Problem-based learning in the first or second language: Does it make a difference?

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Problem-based learning (PBL) is the key didactic approach in the curriculum of the Stenden Hotel Management School. Real-world problems are used to activate prior knowledge and to trigger a learning process aimed at expanding and elaborating students' understanding and competences. Since the hotel school accommodates an international student population, the entire programme uses English as the medium for communication. For approximately 90% of our students, English is a second language. This paper reports on the effectiveness of using the mother tongue (language 1) in collaborative learning, as opposed to using the student's second language. We did so by asking a group of 12 students, who all have Dutch as their first language to perform all PBL activities in English as they usually do. At a later stage, the same group was asked to do a similar task in Dutch. PBL sessions were videotaped in our PBL lab, transcribed and analysed. Utterances of students were divided into the following categories: (1) statements, (2) constructive statements, (3) arguments, (4) questions, (5) confirmations, (6) negations, and (7) source utterances. The utterance analysis was limited to the first five steps in a seven-step approach. The findings in this small-scale pilot show – in line with earlier research – that students mainly communicate factual statements, hardly ask questions, and seldom confirm each other's contributions when using their second language. However, when the first language was used, scores were more positive. Further research should show whether or not this is a structural finding. It was a surprise to notice that the English session contained nine minutes of "reading from paper" out of 32 minutes of reporting. In the Dutch session "reading from paper/tablet/phone" was absent.

Keywords: problem-based learning, second language, collaborative learning, verbal interactions, utterance analysis, English-medium education

Introduction

This article claims that the mother tongue, also referred to as language 1, is a superior instrument in acquiring dialogical knowledge in problem-based learning and is therefore to be preferred from a pedagogical point of view. In the Netherlands we have an ongoing debate on the growing influence of the English language in higher education (Zwarts, 2006). In order to be able to support the above-mentioned claim we first examine the political, educational and legal aspects in the debate. Furthermore we go into internationalisation and difficulties related to English-medium teaching for both staff members and students. Finally a case study contrasting the use of language 1 and language 2 will build further evidence in defense of the claim.

The present language debate

A growing number of schools in the Netherlands offer English programmes and use English as their main medium of communication. This holds true for secondary education in general and even more for vocational education. The Council on Education (2011) reports that the same tendency can be seen in Denmark, Norway and Belgium. The decision to offer an English curriculum is usually made on a variety of arguments. Most arguments in favour of English as a medium of communication relate to marketing strategies, internationalisation, the future career possibilities of students and recruitment of staff (Council on Education, 2011).

In the Netherlands the debate about the use of English as a medium in teaching and research dates back to the fifties and early sixties of the previous century (Coleman, 2006). As from 1990 onward to our present time, the growth of English-medium teaching has been impressive. Already in 2002 Maiworm and Wächter reported that the Netherlands and Finland had many English-medium courses. Recent research on request of the Dutch government shows that today many Master's programmes are offered in English, especially in agricultural, technical and economics courses (Council on Education, 2011).

From a legal point of view, higher education in the Netherlands has to foster and enhance the use of Dutch as a medium for communication in education and science. It should make a strong effort to preserve both language and culture. These requirements are stated explicitly in the law on higher education in the Netherlands (Law on Higher Education, 2016). Similar legislation can be found in Norway, Denmark and Belgium. The European Union follows a multi-language policy; ideally EU citizens should have high language skills in at least two languages next to their mother tongue (Coleman, 2006).

The choice for English

The learning process that higher education offers to students has become a commodity in a global market. Institutes for higher education are run as businesses with an emphasis on marketing (Coleman, 2006). The wish for further growth, for getting a larger segment in the "international market of learning" dominates the decision process. Institutes can only succeed by following internationalisation strategies and starting to use English as a medium for teaching and learning. The two simply go together.

Hospitality education at Stenden chose for English-medium teaching around 2000, with internationalisation as the strongest argument. As Smith (2004) stated, marketing grounds dominate the decision process, ignoring obvious difficulties that may arise when adopting English-medium teaching. Within the framework of this case study, the following problem areas are relevant:

- inadequate language skills among staff and students
- unwillingness of local staff to teach in English
- native speakers in English may have difficulties in adapting to non-native speaking students
- lack of critical mass of international students.

Critics of an English curriculum are afraid that both students and teaching staff may not have a sufficient command of the language, resulting in poor communication, misunderstandings and in general a more shallow learning process and superficial knowledge. The more refined and detailed aspects of a topic get lost in a culture of one-liners. Similar concerns can be found in the report of the Dutch Educational Council (2011). In his study, Klaasen (2001) stated that insufficient mastery of English by teaching staff leads to English-medium teaching that is less precise due to a lack of vocabulary. Furthermore, those lecturers tend to speak with more redundancy in order to get their message across, and speak much more slowly compared to their speech in the first language. Note that this research focuses on the quality of interaction within traditional teaching methods like lecturing.

When starting in PBL

Several studies (De Boer & Otting, 2010; Huang, 2005) have paid attention to the problems students have when making the transition from secondary to higher vocational education. These studies report problem areas for those who start in problem-based learning. Some of these problems relate to the use of English. Research by Huang (2005) in the UK showed that Chinese students were very often uncertain about the accuracy of their new knowledge. Several interviewees in her research stressed this. Consider the following quotes: "*After PBL sessions I was often unsure about what exactly I had learned in class*", and a fellow student saying: "*My English was not very good. Sometimes I was not sure if I had properly understood the case*" (Huang, 2005). International students will face a culture shock when coming to the UK and the Netherlands. This adds to the educational challenges related to starting to study in a PBL curriculum. No longer using the first language is also a drawback. As a Chinese student said after half a year in the Netherlands: "*Nothing is the same anymore and I sometimes feel lost and far away from home. PBL in English is difficult. I cannot say what I know*".

International students are not only far away from home in a literal sense, they also have to communicate in a second language both in daily life and in their educational programme. Insufficient language skills create feelings of uncertainty in both daily life situations as well as in collaborative learning. Uncertainty about their own learning process may also relate to the students' belief of knowledge being unchangeable, or being either true or false (Otting et al., 2009; Savory, 2006). Feelings of uncertainty may also relate to different views on authority and the shift from teacher-centred to student-centred education, which can be noticed by both Dutch and international students (Savory, 2006; Huang, 2005). Nevertheless uncertainty about your "level of English", feeling handicapped because of poor active (speaking, writing) and passive (reading, listening) communication skills, might well be a major block in fully participating in problem-based learning. When this is the case, then it will be a factor that cannot be changed overnight.

Finding the right words to express your thoughts, and understanding the specific shades of meaning in the utterances of fellow students will be a constant challenge for those engaged in the process of building knowledge together. Dialogic knowledge is essentially the outcome of a social process (Barrett, 2011). While discussing a task, students express existing knowledge, share it, elaborate on it and eventually create new insights (Visschers-Pleijers et al., 2006). The process of acquiring dialogic knowledge presupposes a rich interaction and high language skills among participants. Furthermore it also presupposes a desire for more democratic relationships and shared control when it comes to the procedures to be followed (Barrett, 2011).

PBL in a second language

Little or no attention has been paid to the impact of using English as a second language in a problem-based learning setting. Yet it is without dispute that PBL heavily relies on the language skills of both students and tutors. Every PBL session is in itself a small language festival. Students interact with one another and together they build new knowledge. Collaborative learning presupposes a high command of the language both receptive and productive.

Savory (2006) gives an overview of how problem-based learning developed over the years and the way in which it shows similarities and differences with other experimental approaches to teaching. In his article he states that problem-based learning involves problem solving skills, general communication skills, critical thinking skills, argumentation skills and collaborative skills. All these skills relate directly to the language skills students have in the language they use – justifying attention for the role of language in collaborative learning. The following example of our own daily practice as a tutor illustrates and details the kind of difficulties we encounter.

Recently, in a PBL session with 12 students who were in their second year, the tutor asked the group whether the article that they had read was from a peer-reviewed journal. They did not understand the question, one student answering that he had not seen the news the previous day, taking the English "journal" for the Dutch "*journaal*" (news bulletin). Basic words like "peer" and "reviewed" had to be explained before we could go into the actual issue of the credibility of the source they had used. Our daily practice as tutors is crowded with these kinds of misunderstandings.

The example illustrates that students sometimes bluff their way into a topic, guessing for meaning while having a fundamental lack of vocabulary. Some do so with surprising ease, impressing fellow students who do not ask critical questions. The sense-making process that PBL is supposed to be then becomes non-sense when the group is not able to recognise and correct misinterpretations. In situations like this we need critical questions, but as Yew and Schmidt (2007) and also Aarnio et al. (2012) report, students seldom ask critical questions. Students involved in constructing new knowledge find it hard to evaluate the quality of their new findings. Evaluation of your own findings and the findings of fellow students is largely absent, since we see few critical questions or source statements.

The example also shows that tutors in their interventions easily use words or specific terminology that is unknown to students, thus creating misunderstandings. Specifically, native speakers tend to overestimate the passive understanding of students (Coleman, 2006). Simply asking whether the information was "checked by experts" before it was published might have prevented the misconception.

Concluding, we want to state that both students and staff have a challenge to find the right words that help us create a common understanding, and shared knowledge. The active and passive command of the language seems vital for those involved in the process of dialogical knowledge construction.

Additional evidence showing the importance of social interaction in PBL comes from language teachers. The interaction aspect of PBL is so strong that language teachers, teaching English as a foreign language often see problem-based learning as an ideal didactic approach for training language skills. In other words there is a strong link between the didactic approach of PBL and the language skills of participants. Therefore attention to the language aspect in relation to the quality of the learning process seems to be more than justified.

In this study we would like to gain insight into the quality of dialogic knowledge when using English (language 2) as opposed to using Dutch (language 1). We do so by analysing the verbal utterances of participants in PBL using the approach of Yew and Schmidt (2007). This will help us to see whether or not the choice for a specific language influences the learning process of dialogic knowledge construction. Outcomes are expected to be relevant for tutors, course designers and educational policy-makers.

Method
Participants
A group of 12 students was asked to first do the first five steps of a seven-step approach in English. The text of the explanation problem will be in English and is part of their regular programme in the second year module "Planning". The group had been functioning in the same setting for four weeks and had PBL in English for 12 weeks. All group members had Dutch as their mother tongue and all followed medium level hospitality education (MHS), a programme offered in Dutch at different institutes in the Netherlands. MHS students have the legal right to continue their study at the Stenden Hospitality Management School. In contrast to international students they do not have to do a language test before entering. Internships for half a year in the hospitality industry were part of their prior education and allow them to start in the second year. At the

time of the study they had followed half a year of English-medium education. One student in this group had two years of PBL in English at the Stenden Tourism Management School. Considering her experience with PBL at Stenden University, group members tended to ask her for advice.

The group started in English with a PBL-problem on total quality and change management. In analysing and discussing the problem, a variety of approaches could be used. Both the starting up session and the reporting session were videotaped. We asked the same group to do another PBL problem using their mother tongue (Dutch). This second problem was about cultural differences and managing diversity. The group had the same tutor on both occasions and the problems were part of the regular programme. Both PBL problems offer the opportunity to study a variety of sources and are related to practical experiences of the group, thus making it possible to link new findings to existing knowledge.

The PBL sessions were video-recorded in the PBL laboratory offering ideal circumstances – hidden cameras in the ceiling. Our main goal was to see whether or not the use of English (language 2) or Dutch (language 1) made a difference in the quality of the learning process. We made recordings, and asked for permission to videotape the session – promising that recordings would only be used for research purposes. Students had no objections to the study and all signed a form of informed consent.

Instrument
We analysed students' contributions by using the model of Yew and Schmidt (2007), following their definitions of terms as well. Table 1 gives an overview.

We make a distinction between three dimensions: a critical, a co-constructive and a process dimension.

The critical dimension of PBL can be related to two sets of utterances, questions, and utterances about sources. We distinguish critical questions, verification questions and clarification questions. Next to asking questions, we would like students to compare sources, to characterise and evaluate them. We label these utterances as "source statements" and add them to the model of Yew and Schmidt. All activities mentioned add up to a critical reflection on the quality of their prior and new knowledge acquired. When PBL is done on a high level, we expect these utterances to be frequently used. Aarnio et al. (2012) reported that students seldom bring out differences in conceptual thinking and have little depth in their argumentation when they do so. This is an area that needs improvement.

The co-constructive dimension contains all utterances that help to build up knowledge through social interaction. The following utterances fit into this category: statement, constructive statement, argument, counter argument, open question and explanation question. When we take the co-constructive and the critical dimension, together they build the task-oriented dimension (Bales, 1950).

Next to the task-oriented category we have contributions that are process-oriented (Bales, 1950) containing all utterances that focus on procedures, time, discussion rules, ways to report, giving turns, etc. Listening also belongs to process-oriented behaviour, together with encouraging others to give their views, reducing conflict (harmonising), paraphrasing what others said, and summarising.

Table 1: Kinds of utterances

Type of utterance	Defined as	Abbreviation
Statement	Provides factual info containing no indication of reasoning or analysis	S
Constructive statement	Here a concept is related to another concept	CS
Argument	Indicates reasoning and builds on logically to a previous utterance	A
Counter argument	Indicates reasoning and contradicts previous utterance	CA
Open question	Elicits new information and explanations	Q op
Critical question	Casts doubt or indicates the need to reevaluate a previous utterance	Q cr
Verification question	Shows the intent of checking one's own ideas or reasoning	Q ve
Explanation question	Question inviting others to give an explanation	Q ex
Confirmation	Agreement with previous utterance, with no indication of reasoning or analysis (usually Yes)	CON
Negation	Disagreement with previous utterance, with no indication of reasoning or analysis (usually No)	NEG
Source statement	Statements that refer to the quality of a source	S.Sta

Note: The categories Q ex and S.Sta were added to the original model of Yew & Schmidt.

Results

Table 2 shows the main results. When using their first language (Dutch), 54% of the utterances are statements containing factual information without any reasoning or analysis. This is a high percentage and in line with the findings of Yew and Schmidt (2007) who call this a worrying sign. When using English, their second or third language, this percentage is even higher: 69%. It looks as though the use of the second language results in an even stronger use of factual statements.

Relating concepts to each other – constructive statements – was higher in the Dutch session: 11% versus 2.5%.

Questions on procedure were higher in the Dutch session (11.3%) as compared to the English one (6.3%).

Discussion

Both sessions showed a very high percentage of factual statements. In combination with few critical questions this is a worrying sign and fully in line with earlier research (Yew & Schmidt, 2007; Aarnio et al., 2012).

When analysing PBL interaction between students, the question arises: "What is the appropriate unit of analysis?" Is it "sentence", which is a linguistic unit; is it "utterance", which is a much wider concept or should it be "behaviour"? The choice for a unit of analysis is important as it influences directly what you interpret and what you leave out.

Listening behaviour, for example, will not be scored when you take "sentence" or "utterance" as a starting point. Yet tutors will say from their own experience that "listening" is as

Table 2: Frequency of utterances

Type of utterance	Language 1: Dutch	Language 2: English
Statement	54%	69%
Constructive statement	11%	2.5%
Argument	1.8%	10.1%
Counter argument	–	–
Procedure question	15%	7.6%
Open question	1%	–
Critical question	1.8%	1.3%
Verification question	1.8%	–
Explanation question	1.8%	–
Confirmation	11.8%	7%
Negation	–	–
Source statement	–	2.5%

vital for the quality of interaction as is speaking. It influences the level of contributions and discussions. When only a few fellow students really pay attention, then why would you bother about your contribution, the quality of your arguments, or making your point in general? In an analysis using "utterance" as a starting point, vital elements like listening will simply not be scored. This holds true for our study as well, as we decided to follow the method of Yew and Schmidt (2007). In retrospect we regret that we could not pay attention to listening behaviour as it is so important in building up dialogic knowledge, and recommend it to be incorporated in further research.

Table 2 shows that this particular group generally performed better in their first language compared to the English-medium session. Looking at the video recordings, one can also notice a higher level of involvement of the students when using their mother tongue; they speak much faster, make jokes and seem to enjoy the process. The overall group dynamic is much livelier, and there seems to be a stronger will to get to results. To our surprise – since it was not our primary focus – we noticed that students in the English medium session tended to read a lot from paper (9 minutes out of 32 minutes of reporting) when presenting their findings, whereas reading was absent in the Dutch session. After having looked at the video recordings a number of times it was noticeable that reading makes the session stiffer, slower and less dynamic. The effect of reading instead of telling seems to be of utmost importance, because of losing flow in the session and also because reading shows that you have difficulty in both grasping as well as communicating the content: we see a more shallow learning process.

Three of our main findings, (1) reading from paper, (2) focus on factual information and (3) few critical questions, should ring alarm bells since they are indicators of a more shallow level of collaborative learning – to put it mildly. Scores of the first language session were more positive on all three aspects, showing that these students were able to have a higher variety of contributions, could do without reading out texts and were able to ask critical questions. The medium of communication as such seems to have an effect on the nature of collaborative learning. Our findings are striking, worrying, and they indicate that – when looking at the quality of the learning process – English-medium PBL may not be the best vehicle available for non-native speakers.

Further research may show whether or not our findings are incidental or more structural in nature.

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