TOWARDS BLENDED LEARNING IMPLEMENTATION OF INNOVATION AND ENTREPRENEURSHIP (I&E) EDUCATION WITHIN EIT DIGITAL: THE MODELS AND LESSONS LEARNT

G. Pisoni¹, G. Guri¹, G. Dion², J.M. Dalle³, F. Renouard⁴, M. Marchese⁵, A. Tejero⁶, G. Leon⁶, Y. Guseva⁷, O.P. Mutanen⁷

¹University of Trento / EIT Digital (ITALY)
²Agoranov / EIT Digital (FRANCE)
³Sorbonne Université (FRANCE)
⁴Université de Rennes 1 / EIT Digital (FRANCE)
⁵University of Trento (ITALY)
⁶Universidad Politécnica de Madrid (SPAIN)
⁷Aalto University (FINLAND)

Abstract

Part of the mission of EIT Digital (a Knowledge and Innovation Community from the EIT, European Institute of Innovation and Technology) is to train IT graduates at both Master’s and Doctorate levels, with strong innovation and entrepreneurial competences. Around 20 European top universities, renowned researchers and leading businesses are in partnership with EIT Digital to provide cutting-edge ICT education in combination with innovation and entrepreneurship training. To achieve the later one, each partner university in the network implements (from 2013) an “Innovation & Entrepreneurship” (“I&E”) minor, and this minor represents 30 ECTS (European Credits Transfer System) in a 120 ECTS 2-year Master’s program, that corresponds to 25% of the credits each student takes during the studies. This I&E minor is designed and deployed within such EIT Digital network of European universities through deep pedagogical cooperation. Such cooperation is notably enabled by the use of blended learning with online contents coproduced in the network. Taking that the aim is to have the biggest impact, and that there was no possibility to know beforehand which blended learning model among the various possible ones were the best suited for each of the universities and for cooperation within the network, the decision was to experiment and support various ones and like this help the Universities in their blending efforts. Depending on legacy of each university in regards to innovation and entrepreneurship education, and on their (human) resources in place, as well as the level of adoption of IT tools within their work processes, the needs for implementation / moving towards blended education varied for each university in the network. EIT Digital offered different models, varying from more to less loosely-coupled blending models, so that the choice made by each university should, by design, optimize the switching costs towards blended learning from the university point of view, yet satisfy the blending requirements from EIT Digital.

The models we implemented for I&E education in EIT Digital are as follows: (1) flipped classroom, where online contents are delivered to students before class and then discussed in class, (2) blended online course, pre-packaged online contents with assessments that in most of the cases are associated with supervised sessions in class (3) online starter kit, set of online modules with assessments delivered prior to short-span events (such as summer schools for instance) (4) independent levelling-up, contents are delivered before class, accompanied with quizzes or assignments, not necessarily followed up in class, (5) online repository, online packages made available to cover students’ specific needs.

In this paper we describe the models presented above in details, present series of examples from each of them, and reflect on the lessons learnt (from both teachers and students point of view) from the implementation.

Keywords: Blended learning, I&E education, Online education.

1 INTRODUCTION

Blended learning (referred also as hybrid learning), a term used to describe classes that combine online learning with face-to-face teaching, has been increasingly used in higher education over the last years [1]. Limited resources, technological advancements, and shift towards new educational
paradigms require faculties and other institutions of higher education to consider more attractive models of teaching and learning [2]. Universities move towards more engaging learning experiences and transform (digitally) how they approach teaching and learning by redesigning the education environment and the education process [1], [2].

In most cases blended courses allow students to first meet the subject matter before class, and like this, course organizers free up in class space for additional clarifications and encourage more in-depth processing of the course content when the class meets [3], [4]. Different active learning strategies have been studied in the past and there is an empirical evidence that this way of teaching promotes students learning success and gain of knowledge and skills [5], [6]. It stems from the theoretical framework of theory of activity which assumes that learning emerges from activity rather than passive passage of knowledge that happens in classical lecture courses [7], [8]. Many studies agree that active learning promotes deep learning by stimulating inquiry, helps for better acquisition of skills, and suites different learning styles students’ participants have [9], [10], [11].

At EIT Digital the redesign of traditional courses to blended learning is supported with the aim to ease capacity build-up for the universities in the network, i.e. ease the implementation of EIT Digital-compliant courses by new partner universities, and to create a ‘red thread’ around the I&E Minor, i.e. to reinforce the sense of EIT Digital signature and students’ community within the EIT Digital Master programs. Additional aims, resulting also from the original two, were to harmonize I&E education between the different universities, to contribute to the development of the universities and EIT Digital own I&E educational assets, and bring entrepreneurs in classroom via online contents [12].

With these aims in mind, ‘going blended’ projects within the EIT Digital Master and Doctoral school were set in place, and all the universities in the network redesigned their I&E courses, from courses historically taught as frontal lectures courses, into blended ones. Here we present the different approaches we took for the course blending and we present several examples of blended classes from each approach. We also reflect on the teachers involvement and feedback on the process.

2 I&E (BLENDED) EDUCATION: CONTENTS PRODUCTION AND DISSEMINATION

In order to set blended education in place, there was first the need to set a production agenda: the choice was made that few chosen teachers from the I&E group would be also producers and like this create and deliver the agreed online contents to be used by all I&E teachers to set and implement their blended education from scratch.

When defining the production agenda, the emphasis was put on the modularity of the online contents developed to ease integration within the existing programs that were “going blended”. Therefore, the piece of contents called “nuggets” were made short and straight to the point, including descriptor documents, to the attention of the teachers, for smoother adoption. These nuggets are bricks to build a blended learning course. EIT Digital library includes now more than 500 nuggets covering from basic business model introduction to the most complexed technology transfer strategies, from lectures to entrepreneurial cases. As this paper is written, this amounts to more than 45 hours’ worth of videos along with dozens of written cases, quizzes and other form of online/offline assignments [12].

Teachers and students are invited to come and give feedback on the online content production in bimonthly meetings that the I&E group hosts in different Universities of the network. In this bimestrial coordination effort, our teachers-producers receive feedback on their planned production from other teachers and students, which in turn contributes to a better dialogue of the needs of all the involved parties in the education process [13], [14].

After the production, the “nuggets” then go through process of packaging, during which several nuggets are put together to make a thematic unit. In this process they are usually coupled with a quiz or some other type of assessment, like this making it easier for teachers that do not have time to introduce their own assessments and / or strategies for following up on the contents, to still efficiently use them for their teaching. The modules are structured considering the Intended Learning Outcomes of the specific course. The length of each online package is variable depending on the course topic and objectives.

As part of an EIT Digital online contents dissemination efforts, each university in the network is visited, and blended courses are designed together with the involvement of the local teachers. Additionally, local staff is trained on the available contents and practicalities around delivery of them, like this
empowering the teachers in their home Universities to lead the blended learning change, and achieve local impact. We use the online contents in other scenarios too, for instance we also deliver pre-packaged modules before important events (what we call below ‘online starter kits’) prior to important education related activities (such as summer schools or kick-off meetings), to prepare students adequately and to align participants in terms of needed knowledge for the event. These pre-packaged modules are designed and continuously improved together with the teachers in the EIT Digital working group and delivered centrally by the EIT Digital.

3 THE MODELS: EXPLAINED

In this section we describe the different models that were implemented for the needs of I&E education.

3.1 Flipped classroom

Some universities in our network prefer to implement the classical flipped classroom approach, where the online contents are delivered before the class to the students and then discussed together with them in class. This approach requires minimal setup efforts (it required the availability of the contents on the platform), but requires that the teachers are familiar with the contents, and feel comfortable to follow up on them in class together with the students. Here we summarize one example of such class delivered by Universidad Politécnica de Madrid (UPM) on Technology watch. More details about the experience UPM had with blended education can be found in [19].

**Blended class example: Technology watch**

Students dedicate one hour pre-class to watch online lecture of Technology Watch. The information regarding where the contents can be found is sent to students through an email announcement around one week before the class. In the pre-class instructions, students are asked to read all the materials belonging to the online lecture, and are asked to choose to watch one of the 4 videos provided. Later in class, after an initial introduction by the teacher, groups of 4 students are formed, with each group having members that have watched different videos prior to the class, and each member explaining to the other students in the group the concepts each has learnt from the video watched. In the rest of the course, the groups go through several exercises where they put in practice the knowledge gained from the videos online together with the involved teachers.

In this approach the teachers use the in-class time to assess how students internalized the learning from videos, and applying immediately the learning on their projects / assignments. The presence of the teacher is focused on promoting the discussion among students and facilitating student to student interaction. The teacher sometimes are also involved in discussion initiated by students in cases when something is not clear to them.

3.2 Online blended course

Other universities decide to offer full online blended courses: then, pre-packaged online contents with assessments are delivered to students before class and, in most of the cases, are associated with supervised sessions on the same topic in class. As in the previous approach, this meant that the teachers needed to be familiar with the contents, and to follow them up in class. For this model we present an example from the Sorbonne University.

**Blended class example: Customers & Marketing**

This class on “Customer & Marketing” is held after the introduction class of the course. In it, students have some pre-class activities on our platform they watch two videos: the first one on why even engineers, artists and designers need marketing knowledge (20 min), and the second video on how engineers can create customer value (20 min). After this the students are asked to answer 2 quizzes, as an individual test, it is just to be sure they have watched and read everything and had understand the material. The class starts with questions about the pre-class activities, and clarifications about the contents watched, if there are any. The class is splited into groups of three people, where each group needs to build a marketing mix for a product they choose. Towards the end of the class each group has 6 minutes to present the marketing mix they have been working on.

The principal role of teacher is to promote the debate among students, this can be either by introducing questions or specific non-main stream examples, which have not been included in the online modules.
3.3 Online starter kits

In this approach, a set of online pre-packaged modules with assessments is delivered to the students before education events, aiming to better prepare the students for the activity, and balance for the differences in knowledge the students might have as a starting point. One such example of education events are the EIT Digital Summer Schools, mandatory to all Master students that are in the transition period between first and second year of their studies, additionally offered for participation to external students. We have the same type of online preparation for the students before what we call the EIT Digital Master School Kick-Off event (during which all Master school students meet before starting the Master programme) and before each Doctoral school course. Here we explain the online starter kit traditionally delivered to students before the summer school.

**Online starter kit: summer school**

The aim of the starter kit is that students refresh their knowledge (or learn) independently I&E concepts with pre-packaged sessions on 5 modules (approx. 8h of student time). It is composed of the following themes:

- Introduction to assessing the impact of ICT technology (theory and models)
- Business Modelling / Business Model Canvas (process of Business Model Generation, building blocks of the BMC)
- Entrepreneurial Finance (Introduction, cash flow statement, balance sheet)
- Marketing in Technology Ventures (Introduction to customer-oriented marketing thinking & doing, creating, communicating & delivering customer value)
- Introduction to pitching (with examples)
After each module there is a quiz each composed of 10 questions. Students pass the quiz if they score 6 out of 10 and they can take the quiz up to 5 times. The correct quiz answers are released to the students only after the deadline. After the deadline the results are shared with the I&E local coordinator and examiner one week before the start of the summer school.

In this model, the role of instructor is primarily in a follow up session of the starter kit, at the start of the summer school. In this occasion, after having received the results, the instructor will decide to repeat or go through the contents on which the students had lowest scores and like this prepare better the students on the topics of limited knowledge, also covering specific questions that students could have around the online contents.

3.4 Independent levelling-up

In this approach contents are delivered to the students before the class, they are usually accompanied with quizzes or assignments, which students have to complete, and then are not necessarily followed up in class. This is on purpose, with the aim to leave the in-class time available for invited guest lectures or practitioners or topics, and/or for any other planned activities with the students, such as visits of companies and startups, or participation to networking events.

**Blended class example: ‘Quick-and-dirty’ Market Analysis**

This blended teaching example is part of the Growth and Internationalization of Technology SMEs course for IT graduates at both Master’s and Doctorate levels. In the course students familiarize themselves with how to do a market analysis for an internationalizing technology venture, how to analyze and adjust the venture’s offering according to the market environment and how to make a go-to-market plan for a new foreign market entry. Just before the lecture concerning the 1st phase of the course project about conducting a Market Analysis for a real firm case, the students are given a pre-class task to carry out a market research in a “quick-and-dirty” fashion. In the first part, students are instructed to watch an online lecture focusing on exploring customer insight in this kind of netnography. After that students are supposed to write down their assumptions about what is the major problem the case firm is supposed to be solving for its customers. In the second phase, students are instructed to find places online such as social media and forums, where people discuss their everyday life and problems related to the firm’s business model (e.g. customers if B2C, and end-users, if a B2C). In the third phase students are asked to assess how their understanding of the customer's problem has changed based on what they have found on-line and how the actual solution should evolve accordingly. Finally, students are asked to be prepared to present their own findings from the pre-assignment and be ready to comment on corresponding work by the others during the next class on the actual Market Analysis.

In this approach the teacher has the highest degree of flexibility in terms of organization of the course. It requires more time and efforts to setup it up as approach (compared to the previous models), but does not require that the teacher follows up on the contents in class. Additionally, it leaves space for bigger student independence and individual student time management, as well as 1-to-1 help and support on individual knowledge acquisition hurdles.

3.5 Online Repository

Some teachers prefer using the online packages as a way to cover students’ specific needs and open the modules as additions for classes they already run. In this scenario, we train the teachers on all available pre-packages for all of the courses in the I&E minor, and so they learn how to make available to the students only selected subsets, and base their teaching on them.

**Online packages from the blueprints**

To help our blending learning efforts we developed what we call the blueprints, i.e. full course syllabus with associated online contents, where each class comes with quizzes and / or assignments, supported also with many hands-on examples from industry so to fully emerge student on a topic of interest. Teachers invite the students to watch the materials of only selected sessions them, or they point to the students single sessions in the blueprints that can be relevant for the specific needs of the student in question.

In this approach the teacher has highest responsibility to closely follow the student progress and is in a sense responsible for the adequate (or non adequate) coverage of knowledge with online contents. It leaves space for student flexibility and personalized 1-to-1 personal support and guidance.
Figure 2. Visual representation of the (a) individual levelling-up, (b) online repository models. The circle size indicates amount of workload, the bigger the circle, the bigger the workload, while the color indicates the significance of element, the darker color the more substantial for the model the element is, and vice versa, the lighter color is, the less significant the element for the model is, or it can be skipped.

4 TOWARDS THE STANDARD SUITE (RED-THREAD)

In this section we introduce our latest efforts in this respect, the ‘EIT Digital I&E Red Thread suite’ is a set of online I&E contents packages in which all universities in our network deliver the same set of online modules across the I&E courses. It is a coherent suite of packages covering the main EIT and EIT Digital-flavoured topics, introduced in 2017-2018 to all Master School students, while to be fully offered in the fall semester in 2018-2019. The Doctoral School red-thread is still in a design stage at the moment of writing. Each session of the red-thread is composed of video materials and quizzes and peer-review assignments, leaving the possibility for each teacher to choose the assessment type of preference, and to better tune the delivery with the students’ participants. The red-thread will be supported only with these two blending approaches:

- ‘Flipped classroom’, through which we aim at tight coupling with the current course, this would be the preferred model,
- ‘Independent levelling-up, through which we aim at loose coupling with the current course, a quick solution to get started if the University is not ready for full deployment with flipped classroom.

We envision that the I&E Red Thread suite will be a good foundation/support for cross-universities pedagogical activities between students (e.g. through peer-to-peer assessment and forums). For the moment the red-thread counts of 13 sessions across the 3 mandatory courses of the I&E minor.

5 CONCLUSIONS & FUTURE WORK

This article presents the modelling approach to our blended learning education and our experience to integrate online education into university instruction of the I&E group through pedagogical cooperation within the EIT Digital network of European Universities. The approaches explained are based on the key concepts of the activity theory. We have also explained our further steps in this direction.

Taking into account all the difficulties universities face to set up entrepreneurship and innovation education programs, in this paper we have reported on the endeavor undertaken by the EIT Digital to set and implement blended learning within its I&E group, by creating the conditions for cross-university pedagogical collaboration with real impact on teaching. This case study contributes to the analysis of how blended learning can be diffused and adopted widely within networks of universities, and suggested ways to integrate blended learning in higher education institutions.
ACKNOWLEDGEMENTS

The authors would like to acknowledge and thank all the teachers and students who take part in the ‘going blended’ initiative. We would like to thank EIT Digital for supporting such large scale pedagogical cooperation and thus making this work possible.

REFERENCES