(noun,pronoun,adjective,adverb,verbauxiliary) Sentence structure (Subject + verb + Object) Noun phrase
Word Structure Clues	Prefixes, Roots, Suffixes,
Reference	Personal pronoun, Relative pronoun, Demonstrative Pronoun
Punctuation Marks	Full stop, Question mark, Comma, dash, colon, semi-colon, parentheses
Discourse Markers	Definition, Restatement, Similarity, Contrast and Concession, Exemplification, Cause and Effect/Result
Context Clues.	Word meanings from context (additional information)

Clause Analysis

All clauses shown in this section were taken from texts in the Language Study sections in the course book because these texts contain those structures that the course book recommends students to learn.

Data analysis show that there is only 50% correspondence in crude terms. There were some clause complex structures. Since these complex sentence structures did not appear frequently in the textbook and did not appear frequently in the workplace text corpus either, they will not be discussed in detail. The following are examples from the text book.

Since the demand has increased, the prices are higher.

It is certain that untreated water is high in organic matter.

If you want to use an adaptor, you should use no more than one plug with it.

When it says DIRECTION MARKER, you put a circle around NO.

Clause structures in the Language Study sections, whether simple or complex were complete sentences whereas the workplace texts contained some incomplete structures. Sentences given in the Language Study sections provide quite a useful range and model for preparing engineers for the workplace but students do not have sufficient opportunities to produce their own written texts.

Comparison of workplace and classroom texts

Since a central communicative purpose for English in the workplace is writing

instructions, I now compare the language features of instruction in the workplace texts with classroom texts to find if the students are prepared to deal with them.

In Unit 3 of the course book, instructions are defined as 'the statements used to tell or direct people to do things in sequence' (Course book p. 11). Examples of instructions given in the course book are written in the following structures:

- Imperative form (e.g., *Wear safety boots*)
- Present simple functioning as an instruction in a sequence of step with 'you' (e.g., *Then you turn on the monitor*)
- Negative + present participle verb (e.g., *No parking*)
- Negative imperative (e.g., *Do not walk on grass, never overload a socket*)
- Complex instructions, when/ where + present simple clause + imperative (e.g. *When it says DIRECTION MAKER, you put a circle around NO*)

In addition to the structures mentioned above, the course book also introduced sequence markers which are used to order the steps of the instructions.

In the Language Practice sections, students mainly practise reading for comprehension and write simple instructions from the model given. One activity is given below:

> *How to weld with a gas welder*
>
> *Goggles should be worn to protect the eyes. Protective clothing in the form of gauntlets and a leather apron should be worn. Gas and airlines should be in good conditions and the connection between the torch and the gas and airlines should be checked. A screen should be placed in front of the work to protect other workers.*

The students have to write the instructions as in imperatives; the structures are to be rewritten as follows:

Wear goggles to protect your eyes

Wear protective clothing in the form of gauntlets and a leather apron.

Check if the gas and airlines are in good conditions.

Check the connection between the torch and the gas and airlines.

Place a screen in front of the work to protect other workers.

Six workplace texts follow this imperative pattern. Whereas classroom texts gave clear and concise patterns for students to practise, workplace texts contained varied patterns and were less consistent in than the textbook passages.

Table 3 Patterns of Instructions used in the workplace texts

Workplace text	Pattern use	Examples
1. Job to be done during Feb, 03 shut down	Passive imperative	All air filter to be cleaned
2. Shut down job list	Imperative	Provide additional manhole for fresh air circulation
3. ISO pending points and checklist	Mixed patterns Passive imperative Imperative	Old records to be checked and updated. Discard records + months
4. Preventive maintenance checklist	No instruction given, only locations of lightings provided	PCC ROOM (PH-2) DOS ROOM(E T PALNT PH-2)
5. Preventive maintenance plan for beer production	No instruction given, only names of machine and codes provided	SEPARATOR FILTERATION (as original) HYDRAULIC KG 1
6. Extinguisher checklist	No instruction given, only locations of extinguisher provided	Shop yard Sheeting PH-1 RM payment office

A common pattern found in the workplace texts but one not found in the classroom material was passive imperative (e.g., in Text 7 : ISO Pending Points and Checklist). Other texts functioned as instructions but there were no instructions given : Some texts required engineers to fill in the form reporting what jobs had been done. Engineers did not have to describe the jobs, they had only to tick the form or write the codes provided in the form. Though reading or completing instructions in the workplace seems unproblematic, the inconsistency of the language used by engineers (as mentioned earlier) may be an issue for efficiency and unambiguity. Whereas the use of sequence markers was introduced in Language Study as part of instruction, in the workplace texts sequence markers were not apparent, numbers were used to sequence the steps of actions and sometimes series of action were structured in tables or forms.

CONCLUSION

This study compared the characteristics of workplace texts with classroom

materials used with engineering students at RMUTI, KKC, the results of the study are as follows.

1. In terms of salient features of English features that engineers encounter in the workplace, the analysis of workplace texts showed that the main functions of text types in the workplace are limited to giving instructions, reporting jobs done and exchanging information, classroom texts emphasised reading texts that students had to read for comprehension and give short responses.

2. Other differences between workplace use and classroom learning were also found. While the emphasis of RMUTI's program was on reading extensive discourse, engineers in the workplace seldom engaged in reading lengthy texts. Therefore, it can be concluded that there are some mismatches between texts used in the classroom and texts found in the workplace.

3. For writing, engineering students had to respond only to reading comprehension texts with short answers. In the workplace, however, engineers had to write for wider audiences, including supervisors, work colleagues, suppliers, or their customers to direct, report, inform according to their job roles.

4. The weaknesses of the classroom texts are that while many writing exercises in the course book only require students to utilise a single rhetorical mode for their work (writing instruction, completing classification diagram, etc), many workplace writing tasks required engineers to combine several rhetorical modes and to move from one mode to another within the same task.

LIMITATIONS OF THE STUDY

Obviously, the results of this study reflect practice from only one educational context, and a limited number of workplaces. Although no strong conclusions can be drawn, the results suggest that a more wide ranging comparison between language taught in the classroom and language used in the workplace could provide some interesting insights to curriculum designers and developers as well as language teachers in Thailand. For teachers, since language is so complex, and teachers' understanding is so far from complete, working on educated guesswork or hunches needs to be replaced with close examination of language in the target situation. The analysis of English in the workplace could be a sound starting point for teaching or designing a course book and related technical materials. With the help of valid and trustworthy research it would be possible to obtain a much more complete, complex and refined picture of what engineers need to do in English in their workplace contexts. The information gained could be used in the shaping of a more effective ESP curriculum.

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