Mathematical terminology in English: its place at FEEC BUT and students' knowledge

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Abstract

The paper contributes to the issue of teaching scientific, or rather mathematical terminology in English to students in the first two years of bachelor study programmes at universities of technology and implications of the current state. First, an overview of English language education provided at FEEC BUT is given. Later, problems faced by members of the target group are discussed. Our conclusions and suggestions are based on the results of a test of mathematical terminology in English given to second-term students at FEEC BUT. This contribution is a part of a research project, which is being carried out in co-operation with the Department of Mathematics.

1. Introduction

Due to internationalisation of education and fast development of technologies, university studies require certain knowledge of professional English terminology. Many tools students use in classes communicate in English and the students are expected to understand. In this contribution we are going to focus on the current situation at FEEC BUT, what the expectations of students' knowledge of professional English terminology are and what possibilities of learning them there are.

2. Courses of technical terminology in English

2.1 Situation at the FEEC BUT

Language education at the FEEC BUT is provided by the Department of Languages. According to the study regulations, students who entered the university prior to 2005 are required to pass a general English exam of any level by the end of their bachelor studies. Since 2005, they have been obliged to pass an intermediate one-semester course in general English (*BAN3* or *BAN4*) by the same deadline. The first-year students can register for English classes in their second semester. Only after they have passed an intermediate course can they enter a specialised course focusing on different professional terminology. The students can choose from three two-semester courses: *Reading Skills*, *Business English* and *Professional English for Electrical Engineering and Computer Science*. The courses are completed by two semester tests and a final exam. A maximum number of students in the first two courses is 14 and for the last course it is 26.

2.2 Situation at the FIT and FBM BUT

The Department of Languages at FEEC also provides a language education for other faculties

of BUT, such as Faculty of Information Technology (FIT) and Faculty of Business and Management (FBM). The FIT requirements for English education are the same as for the FEEC students. On the other hand, FBM first-year students of Management and Computer Science have to pass a two-semester compulsory course either in professional English or in professional German. The students can choose from three levels in each language and the courses are completed again by two semester tests and a final exam. A maximum number of students in the course is 20.

3. The first- and second-year students at FEEC BUT

We are going to focus our attention on mathematical courses and students' knowledge of the terminology. Since mathematics is taught in the first three semesters of the bachelor study programme, we are going to aim at the first and second year of studies. As results from the above mentioned, the students can enter a specialised course in English no sooner than the first semester of the second year. However, this contradicts their needs for some basics of English mathematical terminology, as in the first year students learn how to work with mathematical software such as Maple and MATLAB, which communicate in English.

We wondered if this causes any problems, thus we did a research on the first-year students' knowledge of mathematical terminology and general English. In order to make a picture of their possible problems, we prepared a questionnaire on using English speaking software and a test of mathematical terminology in English. The content and results of the questionnaire will be discussed later in a different contribution at some other occasion; here we are going to deal with the test of terminology.

4. Aim, form and content of the terminology test

As we needed to test students with some knowledge of English, we distributed the test to the students in their second semester, registered for Mathematics 2 (BMA2) and some English course of any level. The test was given to 170 students in two different forms. As we wanted to compare their active and passive knowledge of the terminology, we prepared two versions of the test:

- multiple choice
- gap filling

Both forms had 10 tasks, in the multiple choice students could choose from 4 options to complete a gap, while the questions in the gap filling were open ones. The multiple choice task was supplemented by a short reading task: two extracts from MATLAB help were given and a task of writing a correct command was set.

We tested knowledge of the following mathematical terms: *sum*, *power*, *square root*, *polynomial* (and its *grade*), *root* (of a polynomial), *solution*, *equation*, *logarithm* (and its *base*), *trigonometric function*, *hyperbolic function*, *matrix*, *transpose*, *inverse*, *determinant*, *sequence*, *series*, *finite*, *infinite*, *variable*, *derivative* (and its *order*), *partial derivative*, *primitive*, *integration*. All of these are basic terms – students learn them either at the secondary school or in the first term of their university studies.

4.1 The tasks: details

The tasks were prepared in such a way that students were to concentrate on the terminology itself, in most of the tasks they knew the correct answer in Czech immediately, such as in e.g.:

- *6 is the …… of 2 and 4 (because 6 = 2+4)*
- *ln 2 and log 3 are both called ……*
  *They have different ……: **e** for ln 2 and 10 for log 3.*

The reading task included in the multiple-choice version read as follows:

Read the following extracts from MATLAB help and complete the task.

MATLAB help entry 1: The `polyder` function calculates the derivative of polynomials, polynomial products, and polynomial quotients. The operands `a`, `b`, and `p` are vectors whose elements are the coefficients of a polynomial in descending powers.
`k = polyder(p)` returns the derivative of the polynomial `p`.
`k = polyder(a,b)` returns the derivative of the product of the polynomials `a` and `b`
`[q,d] = polyder(b,a)` returns the numerator `q` and denominator `d` of the derivative of the polynomial quotient `b/a`

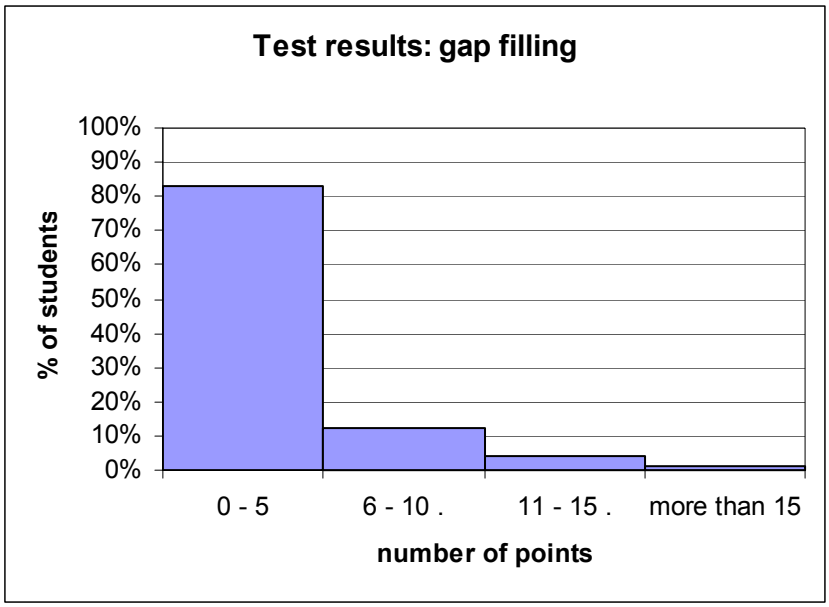
MATLAB help entry 2: Brackets are used to form vectors and matrices.
`[6.9 9.64 sqrt(-1)]` is a vector with three elements separated by blanks.

Task: `S(x)=3x^4+2x^3-x^2+5x-1`. Write a command sequence which would return `S'(x)`. Use the above help entries.

As the students had had no previous experience with MATLAB, they were not biased during answering the reading task. Given our previous experience included in [2] and [3] we were aware of the difficulties students were likely to face when answering this task.

5. Results of the test and their interpretation

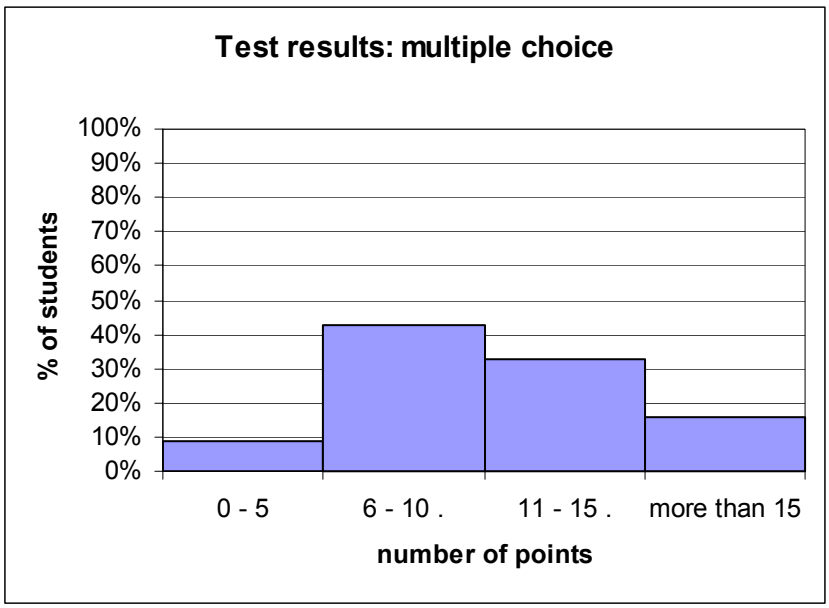
There were 27 terms in the test; each term supplied or chosen correctly counted as 1 point. Correct answer in the reading task of the multiple-choice version counted as 3 points. However, only 1 student answered this task correctly and three students supplied partially correct answers. If we disregard the reading task, we get the following histograms:



The results of the gap filling version are much worse than those of the multiple choice version – the percentage of students

with five or less points in the gap filling suggests that students are completely at a loss when left without any hint or clue. The already bad results look even worse when we consider the fact that the histograms are deformed as the "more than 15" category is almost as big as the previous ones (relevant point maximum of the test was 27).

The multiple choice format most likely helped here even though guessing might have been involved to some extent (given five option for each of the 27 tasks a student can get a mean value of 5.4 points only when guessing). This factor alone, however, could not have generated such an increase. A more likely explanation seems to be the fact that the students are aware of the 'approximate' translation or that they have already heard / seen it somewhere and only cannot recall its correct form, i.e. they have passive knowledge of the term. The multiple-choice options helped in this respect.



There is another interesting aspect to the discrepancies between the gap filling and multiple-choice results. The questionnaire research results discussed in [1] and (to a greater detail) in [3] indicate a high level of students' uneasiness and a priori rejection when faced with a scientific text regardless of its scientific level. These tensions might have been overcome by the multiple-choice format of the test.

6. Conclusion

As results from the above mentioned, many students have poor knowledge of English when they enter the university. Thus teaching them some technical terminology would not be effective until they reached a certain level of knowledge. This, of course, takes some time and when the students are ready, it is usually late for the mathematical purposes. The possible solution for the problem is the creation of some specialised tools, which the students can use for free, outside classes. One of them is the dictionary of mathematical terminology in English, which is now being prepared. For more details about the dictionary, see [3].

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References

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