Motivations and Outcomes: A study of an Intensive International Course*

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In this paper, we study what motivates students and university teachers to do intensive international courses, and how they evaluate the outcomes. The study is based on three years of an Erasmus funded Intensive Programme on "Implementing Europe's Future Broadband Infrastructure". It consisted of a course held each year 2012–2014 during two weeks of July, where 30–35 students and 10–12 teachers from the 4 participating universities would meet in one of the partner institutions. The course was organized with a week of course modules, followed by a week of project work based on real-life problems from companies, where students would work in groups mixed across nationalities and educational backgrounds. The topics of the first week, were defined to support the project work in the following week.

Each year, by the end of the course, all students and teachers filled out evaluation forms addressing motivation for participation and their assessed outcomes (teacher's motivations were only evaluated in the last year). This paper presents these results, together with the key learning points obtained during the three years.

We observe that the motivation for participating is quite balanced and include both academic and cultural factors. The students' travelling activities also emphasizes the "European experience", which is less for students in the host institution. Students following programmes not taught in English, also have an opportunity to practice a foreign language. The teachers are highly motivated by both personal and academic factors, especially by the desire to develop and experiment with new teaching methods. The analysis of the outcomes suggest that an international project with students and teachers from different cultures and learning traditions brings significant added value.

Keywords: problem based learning; internationalisation; intensive programmes; cross-disciplinary projects

1. Introduction

In the recent years, there has been increasing focus on modernisation of higher education in Europe. This is for example described in [1] which identifies a number of targets, including improving the quality and relevance of higher education, promoting mobility and cross-border cooperation, and linking higher education, research and business. In 2012, we initiated a collaboration project named "Implementing Europe's Future Broadband Infrastructure" [2], in the framework of the Erasmus Intensive Programmes. This was partly inspired by the challenges as outlined above, but was done also in order to give students from different countries the possibility to work together in a truly international environment—i.e. an environment without dominance from certain countries or regions. The overall idea of the project was to bring together students and teachers representing different fields of broadband networks and network planning, to give an overview of the most important elements in the whole value chain of planning future broadband network infrastructure, and to let students from the different disciplines work together on projects, by

solving concrete business challenges proposed by companies. This way, we aimed to give the students the following experiences:

- Working together across disciplines, and apply their knowledge and expertise in a context where other students would contribute with their knowledge and expertise.
- Working together across different cultures and learning traditions.
- Working together on projects, solving real-world problems.

It was also a good opportunity for teachers to exchange knowledge, experiences, and best-practice regarding teaching methods, with a focus on projects and Problem Based Learning (PBL). It was also crucial to give the involved teachers an insight to PBL, which is quite different from the classical lecturer role [3].

In this paper, we dig into the question of what motivates students and teachers doing such international and intensive courses based on problem based learning, and how they evaluate the outcomes of such. International experience is generally viewed as important from the point of view of practice and

research, however the motivations for shorter period visits for those students who cannot afford longer visits is practically not researched. Thus, this group of students is left unattended. However, in the context of continuing education and life-long learning more and more people might belong to this group.

Each year all participating students and teachers were asked to fill out a questionnaire regarding their experience. This covered both the practical organisation as well as their motivations and the outcomes of their participation. The main contribution of this paper, is a presentation and discussion of the results of these surveys, a field which is not well covered by existing research. We also describe the experiences and learning points from organising these courses.

The paper is organised as follows. Section 3 gives an overview on how the project was designed and organised, including a presentation of the expected learning outcomes, course structure, and examination. In Section 4 we present the research methodology, and in Section 5 the results extracted from student and teacher evaluations, followed by Section 6 that contains a presentation and discussion of the key observations and lessons learned throughout the course. along with an outlook on potential future work. Section 7 concludes the paper. The paper is an extension of [4].

2. Background

It is known from the literature, e.g., [5, 6], that there are a number of factors that motivate students to go on longer stays abroad and includes both personal and scientific, but also what in [5] is called a "general desire to enhance their knowledge and view of the world". As also pointed out in [5] it is somewhat a paradox that science students historically have low participation rates in study programs abroad, while it is an important qualification for those science students who wish to pursue a career in research. [6] presents a study of 355 students from colleges and universities across the US enrolled in study programs abroad. Four factors of motivations to study abroad were evaluated, with the results that "World Enlightenment" (average 4.28) and "Personal Growth" (average 4.17) are the most important factors, followed closely by "Career Development" (average 3.53). The last factor of motivation, "Entertainment" scores significantly lower than the others (average 1.70). The outcomes and impacts are also studied, see e.g., [7, 8].

This is also seen in the light of an increased focus on internationalisation: According to the Bologna target [9] 20% of all students finishing a higher education should experience a study period or internship abroad of at least 3 months. Not only

the targets but also the actual numbers seem to follow this trend. According to OECD [10] the number of students studying abroad has grown by on average 7% per year during 2000–2012. The Danish numbers follow the OECD trends, and so the number of Danish students going abroad has increased from 4.279 in 2000/2001 to 7.844 in 2011/2012 according to [11]. The Danish numbers also confirm the before mentioned trend of low participation rates among technical and science students.

Shorter intensive programmes offer students the possibility to get an international experience without the need of spending a full semester or longer time abroad, and might be a good alternative for students who cannot go abroad for longer time for e.g., personal, family, occupational or financial reasons. Moreover, such shorter programmes can be a stepping stone for students, who are hesitant to start out with longer stays abroad: Shorter stays can motivate them, give them more confidence in language skills, and provide them with an initial international network. Some benefits of such shorter stays abroad are also documented in previous research, e.g., [12], where the results indicate that short-term programs can have a positive impact on the overall development of cross-cultural sensitivity, and [13] where an Erasmus Intensive Programme is used for developing entrepreneurial skills in an international environment where the students are confronted with real-world problems.

Another aspect of short stays is that the international experience itself can be put more into focus than when students follow a semester abroad. Partly because it is an explicit learning objective, and thus included along other academic activities, and partly because it is possible to setup truly international collaboration in such an environment without a clear national majority. The need for facilitating the intercultural learning processes is also identified in [14], even if the focus of this study is traditional (and thus longer) stays abroad.

However, there is almost no research existing on the motivations and outcomes of such shorter stays. With the increasing volume of Erasmus+, and the flexible options for shorter stays abroad e.g., through Strategic Partnerships, there is a need for more knowledge on these programmes. This paper is a first step towards establishing this knowledge.

In addition to the aspect of internationalisation, the students were also exposed to Problem Based Project Work in groups, inspired by the Aalborg PBL Model [15]. In Aalborg University, the PBL model is usually implemented in a way where students during one semester (30 ECTS) spend half of their study efforts on courses (15 ECTS) and half of their study efforts on problem based project work in groups (also 15 ECTS). Ideally, the

content of the courses will form part of the knowledge base for carrying out the project work, which is also supported by focusing more on courses in the beginning of the semester, and more on projects by the end of the semester. The projects are based on problems, often from industry partners or research projects, and the students will need to analyse the problem and select which methods to use in order to identify and develop solutions. This is also the model which was applied and downscaled in the intensive course, by organising a first week of courses to support the project work carried out in the second week.

PBL has the advantage that the students are not only trained in their own technical domain. They also obtain competences and experience within e.g., problem solving, collaboration, communication, and project planning, and they get an understanding of the context in which they work and operate. [16] studied how the PBL model could be used in interdisciplinary and intercultural projects within engineering. The study concludes that it is a big challenge for students with different backgrounds to coordinate their work, and that strong awareness and conscious efforts are needed. This has been thought into our study by explicitly addressing and discussing these challenges with the students, and by facilitating the collaboration through the teambuilding and training activities during the first week.

Another study on PBL in an international environment is presented in [17], where Danish students with PBL background and international students mostly inexperienced with PBL are studying in the same master programme. The conclusions support the efforts for facilitating collaboration in the groups, and also suggest to include learning objectives related to the working process and learning across differences and cultures.

3. Project design and organisation

The intensive course itself took place during two weeks in the summer in one of the participating countries. In 2012, it was organized in Aalborg, in 2013 in Bydgoszcz, and in 2014 in Barcelona. Each year the Erasmus support would cover the participation of 25 travelling students, and we would accommodate for up to 10 local students (the number of local students varied from 3 to 10 during the three years). The stipends from Erasmus would cover all costs of travelling, accommodation, and subsistence during the two weeks for the travelling students, whereas for the local students the funds were limited to cover the joint meals. In order to facilitate integration and social interaction, all accommodation and meals were organized jointly.

3.1 Learning objectives

All the students were enrolled in B.Sc. or M.Sc. programs with different specialties related to the Intensive Programme: AAU students in Computer Engineering or Networks and Distributed Systems, UPC students in Telecommunications Engineering, RTU students from Business Informatics and UTP students from Telecommunications (but with a different profile than the students from UPC). In the last year half of the UTP students were from Bio Informatics, a choice that not only widened the domain but also contributed to a better gender balance than in the first two years. The diversity ensured that the students needed to collaborate in order to solve the problems at hand, since each group of students would only have shallow knowledge in the areas where other students had their core competencies. Considering that the students had diverse backgrounds and learning traditions, it was important to define explicit learning objectives that could be communicated to the students, along with guidance on how evaluation would be carried out. Consequently, the expectations were aligned and uncertainty avoided, allowing the students to focus on the programme. The learning goals established were the following.

- The students will obtain an understanding of the whole value chain of planning future broadband network infrastructures, enabling them to put their own fields of expertise in a broader extent.
- The students will become familiar with selected real-world problems, and collaborate with students having different backgrounds to develop innovative solutions across traditional disciplines.
- The students will obtain knowledge of different teaching methods, and reflect on their own learning styles.
- The students will improve the competences with respect to entrepreneurship in relation to network planning, in particular by better understanding the relations between technology and business challenges/opportunities.

The first week consisted of mainly course modules. In the second week, the students were working on problem based projects in groups, and eventually ended up with (1) a 30-minute presentation that was also handed in as project documentation and (2) a short document with their reflections about the learning process during the project work. The exam was based on an oral presentation and questioning session.

3.2 Teacher participation

In general, the programme was attended by 1-2

teachers from each university throughout the two weeks. Some teachers participated one week, either providing lectures during the first week or supervision during the second, whereas others participated both weeks. In the second year, there was one teacher participating only a couple of days, but that was an exception.

3.3 Course design and programme

The course was generally designed and planned in the same way during all three years, with smaller adjustments regarding both the course content and the didactical aspects. In the following we present the course as it was given the first year. Adjustments in year 2 and 3 are explained in Section 4. The basic idea for course design was the Aalborg PBL model [15], where the course modules provide knowledge, supporting the students in carrying out the problem based project work. Also, it was inspired by initiatives at the other partner universities, such as the CDIO initiative [18] being implemented at the School of Telecommunication and Engineering in UPC, and the experience of RTU with self-organized student groups working on real-world problems [19].

The students arrived on Saturday (day 1), and left on Sunday (day 16) two weeks later. There were no or little activities on these two days. Sunday (day 2) was spent on teambuilding and get-together activities, in order to facilitate interaction between students from different universities and to "break the ice".

After this, the first week Monday–Thursday (days 3–6) was mainly focusing on course modules including problem solving in groups. In general, one such module was given in the morning session, and another module in the afternoon session. Each module would include teacher presentations as well as group work and problem solving, in terms of both larger problems to be solved in the groups, and small peer discussions during the lectures. The design was left to the individual lecturers, but experiments with active learning were encouraged. There were modules regarding technical aspects of broadband networks and applications, as well as business-oriented modules. One of the last modules was a guest lecture with a lecturer from industry presenting a topic linking business and technical aspects, and demonstrating how both aspects play a role in handling a specific case. All in all, the topics of the modules were chosen to give the students a good overview of the problem domain they would work on during the second week.

Friday (day 7) in the first week served as an introduction to the project work, including presentation and selection of problems to work on, as well as an introduction to carrying out problem based project work, with a focus on collaboration in international groups. The project groups got the opportunity to discuss their project organisation, and made a written collaboration agreement between the group members. Especially since many of the students were unfamiliar with PBL, a good introduction to aims, methods, principles and expectations was deemed crucial for success [20].

The projects were proposed by companies, but in collaboration with the course responsible teacher, in order to ensure a good fit with the learning objectives. The companies involved were mainly SMEs from the countries, working in the area of telecommunications and businesses relying on the extensive use of networks. The proposals would be based on problems, which the students were supposed to analyse and come up with one or more solution proposals, which took into account both technical and business aspects. Examples include an ISP who would like a strategic review on how fast to accelerate Fiber To The Home deployment vs. extending the existing coax infrastructure, and a digital payment provider who would like an analysis of how privacy could be managed in a way that customers would perceive beneficial compared to competitors.

The project definitions were inspired by [21], but modified to suit the short project duration. The 6–7 student groups with 4–5 students each were predetermined by the teachers, and formed to ensure diversity both technically, country wise, and with respect to gender representation. All groups would consist of at least 3 nationalities, and not more than 2 students from each country (ideally each group would have 4 different nationalities represented, but given the distribution of students this could not always be obtained).

In addition to ensure such diversity, the main reason for the pre-determined groups was that we wanted to avoid social tension during the course. Each group was free to choose among the different project proposals by handing in a prioritized list, and the projects would then be assigned fulfilling the student wishes as much as possible while also ensuring diversity in the projects to be carried out.

The weekend (days 8–9) was allocated mainly for joint social activities and excursions, Saturday morning was devoted to an "Entrepreneurship workshop", focusing on practical hands-on use of the Business Model Canvas [22].

In the second week, Monday-Thursday (days 10–13) the students were working on the project. They organized and planned the work and tasks themselves, being supported by the supervisor (one teacher) that was assigned to each group. Moreover, since the participating teachers represented different disciplines including knowledge on PBL, they were able to also draw upon other teachers as project

consultants, and on representatives from the companies, which had contributed with the project proposals. The communication with the companies happened mainly through emails, phone calls or video calls through Skype. In the last year, we also tried to let the companies follow the final project presentations on Skype, but due to technical difficulties we resorted to record the presentations and share them with the companies along with the presentations in e.g., pdf format. In some cases, the companies and the students communicated afterwards with comments and additional questions.

During both weeks, workshops were held among the teachers, to discuss teaching and supervision. The project presentations and examinations took place on Friday in the second week (day 14). One hour was allocated for each group, and was organized as a presentation, questioning time, and discussion session with questions from the teachers. Then a pass/fail evaluation of each individual student took place. After the joint questioning and discussion session, it was also possible to have a more open discussion with questions from other students. On Saturday (day 15) the only organized subject-related activity was the evaluation session, which consisted of both qualitative feedback and collection of quantitative data through questionnaires.

4. Research methodology

During the first 2 years, on the last day of the course, all students and teachers have filled out a questionnaire to evaluate their experiences, based on a template provided by Erasmus. In addition to the questionnaire, there has been an evaluation session, with the possibility to come with more qualitative comments. In the third year, Erasmus changed the evaluation procedure, so that all students and teachers received an electronic questionnaire created by the Erasmus Mobility Tool, in the days following the course. Unfortunately, some of the questions were different from the previous years, and also the scale was changed from "1–5" to "1–4". Also, the teacher evaluations were not so elaborate during the first two years, so their motivations

were only evaluated in the last year. Another difference between to the last year is that only students/teachers travelling received the questionnaire—a difference we were not aware of before it was deemed too late to collect these data.

Since filling out the questionnaire was a condition for funding, and also due to the way the results were collected, we have ensured that all students and teachers have filled it out. On the other hand, it is important to be aware that the number of respondents is so low that the answers from a single student can significantly impact the results.

We would mention at this point that the project was not initially designed as a research project, but we found that the results were interesting and worth sharing with the didactical research community.

To compensate for the differences in questionnaires and a comparatively low number of respondents, we give careful explanations together with the data in Section 5 and provide extended discussion in Section 6. This way we make sure that the generalizations are kept into the context of their validity and single answer influences are reported.

5. Evaluation results and course adjustments

Each year the results of the course were evaluated by students and teachers. The results of these evaluations and changes in the course delivery are presented below for each year. The practical aspects were also evaluated, even though the results are not included here. We have also not included the evaluations of the individual lectures due to space limitations.

5.1 Year 1 (2012)

In 2012, the course was held in Denmark and attended by 3 students from Denmark, 5 students from Latvia, 10 students from Poland and 10 students from Spain. The course was given by 2 teachers from Denmark, 2 teachers from Latvia, 3 teachers from Poland, and 4 teachers from Spain. The main evaluation points for students from the course in 2012 can be seen in Tables 1–2.

Table 1 illustrates that the main motivations were academic and cultural, and that especially the

Table 1. Which factors motivated you to participate? (scale 1–5). Average numbers for all students

	Danish	Latvian	Polish	Spanish	All
Academic	3.7	4.6	4.0	3.8	4.0
Cultural	3.7	4.4	5.0	4.3	4.5
Practice of foreign lang.	2.7	4.2	4.9	4.2	4.3
Friends living abroad	1.3	3.6	1.2	2.6	2.1
Career plans	2.3	4.0	3.9	3.7	3.7
European Experience	2.7	4.6	4.7	4.6	4.4

Table 2. Judgement of outcomes (scale 1–5). Average numbers for all students.

	Danish	Latvian	Polish	Spanish	All
Academic/learning outcome	2.0	4.2	4.4	3.6	3.8
Personal outcome	3.7	4.4	4.9	4.5	4.5
Help in finding job	2.0	2.6	3.7	2.7	3.0
Help in future studies/career	2.3	3.6	4.4	3.6	3.8
Overall evaluation	4.0	4.8	4.3	4.7	4.5

students from outside the hosting country (Denmark), were also highly motivated from the European Experience. The students travelling seem generally more motivated than the students from the hosting country, which might be due to the experience being considered less international when staying in their home country.

In Table 2 it is also clear that the travelling students have judged their personal and academic outcomes to be higher than the Danish student. Generally, the personal outcome was rated higher than the academic outcome.

We also had the following important observations that were not included in the quantitative evaluations:

- The students were eager to get to learn new people from other countries, but on many occasions still had a tendency to form "national cliques"—e.g., during meals, seating for exercises, and social activities.
- For the lecture evaluations, there was a tendency that the technical lectures were rated higher than the more business-oriented lectures. According to the evaluations, it was difficult for them to see the purpose of the business-oriented lectures, especially in the beginning of the course.
- During the presentations and exams some students got extremely nervous, probably because of the exam pressure combined with making their first presentation for a larger audience in English.
- While the students were generally satisfied with both projects and lectures, it was a challenge to find the right level of lectures for such a broad audience with very diverse backgrounds.

With these evaluations and learning points in mind, the program for the second year was adjusted:

- The value of understanding the problem domain from both business and technical aspects was made clearer from the beginning of the course, in order to increase the motivation and satisfaction of the students for the business aspects. This was expected also to increase the academic outcome.
- To facilitate more integration and communication across national cliques, randomized seating was partly introduced already during the first year (in the last modules of the first week). This was taken a step further by using pre-assigned seating during all lectures, and combined with problem solving in groups of different sizes, to ensure that all students would have the chance to get to know each other better. We would also make an effort to have both visiting and local students accommodated together—which was an option due to lower accommodation costs in the 2nd year, due to the location.
- We would focus more on training the students to make good presentations, e.g., through video training.
- For the lectures, it was decided to put even more focus on active learning and peer learning, through e.g., exercises and mini projects. In this way, we expected to increase the learning outcome for students at different levels, also because the students could learn from each other.

The main evaluation points for teachers from the course in 2012 can be seen in Table 3.

We see that generally teachers were satisfied with both their learning/didactical and personal outcome of participation.

5.2 Year 2 (2013)

In 2013, the course was held in Poland and attended by 9 students from Denmark, 5 students from Latvia, 10 students from Poland and 11 students from Spain. The course was given by 3 teachers from Denmark, 2 teachers from Latvia, 3 teachers from Poland, and 3 teachers from Spain. The main evaluation points from the course in 2013 can be seen in Tables 4–5.

Compared to the first year, the motivations

Table 3. Teachers judgement of their own outcomes (scale 1–5). Average numbers for all teachers

	Danish	Latvian	Polish	Spanish	All
Learning/didactical	5.0	5.0	4.7	4.5	4.7
Personal	5.0	4.5	5.0	4.5	4.7

Table 4. Which factors motivated you to participate? (scale 1–5). Average numbers for all students

	Danish	Latvian	Polish	Spanish	All
Academic	3.6	3.5	4.4	3.5	3.8
Cultural	4.8	4.5	3.9	4.4	4.4
Practice of foreign lang.	2.8	4.2	4.4	4.4	3.9
Friends living abroad	2.6	3.7	3.2	3.0	3.0
Career plans	3.3	4.6	3.3	3.0	3.4
European Experience	4.6	4.8	3.4	4.0	4.1

Table 5. Judgement of outcomes (scale 1–5). Average numbers for all students.

	Danish	Latvian	Polish	Spanish	All
Academic/learning outcome	3.2	4.4	4.1	3.5	3.7
Personal outcome	4.2	4.5	4.5	4.4	4.4
Help in finding job	2.7	3.8	3.2	2.4	2.9
Help in future studies/career	3.4	4.2	3.5	3.1	3.5
Overall evaluation	4.7	4.8	4.1	4.5	4.5

(Table 4) were quite similar, with the overall judgements being a bit lower. However, in general the local participants had a higher motivation than in 2012. Some of the ratings, e.g., "European Experience" and "Cultural" seem a bit lower than the previous year, but this can be explained by the fact that there were more local participants (10 instead of 3), and that the local participants rate these points lower than those who travel.

While the quantitative evaluations were very similar to the numbers from 2012, we made the following observations:

- The business-oriented lecture at the end of week one, was rated higher than in the previous year. The entrepreneurship workshop was not rated in 2012, but in 2013 it received one of the highest ratings during the week. We therefore believe that we managed to increase motivation and understanding of the cross-disciplinary work. However, this was not yet established when the course started, and the first lecture (which was more business-oriented), was rated at the same level as in 2012.
- The fact that all students, including local students, stayed in the same accommodation, made it much easier to integrate the local students in all activities, which is also reflected in the evaluations from the local students. The efforts to integrate students during lectures also worked out well.
- The focus on preparing good presentations worked: The presentations were better and more fluent than in 2012, and the students were more comfortable, and had a better experience.

With these evaluations and learning points in mind, the program for the third year was adjusted:

- We decided to put even more emphasis on the

value of working across disciplines, and especially the value of understanding the business and entrepreneurial aspects, from the beginning of the course. Therefore, as a new element, we would add an additional workshop focusing on entrepreneurship already on day 2 (Sunday before the course itself starts). Moreover, the teacher responsible for entrepreneurship would stay throughout the course, to participate in discussions during the first week, and to help focus on entrepreneurial aspects throughout the second week also.
- We decided to increase the video training for presentations, and combine this with pitching entrepreneurial aspects. This was done by ending the afternoon sessions in the second week with a "status pitch" from each group, which was recorded by video and evaluated with the presenter. Moreover, we had several cameras that the students could use for practicing throughout the week, and the opportunity to receive feedback both in groups and one-to-one.
- As an experiment, we would also increase the diversity among students, by including students with a more entrepreneurial background as well as students with a bioinformatics background in 2014. This turned out to give a more equal gender representation among the students.
- We would continue experiencing more with active learning during the lectures.

The main evaluation points for teachers from the course in 2013 can be seen in Table 6.

We see that in general teachers were again satisfied with both their learning/didactical and personal outcome of participation.

5.3 Year 3 (2014)

In 2014, the course was held in Spain and attended

Table 6. Teachers' judgement of their own outcomes (scale 1–5). Average numbers for all teachers

	Danish	Latvian	Polish	Spanish	All
Learning/didactical	5.0	4.8	5.0	4.7	4.8
Personal	4.7	4.5	5.0	4.7	4.7

Table 7. Which factors motivated you to participate? (Normalised to 1–5). Average numbers for all students

	Danish	Latvian	Polish	All
Academic	4.3	4.3	5.0	4.6
Cultural	4.6	4.6	4.9	4.7
Practice of foreign lang.	3.2	3.9	4.9	4.0
Career development	3.7	4.1	4.6	4.1
European Experience	4.1	4.3	4.9	4.5

Table 8. Judgement of outcomes (normalised to 1–5). Average numbers for all students

	Danish	Latvian	Polish	All
Academic/learning outcome	4.4	4.8	5.0	4.7
Personal outcome	4.4	4.8	5.0	4.7
Help in finding job	3.1	3.9	4.2	3.7
Help in future studies/career	3.8	4.3	4.7	4.3
Overall evaluation	5.0	4.8	5.0	4.9

by 9 students from Denmark, 6 students from Latvia, 10 students from Poland and 7 students from Spain. The course was given by 4 teachers from Denmark, 2 teachers from Latvia, 3 teachers from Poland, and 4 teachers from Spain.

The main evaluation points for students from the course in 2014 can be seen in Tables 7–8. It should be noted that this year, a scale (1–4) is used, which is different from the previous years. However, in the table we have normalised the numbers in order to make them comparable. Also, the local students have not received or filled in the questionnaires, which is due to changes in the Erasmus forms distributed to students.

Some interesting observations regarding the last year: Table 7 shows that the motivation regarding the academic aspects is higher in the last year, but also that the judgement of the academic outcome has increased to the same level as the judgement of the personal outcome. The latter has actually increased from 3.7 to 4.7. Even if the local students did not answer the questionnaire in 2014, this indicates a significant improvement. We believe that, at least partly, this can be related to the strong focus on the value of working across disciplines from the beginning to the end of the course – including being very explicit about the learning objective. The increased use of active learning during the first week might also play a role, and we can see from the evaluations that it was appreciated by the students; especially an IT-tool that was used for voting during the lectures, received many positive comments. Moreover, the focus on making

video presentations seemed successful, and may have contributed to the higher judgement of academic/learning outcomes.

As previously mentioned, the numbers for 2014 also include the teachers' motivation. This point is particularly interesting, since the teachers spent 1–2 weeks of work time, which is quite a large amount of time for a teaching task, concerning relatively few students. Moreover, the programme was held during a period of time often allocated for vacation.

Tables 9–10 show the teacher motivations and judgement of outcomes, where it should be noted that the numbers have not been normalised, and thus are based on a scale 1-4.

Table 9 shows that there is quite a high diversity in the motivational factors. All teachers (except one "3") rate "Experience and develop new learning practices and teaching methods" with "4", making it the highest rated factor. But it can be seen that all other factors, except for language skills, are rated on average 3–4, both overall and for each country.

In Table 10 it can be seen that according to the teacher's own assessment there is also a high personal impact of participation. This is true for all factors included in the survey, including also the language skills which were not rated so high among the motivational factors.

5.4 Discussion of the results

In this section, we will discuss the results as presented above.

Among the students, we saw students being motivated by a mix of cultural, academic and

Table 9. Teachers motivations. Average numbers for all teachers (scale 1–4)

	Danish	Latvian	Polish	All
Share my own knowledge and skills with students	3.8	3.0	3.7	3.6
Strengthen cooperation with the partner institutions	3.0	3.5	3.7	3.3
Experience and develop new learning practices and teaching methods	4.0	3.5	4.0	3.9
Increase the quality of the student mobility from/to my institution	3.8	3.0	3,7	3.6
Develop joint future projects	3.3	3.0	4.0	3.4
Improve my foreign language skills	2.3	3.0	2.3	2.4
Expand my professional network	3.3	3.5	3.7	3.4
Other	3.3	2.0	1.0	2.2

Table 10. Teachers judgement of personal impact. Average numbers for all teachers (scale 1–4)

	Danish	Latvian	Polish	All
Improved my teaching/professional skills and competences	3.8	3.0	3.7	3.6
Broadened my understanding of different systems and practices in higher education	3.0	3.5	3.7	3.3
Increased my foreign language competences	4.0	3.5	4.0	3.9
Increased my awareness of social, linguistic and cultural diversity	3.8	3.0	3,7	3.6
Increased my motivation and job satisfaction	3.3	3.0	4.0	3.4

personal factors. Not surprising the students travelling were more motivated by the "European experience" than those hosting the event. Similarly, we see that the students are rating the academic and personal impact of the project quite high. In the first years, the academic outcome was rated somewhat lower than the personal outcome, something that we managed to improve over the duration of the project.

It is also interesting to observe the teacher motivations and outcome judgements. From the first two years, the evaluations are not so elaborate, but it is clear that both personal and learning/didactical outcomes receive high ratings from all the participating teachers.

In the results from the last year, we see that also the teachers are highly driven by a motivation of learning about new learning practices and teaching methods, something that also is reflected in the assessment of outcomes where improvement of teaching/professional skills and competences are rated high. However, like the students, the teachers are also to a very high extend driven by other personal and professional factors. This demonstrates that projects like this are not only benefiting the participating students, but also the teachers and their institutions. We are happy to see that not only is it possible to attract teachers motivated to experience with new teaching methods, these teachers also find that they benefit a lot from exchanging these practices in an international environment with different cultures and learning traditions present.

6. Discussion and outlook

The intensive programme has been well received by both students and teachers, and it has received good evaluations from both groups. Based on the qualitative and quantitative feedback received, there is no doubt that both students and teachers have learned and gained a lot both personally and professionally through their participation. In this section, we will discuss key observations and learning points

- Academically, related to the technical subjects
- Regarding collaboration skills in an interdisciplinary and international environment
- Regarding skills related to bring their competences into play when solving real-life problems
- Related to the teacher participation

During the evaluation of the project, we have made the following observations and learning points, which we believe will be beneficial in future projects that have a similar scope:

- In general, the setup with combining courses and projects worked well. However, it is a challenge to give lectures at an appropriate level, when the students attending have very diverse backgrounds. This is a problem also encountered in our usual classes, e.g., when having guest students from abroad, or when students from different B.Sc. educations study for the same M.Sc. degree. We had good experiences with integrating active learning approaches and mini projects into the lectures, since this allowed for peer learning that was beneficial even for learners at different levels. However, in the future more personalised approaches to learning could be useful, something that could be implemented using blended learning.
- While the subject-related parts of the course were important, we believe that much of the value was

created through the intensity of the program: The students (and teachers) spent two weeks together almost 24/7. Getting to know each other so well also facilitated a good learning environment.

- In our experience, it is important to be very explicit concerning learning objectives and goals, and to motivate the multidisciplinary approach. Even if we felt it was clearly communicated, some students would still have an attitude that the non-technical aspects were not relevant for them. Making an effort on doing so, and doing it from the beginning and in 2014 also throughout the course, was probably one of the reasons that we succeeded in increasing the rating of the business-oriented lectures and the overall judgement of academic outcome.
- Two weeks is short time, and it is important to get the students together as a group quickly. For this, the team building activities were good icebreakers. Also, mixing students throughout the course – both for group work and seating during lectures—turned out to be a surprisingly efficient way of getting students to know each other and avoid national cliques, leading to both personal and academic gains. This approach was also well received by the students who appreciated and even encouraged this approach.
- It was a challenge to integrate local students. One issue was related to the lack of funding for local students, implying that in most cases they could not be accommodated with the students coming from abroad. Also, the local students are in their usual social environment, which makes it difficult for them to become equal part of the group. If at all possible, we would recommend hosting everyone together.
- For communication during the course, we discussed different learning platforms, but ended up creating a Facebook group. The immediate advantage was that the user interface was known by most students and teachers, and that it could run on most devices and platforms, including computers, tablets and smart phones. Thus, for spreading information regarding both subject-related and social activities, it was possible to reach all students quickly. An additional advantage was that it also made it easy to create and sustain friendships, both at an individual basis and by keeping the group active after the course.
- While Aalborg University as a PBL university has a strong tradition for students working on project proposals from companies, this approach was not widely used among the other universities. We increased the number of proposals from non-Danish companies during the three years, but also realized the importance of being very explicit on what exactly was required from the companies, and what they could expect from the students.
- Also, regarding the projects and project proposals, we found it somewhat challenging to identify good problems, where the students could come up with reasonable solutions from a workload corresponding to four days of work, and where all students felt they could contribute across backgrounds. Eventually, we developed a common understanding of "concept development" that fit to the time frame and student backgrounds. However, we found it crucial that the project proposals were truly problem oriented, and not just a de facto list of tasks for the students to carry out. It is also important that all supervisors are comfortable with working on problem based work, and has access to other people with PBL experience.
- As a last observation, it was a pleasure to see how the problem based project work motivated the students beyond our expectations all through the three years. During the last days, many groups would spend at their own initiative (and while being in a good mood) long afternoons and evenings on working on projects and presentations.

After the project has been finished, a continuation has been carried on in the Erasmus+ Strategic Partnership "Collaboration and Innovation for Better, Personalized and IT-supported Teaching (Colibri)" [23], which has also included a number of new academic and industrial partners. Our results here demonstrate a large potential in collaboration internationally between institutions in order to learn and experiment together when it comes to new teaching methods, and how this can contribute to also develop the participating students and teacher's academic, cultural and personal skills at the same time.

We believe the results demonstrate that projects like this is much more than just giving the students an international experience. In addition to being an important social, cultural and personal experience for the students it also creates a room, where teachers motivated to learn and experiment with new teaching methods can do so in a highly efficient way.

In the future, it could be interesting to further and more systematically investigate the motivations among teachers and students participating in such intensive, international projects. In particular, a more systematic collection of data asking the participants about their motivations both before and after the course could improve the validity of the study, as could using the same questions throughout

the duration of the project. Unfortunately, here we were limited to using the questionnaires giving by Erasmus, or the participants would need to answer almost the same questions multiple times which could also lead to unreliable results. We were especially lacking data regarding the participating teachers, both due to the low number of participants, and because the elaborate questions were only asked in the last year. Of course, it would also be helpful if we could increase the number of participants, e.g., by collecting data from a larger number of projects. Finally, our study is quantitative only. It could be interesting to dig deeper into understanding the results by complementing these with qualitative data obtained through interviews with the participants. In particular, this could help us identify more specifically the motivations and outcomes of the participants.

7. Conclusions

This paper addresses the question of what motivates students and teachers doing international and intensive courses based on problem based learning, and how they evaluate the outcomes of such. We have also described our experiences during 3 years of an Erasmus Intensive Programme with focus on letting students work together on projects based on real-world problems across disciplines, nationalities and cultures. The participating teacher and student evaluation of motivation and impact was presented, along with our experiences and learning points, and it was shown how the evaluations and observations led to adjustments during the 3 years.

We saw that the students were highly motivated by both personal, academic and cultural factors, as well as by the international aspect "The European Experience". The latter was less though for students from the hosting institution.

Overall, the student evaluations and judgements of outcomes were high. During the first years, the personal outcome was judged higher than the academic outcome. In the third year, we made a stronger effort in making clear objectives and motivating the interdisciplinary approach throughout the course, which might be one of the reasons that the academic outcome was judged higher this year.

Also, the teachers were motivated by a variety of personal and academic factors, but it seems that the largest motivational factor is about experiencing and developing new teaching methods. It appears that doing so in an international environment with participants from different cultures and learning traditions is regarded as having a very high impact on both the teachers and the participating institutions.

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