Quest 3C: an integrative simulation game used to encourage cross-disciplinary thinking and action

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Abstract

Interdisciplinary, complex problem-solving and the necessity to communicate effectively in global teams characterise today's rapidly changing business environment. Employers consistently stress the need for business engineering graduates to demonstrate technical expertise, methodological competences and diverse soft skills. The "silo effect" in higher education has partially created a gap between what industry wants and what academia provides. Here we examine how interdisciplinary team teaching and shared ICT might be more effective in bringing higher education teaching in sync with industry and its demands.

Introduction

Bridging the gap between academia and business

Interdisciplinary, collaborative problem-solving and effective communication are a sine qua non for global teams in today's rapidly changing marketplace. The working environment of operations managers or business engineers is starkly characterised by cross-functional, context-based problem solving. Business engineers need to react swiftly to customers' demands, applying knowledge from a variety of subject areas to create value-generating solutions.

Employers consistently expect business engineering graduates to have not only domain expertise but team competence, leadership potential, strong communication skills and the ability to think out of the box. As a response to these needs, the German Association of Business Engineers (VWI) has identified some key learning outcomes of business engineering study programmes. These include the ability to think and act in a holistic, networked, intercultural and interdisciplinary manner (Brettel, Dittmann, Englberger, von Hirschhausen, Leipnitz-Ponto et al., p. 25).

Although most business engineering programmes today cover a broad range of disciplines in their curricula, "interdisciplinarity" as such is traditionally managed by offering individual courses which build upon one another or, at best, make reference to one another. Higher education typically teaches in academic disciplines, a process which leads to significant transfer potential getting lost. This paper aims to present ways in which collaborative interdisciplinary teaching complemented by information and communication technologies (ICT) may provide the type of broader competence-based education better suited to industry, in particular, in the field of business engineering..

Methodology of Research

Here we will refer to the updated professional profile of business engineers carried out by the German Association of Business Engineers (VWI) which demonstrates that a field like business engineering can ill afford to be insular.[1] We also draw upon the experience of faculty at ESB Business School, Reutlingen University with respect to interdisciplinary team teaching as a means of fostering a dynamic and interactive learning environment. We will show how collaborative teaching can provide a valuable way of modelling thinking within or across disciplines, as well as inspiring new knowledge partnerships among faculty.

A core focus of this paper is on the collaborative creation of a simulation game at ESB which aims to foster interdisciplinary thinking and team and leadership competences by means of an integrative approach. In other words, relevant methodological competences and soft skills will not be taught in isolation of business and engineering topics, but rather developed hand-in-hand with domain-specific knowledge. Furthermore, we will look at the appropriateness of simulation games for the teaching and assessment of broader competences.

[1] No less than 13 revised and expanded editions of the study exist since 1972. It is one of the central tasks of the organisation to deal with the interests of this study area (Baumgarten & Schmager, p.5).

Findings/Results

Responding to the demands of employers and business engineers

Business engineering emerged as an academic discipline in the 1920s in response to economic demand for experts with both business and technological or engineering know how.[2] Over time business engineering programmes have evolved to meet the needs of the fast changing global marketplace. Interdisciplinarity, one of the three central pillars forming its foundation, remains relevant today. Where some 20 years ago, subject-matter knowledge and additional qualifications marked out the path to success, today considerable importance is attached to practical experience, flexibility and soft skills. Research carried out in 2011 by the German Association of Business Engineers (VWI) identifies the factors named by employers and business engineers as contributing most greatly to success. Topping the list are team competence, customer orientation, responsibility, goal orientation and intrinsic motivation. Other highly rated factors are analytical thinking, integrity, receptiveness, flexibility and soft skills (Baumgarten & Schmager, p. 69). The study goes on to examine the desired changes to business engineering study programmes as a means of preparing students for a successful career in the field. The most sought after changes by employers and business engineers are practical experience, case studies, soft skills and knowledge of processes and methods.

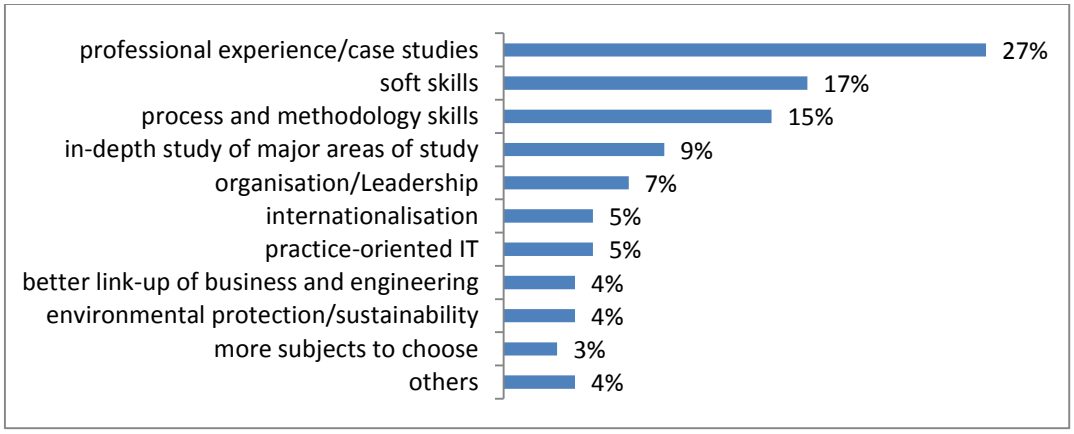

Figure 1: Need for changes in Business Engineering Study programmes[3]

In fall 2014/15, ESB Business School, Reutlingen University will launch a new International Operations and Logistics Management undergraduate programme which aims to address some of the key needs expressed above. A prime objective of the programme is to expose students to authentic problems and industry relevant technology so as to give them a taste of what is to come. First-hand experience has been gained in the master's programme in Operations Management which is entirely project-based. Here, students are presented with real-life industrial problems. They have to apply newly-acquired knowledge to problem-solving and are supported by faculty who take on the role of coaches, guiding the students while assessing what they are learning from the experience.

Development of an interdisciplinary simulation game

Most innovation does not require inventing something new. It may simply involve combining or recombining capabilities across disciplines, organisations, and sectors. This is true both of industry and education. Leveraging the experience and insights gained through the pilot master's programme, scholars at ESB Business School have decided to develop an interdisciplinary simulation game for undergraduate students aimed at addressing the multi-faceted team and leadership challenges encountered when doing business in a technologically complex, globalised world. The game will be delivered in a blended-learning format, by means of face-to-face sessions and via a cloud-based platform

[2] In 1927 at the University of Berlin-Charlottenburg the first integrative business engineering or "Wirtschaftsingenieur" study programme was offered. Retrieved 14.04.2014 from http://www.vwi.org/hauptmenue/beruf-studium/wirtschaftsingenieurwesen/geschichte-und-bedeutung.html.

[3] Berufsbilduntersuchung 2011 Wirtschaftsingenieurwesen in Ausbildung und Praxis, H. Baumgarten und B. Schmager, Herausgeber: Verband Deutscher Wirtschaftsingenieure e.V. (VWI), p. 57

Potential challenges and opportunities of team teaching

The simulation is currently being developed by a team of instructors from different disciplines. Some of the greatest opportunities are to be found in the grey areas between silos. Thinking and acting more horizontally may enable us to harness these opportunities. Many institutions of higher education, however, still fall victim to the "silo effect" (Linton, para.1). The pressure of preparing classes, syllabi, grading papers, advising students, administrating, engaging in committee work, researching and publishing etc. is known to take its toll on faculty. One of the effects of succumbing to the strain is that scholars become isolated in their particular area of interest, looking inwardly instead of towards an intellectual confrontation and debate with other disciplines.

The process of working in a cross-disciplinary team forces familiarisation with material and topics outside one's specialism as well intellectual dialogue with colleagues about their specialist areas. The process is resource-intensive, requiring agreement on content, workload, assessment rubrics and timetabling. It can, however, be extremely rewarding, affording instructors new insights into problems and acquainting them with diverse methodologies. The simulation will be delivered in a team format which presents further challenges. Changes need to take place in university administration to deal with this paradigm shift, making it easier to timetable, deliver and assess such courses. Students, too, might have issues adjusting to this new style of learning in which they will be presented with different opinions, styles of teaching and methodologies in a single course. Care will have to be taken to maintain coherence (Leavitt, p.3).

Value to employers

If successful, the approach should provide students with an impetus to achieve higher levels of synthesis and integration in their study of new material (p.2). It aims to encourage interactions that overlap disciplinary boundaries with a view to generating new common methods, knowledge, or perspectives. After piloting the game, we aim to run it with partner institutions. Improved network bandwidth has facilitated the delivery of online simulation games meaning that the game can be offered to larger, geographically dispersed groups, increasing its pertinence to today's global business environment.

Business engineering students at ESB Business School encounter a number of different simulations during the course of their undergraduate studies. These have to date fallen into the categories of engineering or business. Technologies ranging from ERP systems to sophisticated collaboration suites in CAD enabling digital and virtual factory planning are used to simulate field installations and design customised process solutions. Business or management simulations have also become a standard feature of the curricula.[4] They generally stimulate a high level of student engagement and provide an excellent opportunity to combine conceptual learning with practice to bring about behavioural change. Moreover, research has demonstrated that such games increase the quality of learning, allowing students to gain a deeper, more intuitive understanding of a given field. In methodological terms, such management simulation games are well-suited to the development of soft skills. Recent studies provide empirical evidence in support of this argument (Decker, Kroll & Fortmann, p.21).

The degree of innovation offered by the simulation in question comes from the combined focus on subject-matter expertise, methodological and soft skills against an interdisciplinary backdrop:

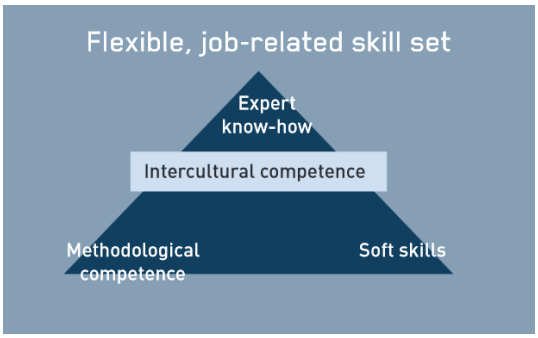

Figure 2: Development of interdisciplinary professional competences by means of an integrated approach

[4] Examples include TOPSIM and BTI Global Factory.

Leadership, intercultural communication and soft skills have traditionally been taught and assessed in isolation of hard skills courses. However, these competences are not mutually exclusive and treating them as such runs counter to the need to develop experts and leaders who are technologically and behaviourally competent. In today's fast-paced business environment, instant communication and the global exchange of information and ideas are the order of the day. Navigating within this complex world requires knowledge, tools, and the ability and skill to adapt to new situations. The immersive, context-rich format of simulations allows for soft, methodological and hard skills training to be blended in a meaningful way.

The simulation will present students with authentic scenarios from a modern-day supply chain at the interface between business and technology. The dynamic setting will offer numerous chances to experiment and test out different management approaches in a risk-free environment. More often than not, students will find themselves in situations which call for rapid responses and educational guesses based on their expertise. They will become acquainted with aspects of the Adizes® methodology, a holistic approach to problem-solving.[5] Besides applying their expert knowledge to resolving complex issues, they will learn to recognise the importance of networking and achieving the buy-in of key players in the decision making process. The methodology stresses the importance of sufficient power, influence and authority as well as an environment of mutual trust and respect for the effective decision making. Another key takeaway is an understanding of how different roles and styles of management in an organisation can impact decision making.

In terms of methodological competences, the game will introduce students to a range of ICT technologies and web 2.0 tools aimed at facilitating teamwork across boundaries and increasing their IT literacy. Never before have sophisticated simulation technologies been so affordable or accessible. Rapid advances in information and communication technologies (ICT) have played a significant role in the productivity growth of many global industries. It is our conviction that parallel implementation of such technologies in academic learning environments should also increase team performance.

Finally, as part of the course, students will be required to use an e-portfolio to chronicle and reflect upon the process and products of learning, as well as to present aspects of their personal development in an evidence-based manner. The portfolio provides opportunities to effect change by enabling ongoing evaluation of performance and associated learning outcomes. Moreover, it is designed to enable learners to create a personalised, powerful and comprehensive digital profile of their achievement, identifying and articulating their particular strengths.

Conclusion

Employers and business engineers increasingly demand that higher education focuses on the development and rigorous assessment of broader competencies rather than simple knowledge transfer. Empirical research on management simulation games demonstrates that the format lends itself well to the combined training of methodological, hard and soft skills. Increased development and delivery of such games by cross-disciplinary faculty teams could help breakdown the silos that often remove higher education from the reality of business practice.

Findings from our case study institution provide some suggestions for how interdisciplinarity can be incorporated into and throughout business engineering curricula. Future research will need to look at whether such approaches improve graduate employability and performance within the field. As team-taught simulation games and other interdisciplinary problem-based learning modules become more mission-critical and sophisticated, their integration into the assessment procedures and administrative structures of higher education might need to be re-evaluated. Such ventures are resource-intensive and rely greatly upon the motivation of individual faculty members. With respect to long-term sustainability, gathering sufficient on-going data to assess the impact of the co-teaching services on student achievement will be essential.

[5] Dr. Ichak Adizes, the founder of the methodology, describes it as a management intervention technique or organisational therapy. It has been used to increase performance in thousands of organisations worldwide, from fledging companies to Fortune 100s, not-for-profit organisations and governments.

References

Barmeyer, C. & Schirrmacher, U. (2013). Interkulturelle Kompetenzentwicklung durch (Unternehmens)Planspiele. In U. von Helmolt, G. Berkenbusch, Wenjian Jia (Hrsg.), *Interkulturelle Lernsettings Konzepte – Formate - Verfahren*. Stuttgart: Ibidem.

Baumgarten, H. & Schmager, B. (Eds.). (2011) *Berufsbilduntersuchung 2011 - Wirtschaftsingenieurwesen in Ausbildung und Praxis*, Berlin: Verband Deutscher Wirtschaftsingenieure e.V. (VWI)

Beutner, M., Fortmann, L. M., Pechuel, R. (forthcoming). PVEC - Paderborn Vocational Education Concept for e-learning. Das Paderborner e-learning Konzept für die berufliche Bildung. *Kölner Zeitschrift für Wirtschaft und Pädagogik*. 27 Beutner, M., Fortmann, L. M., Pechuel, R. (forthcoming). PVEC. Jg., Heft 53, Köln 2012.

Brettel, M., Dittmann, U., Englberger, H. et al. (2012). Qualifikationsrahmen Wirtschaftsingenieurwesen, 1. Auflage, Pforzheim: FFBT Wirtschaftsingenieurwesen e.V.

Damassa, D. A. & Sitko, T.D. (2010). Simulation Technologies in Higher Education: Uses, Trends, and Implications. *ECAR Research Bulletin 3*, Boulder, CO: EDUCAUSE Center for Applied Research. Retrieved from http://www.educause.edu/ecar

Decker, R., Kroll, F., Hentschel, D. & Fortmann, L. M. (2012). Computergestützte Planspiele als Instrument zur Förderung von Soft-Skills bei Studierenden. *ZFHE – Zeitschrift für Hochschulentwicklung*, Jg. 7, Nr. 4, 20 - 31.

Leavitt, M. C. (2006). Team Teaching: Benefits and Challenges. *Speaking of Teaching, 16 (1)*, 1- 4.

Lee, A. (2010). Simulation Games: Shifting from Conceptual Learning to Experiential Learning. *Blended Learning in Practic*e, July 2010, 36-42.

Linton, G. (2009).The “Silo Effect” in Academia and Its Consequences, *Higher Education Pedagogy & Policy*. Retrieved from http://glinton.wordpress.com/2009/01/14/the-silo-effect-in-academia-and-its-consequences/