

Embedding Experiential Learning in Cross-Faculty Entrepreneurship Education

Ebru Turgut-Dao, Real Projects Program Manager SCE

SCE, Heßstr. 89, 85577 München, +8955050634, ebru.turgut-dao@sce.de, www.sce.de

Steven Gedeon, Head of Education, SCE

Klaus Sailer, Managing Director, SCE

Florian Huber, APE Program Manager, SCE

Mirko Franck, Real Projects Program Manager, SCE

1. INTRODUCTION

The Munich University of Applied Sciences (MUAS) implemented its three guiding principles recently - entrepreneurship, internationalization and sustainability. This strategic orientation has mandated that entrepreneurship education be promoted and supported cross-campus and embedded into the degree programs of 13 different faculties. Having 17,000 students at MUAS this mission has required time, resources, and commitment. The Strascheg Center for Entrepreneurship (SCE) designed and implemented a curriculum to meet this demand. We use the Entrepreneurship Program Design Framework (EPDF) to designate the pedagogy, learning objectives, assessment measures and course design. We created the SCE Real Projects course based on principles of action-based learning, interdisciplinary project work, personal development and the human-centered innovation process.

SCE Real Projects use multi-disciplinary project teams based on experiential learning pedagogies. We combine courses from different faculties with professors bringing their respective students and provide SCE staff members for additional support. The aim is that students learn to handle a dynamic innovation process by creating, evaluating and implementing a business or new venture opportunity. Therefore core principles of the effectuation approach (Sarasvathy, 2001) and lean startup (Blank and Dorf, 2012) are incorporated and applied to solve real-world challenges aiming for innovative and sustainable solutions. Different methodologies such as human centered innovation and business modelling are combined and adopted in order to develop a more holistic perspective on the entrepreneurship process. That includes adaptation of the process and rethinking of key success criteria. Learning objectives in Real Projects encompass development of leadership and creativity skills, teamwork, problem solving, resilience, and self-efficacy. SCE applies several learning assessment tools in Real Projects such as group project reports, individual self-reflection assignments and the ASTEE evaluation tool to measure entrepreneurial knowledge, skills, competences, mindset and attitudes. Student teams that create new ventures may obtain additional support, funding and access to the SCE New Ventures Program.

Between winter semester 2012/13 and winter semester 2015/15 SCE delivered 45 courses, we worked with 64 professors, and taught over 1,500 students within 12 of the 13 faculties of MUAS.

The implementation of Real Projects at MUAS since 2012 has provided interesting learnings to date. The level of entrepreneurial knowledge, experiences, and pedagogy of involved professors has a strong effect on the entrepreneurship project. They can boost or baffle the process. That is why SCE set up a training program for Real Project instructors to discuss diverse perspectives, share best practices, and improve their teaching competences.

Multi-disciplinary groups are more difficult to coach but results are often more promising. While all teams struggle with uncertainty in the beginning of the entrepreneurship process, multi-disciplinary teams need special coaching support to avoid frustration and appreciate the diverse perspectives of different disciplines. Early commitment of the team and developing a shared vision enhances teamwork during the transformation process as well as final results.

SCE applies a structured process model for its Real Project courses that incorporates methodologies and tools like Human-Centered Innovation or the Business Model Canvas, however, experiences have shown that the process is not linear but rather iterative. Therefore we emphasize that the entrepreneurship process in Real Projects is dynamic and needs to include several levels and perspectives such as the individuals, the team, and society (Sailer 2012).

The remainder of the paper is structured as follows. We present our approach to designing the Real Project courses at MUAS with regard to theoretical considerations, learning objectives, syllabus, and implementation. Based on our experiences from 2012 to 2014 we discuss results from the courses, our lessons learned, and ongoing challenges. Some have already led to new approaches and measures that we would like to introduce in the chapter on implications and next steps.

2. REAL PROJECTS DESIGN CONSIDERATIONS

Our overall Instructional Development method follows the iterative ADDIE problem-solving process that includes Analysis, Design, Development, Implementation and Evaluation (Molenda, 2003). Our analysis follows the Entrepreneurship Program Design Framework (EPDF) (Gedeon, 2014; Valliere, et al., 2014). The EPDF incorporates the Teaching Model Framework for Entrepreneurship Education (Fayolle and Gailly, 2008) but modifies it to include all seven major education theories (Bechard and Gregoire, 2005). Figure 1 shows the EPDF depiction used for the analysis phase when designing the Real Project program (Valliere, et al., 2014):

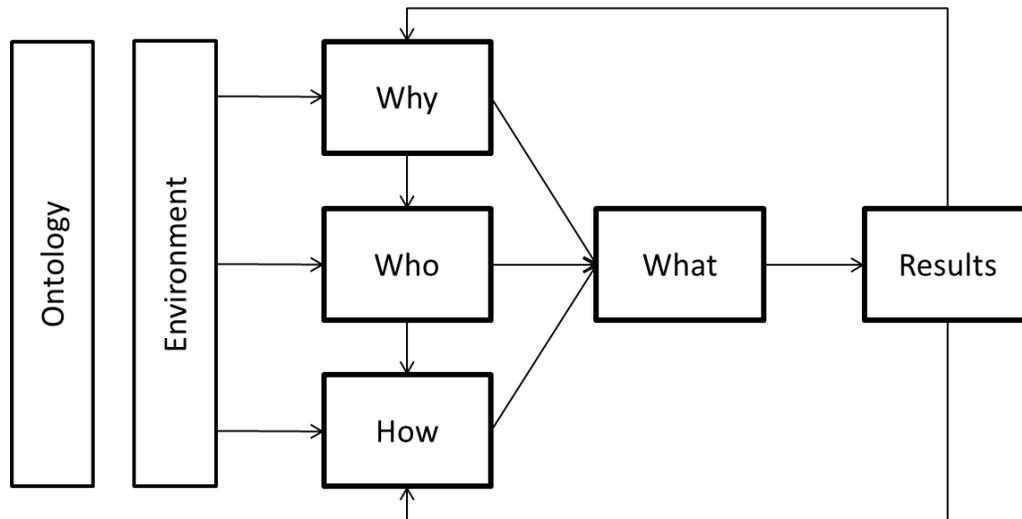


Figure 1: Entrepreneurship Program Design Framework (from Valliere, et al., 2014)

2.1 Ontology - Definitions and Overall Educational Goals

When communicating with diverse stakeholders across the university, it is important to build consensus around definitions (Fayolle and Gailly, 2008). Different faculties will want to understand how the entrepreneurship domain relates to concepts like innovation (from engineering), management (from business), change making or social innovation (from arts and community service) or creativity (from design).

If entrepreneurship is defined primarily as starting a new venture, many students at MUAS will simply be uninterested in the topic. Germany in general has a low rate of venture startups (Chlosta, et al., 2006) and the highest fear of failure of the 36 GEM countries (Wagner and Sternberg, 2004). Germany ranks lowest within the EU for entrepreneurial intention and only 51.7 % of Germans think that entrepreneurship is a good career choice as compared to e.g. the Netherlands with 79.1 % (Global Entrepreneurship Monitor, Singer et al., 2015). The fact that Munich has one of the lowest unemployment rates in the EU also makes starting your own venture an unattractive career choice for many students. Thus the systemic framework in general and the institutional setting in particular need to be considered notably in the design and implementation of entrepreneurship education activities.

We found that critical stakeholder consensus is improved when entrepreneurship is defined in terms of action-based learning, interdisciplinary project work, and personal development. Entrepreneurship thus represents a unique pedagogical teaching method – “teaching through entrepreneurship” (e.g. Samwell, 2010) that may be embraced by service learning community volunteers and social innovators as much as innovative scientists and for profit businesses. This more holistic ontology is reflected in the definitions of entrepreneurship and entrepreneurship education published by Gedeon (2010, 2014). To be specific – SCE identifies four primary domains of entrepreneurship:

1. New Venture Startup
2. Entrepreneurial Action within a Corporate Context (“Intrapreneurship” or “Open Innovation”)

3. Social Entrepreneurship (“Social Innovation” or “Change Making”)
4. Personal Empowerment, Development, Transformation and Growth

We have found that these more inclusive, holistic, four domains of entrepreneurship allowed us to form collaborative partnerships across campus including with engineering, social sciences, humanities, art, and design. In particular, broadening the preconceived notions of entrepreneurship beyond strictly a business discipline into a more holistic philosophy of personal growth, creativity, leadership, problem solving and teamwork has encouraged the collaboration of diverse perspectives.

2.2 Environment and Institutional Framework

The Strascheg Center for Entrepreneurship (SCE) was established at the Munich University of Applied Science (MUAS) in 2002 to promote a culture of innovation as well as of entrepreneurial thinking and action among students and university staff. It has provided leadership in entrepreneurship education and support for the broader Munich eco-system including the formation of the Social Entrepreneurship Academy in 2010 and the Coneect Program for educating entrepreneurship educators since 2012. In 2011 the SCE together with MUAS were recognized for these achievements by being selected as one of Germany’s first three EXIST entrepreneurial universities designated by the Federal Ministry of Economics and Energy. As part of Germany’s Hightech Strategy the EXIST program aims at improving the entrepreneurial performance of science and research institutions and boosting the number of technology-based startups. Since that time MUAS has officially embraced entrepreneurship as one of its strategic priorities, along with internationalization and sustainability.

SCE and MUAS as joint applicants submitted a concept named AHEAD “Advanced Holistic Entrepreneurial Attitude Development” to the EXIST call for proposals and gained funding three years in 2011. As part of the AHEAD plan, we introduced several new education and qualification programs, one of which will be described in detail in this paper – the Real Projects course. The goal of the Real Projects course is to integrate seamlessly into 14 different faculty degree programs across the entire university to provide universal access to entrepreneurship education to all students. This multi-stakeholder curriculum requires a high degree of flexibility from SCE to create customized courses. MUAS has 14 faculties in the areas of technology, economy, social studies and design providing teaching to over 17,000 students in 60 different study courses. Designing a multidisciplinary course format with so many varying stakeholders requires intense advocacy activities and the establishment of strong ties over time.

When determining its entrepreneurship strategy in the AHEAD proposal the board of MUAS included the following five principles that are also relevant for designing education programs (p.13):

1. Establishment of a cross-faculty innovation culture for university members and externals.
2. Promotion of entrepreneurial and responsible personalities by identifying their capabilities.
3. Empowerment of university members and externals to consider new venture creation as an eligible career option.
4. Providing impulses in the field of entrepreneurship through research.

5. Establishment and promotion of regional, national, and international networks beyond MUAS in order to contribute to society and a worth living future.

The environment at MUAS has mostly supported SCE having the mandate to pursue entrepreneurship education. The establishment of interdisciplinary courses required major resources and significant groundwork as to identifying the relevant contacts in the faculty that are responsible for curricula, introducing the concept to various faculty members, and finding the first professors and instructors to start the Real Project courses. This had to be done for each faculty and degree program individually and over time - based on trust and positive experiences. Stable relationships with some faculties/degree programs have taken time to establish and have grown steadily. To date the SCE has grown to 6 staff members (3 professors, 3 coaches) now teaching Real Projects courses.

2.3 Why - Vision and Mission

Vision and Mission are powerful tools to communicate with stakeholders (Ingenhoff and Fuhrer, 2010). They capture the spirit or essence of the academic definitions and holistic ontology with specific inspirational language. The SCE vision is described on its homepage as follows:

“Our range of courses aims to teach young people the entrepreneurial and leadership skills they need to shape our common future. We help our students pursue their professional goals, either as entrepreneurs or employees, and to play their role in the evolution of society.

Our training programs combine practical knowledge and personal development in an interdisciplinary setting, focusing especially on innovation, start-ups, and corporate and social development. As an institute associated with the Munich University of Applied Sciences, SCE is firmly rooted in the academic world.

Our lively interaction with partners and companies encourages an open forum for the exchange of ideas and information.”

As can be seen, the language of the vision and mission help describe the specific benefits that students and professors may gain from participation in these courses.

2.4 Who - Target Audience

Real Project courses are designed for bachelor students, usually in the fifth or sixth semester of their studies in all four disciplines of engineering, economics, social studies, and design. Some professors that get engaged in the courses bring in students of master degree programs. Offering our courses to more experienced students relates to our Real Project approach that is more based on experiential learning through teamwork and less on theoretical inputs. While SCE delivers inputs on innovation process methodology and tools specific knowledge and methods of engineering or economics are either provided by the professors or are presumed. A typical Real Project course is taught by one to two professors and one SCE staff member to a combination of up to 50 students depending on the number of students each professor brings into the interdisciplinary courses.

We mainly reach our students via the professors that bring the pool of students from their specific courses. In the case of elective courses we communicate online the availability of our Real Project courses and ask for online registration. In the design faculty we present all Real Project courses of each semester to the student audience in person so that they can choose one that they are interested in. Online registration to the Real Project courses is coordinated through the SCE homepage.

2.5 How - Pedagogy

It is widely agreed that the best way to teach entrepreneurship is through action-based learning, experiential learning, and problem-based learning pedagogies (e.g. Gorman, et al., 1997; Klandt and Volkmann, 2006). These pedagogies are classified as student-centered constructivist approaches – in contrast to teacher-centric objectivist methods (Brown, 2009).

Traditional teacher-centric methods involving reading, memorization, lectures and tests, are deeply entrenched throughout the EU. While these methods might be appropriate for acquiring knowledge, they are weak at developing skills and competencies (e.g. teamwork, communication, leadership and problem-solving) or attitudes (e.g. self-efficacy and internal locus of control) (Löbler, 2006). Many EU educators are thus relatively unfamiliar with student-centric teaching pedagogies. There are many ways to add these pedagogies to a degree program such as consulting projects (Solomon et al., 1994), case studies (Katz 1995), student entrepreneurship clubs (Gartner and Vesper, 1994), simulations (Hindel, 2002), role playing (Low, et al., 1994), and business plan writing courses (Carrier, 2005).

Experiential learning is the most intensive of the student-centric teaching approaches (Kolb, 2014; Kolb and Kolb, 2005). The deeper the emotional involvement of the students, the deeper and more transformational the learning can be (Shepherd, 2004). Students should care about their own learning, so Real Projects are designed to allow wide student choice and the ability to make an impact on society and achieve student values. Thus Real Projects must be flexible to allow students to make a value connection with their projects and team members to accomplish more than they could on their own.

In designing Real Projects, SCE chose to focus on action-based experiential learning through the introduction of interdisciplinary team projects. We wanted the students to be able to experience an entrepreneurial project from idea generation to actually building something and interacting with customers or stakeholders. In addition to entrepreneurship knowledge they train relevant entrepreneurial skills and competences simply by being involved in the project.

SCE defines the innovation process as dynamic including many dimensions that demand a holistic approach from our teaching activities (Sailer et al., 2012). The starting point of any innovation process can be either a new technology, an idea, a problem, or sometimes only a vision to change something. The most critical factor is actually the individual, within the team, and surrounded by various stakeholders. The impact of society is also essential to the success of innovative solutions and needs to be considered. Among various approaches to innovation processes SCE has chosen and combined two prominent methodologies and tools as guidelines, i.e. human-centered design that puts emphasis on the exploration phase and business modelling that asks for sustainability and profitability.

Our SCE approach to innovation processes provides structure for both students and teachers alike. This model was heavily influenced by the design thinking methodology (T. Brown, 2009) and also includes elements from effectuation theory (Sarasvathy, 2001) and the Lean Startup movement (Blank, 2013; Ries, 2011). Design thinking is an innovation methodology which encompasses a wide set of tool adapted from the domain of traditional design education, which are made available to wider audience. It trains people in the mindset of creating new things which are desirable from a human-centered point of view (it needs to make people's lives better) with what is economically viable (it needs to have a working business model) and with what is technologically feasible (we need to be able to actually build it) (T. Brown, 2009).

One of the key success factors in applying this holistic and dynamic model is the concept of iteration (Grots & Pratschke, 2009). The phases should not be interpreted as a strictly linear 'recipe for success', but rather as a guideline for structuring each Real Project. It is possible to iterate between different steps to e.g. test an assumption formulated with a quick prototype and business model, and then go back and use new insights from this to adjust the project trajectory. Our process model also provokes the use of different modes of thinking by encouraging students to switch between divergent thinking (i.e. generating options/ideas to choose from) and convergent thinking (i.e. narrowing down choices and creating focus) which is crucial in trying to create (radically) new concepts or solve complex problems (T. Brown, 2009). Our experience so far suggests that this model lends itself well for structuring multidisciplinary teamwork of students with little prior exposure to similar innovation models (cf. Seidel & Fixson, 2013).

2.6 What - Course Description

A Real Project takes place when two or more professors team up for an interdisciplinary course that incorporates entrepreneurial thinking and action. This process is often supported and mediated by the SCE project managers, i.e. they search for professors from complementary faculties bringing in their respective students in order to form teams of engineering, business, social, or design students. While the professors are responsible for their specific technical inputs and the grading of their students, the SCE coaches contribute with innovation and entrepreneurship knowledge, methodology, and tools to the course. Figure 3 shows a schematic diagram of a Real Project.

Real Project themes have included mobility, society, education, energy, space, sustainability, and urban farming. Final project deliverables have ranged from final reports and presentations to 3D printed objects, functioning apps and Arduino electronics hardware implementations. Common to all these themes is their innovation potential and open-endedness. Teams with promising projects are encouraged to continue past the conclusion of the course with additional venture support and potential funding from SCE.

Up to 50% of the total student grade is based on their multi-disciplinary group project deliverable. The remaining 50% must be individual-level assessments graded by that student's professor. In a time frame of 12 to 14 weeks interdisciplinary student teams get instructed to experience the fuzzy innovation process which is completely unfamiliar and often very unpleasant to them. The number of hours per week in a Real Projects course is minimum three (3x45min.) since group work requires sufficient time in addition to technical inputs. Technical inputs are either provided in the single sessions by the professors involved or by SCE on entrepreneurship and innovation. In some Real Projects, however, knowledge and competencies

in the respective disciplines is presumed. Thus there are no extra lectures but support by the teachers provided in the coaching times.

The course structure (see Figure 2) is normally based on three stages with respective milestones to be presented by the student teams. In most Real Project courses students get a main topic as an impulse. The topic can be most important for the quality of the results. If it is too general the teams need too long to find an opportunity and therefore the results are not very focused at the end. If the topic is too narrow it restricts creativity and makes it difficult for the student teams to find an “out of the box” solution. In certain courses, giving teams the complete freedom to work on their own independent project ideas has proven to be an efficient and successful approach as well. Supporting team development in the beginning is critical to the teamwork process during the course. We normally restrict the team size to 5-6 students, however, one of our most successful Real Projects courses, in terms of continuing with their ideas in the aftermath, has had teams of eight to ten members.

In the first weeks the teams develop a joint understanding of the problem or challenge they want to solve which is leading to a concise problem definition in the first milestone including research on the needs of users, stakeholders, and the market.

In the next stage of idea generation the teams develop as many ideas or solutions as they can in order to evaluate and then reduce them to one or two. Comparing them in terms of technology development, target groups, strategic partners, competitors, and the business model behind brings student teams to assess feasibility and profitability of the selected ideas. We use varying business models (e.g the Business Model Canvas from Osterwalder, 2010) from literature and practice to illustrate the key components of a successful business that you need to think through to position yourself in the market. Depending on the chosen solutions and the iterative feedback on prototypes and concepts that are collected and incorporated throughout the innovation process, the components do change and get adapted. Thus the second milestone includes (a list of max. 2-3) solutions that had been evaluated by the team pointing out the one that proved worthy to continue.

In the third stage of our Real Project course the students eventually refine their prototypes and complete the business concept in terms of financial planning, marketing strategy, and strategic roadmapping.

The single courses close with the final presentations of the teams, followed by a joint event of all Real Projects where participating professors and students present their courses and ideas to their fellows.

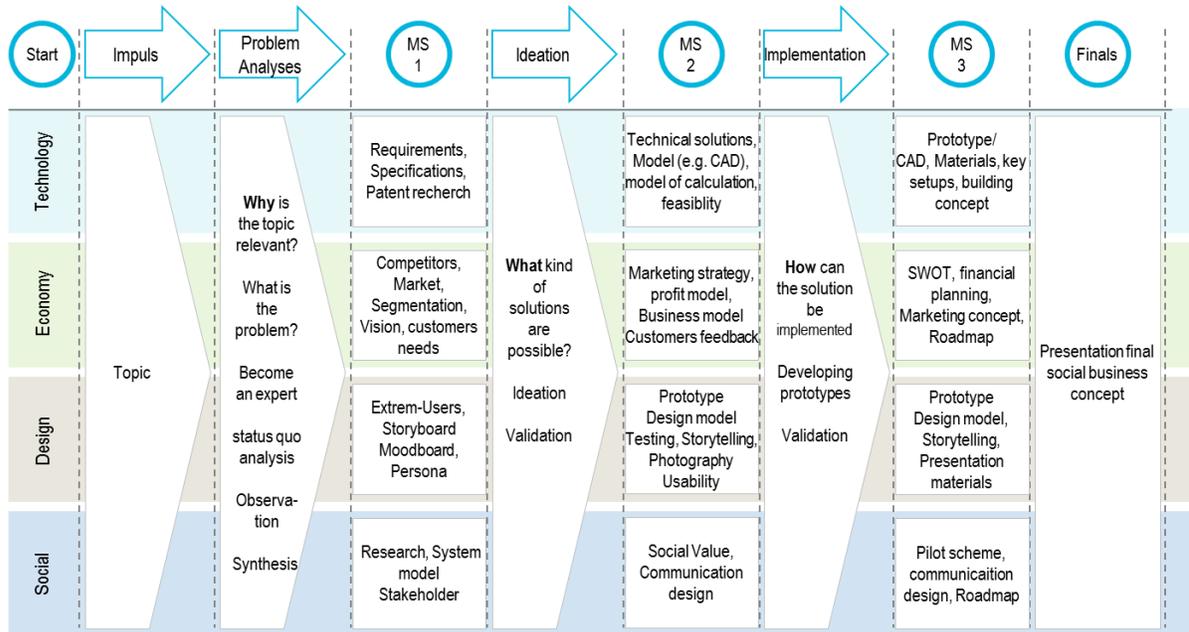


Figure 2: Example of Real Project course outline

SCE has successfully reached to and integrated the business and design faculty as participating in the Real Project courses. They form the largest group of participating faculty members. Business students (bachelor) attend an entrepreneurship course in the sixth semester of their studies, of the available seven entrepreneurship courses two to three courses are implemented as Real Projects each year. Thus Real Projects embrace compulsory and optional courses for the students that can be selected at the beginning of each semester. As already mentioned another degree program that has included Real Projects as a compulsory course in its curriculum recently is management of social innovation.

2.7. Results - Learning Outcomes and Goals

We follow the Best Practices in Entrepreneurship Education Program Objectives presented at the inaugural 3E ECSB Entrepreneurship Education Conference in Aarhus (Gedeon, 2013). These best practices implement the “value add” or “institutional impact” approach that makes student transformation the primary goal of the goal-setting framework (Tam, 2001; McMillan, 1988; Barnett, 1992). Primary goals are thus defined as student learning outcomes (e.g. knowledge, skills and attitudes), secondary goals are input factors that support student transformation (e.g. faculty qualifications, resources and facilities) and tertiary goals are output factors such as number of students, courses, awards, startups, community/society impact and student satisfaction (Gedeon, 2013).

Each professor brings his/her own domain-specific degree program Learning Outcome goals to the course. In addition, each Real Project course is expected to achieve certain overarching Learning Outcomes. In the Real Project courses we are implementing the following educational evaluation measures, based on the Kirkpatrick framework which is the most accepted method (Eseryel, 2002). They include personal growth measures of knowledge, skills, attitudes and satisfaction (Kirkpatrick, 1975).

- **Knowledge (“Head”)**
 - Domain-Specific knowledge (based on the collaborating faculties)
 - Human-centered innovation process methods and tools
 - Business Model Canvas
- **Skills and Competences (“Hand”)**
 - Teamwork
 - Creativity
 - Problem Solving
- **Attitudes and Mindset (“Heart”)**
 - Core Evaluation, Self Esteem and Internal Locus of Control
 - Perceived Self-Efficacy
 - Entrepreneurial Mindset
 - Entrepreneurial Intentions
- **Student Satisfaction**

As for the Real Project courses we want our students to experience and train skills such as teamwork, empathy, dealing with uncertainty in the first stage of analyzing the problem, followed by competencies such as creativity, management of time, project, and often conflicts. In the last stage of the innovation process we make students train their presentation skills, storytelling, and resiliency.

3. OUTCOMES AND ONGOING CHALLENGES

One of the major challenges of settling Real Projects into the curricula of varying degree programs of all 14 faculties has been the search for professors who are interested and have the ability to apply the Real Project format to their regular courses. Recently the faculty of design as well as the degree program of social innovation management have determined at least one Real Project course to be integrated in the examination regulations. These bachelor students will participate in an entrepreneurship education format based on experiential learning in the course of their studies. An increasing number of professors have been open to the Real Project format to be applied to their regular courses. Not all of them think and act entrepreneurially which is why training the teaching staff in experiential pedagogy has become an important issue as well. We cannot impose entrepreneurial behaviour upon all professors that get engaged in Real Projects. With regard to the role of professors as intermediaries in the innovation process, strengthening their competencies has emerged as a critical mission.

3.1 Real Projects training program – Educating-The-Educators

The SCE has six staff members involved in teaching Real Projects that have worked with 64 different MUAS professors from 13 faculties. From 2013 to date we have run three half-day training programs exclusively for MUAS professors. SCE is also the founding partner of the Coneect program – Educating Entrepreneurship Educators – which has now run educational workshops for over 200 entrepreneurship educators in Munich, Aberdeen, Sofia and Tel Aviv.

Currently, SCE is limited in the number of Real Project courses by how many SCE professors we have available. As we begin to scale and enhance the Real Projects courses, we may want to

designate certain MUAS professors as being able to run these courses without the participation of SCE professors. These individuals would receive significant additional Train-the-Trainer education and potentially also receive some additional level of recognition and/or compensation, such as being designated SCE Entrepreneurship Educator Fellows.

Potential Educating-the-Educators training modules could include the following topics:

- Entrepreneurship Theory (Teaching ABOUT Entrepreneurship) such as Agency Theory, Stakeholder Theory, and Resources-Based View of the Firm
- Entrepreneurship as a Pedagogical Method (Teaching THROUGH Entrepreneurship) including student-centric vs. teaching-centric Instructional Design, Action-based Learning, and Experiential Learning
- How to be Entrepreneurial (Teaching FOR Entrepreneurship) providing tools such as the SCE Innovation Process, Lean Startup, Business Modelling, and Strategic Tools, Entrepreneurial Skills, Mindset and Attitudes
- Why and How to Develop a Statement of Teaching Philosophy
- Coaching Techniques (e.g. Motivational Interviewing training)
- Using the SCE Faculty Support Tools
- Hands-on Teaching Workshops and Feedback Sessions

Entrepreneurship educators do not have many programs available to help them with their teaching. There are several high quality conferences – such as the 3E ECSB Entrepreneurship Education Conference, but these focus on presentations, discussion, and networking conversations. In contrast to the large amount of research training available, there are few opportunities for entrepreneurship educators to gain hands-on instructional training.

3.2 Evaluation

SCE is ISO 9001 certified and follows total quality management principles in the delivery of its educational programs (Sun, 2000). There are three potential levels of results we can assess: (1) individual student grades; (2) group-level analysis (by project grade, course grade, by department, drop-out rate, satisfaction...); and/or (3) overall program-level analysis (Baker, 2001). Since individual student grades are directly given by professors to students within their own degree program, it is difficult and potentially inappropriate, for SCE to report on this level of analysis.

SCE is a founding participant in the ASTEE-program (Assessment Tools and Indicators for Entrepreneurship Education). This project was co-funded by the European Community, the Competitiveness and Innovation Framework Programme (CIP) with the goal to develop measurement tools for assessing entrepreneurial knowledge, skills, attitudes and mindsets (Mober, et al., 2014). The ASTEE assessment tool begins with the EU framework for elements of entrepreneurship education (Heinonen and Poikkijoki, 2006) and thus also includes demographic information, experience, awareness of entrepreneurship as a career path, connectedness to education, and connectedness to future career (Moberg, et. Al., 2014). The ASTEE measurement tool for tertiary level measures the following constructs:

- Demographic Information and Experience
- Entrepreneurial Mindset
 - Core self-evaluation (general self-efficacy, internal locus of control, self-esteem)
 - Entrepreneurial attitudes
- Entrepreneurial knowledge
- Entrepreneurial skills
 - Creativity
 - Planning
 - Financial Literacy
 - Resource Marshalling
 - Managing Uncertainty
 - Teamwork
- Connectedness to labour market
 - Innovative employee
 - Entrepreneurial intentions
 - Experience with self-employment

As can be seen, most of the SCE Real Project assessment measures align quite well with the final ASTEE instrument that was released in 2014. We have piloted an ASTEE-based evaluation in one Real Project course and are now elaborating on a final version for online access by our students. We expect to have this fully implemented through all our Real Project courses by the summer of 2015.

4. IMPLICATIONS AND NEXT STEPS

Having established Real Projects courses as required to the faculty of design as well as in the social innovation management program, SCE continues to get more faculties and/or degree programs engaged in Real Projects. A huge step forward has been the decision of the MUAS presiding committee in 2014 to establish a Project Day on Thursday afternoons that will facilitate the organization and coordination of Real Project courses amongst 13 faculties. Starting from summer semester 2015 faculties need to vacate time for Real Projects when planning class schedules. In the following we present further activities and measures based on the experiences of the past three years.

4.1 Student Support through an Online Learning Platform

The most common form of student support is the textbook. However, there are few single-book choices available. We could assign Business Model Generation (Osterwalder and Pigneur, 2010), Startup Owner's Manual (Blank and Dorf, 2012) and Disciplined Entrepreneurship (Aulet, 2013) as well as other textbooks, but this is unrealistic. There on-line Massive Open Online Courses (MOOCs) available, but these suffer from several limitations (Welsh and Dragusin, 2013).

Once the required core entrepreneurship modules have been determined and professors given support materials with which to teach these topics, the students can also be directly supported with online learning tools.

Another option is to use the on-line support materials as assignments. Students would be required to use the on-line tools for the purposes of a grade in which case some assurances of learning would have to be embedded in the on-line modules (such as passing a quiz on-line, or perhaps handing-in an assignment based on the on-line module). Regardless of when, or what is included, there is little doubt that entrepreneurship educators will need to incorporate more online student support tools in the future (Kuratko, 2005).

4.2 Creation of Faculty Support Tools

The SCE Educating-the-Educators program will focus on enhancing faculty entrepreneurship teaching skills. However, professors may still require entrepreneurship domain-specific knowledge support tools. Professors may have deep expertise in their home domain (e.g. electrical engineering, urban farming, space technology, community service) but cannot reasonably be required to also become experts in the entrepreneurship domain. We thus need to share best practices among professors and establish a pool of course outlines, slides, assignments and other tools and materials.

Most professors use a course textbook to augment and support their assignments and in-class teaching. However, there is no one-size-fits-all textbook for entrepreneurship (Solomon, 2007). So if an engineering professor is teaching the course, and cannot rely upon a textbook to provide entrepreneurial domain expertise, then the SCE should be able to help provide this.

One obvious option might be to either select several potential textbooks, or write our own textbook for the Real Projects course. However, based on the tremendous diversity of student backgrounds, interests, and project themes, being able to find or create such a textbook is not practical.

An alternative is to provide professors with access to support tools such as slide banks, grading rubrics, sample assignments, readings, videos and other materials they can select either at the start of the term or on an as-needed basis. A potential sampling of course support tool modules includes:

- Entrepreneurial Method Tools
 - Human-centered Innovation Method
 - Lean Startup Method
 - Disciplined Entrepreneurship Method
 - The Business Model Canvas
- Basic Business Tools
 - How to Determine the Addressable Market Size
 - How to Create a Pro-Forma Financial Projection
 - How to Select Price
 - How to Write a Business Plan
 - Fundamentals of Marketing, Accounting, Finance, HR, Operations
- Strategic Management Concepts and Tools
 - Porters Five Forces, Value Chain Analysis, BCG Matrix, Space Matrix, competitive analysis, SWOT, 7S Framework, Big 8 Strategy Tools
- Entrepreneurship Theory

- Agency Theory, Austrian Economics, Bricolage, Cognitive Biases, Prospect Theory, Decision Theory, Risk-Taking, Effectuation, Game Theory, Schumpeterian Innovation, Signaling Theory, Resource Based View, Transaction Cost Economics, Stakeholder Theory...
- Entrepreneurial Competencies
 - Opportunity Spotting, Opportunity Analysis and Selection, Creativity, Alertness, Resiliency, Bootstrapping, Resourcefulness, Teamwork, Communication, Entrepreneurial Mindset, Agility, Self-Management, Planning

4.3 Advanced Entrepreneurship Education/Master

Students have an array of entry-level entrepreneurship programs available to them. In addition to Real Projects for course credit, we also have programs available such as the Academic Program in Entrepreneurship (APE) and Social Entrepreneurship Academy (SEA). Students who become inspired to pursue their studies in entrepreneurship as a result of these courses and programs should have access to more advanced entrepreneurship education. We are currently in the process of designing a Masters level degree program in entrepreneurship and hope to report on this at a future 3E ESCB Entrepreneurship Education Conference.

5. CONCLUSIONS

Following the ADDIE problem-solving process and the design-thinking approach our Real Project prototype has passed through four of the five stages of Analysis, Design, Development, and Implementation. Currently we are in the process of evaluating our Real Project courses and therefore refine available evaluation tools such as the ASTEE questionnaire. We have started collecting data from our Real Project courses that will help us redefine and redesign our teaching format with regard to learning objectives, pedagogy, and curriculum. Embarking on the next level of prototype advancement of Real Projects we look forward to discussing these ideas at the current conference and presenting the latest results at future 3E conferences.

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