Innovation in teaching and research bridging life-long learning and research

Shaun West, HSLU T&A, Horw

Abstract

Traditionally teaching and research in universities of applied science have been separated, however, in this case study, the innovative integration of research and teaching is explored with the outcomes described, and the lessons learnt. This case study provides an insight to how innovative synergies between teaching and research could be developed and how this could be further improved and integrated to improve the overall learning experience for the students and the quality of research and teaching in general.

Through active management and coaching of students as part of a research project, it is possible to:
- support students with academic writing;
- publish academic papers (e.g., conferences papers, journal papers, and book chapters) based on student project(s);
- provide local firms with state-of-the-art frameworks to support their businesses;
- provide 'interesting' and challenging projects for students;
- provide a route to Innosuisse and SNF backed research.

1 Background

The author, new to the Hochschule in 2014, was tasked with building research around the theme of service innovation/design and servitization within the Business Engineering (now the Institute of Innovation and Technology Management) HSLU T&A. Research in these areas was relatively underdeveloped in Switzerland, whereas it is more developed in other European countries. At the time there was limited Swiss funding available for research in this area, and HSLU had no track record of this area of business research. The challenge was, therefore to, with limited government funding, build a research base attractive to both students, businesses, and academia.

The author had BSc and MSc students as resources who would take part in coached industrial projects of various durations both in Switzerland and internationally. The traditional breakdown of instruments was: teaching; exec-education; student-led project; lecturer-led projects (werkbox); research projects. Collaboration with other universities was considered essential, and a control mechanism to ensure quality. Working closely with firms helped to improve the relevance and applicability of project work.

The author actively engaged with five universities in Switzerland (e.g., ZHAW, SUPSI, EPFL), 12 in Europe (e.g., Aston Business School, University of Florence) and two in the USA (including Stanford). Over the period there have been engagement with 30 firms in Europe, including Swiss SMEs (e.g., Bächli in Kriens, SmartChain in Zug) and large firms in Switzerland and internationally (e.g., Rolls Royce, Airbus, ABB, Ricoh) as well as the Swiss Alliance of Data-Intensive Services.

2 Outcomes

The outcomes from the approach are summarised in Table 1; the table was developed to present the synergies between the combined teaching/research approach.

Table 1 Perceived outcomes for each group based on the five instruments

	Papers / conference presentations	Workshops	Peer teaching	Colloquium
Teaching	Provides theoretical input and cases	W/s built out of project working	Master students better able to support teaching	Able to provide teaching challenges from classes to the students for feedback
Exec-education	Provides theoretical input and cases	W/s built out of project working	WB and MSE students learn that they all have something to learn	CAS in ABE provides current industrial input
Student-led project	Improves writing skills Improved presentations skills	Development and testing of w/s in projects	Improved competency Sharing of know-how	Students able to provide input into a particular them Sharing of the overall understanding
Lecturer-led projects (werkbox)	Student review of papers supports the understanding of academic writing	Development and testing of w/s in projects	Students better able to support lecturer-led projects	Lecturer has a better understanding of the research overall
Research	Increased number of research papers published	Increase number of industrial firms for potential partners	Master students better able to support research	Deeper know-how into the topic area

Note: not described in the table is the research support awarded Innosuisse and SNF in 2019.

This mixed approach resulted in significant publication output, industrial innovation, and new public research funding. Over five years (2014-2019) 12 keynotes at industrial conferences have been made, 12 conference presentations, 12 peer-reviewed conference papers (two awarded best conference paper), six journal papers, four technical papers and four books/book chapters. It is worth noting that two 'best paper' awards for journal papers were co-authored with students. Also, a three-day international conference on Service Innovation was co-hosted with EAWAG and Aston Business School (UK) in Luzern with published proceedings. All of the papers and presentations produced were supported by students working on the most part on industrial projects that formed part of the studies (both BSc and MSc studies). More than 20 Student-led projects were the base of this work. In May 2019 an IMPULSE project award was made by Innosuisse to support research into the design and application of digital twins, the project has three university partners and six industrial partners. A second Innosuisse project award was won in July 2019, demonstrating the long-term impact of integrating research and teaching.

2.1 Reflections – success factors and lesson leant

This approach was successful as it integrated the different university instruments with the vision of using the available resources to provide learning opportunities for both students and firms. Also notable was the creation of a network of partners, both universities and firms, based around the general theme of servitization and service design. To build an internal network of firms and universities takes significant effort and vision as well as pre-existing contacts; it can only be built upon credibility. The core engine was, on reflection, the lecturer-led projects (werkbox) which allowed delivery of small 'consulting-like' projects with students, whereby these along with student projects created a level of freedom and data from which papers could be written, which in turn helped to build the business and academic credibility. The research area was also important as it welcomed qualitative and semi- qualitative research from the social sciences to be applied. Also essential was the applied/practical nature of the project work as the firms supported this, and this aspect provided a positive learning experience for the students.

The lack of a 'lab' could be viewed as a weakness and at a school of engineering this causes confusion as to how research can be delivered with such facilities. This would not have been questioned in a

business school where research approaches are traditionally different compared to engineering sciences. A 'formal' meeting, innovation and co-creation space where students and business people could meet could have accelerated the process and would be a tremendous asset for the new Campus in Horw. The pigeonholing based on traditional delivery instruments can lead to silo thinking with a potential negative impact on all parties.

3 Conclusions

It is possible with limited resources to deliver both industrially relevant and high-quality applied research in the area of Service Innovation by using a mixture of resources. This approach leads to synergies within: classroom teaching; project coaching; the firms in terms of organizational learning and talent identification; academically; and, in the development of a fully-funded research program.

The area of study here is in the intersection between business and technology where qualitative research that takes place in the field is the basis of the research frameworks applied, and therefore this may limit the applicability of the study results. Nevertheless, the support from Innosuisse with the Smart Twins project suggest that it remains possible in some fields to build such a research program. The study's applicability to life-long learning approaches should be tested in other areas to confirm its applicability as it is anticipated that many of non-research synergies will remain.