



Supporting the entrepreneurial potential of higher education

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1 University of Cambridge: Persistently innovating entrepreneurship education models

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Abstract



The main focus in the case study of the University of Cambridge (UC) is set on its Centre for Entrepreneurial Learning (CfEL). CfEL's mission is to spread the spirit of enterprise and this mission is deeply embedded in its approach to entrepreneurship education. CfEL offers a broad variety of innovative educational programmes, such as the Postgraduate Diploma in Entrepreneurship (PGDE), Enterprise Tuesday (ET), Ignite or EnterpriseWISE. In terms of methods, predominately practice-oriented teaching is employed, for instance through business plan seminars or applied case studies. CfEL further emphasises the importance of networks and collaboration, be it in its curricular or its extra-curricular activities. Entrepreneurs in residence and visiting entrepreneurs are strongly integrated into entrepreneurial teaching as lecturers, mentors, coaches or facilitators. CfEL also focuses on collaborating with students in order to consider their needs and demands in educational planning.

Case study fact sheet

Full name of the university and location:	University of Cambridge (UC), Cambridge, United Kingdom
Legal status of the University of Cambridge:	Collegiate Public Research University with 31 constituent colleges and more than 100 academic departments organised into six Schools
Location of the University of Cambridge:	Cambridge, United Kingdom
Year of foundation:	1209
Number of students at the University of Cambridge and its 31 Colleges:	Undergraduate students in 2012/2013: 11,820 students Postgraduate students (Masters) in 2012/2013: 2,620 students Postgraduate students (Doctorate) in 2012/2013: 3,831 students Total number of students in 2012/2013: 18,271 students
Number of employees at the University of Cambridge :	Academic staff in 2013: 1,616 employees Academic related staff in 2013: 1,559 employees Contract research staff in 2013: 3,470 employees Technical staff in 2013: 1,149 employees Clerical and secretarial staff in 2013: 1,601 employees Manual and domestic staff in 2013: 428 employees Total staff in 2013: 9,823 employees
Budget of the University of Cambridge:	Total income in 2012/2013: £905,369,000 Total expenditure in 2012/2013: £874,055,000 Total funds in 2012/2013: £2,628,300
Academic profile of the University of Cambridge:	Cambridge is at the international forefront of excellence in teaching and research as evaluated by different university rankings.
Entrepreneurial profile of the Centre for Entrepreneurial Learning (CfEL):	CfEL is a UC institution and part of Judge Business School (JBS). It directly focuses on entrepreneurship education. CfEL aims at spreading the spirit of enterprise to both the UC community and to wider national and international audiences.
Activities focused in this case study:	Mainly extra-curricular entrepreneurship education activities, such as the Enterprise Tuesday, ETECH, Ignite and Enterprisers.
Case contact persons:	Prof. Shailendra Vyakarnam, former Director of CfEL; Yupar Myint, MBA, Ignite Programme Director and Director of International Development, CfEL; Dr. Joanna Mills, Programme Director of the PGDE and Deputy Director of CfEL.

Information included in this case study is from end of year 2014 unless stated differently.



1.1 The university's entrepreneurial profile

1.1.1 The university's overall approach to entrepreneurship education

Entrepreneurship is integrated in the local culture with Cambridge being home to 1,500 high-tech companies out of which up to one third were formed as a result of UC. The Cambridge region is well known for its thriving entrepreneurial ecosystem, also referred to as 'Silicon Fen'. It features a supportive environment for innovative and high growth start-ups. The Hauser Forum (see: <http://www.hauserforum.com/>) serves as an excellent example for stimulating collaboration between clusters of academics, start-up and established businesses. It offers office space and resources for tenants such as *Cambridge Enterprise* and *ideaSpace* who enable entrepreneurs to work on their research commercialisation activities in cooperation with University staff.

The main institution responsible for entrepreneurship education at the University of Cambridge (UC) is the Centre for Entrepreneurial Learning (CfEL) whose teaching activities will therefore be the focus of this case study. CfEL is part of the Cambridge Judge Business School (CJBS). A precursor of CfEL for entrepreneurial learning in Cambridge was the Cambridge Entrepreneurship Centre (CEC). Three of the key programmes of CEC were Enterprise Tuesday (ET), Ignite and the Business Creation Competition (BCC). ET and Ignite are nowadays offered by CfEL while BCC is offered by Cambridge University Entrepreneurs (CUE). BCC and Ignite – the latter of which was formed as a result of a summer school – were already created before CEC was formed as a result of a competition for funding from the British government to set up an Entrepreneurship Centre. These programmes have helped to raise the profile of entrepreneurship and CEC (and later on CfEL) within the university. They have also resulted in national and international recognition and an enormous development and increased prioritization of entrepreneurship education in Cambridge over time.

While activities already started in 2000, CfEL was officially launched on September 1, 2003 with a mission to "spread the spirit of enterprise to both the University of Cambridge community and to wider national and international audiences through the creation and delivery of a range of educational activities that inspire and build skills in the practise of Entrepreneurship". Since its launch, the centre has run many successful programmes, including the popular ET lectures and numerous networking events. Over time the amount of entrepreneurship education activities offered in Cambridge has expanded and spread. Further flagship programmes of CfEL encompass the ETECH Programme, Ignite, Enterprisers and the Postgraduate Diploma in Entrepreneurship (PGDE) which was the first certified entrepreneurship education offer of its kind. One current project is the launch of a charter that is developed in cooperation with real entrepreneurs in order to provide aspiring entrepreneurs with examples of best practice start-up cases. The main role of CfEL is to evangelize and promote entrepreneurship education, to provide skills and to bring people together. Peculiarities of entrepreneurship education at CfEL include its practitioner-led education *for* and *through* entrepreneurship, its 'learning journey approach' for positioning oneself and the values related to its way of working (e.g. pro-bono teaching, the belief that entrepreneurship can be trained and skilled, the value of social capital and networks).



1.1.2 Leadership and governance

Importance of government strategies

The government of the United Kingdom represents an important funding source for entrepreneurship education, for instance through the Higher Education Innovation Fund where each university receives substantial funds to distribute among its schools and institutes (see: <http://www.hefce.ac.uk/whatwedo/kes/heif/>). From these funds, CfEL currently obtains £300,000.

The starting point for CfEL was in 2001 when 12 universities in the United Kingdom were tasked by the government to support entrepreneurship education with Science Enterprise Challenge funding. The idea was to initiate change in universities which is more favourable for entrepreneurship education. The goal was to reach out to students. Entrepreneurship should no longer solely be on top of existing studies next to other courses but should be deeply integrated into education in Cambridge through curricular offers for undergraduates and extra-curricular offers for postgraduates. To implement these extra-curricular activities, a cultural change (i.e. a change of mindsets) was needed (see section 1.4.3). Cambridge Enterprise and the Cambridge ecosystem were supporting commercialization strategies of start-up companies. As a result, a broad portfolio of extra-curricular and curricular offers was established (see section 1.2 and 1.3). All of these offers were highly innovative when initiated.

Concerning the prioritization of entrepreneurship education, governments were extremely interested in economic development as well as economic and social impact measurement of education. As a consequence, universities were to become more aware of the need to equip graduates with real life skills which can partially be taught through entrepreneurship education.

Importance of entrepreneurship in the university's strategy

Entrepreneurship and entrepreneurship education have gradually become more important at UC. This increase in importance evolved as a mixture of bottom-up and top-down initiatives on entrepreneurship education. In the beginning of the new millennium, there were, as one interviewee said, “low-level, department-focused pockets of happening”. The CEC by then offered a limited number of courses that were directed at particular types of people, such as graduates, summer school participants or physics students. As teaching methods, traditional academic, lecture-based courses and workshops were provided in contrast to real-action learning. There was initially an element of resistance back in the days of including entrepreneurship as part of the university curriculum. There was also resistance in the early days to a practice-based entrepreneurship education since Cambridge is a very traditional university that preferred to focus more on training academics and not practitioners, such as entrepreneurs.

Nowadays, the number of people involved in entrepreneurship-related activities at the university has strongly increased, which is aided by the fact that the current Dean of CJBs, Christoph Loch, has revealed a strong commitment to entrepreneurship and one interviewee mentioned accordingly that “entrepreneurship education is high on the agenda of the JBS”. Next to that, a termly meeting of everyone involved in entrepreneurship education at UC (including among others Cambridge Enterprise, Institute for Manufacturing, professors, lecturers and researchers) is arranged and chaired by Stew McTavish of Ideospace as part of the University Enterprise Network.



Although entrepreneurship education evolved in the years with its activities widening and deepening, it should nonetheless be pointed out that there are no details on official goals or written statements on entrepreneurship education at the university level could be identified. In contrast, CfEL, Ideaspace and Cambridge Enterprise clearly articulate a vision and values related to entrepreneurship on their public profile.

Level of faculties' and units' autonomy to act

Entrepreneurship education at CfEL and the related university institutions, such as student led initiatives as for instance CUE, CUIF or CUTEC, is on the whole organised in a radiant and thus decentralised approach. CfEL is able to design its entrepreneurship education portfolio mostly autonomously, especially with regard to its extra-curricular activities. In terms of the curricular offers (i.e. PGDE and the revised ETECH programme), stronger coordination with UC is needed due to the fact that these offers are certified (see section 1.4).

For the curricular offers, formal quality assurance procedures are required. In terms of the PGDE, quality assurance for certified programmes implies that a teaching and admissions committee and an examination committee are established. The teaching and admissions committee consists of all involved teachers, a CJBS representative as chair and a student representative. It meets once per term with a total of three times a year. During its meetings it reviews prior to teaching and prepares upcoming teaching activities. Moreover, administrative and resource-related matters are discussed as well as general changes which influence the teaching context. The examination committee is composed of internal CfEL staff, a CJBS representative as chair, an external examiner from another university and two observers. It meets once a year and thereby assesses who gets approved for the marking of assignments. The marks provided in turn need to get approved by the chair of examiners (see section 1.2.6).

University's importance for driving entrepreneurship in its environment

Cambridge is located in a highly innovative region with a magnitude of start-ups. These start-ups are mostly created in the area of life science and technology. Entrepreneurship and enterprises in Cambridge are high profile in the media and government. Substantial importance of the UC for driving entrepreneurship in its environment can be noted and numerous successful start-ups have been created from UC alumni (see section 1.4).

1.1.3 Resources: people and financial capacity

Human resources for entrepreneurship education

Attracting highly qualified staff is essential at UC and at CfEL. The strong reputation of the university helps in attracting suitable personnel despite the fact that salaries for academics at UC are at a moderate level. In attracting people, shared values and enthusiasm are desired. Backgrounds of individuals involved in entrepreneurship education vary although a common interest and prior experience in the field of entrepreneurship can generally be observed.

Financial resources for entrepreneurship education

It was highlighted by numerous interviewees that sufficient financial resources are essential for a stable and long-term provision of entrepreneurship education. The



continuity of funds is in particular important in order to engage in long-term planning of entrepreneurship education. CfEL possesses a total of £1,000,000 a year as budget which covers CfEL's expenses and enables the provision of a diversified range of educational offers free of cost to the University's departments. Out of this budget £300,000 a year originate from HEIF while the remainder stems from income generated through course fees, projects and other sources, such as sponsors.

The CFEL customised entrepreneurship programmes can be considered as the examples for project fee income generation at UC. Extracurricular programmes are conducted in Cambridge and target undergraduate students, entrepreneurs and researchers from overseas universities and public institutions with a focus on building entrepreneurial mindsets and capabilities and commercialisation of research. Besides building the skills and providing the insights about the practices and ecosystem in Cambridge it also serves UC's vision of spreading the entrepreneurial spirit through its outreach.

1.2 Entrepreneurship in curricula and teaching

1.2.1 Overview about curricular offers

At present, CfEL focuses on hands-on, extra-curricular entrepreneurship education to pursue its practice oriented approach. Consequently, CfEL solely provides two accredited offers: ETECH Projects programme and the Postgraduate Diploma (PGDE) which are based within CJBS. These two offers have different target groups and varying objectives. While ETECH is focused on delivering inside the university to students doing other courses, PGDE is an outreach type programme not open to current students of other disciplines within UC and it also charges a fee.

It should be pointed out that at the time the interviews were being conducted; CfEL was in the process of restructuring the ETECH programme. Hence, the content and design of the programme is constantly adjusted according to the context it is offered in and the respective requirements for accreditation. For further information on the ETECH programme and its undergoing changes please see the box below.

Since its inception, the PGDE has also developed in a substantial manner. It was initiated in 2006 with formal approval being granted in 2008. The programme began as an Advanced Diploma in Entrepreneurship and as a partnership activity with the Institute of Continuing Education in 2009 with 9 students. Over the years PGDE was moved into the CJBS as a certified programme and an award for non-members of the university. Due to its unique teaching approach, this section will focus on the PGDE (for further information see: <http://www.jbs.cam.ac.uk/entrepreneurship/postgraduate-diploma-in-entrepreneurship/>).

The process of entrepreneurial learning at CfEL is depicted as a so-called "entrepreneurial journey" (see Exhibit 1-1 below). CfEL has established a portfolio of curricular and extra-curricular offers that address individuals on different points on this learning journey. Next to the programmes described in Exhibit 0-1 below, customised programmes could be included in addition, such as short term lectures and workshops, mentoring and project work on start-ups. The programmes encompass early stages of entrepreneurship, such as the establishment of an entrepreneurial mindset and confidence in entrepreneurship. Advanced stages are taken into account with the provision of tools for assessing feasibility of projects and eventually by support in



incubating the business idea. The following figure only displays the programmes run by CfEL (see also section 1.3 for the extra-curricular offers) while additional (extra-curricular) programmes of UC and its ecosystem will be displayed in section 1.3. The ETECH Projects Programme is situated at an intermediate stage within the entrepreneurial journey whereas the PGDE spans across the different stages of the journey.

Exhibit 1-1: Entrepreneurship Journey Map (Source: CfEL Annual Review, 2011)

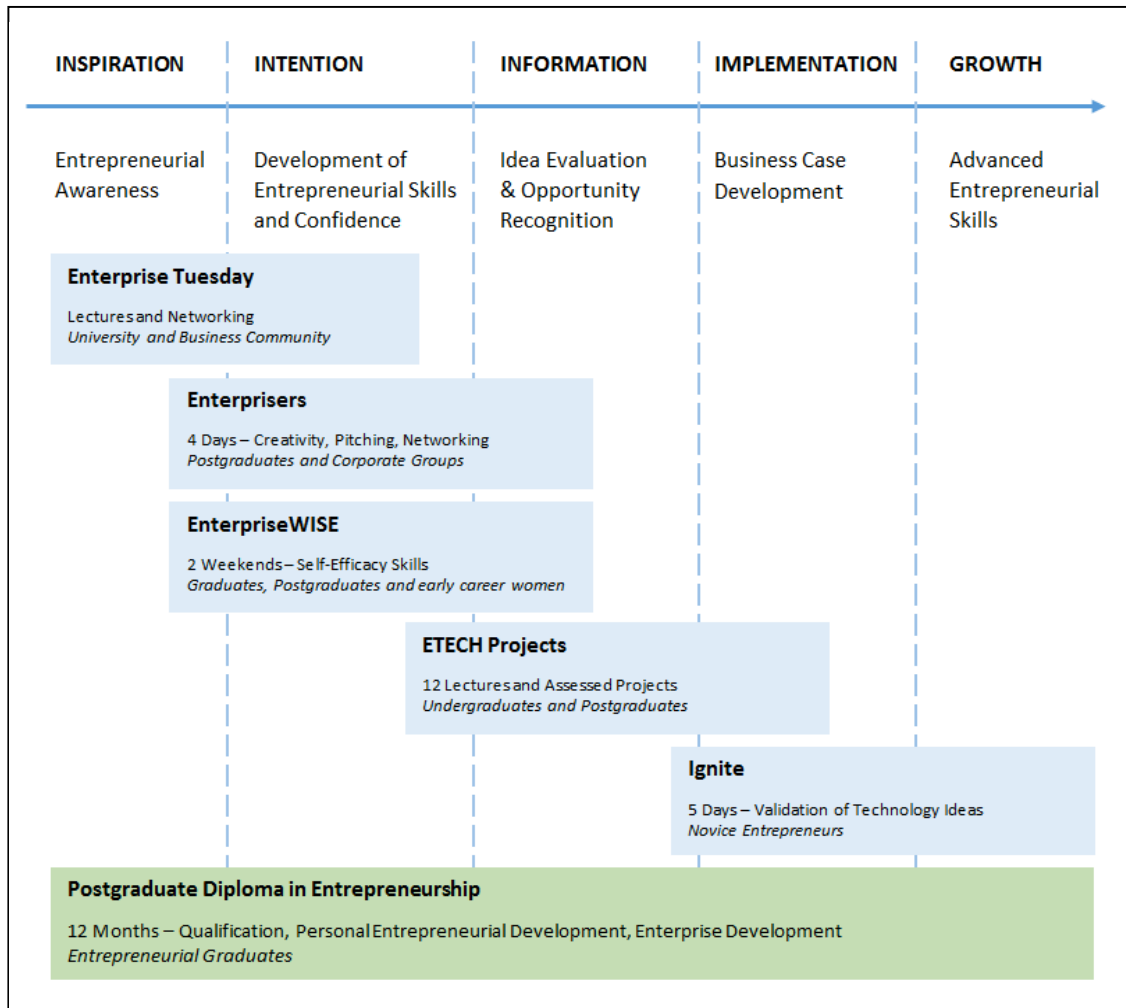


Exhibit 1-2: Overview of curricular entrepreneurship education offers at CfEL

No.	Name	Objectives	Target group	Offered since	Maximum no. of participants per year
1	ETECH Programme	Generate a theoretical understanding of commercialization in entrepreneurship of emergent technologies.	Undergraduate students, graduate students in MBA, PhD students, interdisciplinary.	2001	Approx. 50
2	Postgraduate Diploma in Entrepreneurship	Developing academic skills, self-reflection skills and practical entrepreneurial skills.	Postgraduates	2009	Currently 40

Box 1: ETECH Programme



ETECH Programme

The ETECH Programme accelerates entrepreneurship in emerging technologies and aims at diffusing innovations and high potential technologies from UC. The programme is conducted within credit bearing courses at several University departments such as Natural Sciences, Technology and Biological Sciences. Since 2009, almost 100 ETECH projects resulted in the evaluation of over 50 novel technologies that have been worked on by approximately 500 students and about 30 inventors.

There is a current development at CfEL to revise the ETECH programme as an offer for Research Master Students. The revised programme will be provided for the first time at the end of 2014 shortly after the interviews for this case study were conducted. It serves as a trial which, if successful, will be replicated in the years to come (see: <http://www.cfel.jbs.cam.ac.uk/programmes/etech/index.html>).

Target group

ETECH Projects are part of several degree programmes within the Schools of Technology, Natural Sciences, Physical Sciences and Biological and Biomedical Sciences. The programme targets undergraduate as well as postgraduate students including the MBA and EMBA programmes. The undergraduate variant is provided as assessed service teaching whereas the graduate variants are optional. It is compulsory in the Research Master programme as part of PhD training in sensotechnology. What is more, an assessed course has recently been developed within the Doctoral Training Centres as part of PhD studies in about 7 subject areas. The target audience is therefore interdisciplinary and addresses different levels of study. It is estimated that around 50 students will participate in the programme. Students are selected through a competitive process by six centers involved. The programme is considered necessary for engineers as it helps developing visions through a multidisciplinary effort and constant development.

Programme design

The goal of the programme is to generate a theoretical understanding of commercialization in entrepreneurship of emergent technologies. Thereby, students learn and apply entrepreneurial skills within specific projects in teams. Attention is paid to close collaboration with industrial partners to create a real-life focus. The programme requires a high level of confidentiality due to the early stage of the technologies. Therefore, the students' work is covered by Non-Disclosure Agreements in order to ensure the protection of Intellectual Property. The programme is financed by the British Engineering and Physical Science Research Council UK and the British government.

Teaching methods include academic and practitioner-led lectures with hand-on sessions, technology simulations, debates with real entrepreneurs, pitching sessions in front of investors and feasibility reports developed in team work. Furthermore, supervision and support as well as tools for opportunity evaluation and developing business concepts are provided. The pitching sessions and the feasibility report serve as main assignments of the course.

In terms of the grading, students get evaluated on the basis of their participation, their ability to pitch successfully and the feasibility of their projects.

Setting



The curriculum of the course is currently being designed and adjusted to the new curricular, PhD setting. The course shall take place over a period of approximately three month from December 2014 to March 2015 with a five-day presence in the beginning and a three-day presence in the end.

Persons involved

University lecturers and entrepreneurs serve as instructors throughout the course. Moreover, facilitation sessions in groups are employed.

1.2.2 Target groups

Main target groups of entrepreneurship education

The target audience of the PGDE includes fresh graduates with first working experience as well as graduates with three to five years experience who are in the process of becoming entrepreneurs. What is more, senior participants with vast amount of work or entrepreneurial experience, such as business professionals wanting to start their own ventures, entrepreneurs with early stage ventures or intrapreneurs are also encouraged to participate in the PGDE. All participants will be working on their own entrepreneurial projects throughout the course of the programme in order to ultimately implement their projects.

“The application process for the PGDE was straightforward and efficient and staff was very responsive” (Simon Daly, PGDE alumni).

The first selection criterion for the admission process in the PGDE is a 2:1 grade or better. These applicants are in turn invited to a personal interview. This semi-structured interview serves as a dual assessment: First, it is assessed, whether the applicant qualifies for the PGDE and if so, whether he will benefit from the PGDE. Second, it is assessed, whether other participants of the PGDE would benefit from the applicant. Hence, an applicant must be willing to share his thoughts, ideas and experience to foster mutual learning. Other important criteria for the selection process include the extensiveness of prior industry experience, the amount of previous involvement in entrepreneurial activity, the potential of the proposed business idea as well as the motivation and personality of the applicant. The number of participants in the PGDE depends on the number of qualified applicants with no automatic cap being applied. At present the maximum number of PGDE participants has been 40 (see exhibit 1 above). The PGDE (and other CfEL offers) are marketed through links on Master Studies (www.masterstudies.com), via prospective magazines for graduates and through the alumni network and also through a range of online marketing activities.

1.2.3 Designing lectures and courses – basic curricular decisions

Intentions

The PGDE is a journey. It aims at developing the participants' practical skills and knowledge for successful entrepreneurship. The (personal) learning objective of the PGDE, as perceived by an alumnus, was to facilitate a greater understanding of entrepreneurship, to raise profile in entrepreneurship education and to create a strategic fit with personal interests and job opportunities. Although all participants were generally interested in entrepreneurship, their concrete intentions of the participants did vary: Some



students were aiming at acquiring the skills needed to become an entrepreneur and were looking for recommendations and support for enterprising people to take the next steps; other were already entrepreneurs and needed help in developing their business while the remaining students were involved in entrepreneurship education and were aiming at developing their entrepreneurship teaching approaches.

Contents

The PGDE is a part-time programme that consists of four courses in total. At the beginning of the programme each participant selects one entrepreneurial idea as a business project which he prepares to implement throughout the programme. The first one is a course on “Entrepreneurial Awareness and Skills” which provides a basic general knowledge of entrepreneurship and which familiarises the students with the used technology and theory. The second course is on “Opportunity Recognition and Idea Evaluation” in order to get the students through a feasibility study thinking about opportunities and to provide them with the knowledge to transform their own project ideas into opportunities. The third course is called “Preparing and Implementing the Business Case” where students put down their business models into words to create their individual business cases, for instance with regard to the chosen approach to financing or the market entry strategy. The fourth and last course of the PGDE focuses on “Managing the Early Enterprise” and discusses aspects, such as legal structures, shareholder and stakeholder relations, partnerships and employee roles.

Methods and Media

Throughout the PGDE, various teaching methods are employed, including traditional lectures, readings, videos, discussions and regular (phone) meetings with the respective mentors and tutors. Next to presence-based learning, e-learning via the virtual learning environment (VLE) is a central component of the PGDE (see section 1.2.4)

Using results of entrepreneurship research

The results of entrepreneurship research are mainly included in entrepreneurship education through readings and presentations where relevant findings of entrepreneurship research are brought forward to facilitate understanding of the theoretical basis of entrepreneurship.

1.2.4 Setting of entrepreneurship teaching

Locations and Timing

At CfEL, a blended approach to teaching entrepreneurship is employed. Traditional, presence based learning is combined with e-learning. Presence-based entrepreneurship education at CfEL takes place at the university in lecture halls or tutorial rooms. This VLE is a central e-learning component of programmes like the PGDE or ETECH. In the PGDE, online platforms such as MOODLE are used. Their usage differs on a course-to-course basis to tailor the VLE to the respective educational needs and approaches. This online environment is used for communication and discussions in groups and to upload pre-course material. The discussion of the students in the e-learning environment is assessed for the grading in all four PGD courses as an incentive for increased online participation. Taped video lectures given by entrepreneurs or interviews are also uploaded on the VLE, for example from ET or ETECH (see section 1.3).



The PGDE is a year-long programme which starts end of August or beginning of September and ends around that time in the upcoming year. Within this year two residential periods take place with one week at the beginning of the programme and two more weeks in spring. Throughout the remainder of the year, all teaching activities are organised via the VLE. In the PGDE, there are blocks of learning between 5 and 7 weeks with contributions within weekly time frames. The VLE provides an overview of the key objectives and desired learning outcomes per week. In terms of the design of the lessons in the VLE, the overview is broadly equivalent to a 90-120 minute lecture with a faculty member. These lessons are text-based with a reading list of core and additional readings and include a series of linked webpages and links to the library.

Formal evaluation of learning outcomes

In the PGDE, participants get evaluated by a variety of assignments, including end of course exams, online participation at the VLE, reflective journals, academic essays, oral presentations and the development of the enterprise projects. Next to the obligatory assignments, weekly voluntary, non-credited assignments are also offered for the students to obtain preliminary feedback. In addition to the assessment by the tutors, peers are additionally assessing one another. One unique aspect about the PGDE is the unique group spirit created with a supportive, shared and open culture and regular peer-to-peer feedback.

1.2.5 Instructors: teachers and mentors

Professors, other employees and external lecturers of the university

Academic instructors in the PGDE are usually employees from the CfEL or the CJBS on the whole as course coordinators, lecturers, tutors or facilitators. Hereby, a separation should be made between staff that design and administer courses. Employees at CfEL are highly qualified. Academic staff generally possesses a PhD and/or MBA in a diversity of fields, including entrepreneurship, business administration, anthropology, bioscience and engineering. Administrative staff is well qualified with more than 20 years of work experience.

“Real entrepreneurs” as teachers

At the PGDE, real entrepreneurs are invited as guest speakers during the residential periods. Entrepreneurs are further involved in the organised (social) activities, networking events and excursions, such as company visits or negotiation exercises. These entrepreneurs are on the whole highly experienced and successful. Their involvement in entrepreneurship education (e.g. as lecturers or mentors) is described in more detail in section 1.5.

Mentors

Each student has a mentor and a tutor in the PGDE. For the mentoring, students form a group of four to six members and each group is assigned one mentor on a long-term-basis during the entire programme duration of one year. On average, mentoring sessions take place every two weeks with the frequency being adjusted to the mentees' needs. These mentoring sessions are undertaken both on a group and an individual level and on a face-to-face and virtual basis.



Each mentor has a duty to care for his or her mentees. Mentors are not involved in the grading of the students but their role is to provide guidance, support and practical feedback on the projects to the students throughout the programme and to share their own experiences with the participants. The goal of these mentoring sessions is for the delegates to receive personal, non-academic support and encouragement. Moreover, mentors shall help the mentees to keep track and provide guidance during difficult periods and obstacles. The effectiveness and thus benefit of the mentorship can consequently vary according to the behaviour of the delegates. According to the opinion of an alumnus, the mentoring support used in the PGDE is perceived in a very positive and helpful manner.

As opposed to the facilitators (see section 1.3.5), mentors at PGDE receive a financial compensation and the majority of the mentors have a practical background, usually being real entrepreneurs, and are encouraged to share their real life experience with their mentees. New mentors are identified based on personal recommendation by other mentors.

Instead of a training workshop, the mentors receive a pre-course meeting where details of the structure and organisation of the PGDE are exchanged and where the mentors get a chance to meet and network.

1.2.6 Management of entrepreneurship education

Internal and external network management

Cambridge is known for its profound networking culture (see section 1.5.1). CfEL manages its network informally on the basis of trust and social capital in the Cambridge cluster by building and maintaining good relationships with partners from the network. Such a close relationship with all network partners is kept through regular contact. Each programme has its own list of contacts and network partners. In the beginning of a new programme, as said by one interviewee, it can be challenging to identify qualified and interested mentors, entrepreneurs or investors, but over time – as the reputation of a programme builds up – it becomes easier. New partners are mostly acquired by CfEL through direct contact in form of recommendation by current partners of the network (see section 1.3).

Evaluation of courses and programmes

The quality and alignment of the PGDE is strictly monitored and assured by a range of committees within JBS. Feedback and evaluation is highly important at CfEL. At the end of each curricular or extra-curricular programme staff, external partners and participants get together to reflect upon the programme. Hereby, the content, design and structure get evaluated and recommendations as to how to further improve the quality of entrepreneurship education in the upcoming terms are brought forward. To evaluate the participants' opinion on the programmes in a more formal manner, all students get to fill out a standardised, online feedback form at the end of a course. According to an interviewed alumnus, skills acquired by participants of the PGDE include reflection skills, networking skills, emotional intelligence and social skills.

1.3 Extra-curricular activities related to entrepreneurship education



1.3.1 Overview about extra-curricular entrepreneurship activities

UC offers a range of extracurricular programmes and activities related to entrepreneurship education with diverse objectives, target groups and programme designs. There is a diversity of extra-curricular offers that span across the Entrepreneurial Journey (as displayed in Exhibit 1-3). Next to the programmes run by CfEL additional programmes of the UC ecosystem will be described in the following. It should be pointed out that the extra-curricular activities of student-lead organizations, such as the Business Plan Competition, are not part of UC entrepreneurship education itself but are offered independently by students with permission from UC to operate (see section 1.5).

Exhibit 1-3: Overview of extra-curricular entrepreneurship education offers at UC

No.	Name	Objectives	Target group	Offered since	Participants in 2014
CfEL offers¹					
1	Enterprise Tuesday	Introduce participants to the world of business, as well as to encourage and inspire individuals to pursue their entrepreneurial ambitions.	Students from UC or other universities, local business community representatives, alumni.	1999	Approx. 1500
2	Enterprisers	Action orientated, practical and based on experiential learning, enabling participants to understand their own creativity, generate ideas from research that can be turned into ventures and to build networks.	Undergraduates, PhDs, Post-docs, UC staff and corporate audience, interdisciplinary, international.	2002	Approx. 60
3	EnterpriseWISE	Unlock the entrepreneurial potential of women by developing skills, knowledge and confidence which can be applied to business venture creation, research projects and commercialisation of innovations.	PhD, Post-doc and early career women in science and technology.	2003	NA
4	Ignite	Trial and prepare business ideas for the commercial environment, by practical teaching and mentoring.	Post-doc students, early-stage entrepreneurs and corporate innovators.	1999	Max. 65
Other offers					
5	Accelerate Cambridge (based within CJSB)	Enable and nurture venture creation out of UC through entrepreneurship training, coaching, mentoring and access to shared workspace.	Teams with at least one founder with a "Cambridge connection" (student, alumni, faculty, staff of the University or resident of the town).	2012	NA
6	Business Creation Competition (offered by CUE)	Support and accelerate entrepreneurship and innovation by awarding business ideas as well as offering training, mentoring and networking events.	Undergraduate students to PhD researchers, interdisciplinary.	1999	NA

Box 2: Enterprise Tuesday

Enterprise Tuesday

¹ Arranged in accordance to the Entrepreneurial Journey.



Enterprise Tuesday (ET) is a series of evening lectures free of charge which has been offered since 1999. ET is targeted at people who are curious about entrepreneurship and who wonder whether entrepreneurship might be of interest to them. It is thus the first step of the entrepreneurial journey in order to inspire entrepreneurship. Per ET series there are in total about 1500 registrations. Having started at a small scale with approximately 30 students and being solely available to university students the programme nowadays attracts around 300 participants per evening (see: <http://www.jbs.cam.ac.uk/entrepreneurship/enterprise-tuesday/>).

Target group

The lectures are open to everyone with a focus on students from UC or other universities, local business community representatives and alumni. All registered persons are allowed to participate in the event and there is no further selection process involved. There is a diversity of audiences with around half of the participants coming from UC, another third or fourth from the local community and the remainder from outside Cambridge.

Programme design

There is an underpinning curriculum for the lectures that explore different facets of entrepreneurship. The topics range from personal motivation, circumstances, opportunity recognition and validation to more practical business and management issues such as strategy, marketing and funding. Although the programme is an extracurricular open course, there are two additional sessions embedded in the curricular courses of Management of Technology and Innovation students.

In advance of the lectures, each speaker receives a briefing to ensure the fit to the curriculum and to plan the content of the speech. This is to warrant that the integrity of the programme is protected. The lectures are often delivered as panel discussions, providing diversity of views and experiences.

After the lecture, an hour of networking is scheduled to “mingle informally”. Additionally, a number of discussion groups on specific topics are provided by organisations such as Cambridge Consultants, Beyond Profit, CUE, the Chartered Institute of Marketing and the Cambridge University Technology and Enterprise Club.

For the purpose of network building, participants of ET need to register in an online registration list. This helps generating participation statistics and to keep people informed about upcoming lectures via newsletters. Feedback of the presentations is gathered by small surveys.

The main funding of ET is provided by HEIF. Furthermore, the programme receives sponsorship from organizations such as Cobra Beer and ARM. In the past, IdeaSpace and Business Link East were involved as sponsors while nowadays the number of sponsors has increased. Generally, speakers offer their lectures on a pro-bono basis. However, their travel expenses usually get reimbursed.

Setting

Currently, 8 ET sessions are offered per year (2 times 4). The number has been downsized from previously 12 provided ET sessions while the depth of the sessions has been increased by duration of 90 instead of 60 minutes each. In order to encourage consistency of attendance throughout the series, CfEL highlights the strength of the curriculum and UC students receive a certificate of attendance for having attended 6 out of 8 ET sessions.



Persons involved

The speakers are leading entrepreneurs, investors and professionals, carefully selected according to the following criteria. They shall be a good match, possess outstanding entrepreneurial skills and ideally come along with a strong reputation. Participation from internal speakers is also encouraged in combination with entrepreneurs from outside the university. At times, speakers can come back repetitively but with different topics. Speakers are mostly contacted by CfEL although at times CfEL is approached by desired speakers as well.

Box 3: Enterprisers

Enterprisers

With reference to content development, Enterprisers aims at applying creativity to idea generation and innovation with a focus on the health sector². In doing so, the programme grew out of as a project on health design thinking with an emphasis on problems in a hospital setting carried out in collaboration with Massachusetts Institute of Technology in the year 2000. Originally it was called CMI-Connections (i.e. Cambridge MIT Connections) and evolved to Enterprisers in 2002, better reflecting its intention. Business models are focused on social venture creation and social innovation. The Enterprises programme has been replicated by CfEL in Russia, Australia and Scotland (see: <http://www.jbs.cam.ac.uk/entrepreneurship/enterprisers/>).

Target group

The broad target audiences of Enterprisers are undergraduate students, PhDs and Postdocs, university faculty and corporate audiences with a multi-disciplinary, cross-departmental and international composition of participants. The programme used to be executed in collaboration with MIT only for undergraduates to develop future leaders.

Programme design

The programme focuses on transferable skills development, such as team building or project management. Over time, the programme has been redesigned in a response to a customer comes first approach.

Enterprisers is conducted with 8 groups of 8 participants and two facilitators each. Thus, in total there are around 64 delegates and 16 with varying numbers between 32 and 72 participants over the years.

Entrepreneurship education activities include classroom and group exercises where content is introduced and put into practice afterwards. Case studies are written up as success stories. Students receive feedback on their pitches. All in all, teaching is hands-on but supported by a theoretical framework. According to one interviewee, the framework and curriculum is underlined by research and the practitioners add their individual flavour to it.

Setting

² Interviewees have stated that Enterprisers might not be continued in its current form in the future.



The programme takes place every May in Cambridge. Each of the four days focuses on a certain topic. The first day's topic 'MOI' (which is the French word for 'me') deals with the entrepreneurs' personality, self awareness and ice breaking. The second day concentrates on the idea (ideation). The third day provides skills of networking, motivation and an entrepreneur toolkit (nuts & bolts) and the last day terminates with a pitch (crystal bowl). Participants receive a certificate of attendance and are asked to fill out pre, post and six-months-post follow-up evaluation questionnaires.

Persons involved

Facilitators facilitate the process of learning and individual development. Therefore they receive one day training upfront in order to understand the content and design of the curriculum.

Box 4: EnterpriseWISE

EnterpriseWISE

EnterpriseWISE is a tailored entrepreneurship programme with a focus on female entrepreneurs in science and technology research. Inspired by the idea of the Enterprisers programme, EnterpriseWISE aims at enhancing self efficacy and has also been created by the CfEL in partnership with MIT's Sloan School. Since its establishment in 2003, the programme helps considering starting up new businesses and unlocking the participants' entrepreneurial potential for long-term career enhancement. The procured entrepreneurial skills can be applied to business venture creation, research projects and the commercialisation of innovations (see: <http://www.cfel.jbs.cam.ac.uk/programmes/enterprisewise/>).

Target group

The target groups of EnterpriseWISE are PhD and early career women in science, engineering and technology. This target group showed to be consistently under-represented in mainstream entrepreneurship education programmes. In particular, the programme targets graduates (including Masters, PhDs and Postdocs), academics and researchers as well as early stage career managers. The participation fees are scaled according to the participants' status. UC students are free of charge whereas the fee for Postgraduates is £499 and the Business fee is £995.

Programme design

Research recently conducted by the CfEL and the Faculty of Education indicated that programmes designed and delivered specifically for this female target group could be highly effective. The main objectives are personal development and increasing confidence in being entrepreneurial, highlighting the reality for female entrepreneurs in science and technology and building networks for them.

The educational approach of EnterpriseWISE focuses on self-efficacy skills by adopting methods like learning-by-doing, learning from others and provision of role models. The programme's activities and teaching methods include sitting and listening, talks and lectures, self-reflection, group work and skills trainings, such as presentation and time management skills.

Setting



The programme takes place on two weekends with a gap of over one month in between. This timing was chosen to accommodate busy women in work. At the end of the two weekends, participants are to hold a presentation to demonstrate their self-efficacy skills. The next programme will take place in March and May 2015.

Persons involved

The course designed and delivered entirely by women. The instructors included CEOs, entrepreneurs and managers. Hereby, a focus was set on practical as opposed to academic instructors.

Box 5: Ignite

Ignite

Ignite was established in 1999 with a focus on science and technology, which is a highly important sector in the Cambridge region. The programme can be considered as the first entrepreneurship education programme at UC. Over the years participants have increased from around a dozen to 60 to 80 students. Lately, the programme size has been limited to a maximum of 65 participants (see: <http://www.jbs.cam.ac.uk/entrepreneurship/ignite/>). Ignite has been replicated in Australia with the name “Ignition” in collaboration with Curtin University since 2011 (see: <http://business.curtin.edu.au/courses/centre-for-entrepreneurship/programs/ignition/>) and recently in Austria called “Alpbach Summer School in Entrepreneurship” with The International Entrepreneurship Centre Tirol - Hermann Hauser ((see: http://www.alpbach.org/en/efa15_en/programme-2/summer-school-courses/entrepreneurship/alpbach-summer-school-on-entrepreneurship/)). Discussion to develop the similar model in China and Eastern Europe is underway.

Target group

Ignite is targeted at Postdoc students aiming at commercialising their research, early-stage entrepreneurs (with one to three years of business operation) and intrapreneurs. The age range of the participants usually varies from early 20s to late 40s. In 2013 and 2014, the majority of participants were entrepreneurs, followed by Post-docs and PhDs who are seeking to commercialise their research. The majority of participants have PhDs or Master’s Degrees. In 2013 and 2014, the majority of participants were entrepreneurs, followed by Post-docs and PhDs who are seeking to commercialise their research. The age range of the participants usually varies between 23 and 25. Due to the focus of science and technology, the gender ratio is male-dominated. The programme is targeted at people from all different disciplinary backgrounds. Applicants are assessed through interviews on the basis of the novelty, innovation and technical orientation of their projects and their passion for entrepreneurship. Around two thirds of the applicants ultimately get selected to participate in the programme.

About 747 participants from 33 countries across Europe, Asia and America have attended since the programme started in 1999. Based on the recent survey, above 250 business ventures have been created by the Ignite alumni. More than £200 million in funding has been raised and approximately 4,300 jobs were created by Ignite alumni ventures from 2011 to 2015.

Programme design



The learning objective of Ignite is to clarify the ventures of the participants and to develop their networks (e.g. with regard to investors or partners). Teaching is provided by instructors and mentors and also includes skills training. Thereby, groups of 6 to 8 students are built on the basis of the respective project stages and product categories. Each group in turn gets a mentor with a similar background with whom the students at times stay in touch after the finalisation of the programme. Topics discussed throughout the week include markets, business models, financing and team formation. At the end of the week, a celebration dinner takes place for all participants.

Ignite is run in two separate streams –“life science and hi-tech” in order to address the specific needs of business projects/ ventures from different sectors. As teaching methods, keynote speakers, workshops, pitches, presentations, poster sessions, preparatory readings and group or one-on-one clinics or interactive discussions on business ideas or ventures with mentors are employed. All teaching methods focus on personal reflection for constant learning and development of action plans for new business ideas on the route to commercial success. Participants also gain access to a wealth of resources available via Cambridge’s entrepreneurial ecosystem, enabling the building of skills and networks that will fuel their enterprise. The ethos behind Ignite is to stimulate high-growth, high-potential ideas into successful business ventures.

Ignite is an extra-curricular, non-accredited programme with a certificate of attendance being handed out to the participants at the end of the week. Students nonetheless get feedback on their projects and performance, for example after the pitch from investors, through a written evaluation form.

Setting

Concerning the structure, the duration of Ignite is one week from a Sunday afternoon to a Friday night with a two to three week pre-course preparation upfront. The students receive a course manual beforehand to prepare themselves for the programme and to create a link to theory through suggested readings. The programme starts on Sunday with a socialising event and a clarification of the goals of the week and the current project stages. The programme is driven by leading entrepreneurs and innovators.

In order to evaluate the course, the coordinators talk to all involved delegates and mentors on a regular basis and a debriefing session at the end of the course is held with all mentors.

Persons involved

Instructors of the Ignite programme include real entrepreneurs, mentors and university delegates. A total of around 100 people contribute to each Ignite programme, such as mentors, speakers, lawyers, accountants or investors. Hence, Cambridge possesses a strong network for teaching entrepreneurship education with more than 1,500 ventures being formed around Cambridge where Ignite can serve as an early accelerator.

Box 6: Accelerate Cambridge

Accelerate Cambridge

This extra-curricular programme is based within CJBS and carried out by CJBS since 2012. It should be noted that the programme is not part of CfEL but is allied to CJBS and has direct reporting lines to it. Its “mission is to enable and nurture venture creation out of the University of Cambridge. Accelerate Cambridge offers a structured approach of three-



month programmes that combine entrepreneurship training, regular coaching and mentoring, as well as access to shared workspace” (see: <http://www.jbs.cam.ac.uk/faculty-research/centres/accelerate-cambridge/>).

Target Group

The target group of this programme are teams of two or more members, of which at least one has to have a ‘Cambridge connection’, e.g. student, alumni, faculty, staff of the UC or resident of the town.

Programme design

The Accelerate Programme consists of four levels with different focus areas (see table 1 below). It is designed for entrepreneurs aiming at creating or improving their own start-up companies. Hence, the support that each participant needs is identified at the beginning and the programme is therefore tailored to the specific needs of the participants. It offers students numerous tutoring and mentoring sessions. Assignments include, for instance, pitches in front of investors. According to one interviewed participant, Accelerate Cambridge is very hands-on and a highly valuable programme due to the personalised attention one receives.

Setting

As highlighted in the table below, the setting of the Accelerate programme varies according to the different levels. There are three to eighteen month programmes that entail weekly, bi-weekly or monthly coaching.

Persons involved

The programme works with mentors and coaches whose expertise and investment helps to create ventures outside of Cambridge. They play an essential role to the development of ventures at an early stage as they provide both specialised and general advice. Furthermore, they support established businesses and help them grow.

Exhibit 1-4: Accelerate Programme Stages

Pre-Accelerate <i>Idea and customer development</i>	Accelerate <i>Product development and distribution</i>	Accelerate Plus <i>Go-to-market, bootstrapping and fundraising</i>	Accelerate Star <i>Growth</i>
Three-month structured programme			Up to 18 months
Entrepreneurship education	Entrepreneurship training		Training
Weekly coaching	Bi-weekly coaching		Monthly coaching
Regular mentoring			
Access to shared workspace			
			Access to funding



Box 7: Business Creation Competition

Business Creation Competition

Cambridge University Entrepreneurs (CUE) is an independent student-run association aiming at promoting and nurturing entrepreneurship in Cambridge and beyond. CUE offers students opportunities, such as the Business Creation Competition (BCC) 'Ideas Take Flight', supported by training, mentoring and networking events. Since its establishment in 1999 the BCC has awarded over £500,000 in prize money to more than 40 start-ups and evolved towards an increased focus on technology trends (see: <http://www.cue.org.uk/>).

Target group

The target group of the BCC is the student population from undergraduate to PhD researchers in an interdisciplinary manner. There are competitions held in three areas: Science and Technology, Social Enterprise and Software.

Programme design

The BCC consists of different phases per competition area. Participants can choose one or more of those and enter at any stage. However, entering at an early stage provides access to training, mentoring opportunities and networking events. There are a £100, a £1,000 and a £5,000 competition with different requirements. The £100 competition rewards the best twenty idea proposals, described in 100 words. For the £1,000 competition, the participant has to submit a 1,500 word executive summary of his idea. The £5000 competition requires either a 3,500 word business plan (for the Science and Technology or Social Enterprise area) or a presentation and a 2,000 word business plan (for the Software area).

One interviewed participant describes the competition as a good experience which trains one on how to come up with a valuable business idea. This interviewee especially valued the team work and the team efforts which can "deliver great results". Motivation, in this context, was stated as a key factor for success.

Setting

A series of events is run during the academic year with several events taking place each month, ranging from informal networking events to the BCC, which culminates in a grand finale in May. The events take place in different locations on campus, mostly in the Department of Engineering.

Persons involved

For the BCC the CUE Committee employs in total 10 experts as judges. There are judges for each category (Software, Science and Technology, Social Entrepreneurship) who have a proven track record in the respective field.

1.3.2 Target groups of extra-curricular activities

For a description of the target groups of extra-curricular entrepreneurship education activities, see the boxes in section 1.3.1 above. CfEL generally encourages a diversity of participants in its programmes in terms of nationality, gender and age. All programmes are interdisciplinary regarding the field of study and background to encourage group diversity for mutual learning. In sum, the extra-curricular programmes address a wide range of individuals since there are a variety of programmes focusing on particular needs



of specific target groups. On the one hand, several courses correspond to different stages of the entrepreneurial journey, for instance undergraduate and postgraduate students or novice entrepreneurs. On the other hand, there are tailored offers for certain target groups such as female PhDs and early career women in science, engineering and technology or students in Natural Sciences, Technology and Biological Sciences.

1.3.3 Designing extra-curricular activities

For an overview of the design of extra-curricular entrepreneurship education activities concerning intention, contents, methods and media as well as informal assessment, see the boxes in section 1.3.1 above. Many extra-curricular activities employ experimental and practical learning, such as Enterprisers or BCC, where practitioners hold sessions on how to open a business. Concerning student feedback, one interviewed student stated that the extra-curricular entrepreneurship education activities in Cambridge are fantastic with an enormous range of possible options to choose from, such as teaching programmes, courses, competitions or think-tank programmes.

In accordance with the entrepreneurial journey, the courses apply adequate teaching and learning methods on different stages. The first stage is about building an entrepreneurial mindset which ET covers by inspiring lectures and networking opportunities. The following stages aim at developing entrepreneurial skills and idea evaluation. The pitches in the context of the Enterprisers and ETECH programme respond to this requirement. Eventually, the implementation of a business idea or growth of a new venture can be accelerated by programmes like Ignite or Accelerate Cambridge which employ mentors and offer practical support. All in all, the extra-curricular entrepreneurship education programmes at UC comprise a great number of intentions, programme content and teaching methods.

1.3.4 Setting of extra-curricular activities

For a description of the setting of extra-curricular entrepreneurship education activities in terms of the location, timing and formal evaluation please refer to the boxes in section 1.3.1. These extra-curricular programmes have differing settings concerning their timing, location and formal evaluation of learning outcomes. There are short term courses as well as long term programmes that take place throughout the academic year or up to 18 months as the Accelerate Star programme. The locations are mostly on-campus. Concerning the evaluation of the programmes, approaches vary as well. Some activities are evaluated rather informally through talking and debriefing sessions, whereas for instance, the Enterprisers programme asks the participants to fill out pre, post and six-months-post follow-up evaluation questionnaires.

1.3.5 Persons involved in extra-curricular activities

For an overview of the persons involved in extra-curricular entrepreneurship education activities, see the boxes in section 1.3.1 above. The CfEL employees design and develop curricula and recruit the relevant contributors to deliver the sessions. The programme directors usually hold the structure of teaching sessions and facilitate the learning outcomes for the participants. The programmes offered at UC employ a large pool of practitioners. The entrepreneurial ecosystem in Cambridge provides a valuable base for the integration of mentors. Programmes like Enterprisers emphasize the importance of



including facilitators into entrepreneurship education, which is further elaborated upon in the following section.

1.3.6 Management of extra-curricular activities

Management of persons involved in extra-curricular activities

As an elaboration of the activities above, it should be noted that besides mentoring (see section 1.2.5), facilitations are frequently used in CfEL's entrepreneurship teaching activities like Enterprisers or HKP. At CfEL, training of all persons involved in extra-curricular activities, such as facilitators and mentors, is highly important. The training and preparation of mentors is described in section 1.2.5. Back in the days, facilitators received a handbook of the programme in advance as preparation. Nowadays, facilitators receive additional one-day training before the beginning of the programme which shall prepare them for their facilitation role. This training focuses on developing and deepening facilitation skills, such as listening skills, and on briefing the facilitators on the activities of the programmes, such as Enterprisers, and their concrete role in the programme. The overall objective of this facilitator training is to make the facilitation as effective as possible in order to deliver the best (educational) value to the delegates.

Working with industry mentors is an essential element of the programme like Ignite, where about 10 to 12 senior mentors and 10 to 12 MBAs work in teams of two to support the participants on the programme with practical help, senior level mentoring and guidance. CfEL has to ensure that the mentoring activities are “more pull than push” in their style and has a well honed method for selecting and handling the mentors with deep commercial experience to ensure that delivery is spot on.

Managing student support

One particularity about the facilitation process at the Enterprisers programme is the usage of co-facilitation where each facilitator works as a pair with another facilitator. Facilitation in Enterprisers is provided in a formal (e.g. scheduled facilitation meetings) and in an informal manner (e.g. networking dinners). During the course of the programme, 3 to 4 formal facilitations are scheduled in teams of 5 to 6 students. For an effective facilitation to take place, facilitators need to create an environment of trust and safety. According to one interviewee, facilitation should be process-oriented to eliminate destructive activities and should aim at “getting the delegates thinking”. Thus, facilitation does not imply advising or mentoring students. Concerning the parameters of the facilitation, facilitators volunteer their time but do get their travel expenses reimbursed. The majority of the facilitators have an academic background but also include entrepreneurs, corporate employees and incubator representatives. The network of facilitators at CfEL expands primarily through personal recommendation.

Internal and external network management

One interviewee stressed that the most important thing anybody can have is their networks: The larger the network, the higher the chances of success. This certainly seems to hold true in Cambridge. Many networking events with entrepreneurs take place at UC as part of extra-curricular activities, such as ET. It was stated by several interview participants that Cambridge has a unique networking culture with people being exceptionally open to new contacts (see section 1.5). According to one interviewed entrepreneur, “one therefore needs to leverage and position oneself in these networks to



get access to people who might help you in pushing your business forward to ease the entrepreneurial process (e.g. by getting access to investors, media or business partners). The strength of UC is that it takes you to the right people. There is an ecosystem where people want to connect and where many ecosystems are established. UC encourages this creation.” In the context of network management, an Information Management System was set up almost a decade ago to coordinate events and activities and to facilitate information sharing.

Management of possible integration of extra-curricular elements

The entrepreneurship education journey in section 1.3.1 presents a good overview of how the individual extra-curricular activities in entrepreneurship education build up on one another. In terms of the management of possible integration of extra-curricular elements along this journey, no additional information could be collected.

1.4 Institutional aspects of entrepreneurship education

1.4.1 Organisational set-up and change

Measures for coordinating and integrating EE across the university

Entrepreneurship education activities are not formally integrated across the university but nonetheless seem complementary to one another as result of close cooperation at UC. Accordingly, educational offers build up on one another and address different steps of the entrepreneurial journey (see section 1.3). There is no explicit model for coordinating and integrating entrepreneurship education at all levels across UC. The majority of the programmes and initiatives were initiated by university staff - often through governmental funding - in response to students' needs (see section 1.1.2).

On the whole, CfEL and CJBS operate as rather separate institutions. Nonetheless, CfEL is part of CJBS and falls under its administrative, financial and human resources systems and policies. CfEL has its own organisation of its programmes, its own human resource management and its own sources for financing. This budget and the human resources are however provided to CfEL through CJBS. From 2001 onwards, CfEL was set up as a Cost Centre within the CJBS. In the past, CfEL has been very independent of CJBS in autonomously designing and delivering its educational offers while regularly reporting to the faculty board – with the exception of its accredited programmes. Most of CfEL's programmes are extra-curricular and thus non-certified. The certification of programmes implies that university-wide quality assurance has to be set up (see section 1.1.2 and 1.2.6). Since 2012, entrepreneurship has become a higher priority of the university's management and as a consequence an increased influence of CJBS and a higher integration of CfEL into CJBS can be observed. According to one interviewee, this causes a move from bottom-up to top-down approaches to entrepreneurship education.

1.4.2 Laws, statutes and codes

Incentives for staff to engage in or support entrepreneurship education

There are no specific incentives for staff to engage in or support entrepreneurship education at UC. There are solely laws and rules indirectly related to entrepreneurship at



university level, such as Intellectual Property laws and Human Resource rules. A further aspect of importance is that at times there are limitations for university professors to start their own companies which can impact the engagement in entrepreneurship education. While this law ensures that university professors focus on research and education as opposed to commercial activities, it may also cause that part of the innovations that may stem from research by university professors may not be put into practice by professors through the engagement in entrepreneurial activities.

1.4.3 Mindsets and attitudes

Raising awareness for the importance of entrepreneurship

Through CfEL and other Cambridge-based organizations numerous entrepreneurial events, such as ET or Start-Up Weekends (see section 1.3 and 1.5), are organized in Cambridge which raise awareness for the importance of entrepreneurship. This process has further been facilitated by the provided networking opportunities and the passion and enthusiasm for entrepreneurship within these networks (see section 1.5.1).

Encouraging entrepreneurial behaviour

Entrepreneurship behaviour is encouraged at CfEL through practitioner-based teaching where students develop their own entrepreneurial projects (see e.g. PGDE in section 1.2 or Ignite and BCC in section 1.3) or work in groups with inventors on real entrepreneurial projects (see ETECH in section 1.3). These programmes have helped in changing mindsets by getting people acquainted with entrepreneurship and thereby raising awareness for the importance of entrepreneurship. This process has been facilitated by the development of entrepreneurial skills through entrepreneurship education, such as leadership and social skills. The entrepreneurial mindset implies an open mind for change, failure and networking. Entrepreneurship education can develop that mindset by working with the individual and understanding their motivation and values. This can unlock the ‘can-do attitude’ and the creative process to embrace an opportunity. The entrepreneurial journey further illustrated how entrepreneurial behaviour is encouraged through entrepreneurship education in Cambridge (see section 1.3.1).

1.5 Outreach to external stakeholders

1.5.1 Types of relationships with external stakeholders

“People are happy to give back in Cambridge” (Simon Daly, PGDE alumni).

CfEL and UC in general have the privilege of being located in a very strong network. Several interviewees mentioned that in Cambridge people like to connect with one another, help each other out and “give back something to the university” which especially holds for alumni. CfEL taps into that culture by acquiring mentors, speakers or partners. As a result, CfEL enjoys a strong local, national and international network which is facilitated by the reputation of Cambridge’s educational system. Networks and support systems go hand in hand and include clusters, mentors for support, companies for speakers and sponsorship and advisors. There are 66 networks in Cambridge and these ecosystems are not managed formally but emerge as a bottom-up initiative formed by the people (see section 1.2.6). Numerous stakeholders are involved in entrepreneurship



education in Cambridge. For an overview of these stakeholders, please see the table below and the following section 1.5.2.

Exhibit 1-5: Overview of external stakeholders involved in Entrepreneurship Education at the University of Cambridge

No.	Stakeholder	Type of involvement in EE
1	Enterprises	Guest speakers, mentors, coaches, sponsors
2	Financial institutions	Panel members, investors
3	Support Services (e.g. idea Space)	Networks and support during the start-up process
4	Student organisations (e.g. CUE, CUTEC)	Organisation of events and activities
5	Incubators (e.g. Social Incubator East)	Organisation of events, provision of support services

1.5.2 External stakeholders involved in entrepreneurship education

Enterprises

CfEL collaborates closely with entrepreneurs and managers of companies in its entrepreneurship education. Practitioners can be directly involved in entrepreneurship education as guest speakers (e.g. ET) or as mentors, coaches or facilitators (e.g. PGDE, Accelerate or ETECH). Enterprises can also indirectly contribute to entrepreneurship education by sponsoring events or activities. Hereby, a distinction can be made between visiting entrepreneurs and entrepreneurs in residence in terms of their involvement in entrepreneurship education.

Financial institutions

Although no financial institution has been specifically mentioned by name, it was highlighted that investors were involved in entrepreneurship education as evaluator of idea pitches and consequently as possible investors in potential start-ups (e.g. ETECH, Accelerate or Enterprisers).

Support services

Support to nascent entrepreneurs in Cambridge can be provided by ideaSpace which describes itself as “a community of people in Cambridge starting high impact new ventures” (see: <http://www.ideaspace.cam.ac.uk>). The Cambridge Cluster currently holds approximately 1,500 high-tech companies which provide employment to more than 54,000 people. Out of these companies 12 are valued above \$1 billion and two above \$10 billion. ideaSpace taps into this cluster and provides its members with the Cambridge network to “share experiences with like-minded start-up founders and gain access to some of the UK’s most successful entrepreneurs and investors”.

Student organisations

There are at least four student organisations in Cambridge with a strong linkage to entrepreneurship, namely Cambridge University Innovation Forum (CUIF), Cambridge University Technology and Enterprise Club (CUTEC), Beyond Profit with a focus on Social Entrepreneurship and Cambridge University Enterprise (CUE) as organiser of the BCC (see section 1.3). These student-lead organisations act independently and are not directly part of UC other than given permission to operate.



As one example, CUIF offers numerous networking opportunities, events and start-up support for students. Its uniqueness stems from being an international branch student organization with a virtual network of young researchers. Examples of hosted activities encompass workshops with Cambridge Enterprise, (start-up) companies and political representatives as well as think tanks which aim at solving social problems in an interdisciplinary manner. In these think tanks series, engineering, science and technology students work together in teams of 6 for 3 months on solving a societal problem identified by governments, NGOs or institutions. Students are selected for participation on a competitive basis according to their fit, expertise, motivation and added value. During this period, students receive group mentoring by professors in related fields. The result of this programme is the publication of a white paper.

CUIF is also in charge of organizing the Innovation Leaders Conference once a year, which focuses on innovations with an entrepreneurial focus in the field on grass-root science and entrepreneurship. It is an open, two-day conference with self-registration. The speakers are usually opinion-makers such as CEOs from major companies or government representatives from the United Nations. The conference goal is, according to one interviewee, “to have young investigators rub shoulders with opinion leaders from academia, government and investors”. Feedback from the conference is collected via evaluation sheets and via word-of-mouth feedback whereby the event was regularly described as “one of the best events” one has ever participated in (see: <http://www.inno-forum.org/>).

Incubators, accelerators, science parks and technology parks

There are numerous incubators for entrepreneurship in the Cambridge region. For instance the Social Incubator East is an incubator that is funded by the government. Educational activities provided include the Social Venture Weekend where 40-50 people with business ideas receive the basic tools and inspiration for starting a venture. After that weekend up to 15 ideas are selected that go through the incubation period of six to nine months. Within this period, a Social Venture Week takes place with three days of tackling issues such as legal structures, intellectual property rights, cash flows, market research or business model development. Individual and group mentoring sessions are employed during the incubation period. Anyone can participate in terms of age, gender, discipline but their projects or ideas should be in the field of social or ecological entrepreneurship. The idea of this initiative is to combine classroom learning with practical experience to inspire people to take the intentions to start their own business. The goal is that participants start their own business in the end (see: <http://www.socialincubatoreast.org.uk/ventures/cambridge-hub/>).

Further examples include the Babraham Institute for life scientists (see: <http://www.babraham.ac.uk/>), the St. John's Innovation Center for physical scientists (see: <http://stjohns.co.uk/>) or the Centre for Social Innovation for social innovators (see: <http://www.jbs.cam.ac.uk/faculty-research/centres/social-innovation/>).

1.5.3 International relationships

UC engages in various international cooperations in the field of entrepreneurship education through third-party projects, such as Biolno. This is a project by the European Union which is run by CfEL in combination with Tuscia University, Antwerp University of Applied Science, University of East Anglia and Incrops. It was employed as a pilot project in Cambridge in March 2014 and was replicated due to its initial success in Viterbo, Italy,



in September 2014. The target audiences of Biolno are PhD and business students from Antwerp. The aim is to start building an ecosystem for entrepreneurship as support system. Hereby, a model is used to start building the mindset and the ecosystem for entrepreneurship. The Biolno programme design uses the framework of Enterprisers as adopted model for phasing cultural differences, e.g. creativity, business models. It is a three-day programme that offers practical elements with lectures and an additional one-day facilitator training upfront.

Another Example of the EU-funded project is training the European professors in teaching entrepreneurship, collaboration with the European Forum in Entrepreneurship Research in the Netherlands, IESE in Spain and Warsaw School of Economics in Poland. Under this project, three programmes were delivered in Barcelona, Warsaw and Cambridge respectively. The programme targeted the European professors and educators seeking to integrate more effective, appropriate and interactive approaches, and practical skills in teaching entrepreneurship. Through this project, about 160 professors from more than 50 institutions across 30 European countries were trained in entrepreneurship teaching.

Another core part of international partnership is in the areas of training scientists in the area of commercializing research. In partnership with Royal academy of Engineering, UC trains 75 scientists and early stage entrepreneurs from emerging countries such as India, Thailand, Vietnam and South Africa under the Newton Fund Programme. The focus of those programmes is building the capacity of researchers for entrepreneurship and commercialisation of their innovations, and increase networking and connectivity between UK and the developing countries in the area of science and innovation partnerships. Further international partnerships in entrepreneurship education of UC include universities in Shanghai and Hong Kong regarding building entrepreneurial mindsets and gaining exposure to the entrepreneurial ecosystem and practices of Cambridge. These partnerships are on an on-going basis and about 100 undergraduates from China and HK have been trained in the last two years. Laurea Univesity in Finland is another educational partner of UC through its cooperation in teaching and the creation of boot camps.

Another level of partnership is through its regular programmes. For Example, since 2006 Ignite has developed a strategic partnership with the organizations which have actively promoted and supported entrepreneurs and early stage ventures in their local regions such as La Caixa premio Emprendedor XXI in Spain, ASTER in Italy, Foundation for Polish Science, Biotechnology Industry Research Assistance Council, A Government of India Enterprise and Cannan Partners, Informatics Ventures and Royal Academy of Engineering in the UK and Shanghai Art & Design Academy, Shenzhen Nanshan Science and Innovation Bureau in China. Those organisations sponsor their entrepreneur winners to attend Ignite in Cambridge regularly.

In addition, as a part of capacity building with regard to entrepreneurship education, UC works with the partners in other countries to replicate its regular programmes. For example, Ignite model brings together experienced entrepreneurs, investors, science and technology sources and the wider ecosystem in accessing new ideas and venture creation. In order to stimulate this type of connections in wider ecosystem in other regions, *Ignition* programme was developed in collaboration with University of Curtin In Australia and *Alpbach Summer School in entrepreneurship* with The International Entrepreneurship Centre Tirol - Hermann Hauser. The target group of Ignition is anyone from Australia and Asia who are passionate in developing an idea into a real business.



The target group of the Summer school in Austria are PhD or Post-Doc students and researchers from the fields of technology, advanced engineering, science and mathematics, ideally from equal parts from Tyrol, Austria and Europe. The objective is to encourage and foster individual entrepreneurship in creating new employment opportunities in Europe and have positive influence on the economic development.

1.6 Impact and lessons learned

1.6.1 Evaluating impacts of the entrepreneurship education approach

Overview of impact evaluation methods applied

Although no precise impact evaluation methods were announced during the interviews, the impact of CfEL as a whole on the Cambridge region is substantial (see: <http://www.cfel.jbs.cam.ac.uk/aboutus/achievements.html>). According to Prof. Vyakarnam, during the centre's ten years 250 new businesses have been set up by CfEL alumni employing 2,500 people. One start-up example is MagicSolver.com, which is a developer of innovative iPhone Applications, set up by ET alumnus Emmanuel Carraud (see: <http://www.cfel.jbs.cam.ac.uk/aboutus/alumni/index.html>). Numerous UC and CfEL graduates stay and work in the Cambridge area and in the last two years CfEL alumni have raised £120 million in funding. The number of students at CfEL has scaled up from approximately 200 students a year in the inception period to 1500 to 2000 students a year in recent years. Since 2003 more than 16,000 people have participated in the 200 completed CfEL programmes and events. In this context, over 500 educational videos, video clips and podcasts published since 2008 and an established network of more than 300 entrepreneurs and practitioners have contributed to CfEL entrepreneurship education activities. The quality of research in entrepreneurship and entrepreneurship education at CfEL gets formally assessed via the Research Excellence Framework in the United Kingdom (see: <http://www.ref.ac.uk/>). During CfEL's 10-year-anniversary celebration in December 2014, the overall impact of CfEL was summarized as follows:

"The centre has made a special contribution to the university and to society. A university relies on goodwill and the centre has helped build good will." (Dr Andy Hopper, head of the university's computer lab).

"The centre has made a real impact on enterprise at the school, and it has now started to accompany and support fledgling businesses as they grow into companies and need to put processes and structures in place." (Professor Christopher Loch, Director of the Judge Business School).

In terms of the student feedback, it was mentioned by an alumnus of the PGDE that especially the mentoring report, the financial knowledge, the networking opportunities and the residential periods were considered as highly valuable. Overall, it was an excellent and challenging course. The course management was good and people were very accessible. The assignments floated with a purpose and were relevant. The geographical flexibility was appreciated by several students. As possible point of improvement, it was mentioned that the feedback and guidance throughout the course could be further intensified.

"UC education gets you inspired. Entrepreneurship education at UC gives you the confidence to go and try things out. Whether you fail or not does not matter as long



as you dared to try and gave it your best shot at exploring your opportunities. [...] I think the Postgraduate Diploma is the best entrepreneurship course in the country, especially with regard to resources, expertise, knowledge and intellect. If you are serious about entrepreneurship education, you can't afford to not do this course."
(Simon Daly, PGDE alumnus).

1.6.2 Lessons learned

Summary of lessons learned from this case

The key lessons learned from this case can be grouped into six different categories of importance to entrepreneurship education, namely human and financial resources; practice-based entrepreneurship education; a blended teaching approach to entrepreneurship education; constant adjustment, innovation and reflection of entrepreneurship education; developing entrepreneurial skills and mindsets; and the role of networks and supporting ecosystems.

First, when looking at **human and financial resources** for entrepreneurship education, stability matters (see section 1.1. and 1.4). Entrepreneurship education and building the enterprise agenda takes time. CfEL has a long established team and employees possess a strong loyalty towards the Centre. There is a strong belief at CfEL in its mission to "spread the spirit of enterprise". This high degree of familiarisation and commitment enhances the quality of entrepreneurship education at CfEL and facilitates the development of its staff and its educational offers. Universities play an important role for companies and countries and high turnover can be a severe risk for entrepreneurship education as stated by one interviewee. Besides, money for facilitators' or mentors' training and ongoing development is important to ensure that all facilitators and mentors provide the highest possible support. Nonetheless, according to one interviewee, the question remains in this context about which expenses for entrepreneurship education support staff are justifiable with regard to training and payment as reward. Interviewees highlighted that budgets and monetary matters should be embedded in the system and funding should be provided on a long-term basis with a minimum planning horizon of five years. Long-term funding such as the HEInnovation Fund in the United Kingdom was very helpful for a long-term perspective on entrepreneurship education. This is needed since it takes time to see results of entrepreneurship education. Such practices shall serve as incentive for creating and sustaining a programme. Moreover, recognition and acknowledgment are vital, both for the participating students but also for the academic personnel involved in providing entrepreneurship education. As a related aspect, it was further argued that enhanced integration of entrepreneurship education and thus coordination of all personnel involved is needed. Separate units, like CfEL, thus need to collaborate more closely with the respective units and institutions to foster entrepreneurship education to aligned bottom-up and top-down initiatives. One interviewee mentioned "that to disrupt the system for entrepreneurship education from bottom-up you need the bin from the top".

Second, CfEL is unique because it uses entrepreneurs to teach entrepreneurship. By hearing stories, mistakes and real-life examples, students experience **practice-based entrepreneurship education** by teaching *through* and *for* entrepreneurship (see section 1.2 and 1.3). It is auxiliary to align the structure of a programme, such as the PGDE, to its system and to the predominant culture in that system to create a fit. In Cambridge, innovative entrepreneurial behaviour is widespread and encouraged and therefore a



practice-based entrepreneurship education approach is well suited to the Cambridge environment. Practitioner-based education and building ecosystems were regarded as the right things to do and it was emphasized in this respect that nurturing alumni and keeping in touch with them actively should be practiced. Furthermore, mentoring, coaching and facilitation were considered as crucial in the context of (practice-based) entrepreneurship education. It is important to keep mentors and ecosystems connected. In terms of the student group composition, multi-disciplinarity was practiced to encourage creativity. Overall, several interviewees came to the conclusion that there is a “huge appetite” for entrepreneurship education, especially when it is framed in a practical fashion.

Third, to keep entrepreneurship education up to date, a **blended teaching approach** may be needed which combines online learning with presence learning (see section 1.2 and 1.3). 70-80% of the education at CfEL concerning the PGDE is conducted online through the VLE. During the interviews it was repetitively pointed out that VLEs have an important role to play in the context of entrepreneurship education. Feedback from the interviewees on e-learning was generally positive and several advantages in terms of flexibility and creativity were highlighted. It was nonetheless mentioned that e-learning should not be used on its own but in combination with presence learning to enable personal interaction which may in turn also lead to team spirit and bonding. Potential risks of a virtual learning environment should simultaneously be kept in mind including the length of the adjustment period and the information overflow (e.g. in group chats).

Fourth, since entrepreneurship education is highly complex **constant adjustment, innovation and reflection** were highlighted as fundamental (see section 1.2.6 and 1.3.6). Change can be a good thing. At CfEL courses constantly develop and change. Renewal is thus framed in a positive manner. Feedback, reflection and evaluation enhance the quality of entrepreneurship education. It enables constant adaption and improvement of educational offers by taking feedback into account in the content, design and nature of the courses. Hence, a feedback loop is needed to keep innovative. Innovation is key and universities or research institutes can serve as a vital source of innovations and thus should be kept as long-term, stable resources. Competition between universities pushes innovative entrepreneurship education forward to deliver the best education possible and to serve as a role model for others.

Fifth, developing **entrepreneurial skills and mindsets** which encourages entrepreneurial behaviour is key (see section, 1.2, 1.3 and 1.4). One interviewee emphasized that the right mindset is needed for a constant development of education and that entrepreneurship and entrepreneurial skills are different. There is a difference between a knowledge economy and a skills economy. Universities tend to focus more on the knowledge economy and neglect the skills economy. As lecturer or course coordinator, one needs to embrace and use a variety of methods in entrepreneurship education. It is not solely about knowledge and content but also about combining skills development, personal development and project-based work. In the context of fostering entrepreneurship, the development of leadership skills, social skills and creative problem solving skills are indispensable according to one interviewee. Learning from peers also matters. Moreover, the development of mindsets, visions and right intentions are important (i.e. if you know what you want you can find a way). Ultimately, personal reflection skills were highlighted as fundamental especially when it comes to understanding one's own personal motivation for entrepreneurial behaviour.



Sixth, **networks and supporting ecosystems** are essential for entrepreneurship education (see section 1.5). Several interviewees pointed out that networks, the sharing of contacts and openness for collaboration and innovation are extremely relevant for entrepreneurs. Entrepreneurship is more likely to happen when there is a strong network and support system behind it. Cambridge knows how to network and thereby creates a personal environment with a “village feeling” according to one interviewee. An ecosystem has developed in the region and people are very keen to give back and foster that ecosystem by investing time and money into it without solely looking at their personal gains. This entrepreneurial ecosystem makes Cambridge unique. The respective support systems are helpful by encouraging creativity and the entrepreneurial spirit in the region. On top of that, people seem to be more open because of this encouraging environment which provides reasons for collaboration and creates chains of interdependence. In the same context, one interviewee emphasized that knowing how to approach investors or companies and knowing how to communicate and carry your self is vital. The same holds for knowing how to pitch and how to leverage while networking your background during discussions. Entrepreneurship education in Cambridge can foster the nurturing of these vital social and networking skills and can provide a much needed support system for aspiring entrepreneurs.

Transferability to other universities

UC is an elite university. It was mentioned by one interviewee that in Cambridge approximately 40% of all university students come from prestigious private high schools like Eaton, Winchester or Harrow which is largely above the country average of 2%. Due to the prestigious reputation of the university in combination with the required studying fees, money may be less of an issue in Cambridge than it is in other university contexts. Moreover, the strong networking ties in Cambridge are also quite unique. These aspects have to be taken into account when thinking about the transferability of the entrepreneurship education approach of UC to other universities. However, in recent years a change towards focussing less on elite education at UC but rather on granting entrance to the university to students from all backgrounds based on merits has been observed. This reputation facilitates the attraction of excellent entrepreneurship educators and the acquisition of financial resources to engage in entrepreneurship education. The acquisition of human and financial resources for entrepreneurship education might be more challenging in other university contexts.

In terms of the transferability, it should further be mentioned that numerous successful programmes that were initially developed in Cambridge have, over time, been copied by other universities on a global scale. Examples encompass ET, Ignite, Enterprisers, the BCC and the Start-Up Weekend which were all pioneers of its kind while the PGDE was the first accredited programme of its kind in the world. There are manifold support systems out there for aspiring entrepreneurs which are comparable to the ones in Cambridge. According to one interviewee, scalability and transferability can especially be fostered by a move to e-learning or blended learning. Through e-learning, knowledge transfer and skills development content becomes easier to share, which facilitates the up-scaling of educational activities through online usage of podcasts, videos and discussion forums. Simultaneously, e-learning enables monitoring statistics of students, which in turn advances the ability to assess the impact of entrepreneurship education.

CfEL places a strong emphasis of sharing its best practices and lessons learned on entrepreneurship education with others. Knowledge exchanges takes place through its open website, frequent public talks and its publications (e.g. see: Vyakarnam, S., &



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List of Abbreviations

BCC	Business Creation Competition
CEC	Cambridge Entrepreneurship Centre
CfEL	Centre for Entrepreneurial Learning
CJBS	Cambridge Judge Business School
CUE	Cambridge University Enterprise
CUIF	Cambridge University Innovation Forum
CUTEC	Cambridge University Technology and Enterprise Club
ET	Enterprise Tuesday
HKP	Hong-Kong Programme
PGDE	Postgraduate Diploma in Entrepreneurship
UC	University of Cambridge
VLE	Virtual Learning Environment

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Because the University of Cambridge is an already prominent and well knowing case of entrepreneurship and entrepreneurship education in Europe, this case study uses foremost interview data collected on site rather than existing published material. Sources and references used include desk research plus:

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