OpenBologna: a strategic instrument for integrating students in curriculum development

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Abstract

In 2010, the Mercator Foundation and VolkswagenStiftung's initiative *Bologna – the Future of Teaching* introduced funding for degree programmes and competence centres for a variety of issues in Germany, following the example of UK Subject Centres.

In order to tackle the challenges in engineering sciences brought about by the Bologna Process, three large German technical universities (RWTH Aachen University, Ruhr-University Bochum and Technical University Dortmund) launched the Competence and Service Centre for Teaching and Learning in Engineering Sciences (known as TeachING-LearnING.EU). Here, students are involved in the improvement of teaching and learning using the strategic instrument of *OpenBologna*. It is based on the concept of *Open Innovation*, developed and used by companies in the business sector to actively integrate customers into new product developments.

This paper illustrates the OpenBologna strategy and its potential benefits for curriculum development. The general aims of the Competence and Service Centre TeachING-LearnING.EU and the strategic instrument OpenBologna are presented. A short introduction to Open Innovation describes the foundation on which the new strategy for curriculum development is based. This is followed by some general thoughts about the transfer of Open Innovation to the educational sector and a description of the operational level of OpenBologna. In order to give the reader an impression of the outcome of OpenBologna, the results of the first ideas contest are presented and reflected on in terms of their benefits to curriculum development. The paper concludes with upcoming measures and corresponding research questions.

Introduction

The aims of the Competence and Service Center TeachING-LearnING.EU and its strategic instrument OpenBologna

When the European Ministers of Higher Education agreed upon the Bologna Declaration in 1999 they had seven main objectives:

1. Adoption of a system of easily readable and comparable degrees
2. Promotion of European citizens' employability
3. Adoption of a system based on two cycles: undergraduate and graduate
4. Establishment of a system of credits
5. Promotion of mobility
6. Promotion of European cooperation in quality assurance
7. Promotion of European dimensions in higher education.

The Bologna Process encouraged a wide range of general improvements to teaching in higher education, particularly during the implementation of Bachelor and Master degrees in Germany. One example is the *Teaching Quality Pact* of the Federal Ministry of Education and Research and the Federal States which commenced in October 2011, funding 111 projects in Germany with 2 billion Euros. Prior to this, the initiative *Bologna – the Future of Teaching* (spearheaded by the Mercator Foundation and VolkswagenStiftung) funded the foundation of three Subject Centres for engineering, mathematics and medicine. Their goal is to 'facilitate the use of existing and future knowledge and experience to improve teaching quality and to pool it in expert centres, specific disciplines or subject groups' (Mercator Foundation, 2009).

In June 2010, RWTH Aachen University, Ruhr-University Bochum and Technical University Dortmund launched the initiative for

engineering education, TeachING-LearnING.EU, which is developed according to the UK example (Jeschke, 2009). Research, service and strategic networking are the key elements of its concept. In its seven research fields, TeachING-LearnING.EU focuses on:

- best practice monitoring regarding the achievement of the Bologna goals
- curriculum development
- new teaching and learning concepts
- competence oriented testing
- teaching experiments
- higher education didactics for lectures with large audiences (500+).

The five service fields are:

- higher education qualification
- coaching and consulting
- flexible funds for teaching staff
- models for doctorate studies
- following up the work of the Bologna Process in terms of teaching and learning.

The major goal for strategic networking is to bring together all those involved in engineering education and achieve a broad resonance in German higher education in order to improve engineering education. For each target group a special instrument has been identified to support the communication process (see Figure 1). Representatives of companies and educational institutions come together twice a year in the Community of Practice in order to meet the Bologna goal of increasing the employability of graduates. An International Advisory Board supports and counsels all actions of TeachING-LearnING.EU from a metaperspective. Special interest groups like the Association of German Engineers (Verein Deutscher Ingenieure, VDI) or the Industrial Labour Union Metal (IG Metall) also facilitate working groups for engineering education which meet regularly with the Competence and Service Centre. The quality of engineering education in Germany is the subject of an annual conference which is actively attended by all of the stakeholders.

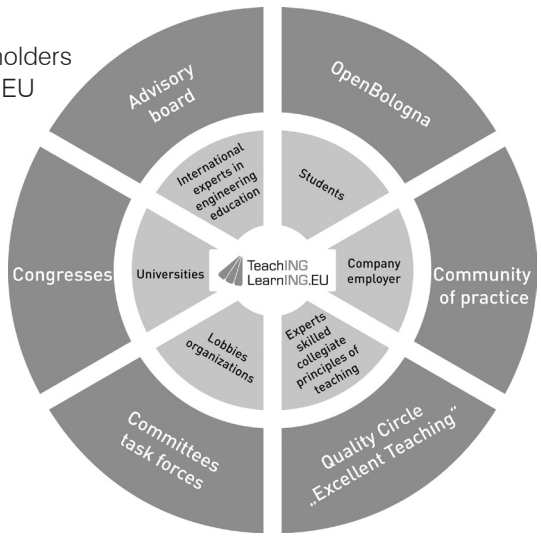

Figure 1.
Instruments and stakeholders of TeachING-LearnING.EU

Special attention is given to the integration and participation of students in the improvement of teaching and learning. According to the Budapest-Vienna Declaration, student involvement is necessary in order to develop the European Higher Education Area as it was originally envisaged in 1999 (European Ministers of Higher Education, 2010). The importance of the participation of students in implementation processes is also stressed by the CDIO initiative, which underpins the relevance of this measure, especially in the field of engineering education (CDIO, 2011).

In order to fulfil the rather vague recommendation of the European Ministers of Higher Education of 'involving students', it has been the objective of TeachING-LearnING.EU to establish some key mechanisms and to form an instrumental framework for student involvement. For gathering the students' opinions, the project team found a new and promising method in economic sciences: the Open Innovation concept. Its basic principles are identified and adapted to the demands of the Competence and Service Centre. The main questions of the Open Innovation approach are:

- how can customers be integrated into new product development?
- how can the newly gained knowledge be preserved, used and further developed?
- what is the motivation of the customers to participate in Open Innovation activities?

In 2009 and 2010 many students in Germany protested against the Bologna Process and demanded better study conditions. Points of criticism were, for example, the workload of the Bachelor degree being much higher compared to the former *Diplom* and the former not being accepted by industry. In the context of the student protests during that time, the term *OpenBologna* was adopted for marketing reasons – to attract the students' attention and

convince them to support and shape the Bologna Process instead of protesting against it.

The motivation to establish the instrument OpenBologna within the TeachING-LearnING.EU project lies in previous experience with the involvement of students in the implementation of the Bologna Process in Germany's engineering education. So far, student involvement has mostly been restricted to either the meta-level in accreditation processes or the micro-level in individual evaluations of lectures (see Schuster et al., 2010). Moreover, student engagement is often connected to political engagement (such as student council or student parliament). But does political engagement and having good ideas for curriculum development automatically correlate? Is it not possible that many students can have good ideas about curriculum development but have no intention whatsoever in becoming politically active? Without judging this, shouldn't the goal be to get as many ideas from the students as possible?

These questions lead to one of the major premises of the new strategic instrument OpenBologna. The first hurdle of participating in curriculum development must be low. The different possibilities of doing so are described in more detail under *OpenBologna on an operational level*. Another key element of developing OpenBologna is the system of incentives. Students need to be intrinsically motivated; they need to know how their ideas will be handled and if they are going to be implemented. To a certain degree they also need *extrinsic* motivation, such as winning a prize or getting recognition for the best idea. Another aspect is that the majority of today's students have grown up with digital media (Prensky, 2001) and thus the possibilities of web 2.0 technology are also taken into account. In general, TeachING-LearnING.EU regards students as equal partners besides other stakeholders who are fostering improvement of German engineering education.

The following section clarifies the basic principles of the business strategy *Open Innovation*, on which OpenBologna is based.

What is Open Innovation?

Being able to innovate is a key factor in a company's competitiveness. As a result of the rapid growth in markets in information and communication technology, combined with shorter product life cycles, global competition and heterogeneous demand of consumers, innovation management in companies has become quite complex. As well as (sometimes decades of) internal knowledge, many companies use the experiences and demands of their customers to improve products or services. The integration of external stakeholders into the whole innovation process has coined the term *Open Innovation* (Chesbrough, 2003). Apart from customers, other organisations such as research centres or universities can be involved in new product development. Not only companies but also public institutions gain many advantages by involving external stakeholders. In general, Open Innovation processes are quicker because more people participate but, by the same token, the approach broadens the scope for solutions as so many are brought to the table. Because of the direct integration of users, expensive and time-consuming market research can be omitted (Brem, 2008). Moreover, the acceptance of openly developed products is higher when compared to a traditional closed innovation process. Information about needs, problems and solutions is taken into account at an early stage of the development process; thus consumers tend to be willing to pay more for the co-developed product in comparison to a competing product on the market (Franke and Piller, 2004). In a university context this means that students may be willing to invest more effort in a class if the teaching concept was co-developed by them.

A common approach in the research community and also in industrial practice is the *lead user method* (von Hippel, 2005). Lead users are individuals that are experiencing needs ahead of the market trend and are at the beginning of the innovation process (see Figure 2). According to Churchill et al., lead users

> *often both experience emerging needs and may develop prototype products and services that can satisfy these needs. Lead user prototypes can then become the basis for commercially attractive new products and services that will be appealing to routine users in the general marketplace.*
>
> (Churchill et al., 2009, p5).

The implementation of the Open Innovation strategy is based on different relationships within a different framework, depending on the sector. At first glance it seems that the

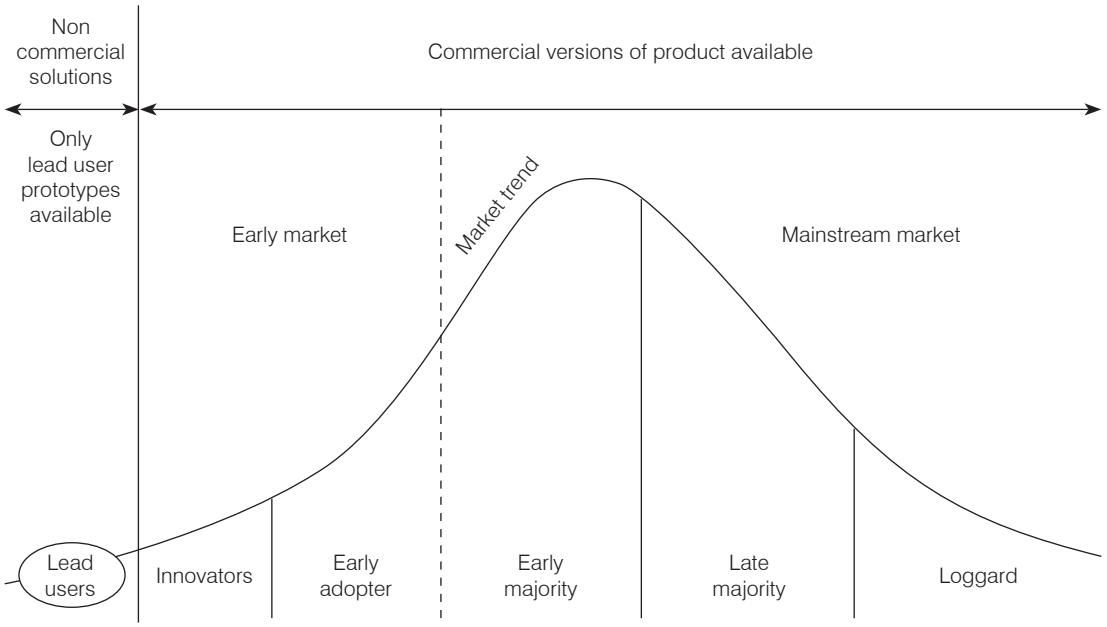

Figure 2.
Lead user concept (von Hippel, 2005)

great success in the economic sector could be easily replicated by the educational sector, but in reality the transfer is not trivial. This transformation is discussed in the next section.

From Open Innovation to OpenBologna

The demand is obvious – more than ten years after the Bologna declaration has been passed, adjustments are still necessary. The European Ministers of Higher Education claim in the Budapest-Vienna Declaration in point 7 that they want to support 'efforts to accomplish the reforms already underway to enable students and staff to be mobile, *to improve teaching and learning in higher education institutions* [emphasis of the author], to enhance graduate employability, and to provide quality higher education for all.'

When using the Open Innovation approach to achieve the goal set by the ministers, some aspects should be discussed. The most pertinent questions are:

1. are universities comparable to companies?
2. does an "educational market" exist?
3. can students really be regarded as customers of the university?

In order to answer the first question, the term "company" needs to be defined. According to Sullivan (2003), companies are organisations engaged in the trade of goods, services or both to consumers. They usually follow the principle of maximised profit (Heiring and Lippens, 2002). In the case of universities, the "goods" of knowledge are provided through two core segments: research results and education. By paying tuition fees, students pay for their education; thus resulting in a trade situation. Since universities are nonprofit organisations, the companies' profit-maximisation approach is not applicable. German universities' financial status relies heavily on third-party funding for their research, the amount of which can of course be maximised but, as discussed before, without monetary profit. In terms of education, the number of students who graduate could be compared to "profit" – at RWTH Aachen University, for example, it is the mission of the Future Concept for Excellent Teaching to increase the number of students who graduate from one enrolment cohort up to 75% (RWTH Aachen University, 2009).

The second question (concerning the existence of an educational market) is closely linked to the first. It is obvious that universities compete with each other – for the best academics, for funding and for the best students. Globalisation intensifies this competition even more since it multiplies the alternatives (at least for academics and students) and enlarges their scope of action. The new trend of many universities putting a lot of effort into marketing activities also shows that certain measures from industry find their way into the educational system. Without any judgment of this trend, the situation resembles a market for the "goods" of education.

In order to answer the third question (whether students can be perceived as customers of the university), the term "customer" must be defined. In general, a customer is a person who buys goods or services (Hornby et al., 2005). A more economic viewpoint defines a customer as an individual or a party on the demand side of the market, which can consist of individuals, institutions or organisations with several decision-makers. According to Rogall (2000), in a market situation, a customer has the ability to choose between different products and suppliers. What is interesting now is that Rogall does not include the aspect of payment in his definition. Since students stand on the demand side of the education market and have the ability to choose between many different universities, they can therefore be considered as customers. According to Hees and Isenhardt (2005), science always has many "customers", from ministries or project-executing organisations to students and citizens. The most important precondition for the relationship between customers and organisations is *partnership* (Hees and Isenhardt, 2005). The characterisation of students as partners has also been claimed by the European Ministers of Higher Education. The Prague Communiqué of 2001 says:

> *Ministers stressed that the involvement of universities and other higher education institutions and of students as competent, active and constructive partners in the establishment and shaping of a European Higher Education Area is needed and welcomed* […] *Students should participate in and influence the organisation and content of education at universities and other higher education institutions.*

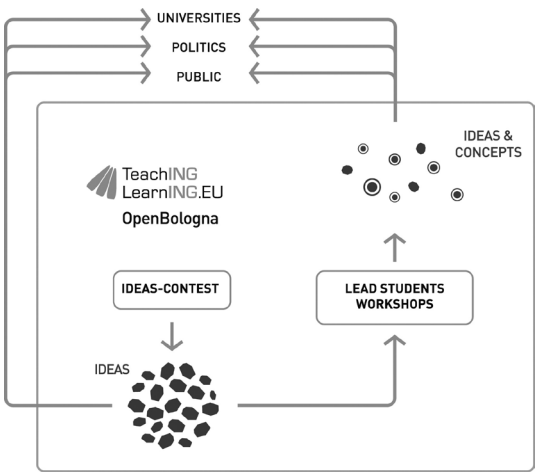

Figure 3.
Illustration of the strategic instrument OpenBologna

The discussion above leads to a key understanding of the role of universities and students. Universities are not entirely comparable to companies, but share some characteristics. They provide the "goods" of knowledge through education, and students are the main customers for that "product". The relationship between universities and students should be based on partnership. Universities compete against each other on the educational market for these customers – at least for those who are most likely to graduate. Therefore universities have a strong interest in the quality of their education as one of their core products. Following the principle of Open Innovation, students' experiences and requests can support the university to improve its "goods" in terms of education.

Putting the theory of the transformation from Open Innovation to OpenBologna into practice, the operational design of OpenBologna is described in detail in the following section.

OpenBologna on an operational level

In TeachING-LearnING.EU, the strategic instrument OpenBologna has been used from the very beginning. Each semester there is an *ideas contest*, a very common Open Innovation method. It is characterised by a high degree of freedom and the immediate generation of innovative ideas (Piller and Ihl, 2009). As a by-product, it also serves for the identification of lead users (Piller and Walcher, 2006). Topics are teaching and learning in engineering education. By awarding the best ideas with a prize, the students are motivated by extrinsic incentives. The first and second ideas contests were sponsored by famous tool suppliers (Bosch and Hilti).

In addition to the ideas contests, TeachING-LearnING.EU uses the *lead user* approach described earlier. Engineering students who are interested in the development of teaching and learning are identified, the goal being the improvement of teaching and learning concepts in engineering education, not a general facilitation of degree programmes. Based on the experiences of Open Innovation, the acceptance of new concepts developed by students is quite high. The first lead student workshop will take place in Aachen in November 2011. Adopting the slogan "LearnING by DoING", students are invited to develop innovative teaching concepts that

foster practical competencies for engineers. After the workshop, lead students will present their ideas to the Community of Practice of TeachING-LearnING.EU in order to see if their concepts can pass the "reality check". The whole process of OpenBologna is visualised in Figure 3.

In order to promote the concept of OpenBologna nationwide, it is important to reach as many students as possible. Publicity channels include the website (www.teaching-learning.eu) which publishes engineering education related news on a weekly basis; a Facebook page which is also connected to the news service via an RSS-feed; and a Youtube channel where self-produced video interviews with different stakeholders are regularly published. In the first 17 months online, the Competence and Service Centre collected approximately 694 contacts.

Illustrating the potential outcome of the strategic instrument OpenBologna, the results of the first ideas contest are presented in the following section.

First results: The outcome of the first ideas contest 'Tweak your Bachelor's!'

In the winter semester of 2010/11 TeachING-LearnING.EU ran the first ideas contest of the project. 37 ideas in total were submitted. The method of choosing the winners was as follows: Of each idea that had been sent in, a short version was created. All the team members of TeachING-LearnING.EU in Aachen awarded scores for the ten best ideas, from ten points for the best to one for the tenth best.

The top ten ideas were openly discussed within the teams at Aachen, Bochum and Dortmund. Each group had to select the three best ideas with no regard to the former ranking of the top ten. Additionally each group had to nominate a student, who also had one vote. Out of these six votes, the winning ideas were identified. The three winning ideas are presented below, together with their short version descriptions and the statements of the jury.

First place: Engineering Social Learning Network – study and meet new people!

Description:

> *The semester begins. You are one among many. Different city, maybe even a different country - in any case a thousand new faces. The content is hard, the professor is alright but with hundreds of people in the lecture hall many questions remain open. The solution: the Engineering Social Learning Network called INGe! You can register for free and leave a little data, e.g. gender, semesters already accomplished, language(s), subject, preferred study group size etc. INGe now creates study groups by chance, depending on the matching of central criteria (language, subject…), either according to a special lecture or in general for the subject. At the same time, INGe gives the suggested participants the possibility to chat in a forum and to send each other messages. Thus the group can arrange a first meeting quickly which can be entered in INGe's calendar tool. INGe also suggests one of the study rooms of the uni. That way you kill two birds with one stone – study for the uni and meet new people!*
>
> (Sebastian Nowroth, student of metallurgy and material engineering, RWTH Aachen University.)

Jury:
The social learning network absolutely fits the ground rule of TeachING-LearnING.EU: that all new teaching and learning ideas need to be designed for the digital generation. It supports the students in organising themselves in a way that goes beyond providing learning material. By combining a digital platform with real study meetings, it also includes the social side of the Bologna Process which, according to many experts, still needs attention. Its non-subject specific approach helps to improve learning in engineering sciences on a wide basis.

Second place: More groupwork and communication training

Description:

> *There should be more group work. In our case we have group work in the first and second semester, but from that point on not anymore. Now I realise that later in the daily working routine of engineers it is expected that they are capable of dealing with group dynamics. Communication is such an important topic. I know at first hand that it is important to enforce such things. In the uni we have 99%* ex-cathedra *teaching, where you basically never have the chance to play a part in*

the lecture! There are as good as no projects that need to be done.

(Felix Büsing,
student of automotive engineering,
RWTH Aachen University.)

Jury:
To integrate more group work and communication training into curricula is not a new idea – at least within circles of engineering education or didactical experts in general. From a student's point of view it deserves full credit, especially regarding the criteria quality, implementability and effectiveness. Group work and communication training fosters the employability of the students and is also of benefit to each student's personal development. It is implementable in many different subjects.

Third place: Uni-(Wiki)pedia, filled by teaching staff and students

Description:

In the first years of studying you are confronted with plenty of new stuff. A lot of the time you learn in an "exam oriented" way due to a lack of time. You don't understand the topic completely and forget it again quickly. Content you have covered is required throughout the course of your studies, especially mathematical topics. If you can't remember things, you have to do time-consuming research in order to fill your knowledge gap. Search pdfs, type in passwords, skip through scripts and notes and sometimes also video material. If nothing helps you have to go to the library or the confusing internet. My proposal is to connect content from the internet with the possibility to communicate about it. For example, the Taylor series is used for a derivation. If a student doesn't recognise it, he can ask a question which is visible to everyone. This could appear next to the text. In the answer (students as well as teaching staff can answer and everyone can view it) there could be a link to the cumulated content available for the Taylor series (e.g. short definitions, lecture transcripts where the topic has been covered, videos, exercises with solutions and links to literature which is available in the library). That way resources from a faculty, a university or many universities could be connected. Students should also have access prior to arriving at university in order to inform themselves about the content of different studies and prepare themselves better.

(Felix Moog,
student of mechanical engineering,
Leibniz University Hannover.)

Jury:
Having a wiki specially for engineering content with the capacity to exchange learning material and communicate about the given content combines communicative and meta-communicative aspects and therefore helps the students to understand the content on a deeper level. The idea also has the potential to improve teaching as staff can easily see which parts of their lecture cause problems among the students and bear repetition and clarification.

Interpretation of the results

A wide-ranging spectrum of ideas was submitted. Some are very thoughtfully conceived, others are just shorts flashes of inspiration, for example:

- *Could the teachers please use green laser pointers instead of red ones? You can see them much better*
- *More groupwork in all study courses (social competencies)*
- *Strengthening humanities.*

This lack of elaboration should not be viewed as a lack of quality because, although they have the characteristics of catch-phrases, they are valid observations.

Many ideas were combined with a general criticism of the educational system:

- *I think your campaign is really good because there are indeed some things to criticise*
- *Every semester we have the situation that graduate engineers leave the uni who are interpersonally retarded*
- *It strikes me that many exams have the goal to memorise absurd devolutions of actions or law texts which are forced by the chairs, in order to depict them one to one.*

These comments were offensive in parts and one could argue that this is not the right way to constructively present ideas for improvement. Nevertheless, for the purposes of evaluating the ideas the insults were ignored and did not

appear in the short versions which were rated by the jury.

Another interesting aspect was that some students proposed the same concepts that are currently being discussed and praised by the engineering education community. Although they might not be innovative from the community's perspective, they underline the students' need for these didactical concepts.

Different learning types:

- *There are different strategies to configure your studies; everybody needs to find his or her own way. For that, it could be useful to find out the strategies with which others master their studies.*

Practical application:

- *In general, practical application is very important. One or two construction projects make a lot of sense. Like in coding tasks. But simulations should also be obligatory in compulsory subjects for students nowadays. And not just the theory but also the practical application. For construction, a FEM-simulation should be taken for granted.*

The general feedback on the ideas contest was positive:

- *I'm really pleased that such an initiative exists, which has set itself the goal to improve study conditions.*
- *I also want to contribute some hopefully new ideas soon – it's a great opportunity to do so!*

Only one participant was sceptical:

- *Apart from that, this here probably won't change a lot.*

To sum up the reflections on the first ideas contest, it is important to compare the results with the original aims of this part of the OpenBologna strategy. If at first sight the number of ideas is compared to the number of students enrolled in engineering science in Germany, the participation appears frustratingly low. However, TeachING-LearnING.EU takes a different perspective. If not for this contest, these ideas would probably never have been voiced - if at all, it would have been in a soon-forgotten (and certainly unpublished) conversation with peers in the cafeteria. Through the instrument of the ideas contest within the framework of OpenBologna, students were given a voice in the debate about how to improve engineering education in Germany and their ideas are subsequently being presented to experts, to political decision makers and to the public. From an economic point of view, the goal of expanding the scope for solutions by including students in the conversation has been achieved and it is illuminating to see that some of the ideas match those of engineering education researchers.

Putting words into action

An important and pending question is what will happen to the ideas after they have been handed in. TeachING-LearnING.EU takes a supportive role, rather than forcing teaching staff to implement the new ideas. The first step to realising the ideas is to promote them. All winning ideas will be presented at the annual conference, attended by teaching staff, including working groups with high ranking people (e.g. teaching deans). The ideas are going to be published by TeachING-LearnING.EU and will be distributed amongst the teaching staff of the three universities and via download on www.teaching-learning.eu. But promoting the ideas is not enough. TeachING-LearnING.EU actively tries to match the students' ideas with potential implementers (e.g. lecturers or teaching staff attending upcoming events run by the Competence and Service Centre). The implementers commit themselves to pushing forward the realisation of the idea in their organisation. TeachING-LearnING.EU will request regular updates about the state of implementation and the quickest implementer is awarded *TeachING-LearnING.EU Maker of the Year*. With this approach, TeachING-LearnING.EU overcomes the problem of financing, appeals to the goodwill of the engineering education community and shows appreciation for the implementers. The matching of ideas and implementers at the conference ensures that everyone is "on the same page" and fosters an atmosphere of change through shared responsibility.

Conclusion and further research

The results of the first ideas contest of TeachING-LearnING.EU have shown that the strategic instrument OpenBologna can be a supportive element in the involvement of students in curriculum development. The next step will be to garner support from different

levels within the universities in order to put the ideas into action. To ensure the effectiveness of OpenBologna, it has to be ensured that as many ideas as possible will be translated into actual curriculum development. To start the process top-down, the new ideas will be presented at TeachING-LearnING.EU events, as well as in smaller circles with decision makers of the universities. They are being trialled prototypically in teaching experiments in order to get direct feedback from students and teaching staff and will be presented in the next call for Flexible Funds in order to give teaching staff ideas for their own projects, sensitising them to students' ideas and inspiring them to improve their lectures with the financial support of TeachING-LearnING.EU.

The first ideas contest helped to broaden the scope for solutions for curriculum development and showed that students can be reliable partners, especially when it comes to new teaching concepts for the digital generation. It has to be pointed out, however, that the topic of the first ideas contest was somewhat general and it will be interesting to see if the quantity and the quality of submissions will change with more specific topics in subsequent contests. The results of the first lead student workshop are also eagerly awaited, as this method is expected to elicit more detailed solutions (something like prototypes or further developed products). It will be interesting to identify the major psychological motifs of the students as they participate in curriculum development processes. This will inform the further implementation of OpenBologna within TeachING-LearnING.EU and in other universities in the future. The critical question is whether students would be willing to invest more time in their studies if the teaching concept is co-developed by them. In order to standardise the instrument OpenBologna and to measure its efficiency, the development of a management control system could be useful in the future. This could help to implement the strategic instrument in future curriculum development on a sustained basis. ■

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