

# Topic Oriented Mixed-Method System (TOMMS)

## A Holistic System to Integrate English Language Classes into English-Medium Instruction Courses in European Higher Education

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**Abstract.** This paper addresses the issue of English-Medium Instruction (EMI) in European higher education, which has been referred to as ‘the language of higher education in Europe’ [1]. It outlines the goals of this new phenomenon, analyses the current situation and evaluates potential limitations. It investigates how, using team-teaching, inverted classrooms and active classroom techniques, potential hurdles may be reduced. How, through careful planning and coordination, students and teachers alike, can be prepared for the new challenge of teaching and learning content through English. It goes on to outline a systematic approach, coined by the authors as the Topic Oriented Mixed-Method System (TOMMS), where each topic is initially addressed in a contact lesson with a Language Teaching Expert (LTE), to prepare students, it then introduces them to the theory in self-study sessions, before applying the theory, under guidance of the Content Expert (CE), in tasks and projects. This paper provides a holistic mixed-methods pedagogical approach to address the issue of knowledge transfer in EMI programmes using state of the art methodologies to allow the LTE to support the CE in planning and teaching of content. It offers higher education institutes (HEIs), who may be averse to teaching content courses in English, an effective system to implement EMI and, for those that already have, it offers ways to improve the efficiency of them.

**Keywords:** English as a Medium of Instruction (EMI) · Inverted classroom  
Blended learning · Active classroom · Web-based learning · Project-based learning  
Team-teaching

## 1 Introduction

English as a Medium of Instruction (EMI) is well described as “The use of the English language to teach academic subjects in countries or jurisdictions where the first language (L1) of the majority of the population is not English” [2]. This growing global phenomenon [1] is employed in a quarter of all universities across Europe [3] and the spread of English is said to be “inseparable from globalization” [4]. However, is this medium of

content transfer really as efficient and effective as teaching in the native tongue? Here the data is unclear as there is a lack of empirical studies [5].

Can content teachers be expected to achieve the equivalent level of knowledge transfer in a foreign language? There is conflicting evidence from studies [6–8] as to whether it does indeed lead to a reduction in academic outcomes, but experts agree that further research is urgently required [5]. Also, there is a general perception that implementing EMI without the required support ‘may actually hinder students’ acquisition of the subject matter being taught’ [8].

Another issue is whether students can really be expected to learn language indirectly from EMI content lessons without the support of a language specialist? This problem was anticipated for in the early stages EMI, notably at the Maastricht University in the mid-1980s, where the importance of involving the language teacher in the planning and implementation of the content courses was well known. As stated by Wilkinson, in his chapter in *English-Medium Instruction at Universities* [5], content teachers would discuss each lesson with the English teacher, before and after, to ensure that pedagogical goals were being met. Wilkinson goes on to explain that content lessons were monitored by an English teacher who would offer feedback and help students at the end of content lessons. This close coordination of the two departments allowed the teachers to tweak the lessons to better support each other and was a contributing factor to the programme’s success (Ibid).

It is the authors’ contention that EMI courses are now being used in European higher educational institutes as a matter of course, but the amount of care and consideration that goes into the planning of syllabi, materials and methodologies is underestimated and, therefore, not performed optimally. In this respect, it is the aim of this paper to answer the following question:

*How to enhance knowledge transfer on EMI courses through improved interdisciplinary synergy by implementing state-of-the-art pedagogical approaches and methods?*

Derived from this aim, this paper starts with a literature review addressing the aims of EMI, the current situation in Europe as well as critical issues. Based on this knowledge the authors have developed a framework which can act as a reference model for topic-based cooperation of language and content teacher using state-of-the-art pedagogical methods. Subsequently, an exemplary practical implementation of this model is described. At the end of this paper, the authors discuss the practical implications and limitations of the framework and address aspects for further research.

## 2 English-Medium Instruction

### 2.1 Drivers and Aims

The EMI approach of integrated language and content transfer has shown exponential growth in European universities over the past twenty-five years. The development, driven by internationalisation [9], can cause difficulties for indigenous students due to their language capabilities, as well as staff, due to inadequate language skills and unwillingness to teach through English [1].

The aims of EMI in European universities are ‘enhanced employability for domestic graduates, institutional prestige and greater success in attracting research and development funding’ [1]. EMI is intended to increase the global employability of students, through improved linguistic competence in the subject matter, and to improve English language proficiency [10], however, EMI sets no requirements or guidelines regarding English language skills. It may be assumed, that English-language learning will be a by-product of learning the content, but complications of content knowledge transfer must also be considered. Dearden states, “how are students supposed to understand lectures and classes if the EMI teacher does not help [them] with their knowledge of English” [2].

## 2.2 Current Situation

English-taught programmes (ETPs) in European universities have increased, according to studies by Maiworm and Wächter [3, 9, 11], from 725 in 2001 to 8089 in 2014, with 27% of higher education institutions (HEIs) now offering at least one ETP. Nordic regions are leading the way in the march with 61%, Central West Europe has 44.5% of HEIs offering ETPs, and nearly six percent of all programmes in HEIs in Europe are English-taught programmes [3].

Studies have shown that the level of English language proficiency of students and staff was shown to be perceived as adequate but potentials of English language diversity of the students viewed as a problem [3]. The issue, in the authors’ opinion, seems not to be whether the students and teachers meet basic language requirements but more that they are reduced in their capacity to express themselves as they would in their native tongue.

A further issue is the amount of language support classes or rather lack of them. Wächter and Maiworm’s study [3] showed that around one-third of the HEIs in the study provided no language training at all for students on ETPs and that it was more common to be offered language support on Bachelor programmes in comparison to Master or PHD programmes.

The statistics regarding English language training for academic staff were no more reassuring, finding that even though half of master programmes, and nearly three-quarters of Bachelor programmes, stated English proficiency as an important selection criterion for the recruitment of new academic staff, mandatory English courses for academic staff are rather rare (19% for Bachelor and 11% for Master programmes) [3].

The size of the HEI is a major factor in the decision to offer ETPs, with over 80% of larger HEIs, of 10,000 students and more, offering at least one course, but only 14% of small HEIs having at least one programme on offer [3]. This, as the authors state, is unsurprising as the larger the institute the more programmes generally on offer. However, it does illustrate a need to implement such programmes in these smaller HEIs, therefore, allowing them to contribute to the contingent offering programmes for international ERASMUS students.

So, which students are taking advantage of the EMI courses, indigenous or foreign students? According to the most recent study [3], just over half are foreign students, which shows that the initial aim of internationalisation has been successful. However, upon further analysis, it can be seen that the number of foreign students on Master

programmes (57%) is markedly higher than bachelor programmes (39%) (Ibid.). Wächter and Maiworm summarise, that “This finding supports the assumption that Bachelor programmes more often serve as a means to make domestic students fit for the global market while Master programmes more often suit to attract foreign students as top talents for the own labour markets, as fee payers, etc.” (Ibid. p. 83).

### 2.3 Critical Issues of EMI

The rise of English as a global Lingua Franca, although long predicted [1] and widely practised, still faces many hurdles in education. Dafouz and Nunez, in Doiz, Lasabaster and Sierra, warn of possible implications for pedagogical practices and learning outcomes [5]. Coleman states, that even if content teachers have adequate English language proficiency skills, they may well lack the knowledge of the demands of higher level education through it [1]. Dearden goes on to say that “EMI teachers are not, or at least do not see themselves as, language teachers” [2] and Sowden points out another issue, that both teachers and students are forced to ‘embrace and foster a variety of English which up to now they have learnt to treat as inferior and by doing so risk undermining their academic self-image’ [12].

Some HEIs are reluctant to introduce EMI courses, due to inadequate English skills of teachers and the resulting resistance to teaching in this medium [3], as they may perceive themselves as not fully capable of achieving the required language level [13]. Studies [Arantegui et al. and Dafuz et al. in, 5] have shown that although lecturers strongly supported introducing subjects using EMI they did not themselves feel prepared enough to teach it.

It may also be argued, in the age of EMI, that classical English lessons are superfluous, which could lead to a reduction in teaching hours for English as a second language (ESL) teachers. However, even if English language lessons are still offered, they may not necessarily be aimed at supporting the EMI classes, or the students’ explicit requirements surrounding them, but rather at generic English language skills.

Although EMI has been in practice across HEIs in Europe for over 30 years the amount of empirical research to prove its effectiveness is lacking [5]. Much research is still needed in order to ascertain how much language is actually being learnt, and if there is a compromise in the level of academic content conveyed. However, research in contexts of immigration shows evidence that ‘this type of learning is not very effective’ [Shohamy in, 5].

## 3 Topic Oriented Mixed-Method System - TOMMS

### 3.1 Aims

In order to address the issue of effective and efficient knowledge transfer in EMI courses, the authors have derived the following criteria, which is to be taken into consideration when selecting methodologies and approaches: increased levels of cognitive work in the classroom, interdisciplinary synergies, cost efficiency of classes, improved course flexibility and increased individual learning.

### 3.2 Methodologies Applied

The mixed-methods pedagogical concept developed is a building-block system and has been coined the Topic Oriented Mixed-Method System (TOMMS), it applies inverted classroom, blended learning, active learning and project-based learning, as well as team-teaching, to improve learning effectiveness and efficiency.

**Inverted Classroom.** This methodology was chosen to fulfil the criteria of improved course-flexibility, increased individual learning and cost efficiency of classes.

An inverted classroom approach will be used to introduce theory, as distance E-learning [14], prior to the session with the teacher. In this way, all the students will come with a basic understanding of the topic, from previewing the theory at home, allowing them to be able to process the information at their own pace [15], and evens out potential disadvantages and misunderstandings due to language deficiencies.

King [16] first broached the idea of changing the learning process from the traditional transmittal model, whereby knowledge is seen purely as generic input, to a constructivist one, where the learner's existing knowledge is used to help them understand new materials, in the article "From sage on the stage to guide on the side". With it came the notion of changing the teacher's role from central figure to support person, which was later developed by Lage et al. [17] into the inverted, or flipped, classroom approach. Here out-of-class asynchronous theory is combined with synchronous classroom tasks and activities, and the learner's role goes from passive observer to active participant.

Decentralised teaching methods, as opposed to frontal teaching and rote learning, are relatively commonplace in English language classrooms and aim to increase motivation through participation [18]. Additionally, this methodology can lead to reduced costs which are of relevance to counteract team teaching methods employed.

**Blended learning.** Blended learning can be more successful than a non-blended approach and aims to support effective and efficient knowledge transfer by obtaining "a perfect blend between face-to-face learning done in the classroom by teachers and online learning experience done outside the classroom as a complement" [19]. In a study by Thompson [20], learners showed improved accuracy of 30% and an increased learning tempo of 40% in comparison to a non-blended approach control group. A Meta-Analysis and Review of Online Learning Studies, by the U.S. Department of Education [21], into face-to-face instruction compared to blended learning in K-12 students, showed that blended learning improved student performance over face-to-face and also over purely online learning techniques.

**Active Learning.** As sections of the theory are moved from the classroom to web-based environments it is important to implement new activities into the contact teaching time. This, done through active learning, aims to actively involve students in the learning process. It uses Bloom's taxonomy model to progress from lower order thinking tasks to higher level cognitive work. For the purposes of this paper, a more real-world problem-solving approach will be taken and methods such as task-based and project-based learning will be suggested.

Student centred learning (SCL), which has always been seen as conducive to learning in EMI classes, reduces pressure on teachers to produce English language content at an equivalent level to that of their L1 [5]. SCL allows the student more scope and responsibility by implementing methods such as task-based learning (TBL) and problem-based learning (PBL), whereby the learners are required to use language skills in order to perform tasks and solve problems. Such higher-level cognitive activities, according to Bloom et al. [22], increase learner motivation, engagement and understanding, and therefore ultimately student success.

This higher-level cognitive work will be done in face-to-face sessions. The theory is applied through active learning [23], under supervision of the teacher, or teachers where team-teaching is employed, and will typically be done in groups, allowing for focus on their individual needs, in order to increase student engagement and promote understanding of the core content [24]. Research also suggests that this active participation, whereby students are engaged in solving problems through discussion and collaboration, improves knowledge understanding and therefore retention [25].

**Project-based Learning.** This methodology was selected to increase the amount of individual learning in the classroom. Project-based and task-based learning are both student-centred learning approaches, where content is taught through problem-solving and critical thinking, instead of rote learning, to engage students in real-world situations [24]. It is often employed in language teaching as a top-down method, that exposes learners to language in its full natural form, before going on to focus on specific aspects of it, this is called a “meaning-based approach” by Willis and Willis [26]. It uses active learning methods to apply learnt theory, in interactive situations [27], and “requires learners to arrive at an outcome from given information, through some process of thought, and which allows teachers to control and regulate that process” [28]. In regards to language learning it has more recently been defined as “a goal-oriented communicative activity with a specific outcome where the emphasis is on exchanging meanings not producing specific language forms” [29]. In addition, this methodology again supports higher-level cognitive work and interdisciplinary projects.

**Team-Teaching.** Coats, in Doiz et al. [5], suggests that the neglect of focus on language in EMI may in part be due to the fact that the EMI instructors are lacking in language training as well as language proficiency (Ibid., p. 117). Tandem teaching, with a Content Expert (CE) and a Language Teaching Expert (LTE) working together, may help to remedy this by creating interdisciplinary synergies and is a cornerstone of TOMMS. However, it must be stressed that this collaboration must exceed the teaching task alone and should also include syllabus creation, material design and the planning of classroom activities.

### 3.3 Language Acquisition Approaches

The model of Second Language Acquisition (SLA) that TOMMS is based on is the Input Hypothesis, this states “that in order for acquirers to progress to the next stage of the acquisition of the target language, they need to understand input language that includes

a structure that is part of the next stage” [30]. Such comprehensible input, or input at  $i+1$ , was originally described by Krashen as “when we understand language that contains structure that is “a little beyond” where we are now” [31].

This comprehensible input approach is further developed by Long, in his Interaction Hypothesis [32], which states that the effectiveness of comprehensible input is greatly increased when learners have to negotiate for meaning. This can be understood in the form of classroom tasks whereby the students are forced to communicate in English whilst debating topics and discussing their opinions.

In TOMMS, language teaching experts work closely with content experts, to develop materials in a contextualised framework, which introduces new topics in order to extrinsically motivate students, whilst stimulating interaction, and encouraging learning skills and strategies. The teachers prepare materials in such a way that when the students come to the lessons they will encounter new concepts as comprehensible input in low-stress situations. This means, that they are prepared with tools and vocabulary to be able to conceptualise the idea and learn language simultaneously. They are also supported, whilst they work on group tasks and problems, and implement the target language in interactive communication.

### 3.4 Conceptual Framework

By implementing the above-detailed methodologies and approaches, into an existing EMI content lesson, the building-block strategy called Topic Oriented Mixed-Method System (TOMMS) has been developed and coined.

TOMMS ensures that students are initially exposed to new concepts in a physical language lesson, taught by an LTE, who supports the students’ needs in regards to new language constructions, techniques to manage complex concepts in English as well as introducing the topics themselves. This initial lesson is followed by a self-study session where, through blended learning, the principles and theories behind the concept are further explained. Thirdly, the students attend a physical EMI lesson where the CE, possibly aided by the LTE in a team-teaching approach, guides and supports the students, while they apply the learned concepts, in interdisciplinary long-term projects. It is in this phase, that the students are instructed, under the premise of the active classroom, in the implementation of the principles, in what Bonwell and Eison [23] call meaningful activities, that require students to think about what they are doing. Finally, students are required to work independently, at home, on creative output. These individual parts, content lesson LTE, self-study, content lesson CE and creative output, complete one block and cover one topic, they are then repeated for each topic in the curriculum. The individual tasks and projects merge, to form an interdisciplinary long-term project, that runs in parallel, therefore, allowing the students to combine the individual topics, concepts and theories into one solution-based example (see Fig. 1).

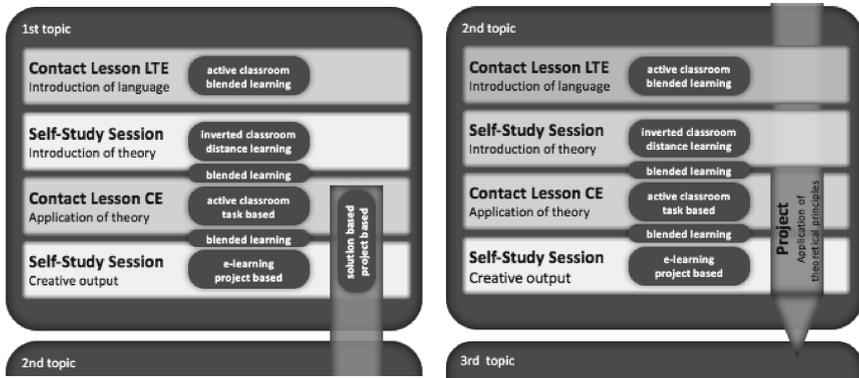


Fig. 1. Conceptual framework TOMMS

### 3.5 Implementation

In this paper, the syllabus, methodological planning and materials creation phases are not detailed due to space limitations, but were performed through the close collaboration of the LTE and the CE.

The conceptual framework was implemented in the course Innovation Management, in the degree programme Automotive Mechatronic and Management (AMM), in order to create synergies across the disciplines and competence areas of each expert. Originally this course did not include any ESL quota, it was, therefore, necessary to reduce the amount of CE teaching time, through blended learning and self-study, in order to be able to allocate teaching time to the LTE. It is, therefore, cost neutral and includes the equivalent amount to teaching hours, it is however more effective and efficient as both lessons now support, and build upon, each other and the finished product should ideally be more than just a sum of its constituting parts.

Figure 2 is an excerpt from the AMM syllabus showing the individual lessons and self-study session, of one topic from a total of five, illustrating the interdisciplinary synergies.

<p><b>Contact Lesson LTE</b></p> <p>Active classroom, Blended learning</p> <p>In this lesson, the topics of <b>Creative thinking</b> and <b>Problem-solving</b> will be introduced.</p> <p>The subcategories of <b>Incubation / convergent and divergent thinking / creative cognitive approach / the Explicit-Implicit Interaction theory, the Honing theory, and conceptual blending</b> will be researched and discussed.</p> <hr/> <p><b>Self-Study Session</b></p> <p>Inverted classroom, Blended learning</p> <p>In order to prepare you for the lesson on <b>Open Innovation, Idea management, and Creative process &amp; creativity techniques</b> you are required to read: <b>Textbook pages 83 to 131</b> and to watch the videos linked below.</p> <p>Don't forget to participate in the forum discussion posted below.</p> <ul style="list-style-type: none"> <li> Text Book Innovation and Product Management</li> <li> Open Innovation</li> <li> SCAMPER</li> <li> Discussion:</li> </ul>	<p><b>Contact Lesson CE</b></p> <p>Active classroom, Task/project based, Blended learning</p> <p>In this lesson moderated <b>Brainstorming on Identification of advantages and risks of Open Innovation</b> will be performed with under guidance.</p> <p><b>Students will be tested on theory learned in the self-study session</b></p> <p><b>Feedback Quiz:</b> Idea Management and OI-Tools</p> <p><b>Project task 2:</b> Presentation of PESTEL-tables and scenarios on pin board (gallery method)</p> <p> Slides Gaubinger Part 3 (115-179)</p> <hr/> <p><b>Self-Study Session</b></p> <p>Task/project based E-learning</p> <p>Project task 3: Preparation for an idea workshop focusing on ideas for variation and innovation</p> <ul style="list-style-type: none"> <li> Project Planning Overview</li> <li> Creativity Workshop Template</li> </ul>
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Fig. 2. Implementation of TOMMS (excerpt)

Initially, students are introduced to the main topics, creative thinking and problem-solving with language pertaining to them, in the contact lesson with the LTE. Students work in groups, on an online research task, where they are given different subcategories to investigate and then are required to explain their findings to the others. In this way, all students are active all of the time, whilst completing specially designed activities. This is followed by a reading and writing task, to expose them to language structures, required for the content class.

Subsequently, students are given multi-media materials, in a self-study session, which introduces the main content theory to them at their own pace before coming to the physical content lesson with the CE where these will be applied to real-world scenarios, in the form of a project, whilst receiving individual guidance from the content teacher. In addition, some time is taken in the contact lesson to check the understanding of the theory learned, through digital testing methods, whereby the results can be evaluated immediately and any deficiencies addressed. Students are also required to present the findings of a previous task (PESTEL tables) to their peers, which leads into a class discussion, on similarities and differences of various problem-solving skills, previously learnt.

Finally, students continue to apply the theory learned into their allocated projects, via a self-study session, where support is offered through chat forums and in person at the university.

## 4 Discussion

The English-Medium Instruction approach, with the supposition that language learning will be a by-product of the content lessons [6], is seen by the authors as credulous and the probability that effective transfer of content knowledge will be reduced, due to language obstacles, must be considered. Some of the basic principles and practices, as discussed in the introduction, that were initially employed in the Maastricht university, have been forgotten and this has led to ineffective practices where content teachers are unsupported and face issues for which they are not equipped to deal with.

Additionally, the linguistic objectives of the EMI courses need to be clearly defined and the teacher needs to be able to support the students with their knowledge of English [2]. TOMMS aims to illustrate how this can be effectively implemented, with language lessons introducing content, and preceding the content lessons themselves, thus creating the core competencies and skill sets needed to tackle academic materials in a foreign language. Again, the importance of the content expert and the language teaching expert working together in the creation of syllabus and materials, plus the continued collaboration during the teaching semester, cannot be understated as one of the underpinning concepts of TOMMS.

One of the major issues of English-taught programmes is the variation of academic ability of students [3], although not solely due to the new medium of instruction this variation may be emphasised (Ibid.) by it. The use of inverted classroom techniques is vital in order to prepare students for new academic topics, by supplying materials, which they can watch at their own pace, using the techniques taught to them. This allows for

more effective knowledge transfer, and ‘levels the playing field’ of student ability before they attend a contact lesson.

There is a risk that students will not participate in activities or learn sufficient content [25] from the online activates set for self-study. As with all out-of-class activities, it is essential to check understanding at intervals, to reduce the possibility of students misunderstanding and falling behind. Here it is suggested to ‘test’ student’s knowledge briefly, after each self-study block, during the contact lesson. This could be formal paper tests or quick opinion poll questions, through web-based apps, to get a general feeling of understanding. The teacher then has the possibility to re-address areas deemed necessary or to expand on the basic premise through active learning higher order tasks.

Teachers may lack the necessary skills to be able to implement the methodologies and tools described as well as possibly having a low affinity for them. It is the intention of this concept that teachers are guided, on a one-to-one basis, during course planning, by a methodological expert, and are able to choose the tools that they see as appropriate for them. They are then aided in implementing and setting them up. In this manner, it is hoped, that insecurities and aversions be reduced. Another issue is the involved development costs and time in creating new materials and applying such methods, which may even require dedicated members of staff initially. This is, in the author’s opinion, unavoidable and must be accepted if the HEI is serious about developing itself in EMI, and therefore reaping the rewards that go with it.

The TOMM system is currently being implemented in one study programme in the university of applied sciences in Wels, Austria. Upon completion of the trial phase, predicted to be in 2018, it will be rolled out across more study programmes and disciplines. However, the actual effects on, and improvements in, knowledge transfer efficiency and accuracy have not yet been empirically measured.

This system requires at least one of the teachers to be the teaching expert, with deep pedagogical knowledge. In our scenarios, this is the language teaching expert but it must be noted that it could quite as well be the content teaching expert who plays this role, and leads in the creation of materials and methods, for the topics.

Although, in this example, the course where TOMMS was implemented was an EMI programme without language support quota, the framework can just as well be used to integrate already existing language lessons, and in this manner create better synergy, through the integration of language teachers into content courses.

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