

McGee O, Forshaw M, Hodgson B, Caughey S.

[Out of the comfort zone: Embedding entrepreneurship in a cohort of computer science doctoral students.](#)

In: ITiCSE '16 Annual Conference on Innovation and Technology in Computer Science Education

11-13 July 2016, Arequipa, Peru: ACM.

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Date deposited:

30/10/2017

Out of the Comfort Zone: Embedding Entrepreneurship in a Cohort of Computer Science Doctoral Students

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ABSTRACT

The study of entrepreneurship, and widening debate on providing Computer Science (CS) students with skills for employment, has led to a rise in programmes offering additional skills including entrepreneurship, presentation skills and communication skills. This paper provides an early stage reflection of the design, development and delivery of a bespoke entrepreneurship module, designed to empower students and provide them with skills to build successful startup businesses. This course was designed specifically for Computer Science and Mathematics students, within a cohort-learning environment. Students were guided through the principles of the Osterwalder Business Model Canvas, allocated into groups and asked to devise a business idea, iterating this throughout an eight week period. Students were provided with support from teaching staff alongside weekly coaching from successful entrepreneurs and flipped classroom tuition. The teaching methods employed in the Professional Skills course are not traditionally used in Computer Science education and students reported a number of challenges in completing the module. These included team dynamics, time and investment required and the requirement for engagement with stakeholders. All of these issues highlight the unique nature and practical application of the course material, presenting the opportunity for reflection of the success and impact of the module. In addition, the tutors of the course reflect on their experience of delivering the course for the first time, and their response to student feedback. We also provide advice on reproducing the course.

CCS Concepts

•Social and professional topics → Computing education programs; Employment issues;

Keywords

Entrepreneurship; startups; industry engagement

1. INTRODUCTION

The importance of entrepreneurship as a basis for business growth, economic activity and employability are well understood [10]. The efficacy of entrepreneurship education has been widely debated, with scholars arguing that some traits cannot be taught within a classroom environment [14]. However, it is acknowledged that certain skills and processes valuable to business creation, can be embedded within educational programs, if correct methods are employed.

There exists widespread support in the literature advocating action-based and experiential approaches to entrepreneurship education [11, 8]. Williams-Middleton *et al* argue; “*In order to provide the conditions for experience-based learning, entrepreneurship education needs to provide possibilities for both entrepreneurial experience and reflection*” [15]. Despite increased interest in the area, a lack of integrated experience-based approaches in CS education are observed [9, 8].

Within this paper we outline the development and delivery of a bespoke entrepreneurship module, Professional Skills, which aims to develop entrepreneurial skills within a cohort of doctoral students from Computer Science and Mathematics backgrounds. Our students are brought together in a Centre for Doctoral Training (CDT) in Cloud Computing for Big Data, established to meet significant and growing demand for skilled graduates in an area we will term the ‘Big Data Economy’ [4]. Furthermore, the contribution of micro firms to the economy is huge and the introduction of entrepreneurial skills into the curriculum could be critical to the success of graduates’ future careers [16].

In the paper we seek to analyse the impact of our course, considering student feedback, assessing our current teaching methods, and providing details of future curriculum adaptations. Issues which arose throughout the course are discussed, including stakeholder engagement, group dynamics and investment of time. We also discuss the potential challenges of reproducibility and provide suggestions for educators wishing to replicate this course in their own institutions.

The remainder of this paper is organised as follows. Section 2 considers relevant literature relating to entrepreneurship, employability and the integration of industry partners within CS education. In Section 3 we provide a description of the course structure and assessment. Section 4 comprises of student feedback and key areas for consideration. This is followed by reflections from industry partners in Section 5, and staff reflections in Section 6. We consider issues of reproducibility in Section 7, offering guidelines for course delivery at other institutions. Finally, we conclude and outline areas of future work in Section 8.

2. RELATED WORK

A number of initiatives have sought to equip Computer Science students with employability [5] and entrepreneurship skills. These initiatives vary in the following dimensions; *a*) authenticity of business environment – ranging from simulated environments to those incubating real businesses, *b*) emphasis on entrepreneurial versus software engineering activities, *c*) extent of industry involvement.

Hickey *et al* [6] document three years of a web and mobile development ten-week summer school in the context of entrepreneurship, combining both entrepreneurial and software development activities. Our work differs in its in-session and compulsory delivery, depth of industry collaboration, and focus on entrepreneurial processes, e.g. business model iteration and stakeholder engagement.

Venture Creation Programs (VCPs) [8] are a class of entrepreneurship programme characterised by a longer programme duration (typically 1-2 years) with an emphasis on the creation of a viable business from University research.

Whilst other initiatives seek to fast-track and equip students with skills for more immediate employment, our students are enrolled on a four-year doctoral programme. By fostering entrepreneurial thinking and providing students with the necessary tools to set up and develop their business ideas at an early stage within their education, we hope to enable and empower the students to consider research commercialisation opportunities throughout their studies, and entrepreneurship as a viable future employment option.

There are a number of challenges in integrating entrepreneurship within the curriculum [3], which we consider within this paper. In addition, issues around group work are further compounded by different learning styles [7].

3. COURSE DESCRIPTION

The aim of the Professional Skills course (or ‘*module*’) is to develop students’ knowledge, understanding and practical expertise around enterprise culture. Students learn the key fundamentals of entrepreneurial thinking, by gaining the key tools required in forming a successful startup business.

Crucially, students are expected to step out of the classroom (and their comfort zone) in order to engage with external stakeholders, including industry experts, finance specialists, local businesses and potential customers. This is a key component of the module and critical to their understanding of the importance of communication skills and relationship forming, outside of academia. These interactions inform the iterations of the business canvas and support students in forming a robust business plan, providing evidence for their idea, which is crucial for pitches to investors.

The course employs the techniques of the flipped classroom model, combining interactive, hands-on workshops and weekly iterations of the Business Model Canvas [12, 2].

Another unique aspect of the module is the formation of the teaching team. Two members of staff have been involved in a successful software spin-out company, one a current entrepreneur. This unique blend of expertise and skills affords the students to be exposed to individuals with a wide knowledge base to create a simulated incubator environment.

3.1 Industry experts

The students are exposed to industry experts each week, who provide a vital role in being a *critical friend* and mentor for the groups. In order for the sessions to be of maxi-

imum benefit to the students, they begin with the industry expert describing their own entrepreneurial journey, highlighting the challenges they faced and how they combated these. Giving the students this insight enables them to consider a number of issues, previously unexplored within their academic education programs. Although other programs involve industry partners and feature guest seminars, ours is unique in that the industry experts are integral to the learning experience.

3.2 Structure

The Professional Skills module runs for eight weeks, with a four-hour scheduled lectured slot in each week. Assessment for the course is 100% project based. Students are allocated a further ten hours of guided independent study within which they may conduct stakeholder engagement, hold group meetings, prepare for weekly presentations, etc.

The introductory session aims to familiarise the students with the business model canvas. It exposes the students to basic principles of startup formation, guides them through the Business Model Canvas and begins to develop their entrepreneurial thinking.

Following this initial introduction, the students are required to develop their business idea, having undertaken market analysis with external and internal stakeholders. During subsequent weekly sessions, the students present their current business model iteration, receive feedback, and gain insight from an industry expert. The final week’s session comprises of a student pitch to a panel of industrial partners, posing as potential investors.

3.3 Assessment

Students are assessed through a combination of individual and group exercises.

Group Report: A substantial group written report represents 60% of the overall course mark. Within this report, students should document their process iterating around their business idea, culminating in a concrete business plan.

Individual Reflective Log: Acknowledging the importance of reflection in developing entrepreneurship [15], we assess students on a reflective log document contributing 20% of the overall course mark. This is a reflective written piece charting a student’s personal learning in the course, and identifying particular issues that have affected them.

Each week, students are expected to reflect on the process, and use this to inform subsequent iterations. These reflective reports are contributed to a Virtual Learning Environment (VLE) monitored by each member of the teaching team. The Individual Reflective Log exercise is introduced as a mechanism to provide students with formative feedback throughout the course, as well as providing teaching staff with insights into the running the course. This in turn inform the focus of subsequent sessions.

Reflections from each week of the course are collated, and supplemented with additional discussion to summarise the student’s experience across the whole course.

The Final Pitch: In the final week of the course, each group delivers their final pitch to the teaching team and a panel of industry guests. Each team is assessed on the presentation of their idea, articulation of market research, consideration of finance and future plans, contributing 20% of the course mark.

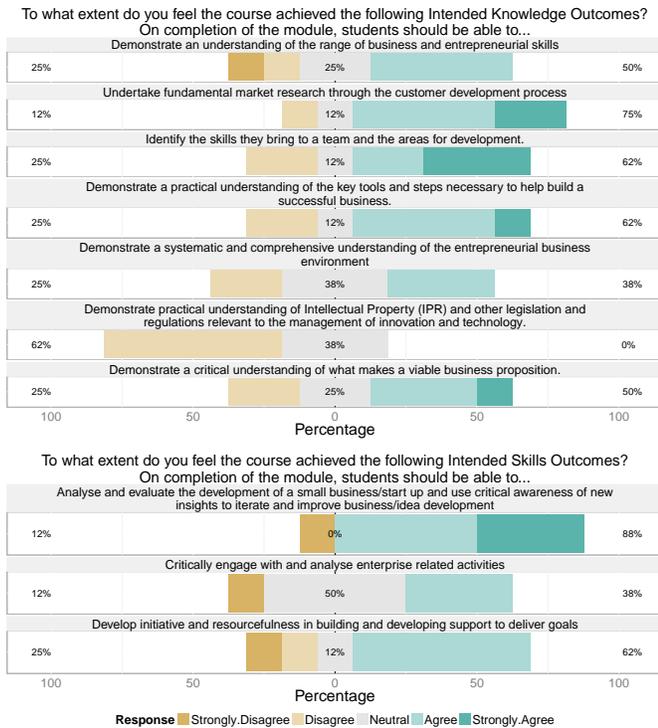


Figure 1: Student feedback on Intended Knowledge and Skills Outcomes

4. EVALUATING COURSE IMPACT USING STUDENT FEEDBACK

Within this section we examine free-text responses to the University-administered student module questionnaire. In order to substantiate our initial findings, and afford the students the additional opportunity to reflect on their learning experience, we also administered a follow-on survey to students six months after course completion. Results from the follow-on survey, on a five-point Likert scale, with eight out of ten students responding, are presented in Figures 1 and 2.

For the purpose of discussion, we have included quotes from the module survey, and follow-on survey responses below. A number of issues, initially revealed by the module feedback, are explored in light of the follow-on feedback. We draw inferences on the impact of the module and select areas for future research, including; group dynamics and teamwork, Intellectual Property; investment of time and exposure to industry experts.

4.1 Group Dynamics

Group dynamics featured heavily in the module feedback, demonstrating the need for further exploration of this area. The results identified that some students felt that they were unable to identify the skills they brought to a team and their own areas for development. This could be as a result of being in a task-driven environment, affecting their overall learning experience of group work. This echoes previous research on task-driven cohorts [13], where individuals take on the role required to enable the task to be completed, rather than one which would challenge them or allow them to develop. However, the follow-on survey identified that

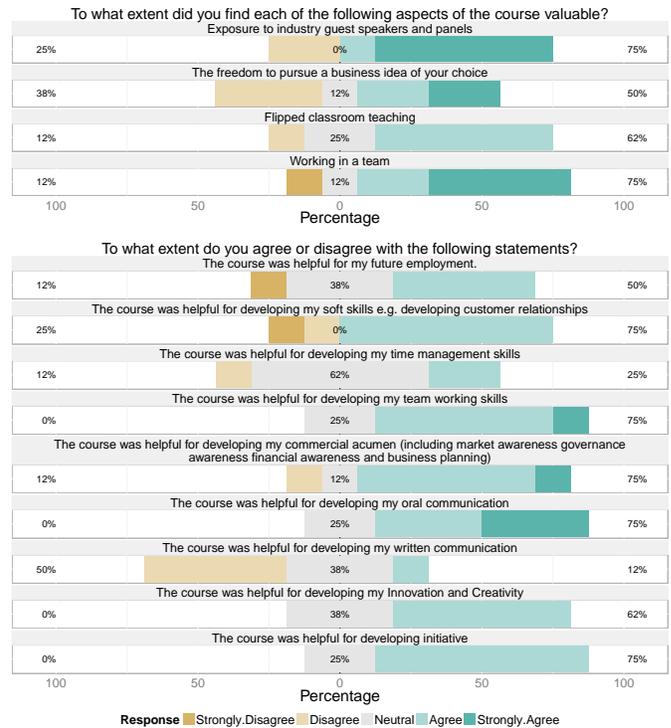


Figure 2: Follow-up Questionnaire Results

the students had found the teamwork aspect of the module valuable, stating that they found the course useful for developing teamworking skills. This suggests that, despite the challenges, teamwork is an essential and important component of the module.

The students also commented on the fact that they had not been able to select their own teams:

“We should be able to choose who is in our group, and there should be a procedure if someone isn’t willing to work with you in the group.”

As the course leader allocated the students into teams, the typical behaviours of organically formed teams might not have been able to come to the surface. Bains [1] highlights that within the startup environment, *“team efficiency is the key to success”* as close working and flexibility are critical within the formation stages of a business.

In response to this feedback the following change has now been implemented for future years. The groups will now be selected five months in advance of the course start date and communicated to students, to enable them to develop ideas and relationships in advance. The students were working within groups on two parallel modules; one which required them to utilise their technical skills by applying them to a research problem, the other a research skills module which reinforced important research techniques and presentation skills. The issue of group fatigue may have been a contributing factor to their discontent with group work overall, rather than being an issue specific to this module. By communicating group selection in advance, this will streamline, and create synergy, across the curriculum to improve the student experience.

After a year, we will review the group selection process

in light of additional student feedback. In addition we will set weekly review meetings to review individual logs and identify any group issues earlier, working with groups to ensure that each member is contributing.

Previously, some members of the team presented the business ideas each week, taking the responsibility of the group. In order to redress this balance we will now ask each group to identify the contribution of team members. Where a team member does not take part in the presentation of the business idea or the pitch, they will be asked to answer questions on e.g. finance, stakeholder engagement. We hope that this will alleviate some of the issues around fairness within groups and perceived levels of effort.

4.2 Intellectual Property and Business Law

“I think that the incorporation of law into the module would be really useful. [...] whether it be in industry or in academia where patents arise from research.”

The issue of Intellectual Property Rights was reported as a key area, which we had failed to explicitly cover within the taught course sessions. We have acknowledged this as a limitation, which needs immediate attention, if the students are able to progress their ideas beyond the initial design stage. To rectify this for future years, and provide a valuable and rounded learning experience, we will seek the support of a business law expert and a member of the University’s Business Development team to give an overview of the patent process and issues surrounding academic spin-outs. This will afford us to strengthen the student’s knowledge of an area of critical importance within business formation. This is especially relevant in a fast-paced technology environment.

4.3 Idea Selection and Buy-in

“I feel that while the module was very fun, a lot of time was spent on the business cycle for a product that we all knew was never going to materialise; and this was a big demotivator”

As the course was delivered in a simulated environment, some students felt that their ideas were not going to be developed into a viable product. In the first year we asked students to formulate business ideas approximately four weeks in advance, but stressed the importance of the learning experience and knowledge acquisition, rather than a focus on developing a real and successful business. In addition, as the students were already assigned to groups there was a limit to the formation of ideas in some groups.

In future years we plan to implement the following: Students will be asked to formulate ideas during induction week in September and bring these to a workshop in January. During this workshop the students will vote on three ideas to develop as a business and select which group they would like to join. This enables students to join a team and develop an idea which they have chosen. We will also provide further examples of successful academic spin-out companies and explain that there would be support available, for students who wished to pursue their business outside of the course structure.

4.4 Investment of time

“The true entrepreneur is a doer, not a dreamer.”

The Professional Skills module is designed to simulate a real business environment, and this includes a significant investment of time and effort, on behalf of the students.

This level of dedication is expected within small busi-

nesses, but the students saw this as a disproportionate level of work in relation to the number of credits they received for the module. Educating students, on the challenges and investment required in the early stages of business formation, was reinforced by each guest speaker from industry. The industry experts commented on this during their feedback to the students, cementing the importance of passion, belief and investment in making a business a success.

“The time and effort required for this module is not proportional to the credits available. I spend 2-3 days a week meeting people and organising presentations. I don’t think that I need to be as long as it was; with an ever fractured group motivation was very low towards the final weeks. This certainly was not a reflection of the quality of teaching that we received.”

The above quote also highlights the issue of motivation, which is explored further in the ‘Buy-In’ Section 4.3.

“This module ended up taking an disproportionate amount of time out of my schedule. It may benefit from a slightly different structure - maybe a 2-3 week intensive course.”

Whilst some organisations do operate their business formation courses in an intensive setting, we elected to construct a course which allowed the students additional time for stakeholder development, iteration of ideas and reflection. We feel these are key aspects which would be lost in a shorter, intensive environment. In addition we are restricted by the semester system within the University and an intensive first year programme, designed to equip the students with a multitude of skills, before they are able to progress to the research stage of their doctorate.

4.5 Exposure to industry experts

One area of importance, in light of both formal University course evaluation and the follow on survey, is the integration of industry partners. 75% of respondents identified this as being an important part of the course and felt that the module had succeeded in attaining this learning outcome. This highlights the importance of industry collaboration, exposure to entrepreneurs and the involvement of experts in delivering this important set of skills.

In light of this feedback, we are seeking to develop and embed industry panels further. We will do this by selecting a core team of entrepreneurs to support the students throughout the iterations of their ideas; strengthening the simulated incubator environment.

Whilst many of the entrepreneurs were sourced through local and existing collaborative relationships this involvement could be realised by an outreach programme.

4.6 Stakeholder Engagement

“Pity that we need to go out and speak with people - I think the fact that we are all mathematicians and computer scientists means that by our very nature, we are introverts.”

A number of the students reported that they had difficulties in meeting the requirements of weekly stakeholder engagement, a key component of the module, citing that the expectation was too much.

“The recommendation of speaking to at least 10 potential customers/clients per week was too much.”

A key issue, as identified from the initial feedback, was communication with external stakeholders; a critical aspect of forming a successful business and meeting the market research aspect of the course. This is a central component and

will not be changed, although the tutors have acknowledged that in forthcoming years, there will be further support offered to combat these issues. One potential way to support this would be for the staff members to provide accompaniment on the initial customer visits, in order to enable the students to observe and practice conducting this essential part of the module. The rationale behind this is that once students gain confidence in speaking to stakeholders, they should then feel empowered to continue this activity without further guidance. We followed up on this, and asked students if the course had met the intended outcome of developing soft skills e.g. developing customer relationships.

Within the responses some students felt that the course had not met these needs. However, a possible limitation should be acknowledged here. The inclusion of the example of customer relationships may have unintentionally linked the notion of soft skills with their previous negative experience of having to engage with external stakeholders; one of their main perceived difficulties. Upon reflection of this further feedback, we compared the results of this question with one related to the development of oral communication skills. Conversely the students reported that the course had improved their oral communication skills, suggesting a positive impact of the focus of the course outcomes and the requirement for students to present their business ideas to both internal and external stakeholders. This skill, in combination with teamwork and an understanding of business formation are undoubtedly beneficial for future employment.

4.7 Skills for Employment

The Professional Skills course aims to teach students the skills required to start a business, but the underlying skills and attributes are applicable to all areas of employment. Within the follow-on feedback students reported that the course was useful for developing their commercial acumen, team working and oral communication; skills valued by prospective employers. This was a positive impact of the course, demonstrating the importance of embedding these skills within a CS curriculum. Traditionally these skills are not adequately integrated within CS education programmes [5], and students are often expected to gain these from additional programmes provided by other university departments, such as the Careers Service.

5. INDUSTRY REFLECTIONS

During the evaluation of the impact of our course, we contacted industry partners and asked them to provide a reflection of the course and their involvement.

“As an IT service provider to business it is essential that our staff can understand and identify organisations’ needs and then architect and deliver the technology to enable them. All too often we are having to educate our (post) graduate starters from a very low level of understanding about how to make this connection between business/entrepreneurial need and technology so it was a breath of fresh air to be involved in a project that provided this perspective on a technology course. The enthusiasm of the students was clear and the progress they made on their concepts from initial thoughts to final presentation was great to see. Their appreciation of the business & entrepreneurial aspects of technology projects should be of great benefit to their future careers.”, Andrew Robson, Perfect Image Ltd.

This reflection supports our argument that the course is

able to provide students with the necessary skills to work within industry, saving organisations time and investment.

“I was invited to take part in the professional skills course as part of the CDT overall course and was great to see real business input into the CDT course rather than being treated as an academic only exercise. Using the latest lean startup ideas and helping students link their research to real-world problems and understand how to incorporate this into a potential business will stand them in good stead as they embark on their PhD studies and I’m sure will enable them all to make a real impact on the local economy.”, Dominic Murphy, CEO, Geek Talent

Our partners highlight the importance of the link between business and academic knowledge for developing industry-ready graduates, able to contribute to the economy.

6. STAFF REFLECTIONS

Following the delivery of the first year of the course, we asked the course leader to reflect, taking in account student feedback. The following quote identifies that some of the issues raised by the students, could have been directly influenced by their engagement with the course.

“Given the background and motivation of students on the CDT for Cloud Computing for Big Data, the feedback for this module illustrates how many students found the course content outside of their comfort zone. Students found it challenging to gather data from real stakeholders (to go out and talk to potential customers, etc.) They found group work difficult in a context where the focus was not on technical issues but on business issues. Some students thought the course lacked intellectual stimulation – although, as well as offering a general grounding in business thinking the course offered experiential benefits (building relationships and networks) which are directly aligned to the participation and contribution of the student. Without real engagement with the business idea and willingness to participate and contribute, the intellectual reward will undoubtedly be less rich.”

A core member of the teaching staff is an alumni of the institution, who participates on a part-time basis to support entrepreneurship within the University. He highlights the importance of developing skills within graduates, drawing on the difference between UK and US educational structures.

“As a UK entrepreneur who has spent quite a lot of time visiting the US and talking to entrepreneurs there, it has frequently struck me that in the UK PhD students are being trained for academic careers whilst in the US they are being trained for business careers. Yet in both cases the majority end up in business. In addition in the US, PhD students in tech mix frequently with people of their own generation who have succeeded as entrepreneurs. This instills an attitude of “well, if they can do it, so can I”. The Professional Skills program at Newcastle University addresses both of these issues. It encourages students to consider their business opportunities (and provides them with some fundamental business skills) and exposes them to people from a similar background to their own who have created successful companies.”

7. CHALLENGES TO REPRODUCIBILITY

In developing this curriculum, we seek to provide guidance to other practitioners seeking to replicate the course within their institutions. Whilst we acknowledge there are a number of unique factors which contributed to the success

of the module within our institution, we support and encourage the adoption of the methods at other institutions, arguing that the course can be reproduced.

Investment of time: The most significant challenge for reproducing the course, is the significant investment of time required by tutors at both the planning stages and during classroom sessions. Whilst the course is advertised as employing a ‘flipped classroom’ technique, the amount of contact time should not be underestimated. Within the initial business canvas mapping and idea selection, we utilised the skills of two external consultants alongside four tutors. Whilst we appreciate that not all institutions have the resources to enable this level of interaction, we believe that the skills required to deliver this session could be acquired by tutors and enthusiastic postgraduate students. By holding an initial skills training session, guided by additional reading and an understanding of the Business Model Canvas, the course could be delivered by one tutor with the support of graduate assistants. In addition, the tutors could offer the opportunity as a learning experience for business law/MBA students within another faculty, strengthening cross-faculty relationships and providing the opportunity for inter-disciplinary student collaboration.

Access to Industry Experts: One limitation, which should be acknowledged, is that access to industry experts could be a potential barrier for some smaller institutions willing to run a similar course. One suggestion, to assist in making these connections, would be to use your institution’s business development unit, Careers service or alumni organisation. Each of these departments have mechanisms for engaging with external organisations. Alternatively, small business organisations such as the Federation of Small Businesses, or in the US, the Small Business Administration, have local contacts and access points. Whilst smaller businesses do not always have the resources to invest significant time, they can benefit from involvement with the course by developing networks with the academic institution.

8. CONCLUSIONS

Embedding entrepreneurship into the curriculum, within any subject area, is challenging. However, introducing these concepts to students from a Computer Science and Mathematics background, brought a fresh set of challenges. Taking into account issues of group cohesion and the introduction of a new subject area, there was also an underlying issue around communication skills and stakeholder engagement which arose during the delivery of the module. Student feedback has afforded us with the opportunity to make amendments to the curriculum to benefit future cohorts.

Concerns around engagement and commitment were raised by the students and in future years we will seek to investigate alternative practices, e.g. task rotation within groups. This will provide opportunities for each student to experience different roles within the business, enhancing their skill set and exposing them to new experiences.

The involvement of industry is critical to the success of this course and we seek to embed this further in future years, examining the effects of a single, dedicated, panel throughout the course. This was supported by reflection from a member of teaching staff, a current entrepreneur, who highlighted that there is a disparity between the UK and US educational programmes for doctoral students. This is something we are keen to investigate further, and we plan to

further our understanding of industry integration, in order to learn from best practice within the US.

Acknowledgment

This work was supported by the Engineering and Physical Sciences Research Council [grant number EP/L015358/1].

9. REFERENCES

- [1] W. Bains. What makes a happy team? data from 5 years’ entrepreneurship teaching suggests that working style is a major determinant of team contentment. *J. Commerce Biotechnol*, 20(3):12–22, 2014.
- [2] S. G. Blank and B. Dorf. *The startup owner’s manual*. ”K&S Ranch, Inc.”, 2012.
- [3] G. Curri. Introducing entrepreneurship teaching at select german universities. *Higher Education Management and Policy*, 20(3):1–20, 2008.
- [4] e-Skills UK. Big data analytics: Assessment of demand for labour and skills 2013-2020, 2014.
- [5] M. Forshaw, E. Solaiman, O. McGee, H. Firth, P. Robinson, and R. Emerson. Meeting graduate employability needs through open-source collaboration with industry. In *SIGCSE*. ACM, 2016.
- [6] T. J. Hickey and P. Salas. The entrepreneur’s bootcamp: a new model for teaching web/mobile development and software entrepreneurship. In *SIGCSE*, pages 549–554. ACM, 2013.
- [7] P. Honey, A. Mumford, et al. *The manual of learning styles*. 1992.
- [8] M. Lackéus and K. Williams Middleton. Venture creation programs: bridging entrepreneurship education and technology transfer. *Education+ Training*, 57(1):48–73, 2015.
- [9] G. Lang and J. S. Babb. Addressing the 21st century paradox: Integrating entrepreneurship in the computer information systems curriculum. *Information Systems Education Journal*, 13(4):81, 2015.
- [10] A. Maritz and J. Donovan. Entrepreneurship and innovation: Setting an agenda for greater discipline contextualisation. *Education+ Training*, 57(1):74–87, 2015.
- [11] E. Mwasalwiba. Entrepreneurship education: a review of its objectives, teaching methods, and impact indicators. *Education+ Training*, 52(1):20–47, 2010.
- [12] A. Osterwalder and Y. Pigneur. *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons, 2010.
- [13] J. P. Scribner and J. F. Donaldson. The dynamics of group learning in a cohort: From nonlearning to transformative learning. *Educational Administration Quarterly*, 37(5):605–636, 2001.
- [14] A. Valerio, B. Parton, and A. Robb. *Entrepreneurship education and training programs around the world: dimensions for success*. World Bank, 2014.
- [15] K. Williams Middleton, S. Mueller, P. Blenker, H. Neergaard, and R. Tunstall. Experience-based learning in entrepreneurship education—a comparative study of four programmes in europe. In *RENT XXVIII*, pages 1–15, 2014.
- [16] L. Young. Growing your business: a report on growing micro businesses. *London: Lord*, 2013.