Teaching in English at Engineering Education in Denmark: A presentation of experiences gained from development project

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ABSTRACT

The increasing use of English as language of instruction at Danish universities has become a highly political and ideological issue, and an object of heated debates. However, large parts of Danish higher education have embraced English as the language of instruction as a natural consequence of the internationalisation process that higher education is undergoing, and as a means to further transnational student mobility. The current debate at Danish universities centres upon possible implications of teaching in English for the quality of the courses, including the question of whether the teachers are sufficiently equipped to meet the challenges of teaching in English.

This paper presents and discusses experience gained from a pilot project initiated by LearningLab DTU and funded by a national fund, “Competency Development of Teachers who are Teaching in English at Engineering Education in Denmark”. The project is a collaboration between LearningLab DTU, The Technical University of Denmark, CUCE, Copenhagen University College of Engineering, and AAU, Aalborg University.

The purpose of the project has been to develop a concept for an English course that combines language development skills with teaching methodology. The course has been tailored to meet the specific needs of each participant on the basis of screenings comprising teaching observations, feedback, and individual interviews with the participants. Several courses have already been completed at the participating universities and the course will be offered again in the spring of 2010.

The long-term objective is to boost the quality of courses taught in English at Engineering Education in Denmark.

Keywords: Teaching in English, communicative language teaching, CLT, internationalisation, language strategy, teaching methods, constructivism

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1. Introduction

In the spring of 2008, LearningLab DTU, Technical University of Denmark, CUC, Copenhagen University College of Engineering, and AAU, Aalborg University, commenced the project “Competency Development of Teachers who are Teaching in English at Engineering Education in Denmark” whose outcome was a course for teachers who teach engineering courses at Danish universities and university colleges. The course integrates the development of language skills with pedagogical and educational development. Thus, the course concept is unique in its emphasis on a close and consistent interaction between developing the participants’ English skills and teaching methodology. The course is tailored to meet the specific needs of each participant on the basis of screenings comprising teaching observations, feedback, and individual interviews with the participants.

Several courses have already been completed at the participating universities, and the course will be offered again in the spring of 2010.

The idea behind the project was generated as a consequence of the debate on the increasing use of English as language of instruction at Danish universities. Both in the Danish media, at the universities, and in political circles possible implications of English as language of instruction are presently being debated. In 2008, the report “Languages on Time” was published which devotes a separate chapter to a discussion of English at universities and it offers the following recommendations to Danish universities (extracts from the recommendations of Languages on Time):

- Universities must formulate and implement language strategies
- Language strategies must justify the choice of teaching language(s)
- The language of instruction must be determined and announced in advance
- English teaching must be monitored and evaluated systematically
- Teachers and students must have access to language resource centres (for translation, revision, language teaching, tests, and certification of teachers’ and students’ language competences)
- The level of teaching in courses taught in English must be examined, and students’ reactions to language change from bachelor to master level must be analysed

The attitudes to English as language of instruction at universities in Denmark have tended to group into a predominantly English-positive wing and an English-critical wing. The English-critical wing is greatly concerned that the Danish language will suffer from loss of domains, i.e. that certain scientific subject can only be dealt with in English as Danish language for special purposes will be forgotten. Another cause of worry is that the quality of the teaching will deteriorate as neither teachers nor students work fully competently in a foreign language.

The English-positive wing emphasises the advantages of applying English as language of instruction at Danish universities as, among other things, it will improve the international competitive performance and as such constitutes a crucial element in the internationalisation process that Danish universities are undergoing.

However, both wings seem to agree that teaching in English poses a huge challenge that necessitates systematic and continuous development of the teachers’ language competences.

This article describes and discusses experiences gained from a course whose purpose is to constitute the focal point of such quality development of teachers across universities in Denmark.

2. Course Objectives

The overall course objective is to support teachers in engineering education in order for them to be able to teach proficiently in English as regards both language and teaching methodology. Through this, the long-term aim is to achieve:

- Quality boost of courses taught in English
- Spur teachers’ reflection on selection and application of teaching forms and methods including the importance of applying a variety of teaching methods
- Make teachers’ preparation time more efficient
- Optimise student learning outcome

The course concept that we have developed is first and foremost directed at teachers in natural sciences because of the cross-disciplinary subject fields and language domains across courses and programmes within the natural sciences. The concept is, however, generally implementable at all universities as the concept includes detailed description of methods and tools together with course materials.

3. The core principles of the concept

On the background outlined above we decided that the objective of the project in question would be to develop a course whose underpinning principle would be the development of the English language skills of its participants in close interaction with teaching methodology. This approach has entailed a number of other decisions as regards the pedagogical framework
of the course:

- The course is tailored to meet the specific needs of each participant taking into account pedagogical and linguistic focus areas that occur in specific teaching situations.
- In consequence of this and to facilitate a transfer of the language skills acquired on the course itself to real-life teaching situations, the course must take its point of departure in an authentic teaching context in which teaching exercises constitute the focal point.
- Teaching exercises and feedback have contributed to achieving a high degree of activity amongst the participants and learner activity is given high priority.

3.1 Why combine language and pedagogy?
As previously mentioned, our aim has been to combine development of the participants’ language competences and teaching methodology. Jørn Lund, director of The Danish Language- and Literary Society and co-author of the report Languages on Time, also recognizes the interaction between language and pedagogy:

Deselecting Danish as language of instruction is not simply a question of terminology. It is also a question of pedagogy. When teaching in other languages than one’s mother tongue, much energy is spent on constructing sentences and finding the correct terms. One can say what one has prepared but without necessarily having access to one’s own creative resources. And teaching is a creative process. It is of the utmost importance to good pedagogy sometimes to be able to go down alternative paths than initially intended and inspired by questions and inputs from the students.

Entering into dialogue in English with the students can be quite a challenge and thus prevent some teacher from conducting dialogue-based teaching. Flexibility and spontaneity in the interaction with the students requires a good command of the terminology of the subject taught as well as of colloquial language and it requires fluency and a high level of proficiency in spoken English. Therefore, it is in the interaction that teachers are likely to fall short if they do not possess adequate language competences. The vast majority of university teachers, on the other hand, are able to memorize and read a lecture script in English without missing out on important contents and nuances. Peter Harder, professor of English at the University of Copenhagen, shares this view and says in an article in The University Paper that most teachers can read a text or a script but will encounter difficulties when having to discuss the contents with the students.

A potential consequence of inadequate English language competences might be that teachers disassociate themselves from teaching that involves verbal interaction with the students. Taken to extremes this might lead to teachers resorting to one-way communication and lectures at random instead of making deliberate and reflected selections of teaching methods aligned with topic, contents and the target group in question.

Through our teaching observations (for details see chapter 4) we saw just how vast challenges some teachers were faced with when endeavouring to apply dialogue in their teaching. For this reason we decided to focus particularly on the dialogue-based teaching approach (see e.g. description of a course day titled Communication and Dialogue in Teaching (see chapter 4.2).

3.2 Differentiated teaching in an authentic learning environment
According to cognitive psychology theory information is best retrieved in situations that are similar to those in which it was acquired, and, as such, the ideal learning context is, in fact, one as similar to the one in which the learner is going to use the information. This line of thought is supported by recently quoted research indicating that information is best retrieved in situations that are similar to those in which it was acquired. This is because when we learn something our memories also record something about the context in which it was learned and even about the way we learned it.

In order to facilitate a transfer of the language skills acquired on the course itself to real-life teaching situations, we aimed at establishing an authentic teaching environment where teaching exercises followed by verbal feedback constituted the core. Thus, all course days included teaching exercises of various kinds with different and progressive linguistic and pedagogical focus points. The subsequent feedback comprised check points for language and pedagogy respectively as well as check points related to the interaction between language and teaching methodology in order to pinpoint the situations in which e.g. linguistic inadequacies impede the interaction with the students are not made clear. In continuation of the teaching exercises the participants worked en groups doing exercises on the specific aspects that were identified during the teaching exercises and the feedback. Through the teaching exercises and the screening sessions carried out prior to the commencement of the course, individual focus areas were also identified and taken into account during the course.

3.3 Learner Activity
In developing the course concept we have been strongly inspired by constructivist theory. The
constructivist learning paradigm builds on cognitive psychology and perceives knowledge as an individual construction that takes place in internal and external active mental processes. The most central idea of Constructivism is that human learning is constructed. Our new knowledge is built upon our previous learning. This view of learning contrasts with the one whose idea is that learning is the passive transmission of information from e.g. a teacher to the students.

This course assumes an approach to teaching and learning in which an attempt is made to move from a content-based view to a learning-centred view. To understand the learning-centred view it is necessary to consider the ideas behind the new paradigm, which are crucial for every aspect of teaching planning, namely the constructivist approach:

Two important notions orbit around the simple idea of constructed knowledge. The first is that learners construct new understandings using what they already know. There is no tabula rasa on which new knowledge is etched. Rather, learners come to learning situations with knowledge gained from previous experience, and that prior knowledge influences what new or modified knowledge they will construct from new learning experiences. The second notion is that learning is active rather than passive. Learners confront their understanding in light of what they encounter in the new learning situation. If what learners encounter is inconsistent with their current understanding, their understanding can change to accommodate new experience.

Since the constructivist philosophy has been essential for the planning of this course, the pedagogical dimension has been given high priority by e.g. placing great emphasis on active learning and taking its point of departure in the individual participant targeting the contents individually. The participants have been encouraged to explore a variety of teaching methods the intention of which has been to provide them with tools and inspiration for their future teaching practice. But also the content of the course itself has taken its point of departure in the constructivist ideas about focus on students’ learning and, as such, we have attempted to make it exemplary.

The constructivist idea of construction of knowledge as a result of active internal and external processes and the importance of authenticity of the learning environment is in consistence with the principles of CLT, Communicative Language Teaching, an approach that has gained ground within foreign language teaching and on which our linguistic approach builds.

CLT is usually characterized as a broad approach to teaching, rather than as a teaching method with a clearly defined set of classroom practices. As such, it is most often defined as a list of general principles or features. One of the most recognized of these lists is David Nunan’s (1991) five features of CLT. These five features are claimed by practitioners of CLT to show that they are very interested in the needs and desires of their learners as well as in the connection between the language as it is taught in their class and as it is used outside the classroom. Under this broad umbrella definition, any teaching practice that helps students develop their communicative competence in an authentic context is deemed an acceptable and beneficial form of instruction. Thus, in the classroom CLT often takes the form of pair and group work requiring negotiation and cooperation between learners, fluency-based activities that encourage learners to develop their confidence, role-plays in which students practice and develop language functions, as well as judicious use of grammar and pronunciation focused activities.

The five features are:

**Linking classroom language learning with language activities outside the classroom.**
This feature of CLT has been taken into consideration at the course by establishing a near-to-real-life learning environment integrating screenings and teaching observations, teaching exercises, and feedback in the course.

**An enhancement of the learner’s own personal experiences as important contributing elements to classroom learning.**
This feature of CLT has been taken into consideration at the course through the screening process prior to course commencement including interviews before and after the teaching observations, discussions of issues and problems related to the participants’ own teaching practice, teaching exercises supervised by “a critical friend” (see chapter 4.2, the paragraph on “Communication and Dialogue in Teaching), and more informal exchange of experience amongst the participants.

**The introduction of authentic texts - or problems - into the learning situation.**
This feature of CLT has been taken into consideration at the course through discussions of cases from the participants’ own teaching, by using the participants’ own teaching material, course descriptions and learning objectives, by including relevant texts from English and American magazines, papers and web sources.

**The provision of opportunities for learners to focus not only on language but also on the learning management process.**
This feature of CLT has been taken into consideration at the course through presentations, discussions and exercises on learning approaches, testing/assessing the
participants’ own learning styles, reflection exercises about acquired learning etc.

An emphasis on learning to communicate through interaction in the target language.
The course has been conducted entirely in English and numerous and varied communication- and teaching exercises have been included.

4. Course design
Based on our reflections as outlined in the previous chapters the project members discussed and outlined the overall course concept (concept model enclosed). This chapter presents and discusses experiences from the first courses held at Technical University of Denmark, Aalborg University and Copenhagen University College of Engineering respectively.

4.1 Screenings
In order to be able to identify the individual needs of the participants, screenings were carried out prior to course commencement. The screenings comprised:

- **Interviews** with the participants prior to the teaching observations. The purpose of interviewing the participants was partly to establish a safe atmosphere - to defuse the teaching observation – and partly to match expectations and agree on points to be considered during the observations. Duration: Approximately 30 minutes.
- **Teaching observations** of lessons lasting approximately 45 minutes based on a list of check points developed by the project participants.
- **Verbal and written feedback** on teaching observations. The observations were followed by verbal feedback in immediate continuation of the observations and a 2-3 pages summarised, written feedback including recommendations on to focus areas identified during the course.

4.2 The Course
Based on the initial screenings, the project participants – who were also the course instructors - developed a differentiated five-day course for each of the participating universities. When planning the course we took our point of departure in the written feedback from the screenings and divided the participants into groups according to level and recommended and preferred focus areas.

Not surprisingly, it turned out that some of the recommended focus areas coincided and, consequently, we were able to use parts of the same contents and course material for all three courses.

The major part of the time was devoted to small-group teaching the purpose of which was to address the specific needs and requests of each individual participant, to involve the participants actively, and thus boost their language confidence. These sessions were combined with short plenum sessions in which introductions/background information was provided by the course instructors.

The participants were encouraged to work with and apply various elements of the course contents (e.g. teaching methods) in between course days.

**Learning Objectives**
Based on the principle of developing English language skills in close and consistent interaction with teaching methodology, the course was designed to enhance the level of spoken English in formal, academic contexts.

In the project phase when developing the course concept, we formulated three overall learning objectives for the course in general. It was of vital importance that the participants would have improved their language competences significantly on completion of the course. However, acknowledging the fact that a course of this short duration (30 hours) probably cannot provide the participants with language competences adequate for teaching at university level, we made a point of providing the participants with methods and tools that would enable them to continuously develop their competences after the course had ended. Last but not least, we found it important for the participants to develop awareness of just how close language and pedagogy interact in a teaching situation.

On this background we formulated the overall course objectives which are as follows:

- The participants will strengthen their verbal English language competences in order to achieve a more varied, accurate, and correct communication in a teaching context (The linguistic focus areas were based on the individual recommendations of the screening process)
- The participants will be able to apply tools and methods that will enable them to develop their language and teaching competences continuously in the future
- The participants will become aware of how teaching methods, learning, and language skills interact including how different teaching methods may compensate for possible inadequate language skills

Based on the screenings we added a number of individual objectives within the linguistic areas vocabulary, level of formality, grammar, pronunciation and intonation combined with objectives within teaching methodology, e.g. learning approaches, learning objectives, advantages and disadvantages of various teaching methods etc.
Communication and Dialogue in Teaching – example of course contents

During the course, many aspects of both language and teaching methodology were included, and it is outside the scope of this article to describe each aspect in detail. As an example, however, mention should be made of one of the themes included in the course, e.g. “Communication and Dialogue in Teaching” which constituted the theme of the third course day.

As previously mentioned, one of the major challenges when teaching in a second language appear to be teaching with a dialogue-based approach. It is evidently hard for some teachers to facilitate the dialogue in the classroom while at the same time steering the dialogue in the intended direction, i.e. ensuring the planned learning objectives are covered while simultaneously taking into consideration a number of linguistic and pedagogical matters. Examples of such matters are e.g. making correct grammatical construction of questions, accuracy of language regarding both question and answer, using relevant question technique, paraphrasing answers from the students, gathering up loose ends, and generally keeping up a flow in the dialogue.

With that in mind, we formulated the following objectives for the course day on communication and dialogue in teaching:

- The participants will be able to define the different communicative functions of questions
- The participants will be able to formulate and use questions correctly in English
- The participants will be able to align questions in accordance with the proposed learning objectives
- The participants will be able to apply the dialogue-based method systematically in their teaching

Taking our point of departure in these overall objectives, we initially asked the participants to do language exercises in pairs and groups alternating with brief, theoretical presentations made by the course instructors. The language exercises comprised topics such as general question technique, different communicative intentions and functions of questions, types of questions in English (open/closed questions, direct/indirect questions, tag questions, negative questions, echo questions etc.), grammatical rules, and intonation patterns.

Having focused explicitly on the language of questions, we moved on to the pedagogical part. As an introduction, various types of dialogue-based teaching were presented and discussed including e.g. the teacher inquiry method10.

Based on written instructions and suggestions of points to be paid special attention to, the participants were then asked to prepare teaching sessions in pairs of two taking turns in acting as a “critical friend” whose role was to give feedback on the other person’s session and the ideas behind it. The teaching sessions were then conducted in groups of two followed by feedback from participants and course instructors.

5. Evaluation

As the first courses included newly developed and not tested methods, an extensive analysis of experiences was required in order to be able to adjust and develop future courses.

Evaluations of each of the course days were combined with both summative and formative evaluations on completion of the course and of the project. The objective of these evaluations was to pinpoint possible aspects to be taken into special consideration when running the course again in future.

A complete evaluation design was developed and carried through by an external evaluation consultant in collaboration with the project manager. The design comprised:

a. Focus group interviews (course participants from each of the three institutions)
b. Single interviews (project group members/course instructors)
c. Questionnaire (course participants from each of the three institutions)

After the focus group interviews with course participants from the three institutions represented in the project and individual interviews with members of project development group and teachers, a questionnaire was sent to all course participants. It consisted of 14 questions with fixed response categories as well as possibility for adding comments. The response rate was 68%.

In March 2009, two months after completion of the first round of courses at the three participating universities, an evaluation report was published. The following chapter is based on this report11.

5.1 Overall benefit from the course

Generally, the participants indicate that they were satisfied with the course. Asked to assess their overall benefit from the course (figure 1), 76% of the respondents say that they have benefited from or benefited significantly from the course, whereas 6% find that the benefit has been limited:
Q: What is your assessment of your overall benefit from the course?

This conclusion is supported by the questions in the questionnaire whose purpose were to assess the overall level of satisfaction. Asked e.g. whether the participants would recommend the course to their colleagues, the majority answers in the affirmative.

5.2 Course targeted to individual language and pedagogical skills and level

The screenings were singled out for special mention by the participants as well as by the course instructors. The participants all appear to agree that the screenings were very worthwhile as they generated ideas for individual focus areas during the course as well as for working systematically with these areas during the course and in-between course days. Finally, the screenings provided a good platform for dialogue on language and teaching.

When asked specifically about the extent to which the course took its point of departure in the participants’ language skills and level (figure 2), 94% answer that the course adequately or more that adequately took into account their language skills and level. 6% did not think that this was the case:

Q: To what extent did the course take its point of departure in your language skills and level

Asked the same question but referring to the participants’ pedagogical skills and level (figure 3), only 59% of the respondents say that the course fully took its point of departure in their pedagogical skills and level:

A relatively large proportion of the respondents (41%) seem to agree that the primary focus of the screening was on language adding that the pedagogical elements of the course were less differentiated and tailor-made to the needs and desires of each participant.

However, there is a mismatch between the participants’ perception of their own pedagogical competences and the assessment - based on the teaching observations - made by the course instructors. Based on the screenings, the course instructors identified a significant need for relatively basic tools despite the participants’ claims to the contrary.
Taking into account the participants’ perception of their own pedagogical competences, it is hardly surprising that the participants say that they only to a lesser degree have been introduced to tools and methods that enable them to develop their pedagogical competences when compared to linguistic tools and methods (see diagrams below).

5.3 Continuous competency development after course completion
The participants found that they had been provided with excellent tools enabling them to develop their competences continuously after completion of the course and they were confident that the quality of their courses would be enhanced. Some of the participants missed more references and information in order to be able to develop their competences even further.

Part of the explanation may be that most of the participants joined the course in order to strengthen their language competences and for this reason found language related tools and methods the most useful. Another reason which has been put forward in the evaluation report is that among teachers the pedagogical dimension tends to be seen as an immanent and integrated part of their professional competence while the linguistic dimension is perceived as something external and thus something that can be improved relatively easily through a course.

5.4 Sum up of evaluation
There seem to be a number of criteria for success which are of paramount importance for the effect of the course concept:

- Thorough screenings of the participants
- Good ratio of instructors per participant
- Different backgrounds and competences of the course instructors
- That the participants are from the same institution
- Highly application-oriented course contents including practical exercises

The following points should be taken into consideration in the future development of the course concept:

- The connection of and interaction between the pedagogical and the linguistic dimensions
- Screening of pedagogical competences
- Strengthening the link to the participants’ own teaching

6. Conclusion
In this paper, I have described the background and the objective of the project, “Competency Development of Teachers who are Teaching in English at Engineering Education in Denmark”.

I have outlined the project outcome, the concept of a course for teachers who teach Engineering courses at Danish universities in which development of English language competences goes hand in hand with teaching methodology. I have accounted for the underlying pedagogical approach as well as discussing choice of pedagogical methods. Finally, I have given an overview of the evaluation design and summed up and commented on the conclusions and recommendations of the evaluation report.

The overall conclusion is that the course has been successful in terms of contents, form and the benefit of the participants. The majority of the participants
indicate that they their teaching in English has improved and that they have been provided with tools and methods that enable them to continue improving their teaching with respect to both linguistic and pedagogical aspects.

According to the conclusion of the evaluation report, there appear to be a number of criteria for success that have been crucial for the effect of the concept, e.g. the screenings and an application-oriented approach emphasizing exercises closely related to the participants’ own teaching practice.

However, the evaluation also suggests elements that should be reconsidered, including differentiating parts of the pedagogical contents and strengthening the connection between the linguistic and the pedagogical parts of the course.

Thus, the course evaluation has given rise to careful considerations and reflections on how to adjust the contents for future courses. In the second round of courses held at the participating institutions in the spring of 2009, several changes were made particularly related to differentiating the pedagogical elements of the course based on more thorough screenings. It still remains a challenge to differentiate both pedagogical and linguistic elements while at the same time strengthening the interaction between these elements and between the overall course contents and the participants’ teaching practice.

To assess the long-term effects of the course on the quality of the teaching, we plan to compile data that enable us to make a comparative study in the near future, i.e. comparing student evaluations of a given course before and after the teacher attended this course and perhaps include teaching observations. This entails a close collaboration with the course participants, and the study administrations of the involved institutions as we shall need access to evaluations.

References


Individualization

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