



Developing Self-Efficacy for Innovation and Entrepreneurship: An Educational Approach

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Abstract. This paper presents findings of research undertaken on Enterprisers, a five-day, extra-curricula educational programme supported by the Cambridge-MIT Institute (CMI), designed to enhance entrepreneurial capabilities and intent. A pre-, post-, and six-month follow-up survey methodology is used to measure programme impacts. Survey methods are outlined, and the concepts of entrepreneurial self-confidence and skills self-confidence are discussed. Research findings show that Enterprisers has a substantial and enduring impact on participant self-confidence to become entrepreneurs, but the impact of the programme is more limited in the area of entrepreneurial intention. Implications of the work for models of self-efficacy and intent presented in the literature are considered in the discussion and conclusions.

Keywords: self-efficacy, entrepreneurial intent, entrepreneurship education, measurement.

1. Introduction

Much government attention is being focussed on methods of developing a more competitive economy. The United Kingdom (UK) in common with many nations has given priority to and targeted significant funding (in the region of £65 million) to the promotion of entrepreneurship as a means of realising enhanced levels of innovation and economic growth. Universities have a key role to play in the strategy which sees institutions using education to increase entrepreneurial knowledge, skills and intention of undergraduate and postgraduate students. Adopting the model of Krueger and Brazeal (1994) which suggests that self-efficacy is a key predictor of entrepreneurial intention, this study explores how a UK programme entitled Enterprisers seeks to enhance the entrepreneurial self-confidence of university undergraduates and the impact of the programme on intention. In reporting on the scope and limits of the effects of entrepreneurship programmes, the study seeks to show that there are several forms of self-confidence which have complementary but differing effects on intention.

Enterprisers was developed under the auspices of the Cambridge-MIT Institute (CMI) as a model programme which would serve this national strategy.

The key premise underpinning the design of Enterprisers was the belief that students may be motivated to start new ventures by enhancing their level of self-confidence in entrepreneurial skills. A one-week intensive programme called Leadershape which fosters undergraduate leadership at MIT was reorganised to emphasise entrepreneurship rather than leadership in general. Initially, an entrepreneurship event was designed and offered to test the newly developed programme at MIT, and it was then piloted in 2003 at the University of Durham. Originally known as Connections, Enterprisers has now been offered nine times in the UK and continues to provide data in a quasi-experimental design intended to inform understanding of entrepreneurial education (Cooper 2006). This paper reports on the outcomes of the Enterprisers programme which has now engaged over 550 students from more than 40 UK universities and the Massachusetts Institute of Technology in a five-day, extra-curricula educational programme which is intended to build entrepreneurial capabilities and intention.

By comparison with traditional standards of assessment, a relatively rigorous evaluation design has been employed so that the programme would serve as a type of experimental laboratory which would enable CMI and participating universities to learn the reasons behind success or failure in ways which could provide direction for further development. As the programme has gone on, there has been a discovery that conclusions depended to some degree on which form of self-efficacy was being studied; this has led to an attempt to address here alternative definitions of self-confidence and self-efficacy.

This paper commences with a discussion of entrepreneurial self-confidence and entrepreneurial intent. An overview of the Enterprisers events which are the focus of the research is then provided, with specific attention to the components which are intended to strengthen participant confidence in their entrepreneurial abilities. The research design used in the evaluation of the programme, and the definition and measures of entrepreneurial self-confidence and intention employed in the research are discussed. Results are then presented which indicate that the Enterprisers programmes have had a substantial and persistent impact on the self-confidence of participants to become entrepreneurs, but that the impact of the programme on sustained entrepreneurial intentions has been more limited. The concluding discussion considers the value of the research design used in this study, and the implications of the research for the Krueger and Brazeal model.

2. Entrepreneurial Self-confidence, Entrepreneurial Intent and Enterprisers

2.1. Beliefs, Attitudes, Intentions and Behaviour

The level of confidence that an individual has in their skills and abilities to undertake successfully all the activities and stages which are integral to venture

creation will be critical in the decision to start a new company. The concept of self-efficacy (Bandura 1997) is pivotal to the willingness of individuals to act in an entrepreneurial way, identifying and seizing opportunities. Self-efficacy beliefs are “people’s judgment of their capabilities to organise and execute courses of action required to produce given attainments” and have the consequence that “people’s level of motivation, affective states, and actions are based more on what they believe than on what is objectively true” (Bandura 1997). It is important that individuals possess an accurate sense of their abilities if they are to avoid putting themselves into positions in which they are likely to fail badly, which may have the negative effect of decreasing their level of self-confidence. There are a number of sources from which individuals develop confidence in their abilities and increase their levels of self-efficacy. These include authentic mastery, modest levels of failure and vicarious experience where the observation of others may result in modelling behaviour (Bandura 1997).

Evidence shows that self-efficacy predicts individual behaviour and performance in a variety of contexts (Stajkovic and Luthans 1998) and results in effects which, in a large number of cases, endure for years. Highly efficacious individuals are likely to possess greater confidence in their abilities to embark on challenging courses of action, and also to persist when faced with obstacles which they find between them and their goal. When success is achieved it feeds the sense of self-competence, thus further enhancing an individual’s belief in their ability to undertake difficult tasks successfully. The less efficacious individual, even in instances where they possess the requisite skills, will be less inclined to pursue a course of action which involves them entering into new and uncharted territory (Bandura 1986). In the event that they are tempted to take steps along a challenging route, they are more likely to give up in the face of obstacles. Self-limiting decisions as to the areas which an individual decides to pursue deprives the less efficacious individual of opportunities to perform successfully and break the vicious circle which, otherwise, is in danger of being perpetuated.

Self-efficacy has also been explored in the context of its application to the confidence which individuals feel that they are able to succeed along a specific career path. Self-efficacy expectation have been identified as influencing career choice (Betz 2000, 2004; Betz and Hackett 1981, 1997); Betz and Hackett (1993) asked individuals whether they could successfully complete the educational requirements for a job, and then whether they could perform the duties associated with that job. The approach has been found to be particularly useful in assessing the effects of self-limiting gender bias on occupational choice, and in career counselling (Pajares 1996). Those with low self-efficacy levels will tend to avoid some careers; for example, women with low self-efficacy levels tend to avoid traditionally male-dominated careers. Betz (2004) also points to the likelihood that individuals whose self-confidence is lacking in their career-related skills will under perform, a view which complements Baum and Locke’s (1984) work

highlighting linkages between increased levels of self-efficacy and confidence in new business success and growth. It can be seen how increased self-efficacy will be important if individuals are to consider career options which are perceived as challenging and non-standard, and are then to persist within such areas (Mau 2003).

Linkages between self-efficacy and persistence are particularly significant in the context of entrepreneurship. The pathway to entrepreneurship is characterised by the requirement to identify opportunities, develop products/services, establish a company, recruit staff, deliver products/services to market, secure the resources to undertake these activities, as well as complete all the other tasks involved in creating and building a venture. Obstacles and set-backs are all part of the 'package', so entrepreneurs have to be confident in their own capabilities as well as determined to see their plan through. In view of the challenges posed, it is not surprising that a high level of confidence is pivotal to starting companies. Indeed, self-confidence in one's skills has been associated with behaviours such as innovation, opportunity recognition and intentions to start new ventures (Anna *et al.* 2000, Ardichvili *et al.* 2003, Baum and Locke 2004, Boyd and Vozikis 1994, Chandler and Jansen 1992, Chen *et al.* 1998, Krueger 1993 and 2000, Krueger and Brazeal 1994, Markman *et al.* 2002). Baum and Locke's (2004) work highlights the importance of goals, vision and self-efficacy as explanatory factors for successful new ventures and those which grew over time.

The literature suggests that intention to start a venture lies at the heart of entrepreneurship (Bird 1988, Krueger 1993; Krueger *et al.* 2000). The beliefs which individuals hold with respect to their abilities within a range of activities pivotal to entrepreneurship may have an influence upon the likelihood that, at some point, they will pursue such behaviour themselves; there are, however, a number of steps in the causal chain as beliefs inform attitudes, which in turn influence intentions, which ultimately lead to behaviour (Fishbein and Ajzen 1975). Thus, bringing about changes in an individual's beliefs, and even attitudes, may not be sufficient to realise changes in behaviour. If an individual is to display entrepreneurial behaviour it requires them to have formed an intention to do so; intentions reflect an individual's willingness to pursue a certain type of behaviour, taking account of the external environment, which may impose barriers, and any influence resulting from their background or personal capabilities. Boyd and Vozikis (1994) point to Ajzen's (1987) work which links perceived control over behaviour with Bandura's self-efficacy construct. Both concepts are developed around the notion of perceptual factors which are linked directly with attaining certain goals. Thus, if the desire is to enhance levels of entrepreneurial behaviour it is necessary not only to develop positive attitudes toward entrepreneurial pathways but also to realise positive shifts in intentions to pursue those courses of action, as a precursor to influencing behaviour.

Given the above discussion which has presented a body of evidence with respect to the general importance of self-efficacy, the role which it plays in

influencing and sustaining intention, its power to predict work performance in business, including an association between start-up success and founder self-efficacy, it is fair to expect that self-efficacy might have an important role to play in the development and performance of entrepreneurs. Peterman and Kennedy (2003) identify the role which education and past experience play in influencing attitudes to venture start-up; this raises questions regarding the extent to which education may influence not only attitudes but also intention and, ultimately, behaviour.

2.2. Education and its Influence upon Beliefs, Attitudes and Intentions

If the objective of education is to influence beliefs, attitudes and intentions towards entrepreneurship it is important to consider how programmes might bring about changes in an individual's levels of self-confidence so that they will be motivated to try new activities and to persist in the face of difficulty and challenge. By drawing upon the theoretical concepts discussed above in designing new programmes it is possible to determine not only the nature of the content to be included, but also which pedagogical techniques might best be adopted to deliver that content. In this way both content and pedagogy may be employed to deliver desired outcomes, such as positive changes in attitudes and confidence toward skills and competences which are closely associated with entrepreneurial behaviour.

A number of authors recognise the positive association between deep learning and the use of experiential and reflective teaching and learning methods (Barclay 1996; Cope and Watts 2000; Krebner 2001; Loo and Thorpe 2002), approaches which are also relevant in the development of self-belief and self-efficacy (Ndoye 2003). As mentioned above, self-efficacy can be developed through vicarious experience; thus, self-efficacy for entrepreneurship can be conceptualised as being enhanced by using pedagogical approaches which encourage student learning through exposure to the experiences of others, as well as through their own experience (Rae and Carswell 2000).

Heightened emotional states are associated with the development of enhanced self-efficacy, so that the greater the level of emotional engagement in an activity the greater the likelihood that it will bring about positive changes in an individual's self-efficacy beliefs (Wood and Bandura 1989). Since changing beliefs is the first critical step on the pathway towards influencing behaviour, this points to the need to adopt pedagogical approaches which engage students actively in the learning process. Cooper *et al.* (2004) propose an educational learning continuum which encompasses a wide spectrum of approaches from passive to active and highly experiential. The passive end of the spectrum sees students learn through the introduction of brief examples into theoretical or concept-based lectures. The use of case studies as a basis of class discussion

engages students slightly more actively, as they explore the entrepreneurial event or some other aspect of the venture start-up process (Krebner 2001). The use of guest entrepreneurs in the classroom provides students with the opportunity to learn from those with first-hand experience of the venture creation process (Cooper *et al.* 2004). Exposure to such entrepreneurial role models provides students with the opportunity to gain a sense of the feasibility and desirability of pursuing a similar course of action, learn of likely challenges along the way, as well as hear about ways and means of overcoming them. Video profiles provide an alternative where an entrepreneur cannot be present in the classroom (Robertson and Collins 2003); however, students do not have the chance to engage with the speaker or observe them more generally.

The lessons to be delivered will influence the choice of speaker since, from a theoretical perspective, it is possible to select specific guest speakers to act as role models to maximise the likelihood of influencing student beliefs and attitudes. If guest speakers are to assist students to construct realistic views of what it takes to become an entrepreneur and start a venture their presentation should not make it sound easy by focusing solely on their successes and omitting their difficulties and the challenges which they had to overcome. Where speakers introduce examples to demonstrate how they overcame failure, faced up to difficulties and persisted to overcome significant challenges, students have the opportunity to learn vicariously important lessons regarding persistence and feasibility. Where a panel or series of guest speakers is used they may be selected to represent a range of contexts and scenarios, each of which carries its own message. For example, it may be useful to select role models who are at different stages of their careers, to convey a sense of the progressive steps along the pathway to entrepreneurial success and the feasibility of attaining those progressively higher levels.

In selecting guest speakers it is also valuable to consider the similarity between the speaker and the target audience. Gibson (2003) identifies several attributes which individuals may use to determine whether or not they draw lessons from a particular role model. Gibson identifies positive/negative, global/specific, close/distant and hierarchically superior/peer subordinate (2003). The selection of appropriate role models to speak to students groups, considering their attributes, points to the importance of taking into account characteristics such as age, gender, ethnic background, subject/sector of activity and level of success. During the Enterprisers programme, participants who were concerned that entrepreneurs are sometimes less than ethical were engaged by a speaker involved with the creation of a social enterprise. An undergraduate audience is very likely to be inspired by a very young entrepreneur.

In selecting the types of activities to build self-efficacy and skills, the incorporation of individual, small and large group activities offers the chance to develop other dimensions of self-efficacy and skills which are important in venture creation, such as team-working, while bringing together those from

different backgrounds and cultures into mixed groups is also important in building understanding of different perspectives and developing subject mastery (Driver 2003; Gear *et al.* 2003; Poell and Van der Krogt 2003). Considered use of assessment and the provision of feedback has been shown to influence positively the development of self-efficacy (Humphreys *et al.* 1997); assessment and feedback on a regular and timely basis provides tangible evidence of changes in performance which can influence the enhancement of self-efficacy (Orpen 1999). Reflection on activities and critical thinking have been linked to deep learning and the use of practices such as journaling and the creation of learning logs may support such activities (Barclay 1996; Jack and Anderson 1999; Loo and Thorpe 2002; Van Woerkom *et al.* 2002).

Following the above discussion regarding issues associated with the choice of pedagogical approaches in entrepreneurship education, the following section explores the Enterprisers programme, with a particular focus on its components intended to strengthen participant confidence in their entrepreneurial abilities.

2.3. The Enterprisers Programme

The Enterprisers programme (www.enterprisers.org.uk), formerly known as CMI Connections, brings together mainly undergraduate students from UK universities and MIT for a highly interactive and participative, week-long, residential programme. The programme is intended to develop entrepreneurial skills and build confidence and strengthen entrepreneurial intentions among participants. Students participating in the Enterprisers programme are drawn from a wide variety of cultural backgrounds and academic disciplines.

The programme provides participants with opportunities to learn about entrepreneurship and how to pursue their interests and passions, acquire the tools and develop/enhance their skills for pursuing projects and building new ventures. As will be discussed in more detail below, programme content and delivery have been conceived to equip participants with entrepreneurial project/venture skills, for example, networking, team building and creativity. The programme provides participants with the opportunity to learn about the resources needed to support new activities, develop an international network of like-minded students and build links with university faculty members and resources within their own institutions. The focus is on assisting participants to unlock their entrepreneurial spirit, develop a “can do” attitude and encourage the acquisition of the skills, confidence and contacts to realise ambitions within a “safe” environment. In this process participants are supported by university faculty and other actors from the entrepreneurial community.

There have been nine programmes to date offered in the UK; Durham 2003, Strathclyde 2003, Durham 2004, Heriot-Watt 2004, Durham 2005, Brighton 2005, WestFocus (West London) 2005, Durham 2006 and Brighton 2006. The composition of participants on the early programmes involved around ten

students and two facilitators from each of six universities, and two or three lead facilitators; more recent programmes have involved students from a larger number of institutions, but with fewer students from each university. Participants are drawn from a wide diversity of academic disciplines/backgrounds and they are not required to have studied entrepreneurship prior to attending the Enterprisers programme. Consequently, students from fields as diverse as Law, Scottish Studies and Mechanical Engineering have taken part in the programme. The majority of participants have been university undergraduates, although a relatively small number of graduate students have taken part. The facilitators who contribute to the programme are, in the main, involved in small business and enterprise teaching and/or have a personal involvement or interest in entrepreneurship. A two-day training event for facilitators is offered prior to the programme. Programmes also draw upon individuals from the enterprise community through bringing in guest speakers (including entrepreneurs from the social as well as the profit-based sector, and others such as financiers) to serve the function of role models and provide opportunities for students to network with and learn from those who have created their own ventures or support those who are entrepreneurial.

2.4. The Enterprisers Curriculum and Aspects of Programme Delivery

The Enterprisers curriculum is built around four central themes which were originally integrated into the programme design by Shai Vyakaram of the Centre for Entrepreneurial Learning at the University of Cambridge. These themes underpin the project/venture development process and support students in the development of ideas/opportunities from not-for-profit initiatives to new business ventures. Each of the following themes broadly forms the focus for a day of the programme:

The entrepreneur within each of us (Moi): defining and understanding entrepreneurship and understanding one's self and personal motivations, values, ethics and goals;

Launching a great idea (Ideation/Peopleology): understanding what an entrepreneur is, the process of creativity and idea generation, meeting unmet customer needs and developing the first stage of the project plan;

What it will take to succeed (Nuts 'n' Bolts): leadership and teams, the identification and acquisition of resources and the use of networks in resource acquisition and project execution;

Keeping the dream alive (Crystal Ball): maintaining motivation and commitment, celebrating progress and building sustainable projects.

A range of pedagogical techniques is used to deliver the curriculum in order to create contrasting learning environments which enable students to gain contrasting perspectives on the venture creation/project development process. Elements of the core curriculum are delivered by means of large group sessions; these include sub-themes, such as ethics, creativity and finance. Even during large plenary sessions students occasionally divide up to work in smaller, tutor-facilitated groups to engage in highly participative, interactive exercises. During some activities students work independently, for example when developing their own project idea and pitch, although they then work in pairs and small groups to practise pitching their idea and to gain feedback on performance and how it might be enhanced. These activities are intended to engage the learner in hands-on activities to enable them to learn experientially. Another dimension is based around heightening the emotional involvement of students with the subject, as heightened emotional states are a source of self-efficacy which relates to the theoretical concept discussed earlier.

There is fairly extensive use of guest speakers who are selected to represent a range of backgrounds, ages, markets and experiences. Guest speakers present their varied experiences to the Enterprisers audience which enables participants to derive lessons from both the positive and negative experiences which are conveyed. It is important that participants appreciate that project development and implementation in the context of venture creation is not easy, and that they will fail in some aspects of their actions. Entrepreneurs share both their success and key mistakes/failures to illustrate the multiple dimensions of the enterprise experience so that participants are able to learn vicariously from them. Guest speaker diversity is important in the context of issues raised by Gibson (2003) regarding the identification of role models. Gibson's work suggests that students will align themselves with the different role models and appreciate the diversity of career paths taken by the speakers "based on the attributes of people in social roles an individual perceives to be similar to him or herself to some extent and desires to increase perceived similarity by emulating those attributes" (Gibson, 2003).

Gibson (2001, 2003) highlights cognitive and structural dimensions of influence in the identification of a role model. There are two cognitive sub-dimensions (positive/negative, global/specific) and two structural sub-dimensions (close/distant, up/across-down). The cognitive dimensions suggest that an individual can identify a role model in both positive and negative terms in relation to their behaviour, attributes and style, and in both general and specific contexts. The structural dimensions suggest that a role model can be constructed from a distant perspective, through the media or television, or by contrast from a close perspective, where the role model is in close proximity to the individual, perhaps a family member, employer or work colleague, at least someone with whom the observer is able to interact or observe at close quarters. Gibson's work points to the importance of selecting a range of guest speakers of different ages,

both male and female and from a range of backgrounds so that students are able to derive different lessons from different speakers. From vicarious observation students will be able to draw personal lessons as they envisaged how they might think about work opportunities as steps in a career, in particular in terms of desirability, feasibility and their own capability to succeed within their preferred domain. Other programme sessions are built around themes such as project planning, resource identification/acquisition and networking. A number of sessions are based around the development of key skills, with exercises to build and enhance presentations and pitching skills (describing project concepts orally). Others explore aspects such as the importance of giving and receiving feedback and learning from constructive criticism.

Students engage with the final stage of Kolb's (1984) experiential learning cycle through reflections which they record in a daily journal/learning log which they are encouraged to keep based around their experience of the programme and the learning process.

3. The Research Design and Approach to Measurement

It is important to seek ways to establish internal validity, whether or not an experimental treatment or, more generally as in this case, a programme of activity makes a difference. If there is an increase in some performance measure the challenge is to establish that the activity caused the change. Campbell and Stanley (1963) identify eight broadly defined classes of extraneous factors that could have caused any increase one might have found. Although social scientists are often unwilling to say that one thing caused another, there is an available language and corresponding logic of experimental design to see just how strongly a cause and effect relationship can be demonstrated. While this view is generally taken for experiments run by social science and other university departments, Campbell (1969) made it clear that the same logic should also be applied to social programmes. A key challenge to internal validity is 'history', where outside events or on-going trends might have a sound claim for having caused at least some of any change.

In developing the research design and methods of measurement for the study of Enterprisers emphasis was given to establishing whether or not the programmes were a cause of change in several forms of entrepreneurial self-confidence, as well as in entrepreneurial intent. A methodology was developed to enable testing to establish in the case of changes occurring, whether or not those changes were found to be sustained some months after completion of the programme. This involved a three-step questionnaire, beginning with the distribution and completion of a questionnaire at the beginning of the programme. Two post-tests were used the scope of which were determined by the focus on the need to measure change over the programme and the enduring nature of any

changes observed. One instrument was administered immediately following the programme; the intention here was to collect data on perceptions of various programme elements which could be related to outcomes to see whether the research could attribute success or failure to specific components within the programme. To keep the instrument relatively short a subset of items from the longer scales was used as the purpose was only to document that significant changes had occurred within the duration of the programme. Six months later a questionnaire containing the full set of outcome questions which were asked in the pre-test was sent to all participants for completion.

This procedure was followed first for a pilot programme at the University of Durham, and then with relatively stable instruments for subsequent programmes. While to date more than 550 students have participated in nine offerings, the research team is in a continuing process of collecting the six-month surveys for the more recent programmes, and at the time of writing this paper six-month data were not in hand for the January 2006 and subsequent programmes. Data are available for this paper for pre-post event surveys for 348 students who participated in six of the nine Enterprisers programmes, with six-month data in hand for 164 or 47.3% of the participating students in those programmes. With respect to some items the N for the pre-test is lower than the 348 total as a result of some items not being incorporated in all of the six pre-test instruments.

3.1. Measurement

The original concept of entrepreneurial self-confidence was career self-confidence and confidence in functional skills. The Enterprisers evaluation of self-confidence adopted a battery of skills items used by Terenzini *et al.* (1991), and included a number of new items more specific to entrepreneurship. The central outcome measure was the active intention of individuals to start a new venture.

Entrepreneurial self-confidence. In viewing the entrepreneurial career path, it is possible to view it as somewhat like that followed by engineers or lawyers, rather than being particularly special and unique. Entrepreneurs are heavily influenced by parental occupation, and many pursue it as a vocational goal at an early age. While it is not common for entrepreneurs to have an undergraduate degree dedicated to being an entrepreneur, the number of university entrepreneurship courses continues to expand. Trends such as growing positive media attention on enterprise and nations/governments providing greater encouragement for young adults to pursue entrepreneurship, mean that it is increasingly becoming a salient career option. This suggests one might draw upon the more general vocational behaviour literature, including the work of Lent and Hackett (1987), who suggest that career self-efficacy is vital for the pursuit of any sort of career. They point

out that career self-efficacy is only the name of a category of phenomena and is not itself a psychological trait. Instead, individuals have differing degrees of career self-efficacy for particular occupations or professions, which could include entrepreneurship amongst them. In the context of this research, entrepreneurial self-efficacy for undergraduates and younger professionals is viewed as a belief in one's ability to master the skills and perform the tasks which are relevant to becoming an entrepreneur.

Much of the early work focused around this concept measured it without specification of its content. Thus, individuals are asked whether they are capable of performing the role of a given occupation without specifying the skills which might be required, or articulating tasks that would need to be completed. Betz and Hackett (1993), for example, provide a useful and detailed guide for their study of male- and female-dominated occupations. With respect to each of several occupations (e.g., nurse, teacher), individuals were asked simply if they were confident that they could meet the educational requirements of a given job, and whether they could perform the duties, (unspecified), of that job.

To assess the confidence of Enterprisers participants in their skill to follow a vocational path of entrepreneurship, the participants in the Enterpriser programmes were similarly asked to make summary judgments about, in this case, their knowledge and ability to perform the role of being an entrepreneur. Participants were asked to rank from poor to excellent their skill to understand what it takes to start their own business, and then whether they could actually start a successful business if they decided to try.

Functional skill self-confidence. The focus here is reversed; rather than enquiring about a vocational domain with the skills unstated, there is no regard to the vocational career path which might be involved but instead the focus is on the self-confidence in skills. One of the most useful pieces of work for this research has been that of Terenzini *et al.* (1991). They report on a set of scales designed to determine the quality of engineering education. A factor analysis was used to group a set of items into several skill domains, including two that are included in the Enterprisers evaluation. Confidence in problem-solving skills was explored by asking participants how they would rank their skill to "solve an unstructured problem", "apply an abstract idea of concept to a real problem", and "evaluate arguments and evidence" of competing alternatives. This area also includes communications in problem-solving, as in their skill, both orally and in writing, clearly to describe a problem (see Tables 1 and 2). The Enterprisers questionnaire also draws on their items for group-working skills, including such skills as to "listen to the ideas of others" and "pay attention to the feeling of group". Additional items were developed and added to the skills battery in order to identify abilities more specific to entrepreneurship, including the somewhat general skill to "recognise an opportunity".

Entrepreneurial Intention. The pre-, post-programme and six month surveys included a measure of an individual's intention to pursue entrepreneurship to see if any increase in entrepreneurial self-confidence has a concomitant impact on the participants' intention to start a venture. Two items (see Table 1B) asked about joining a start-up in the near term, and another statement expressed a focus on starting a company sooner or later. A third statement was included to see whether or not the participant was attracted by high risk/high pay-off ventures, and the fourth statement sought if one often thought about starting a company. These four items have formed a successful scale in earlier research at MIT, with Cronbach's alphas falling generally between .78 and .81, with one study finding an alpha of .68.

3.2. Results

The results of the research suggest that the Enterprisers programme has brought about consequential and enduring impacts upon participant self-confidence, with a sizeable proportion of the change identified at the end of the programmes still present after a period of half year or more. There is, however, only a minimal enduring effect if any at all on entrepreneurial intentions.

Table 1 presents the results for the self-confidence items and these findings indicate significant positive change in self-confidence from the start of the programme to its close four and a half days later. The percentage of those saying that they rated their skill to design something new as good to excellent rose from 58.9% to 81.3%; the proportion who rated their ability to recognise a good opportunity rose from 73.9% to 87.9%. Similar changes are evident in skills of solving an unstructured problem, describing problems clearly both orally and in writing, probing to clarify facts and motivating others to work together. Results of the Wilcoxon test indicate that these changes are strongly, statistically significant.

The two items which asked participants to self-rate their skill to become entrepreneurs showed even greater change. At the beginning of Enterprisers, 45.2% of the participants felt they had a good to excellent understanding of what it requires to start their own businesses, and at the end of the week 87.9% felt that they had that level of knowledge. At the same time, 44.2% also rated their ability to start a company as good to excellent, compared with 83.8% at the conclusion of the programme.

The third result found in the programme post-test shows a modest increase in the strength of the participants' entrepreneurial intention. Study of the separate items reveals increases in the proportions that "agree" or "strongly agree" with the four statements (Table 1). The largest gains are found in the statement that one would take an opportunity to join a start-up in the next few years (pre-test 70.4%, post-test 78.6%), and the desire to at least once start one's own company

(pre-test 80.3%, post-test 90.2%). When the four items are combined in the entrepreneurial intention scale, the average pre-test score is 5.29, and it rises to 5.58 at the close of the programme, an increase which is statistically significant at the $p=0.001$ level.

Together these results show that the six Enterprisers programmes evaluated here have brought about a consequential and statistically significant impact on the self-confidence and entrepreneurial intentions of the participating students.

Table 1: Self-confidence in Entrepreneurial Skills and Intention at Post-Programme Survey

A. Self-confidence in skills: Current levels compared to university students	Percent ranking skill "Good" to "Excellent"			
	Pre-Programme	After Programme	N	P value
Design something novel and innovative.	58.9%	81.3%	348	0.001
Solve an unstructured problem.	74.9%	88.6%	219	0.001
Clearly describe a problem orally.	65.4%	82.2%	269	0.001
Clearly describe a problem in writing.	66.4%	79.5%	268	0.001
Ask probing questions that clarify facts.	70.0%	88.5%	270	0.001
Motivate others to work together.	72.3%	85.0%	346	0.001
Recognise a good opportunity.	73.9%	87.9%	348	0.001
Understand what it takes to start your own business.	45.2%	87.9%	347	0.001
Start a successful business if you want.	44.2%	83.8%	346	0.001
B. Entrepreneurial Intent: Pre- and post-programme items and scale score.	Percent who agree or agree strongly		N	P value
If I see an opportunity to join a start-up company in the next few years, I'll take it.	70.4%	78.6%	345	0.001
The idea of a high risk/high payoff ventures appeals to me.	62.1%	67.9%	346	0.001
I often think about ideas and ways to start a business.	79.1%	84.6%	345	0.001
At least once I will have to take a chance and start my own company.	80.3%	90.2%	346	0.001
Entrepreneurial Intent: average scale score	5.289	5.579	344	0.001

The Wilcoxon test was used to estimate statistical strength of significance because t-test or other methods using difference of means are inappropriate for the pre- and post-test of the same group (SPSS, 1999; Foster 2001).

Persisting Effects of Enterprisers. The baseline pre-test data are then compared with the results of the follow-up survey conducted six months or more after the programmes, with the aim of seeing whether change persisted over time. The narrow purpose of the post-programme survey was to show that the cause of change could be linked directly to Enterprisers, thus, only a shortened list of skills was included in the questionnaire. The results of the change from the pre-

programme survey to that sent out six months later are based upon a longer list of items selected from the Terenzini set of group and problem-solving skills, and additional skills believed to be linked to entrepreneurship. As a result of a response rate of 47.1% to the follow-up surveys, data are available for a maximum of 164 participants for this analysis. As in the case of the pre- and post-test data, a small number of items were not included in the assessment of all six programmes; thus, in some cases there is a reduced N. As a general result, analysis of change data for these participants indicates that the heightened self-confidence present at the end of each Enterprisers programme is shown to have been sustained (Table 2). The findings are less supportive of a belief that the programme brought about sustained increases in entrepreneurial intent.

When the results of the pre- and six-month surveys are compared, the most conspicuous finding is that the results found immediately following Enterprisers are generally found to have persisted some months after the programme. The levels of self-rated skills which are good to excellent for participants across the different offerings still show a substantial and significant increase. Believing one is at least good at designing something novel shows an increase from 63.2% to 82.7%. Similar results are found for the problem-solving skills like solving an unstructured problem (from 70.2% up to 78.2%), applying an abstract concept to solve a problem (64.8% up to 85.8%), and the ability to clearly describe problems orally (65.9% up to 84.1%) and in writing (65.9% to 79.3%). Self-perception of leadership skills increases, with heightened confidence that the participants can motivate others to work together (73.5% to 84.0%), and lead a group whose members disagree (50.0% up to 71.3%). More specifically linked to entrepreneurship are the abilities to recognise new opportunities and to be able to put a plan into action. Participants rating their ability to recognise opportunity as good or better increases from 68.7% to 87.7%. The skill of putting a detailed plan into action increases from 70.1% to 85.1%, and delivering on a job one has promised to do rises from 84.6% to 91.0%.

These change data also allow the computation of statistical tests that these changes could have occurred by chance using the Wilcoxon test and the result is that all except the collaborative team task have changes that are still statistically significant at the 0.005 level, or higher. Not surprisingly given the persistence of change in self-rated skills, self-rated competence to start companies also remains high, with striking increases persisting after six months. Feeling that one is good or better at understanding what it takes to start a company rises from 41.6% to 75.8%; being able to go out and start a company increases from 43.8% to 67.3%.

Table 2: Self-confidence in Entrepreneurial Skills and Intention Six Months after the Programme

Self-confidence in skills: Self-ranking compared to other university students	Percent ranking skill “Good” to “Excellent”			
Response rate at post-test, 33.9%, for N=75	Pre-Programme	After 6 months	N	P value
Design something novel and innovative.	58.3%	66.9%	163	0.004
Solve an unstructured problem.	70.2%	78.2%	124	0.003
Develop ways to resolve conflict in a group.	78.0%	89.0%	164	0.001
Apply an abstract idea or concept to a real problem or situation.	64.8%	85.8%	162	0.001
Clearly describe a problem orally.	65.9%	84.1%	164	0.001
Clearly describe a problem in writing.	65.9%	79.3%	164	0.001
Work on collaborative projects as a member of a team.	84.7%	92.6%	163	0.006
Ask probing questions that clarify facts.	71.0%	86.5%	155	0.001
Recognise a good opportunity.	68.7%	87.7%	163	0.001
Motivate others to work together.	73.5%	84.0%	162	0.001
Lead a group whose members disagree.	50.0%	71.3%	164	0.001
Put a detailed plan into action.	70.1%	85.1%	154	0.001
Deliver on a job you have agreed to do.	84.6%	91.0%	156	0.003
Understand what it takes to start your own business.	41.6%	75.8%	161	0.001
Start a successful business if you want.	43.8%	67.3%	162	0.001
B. Entrepreneurial Intent. Pre- to post programme change in items and scale score.	Percent who agree or strongly agree		N	P value
If I see an opportunity to join a start-up company in the next few years, I'll take it.	74.2%	66.0%	159	NS
The idea of a high risk/high payoff ventures appeals to me.	61.6%	65.4%	159	NS
I often think about ideas and ways to start a business.	77.4%	81.8%	159	0.036
At least once I will have to take a chance and start my own company.	75.3%	82.9%	158	0.002
Entrepreneurial Intent: average scale score	4.98	5.13	158	NS

NS= Not significant

When one considers the attitude scale used to measure entrepreneurial intent, the results are quite different. Where the immediate post-programme scale scores, as well as the separate items, clearly show positive increases, after the passage of six months the evidence is problematical. First, the average scale score after six months has dropped back to 5.31, which no longer shows a statistically significant increase when compared with the 5.19 average for this group at the start of the programme. In general one then concludes that the increase in entrepreneurial intent found at the post-test was transitory. When the attitude scale items are considered separately, it is clear that strongly significant change has persisted in one item, the notion that “at least once” the participant will start a company, with often thinking “about ideas and ways to start a company” having fallen back to a significance level of just $p=0.036$. The remaining two items no longer show significant changes.

4. Discussion

Enterprisers set out with the objective of strengthening the likelihood that its participants would pursue entrepreneurship, and success has been achieved from one perspective. The participants’ confidence that they possessed the knowledge and capability to start a company rose dramatically as a direct result of the programme. To claim that a programme causes a desirable effect is often open to challenge, but the evidence here appears clear. The students were from diverse backgrounds which makes it hard to argue that the change resulted from some external source. For the duration of these residential programmes they were relatively isolated and spent extremely long days and evenings together, with virtually no common experience during the week except the programme itself. Any change evident at the end of the week can be attributed to the short-term influence of Enterprisers activities. The analysis presented here includes the same programme delivered in different locations, and to students from different institutions. Results of analysis of outcomes of individual programmes reflect those for the aggregate group of programmes.

The follow-up survey was undertaken six months or more later, and the levels of self-confidence generated by Enterprisers and present at the end of the programme, still persisted. It is hard to argue that some external factor might have enabled these sustained effects when the participants returned to many different universities in different countries, with English students showing the same enduring effects as the students in Wales, Scotland, and Northern Ireland, not to mention the MIT students who returned to the United States. One can, thus, remark that the five-day Enterprisers caused a sizeable, robust and persistent change in participant entrepreneurial self-confidence.

The brevity of the programme makes this outcome all the more remarkable. The surge of self-confidence might perhaps result from the fact that participants

were self-selected and approached the programme both eager and ready to be influenced to believe that they had leadership and entrepreneurial potential. The nature of self-efficacy renders it less surprising that the effects have been sustained; Mau's (2003) work suggests that once established self-efficacy can have a strong and long lasting influence as confidence encourages the acceptance of further challenge, with success feeding back into a spiralling process which enhances self-efficacy further.

The negative result is that the programme, which was intended to build entrepreneurial intentions, brought about short-term changes which were not sustained; thus, it did not do much to change the active intention of participants to start ventures. The entrepreneurial intention scale employed here has been used in other research, and has been found to capture an estimate of short-term, immediate intentions to start a company. There is one scale item which holds open a longer time-frame, with a sense that sooner or later participants will want to try to start a company. This is the one item which shows persistent and significant increase over the pre-test survey and after six months. This suggests that *Enterprisers* has perhaps increased a desire to be an entrepreneur that could be readily triggered by need or identification of an opportunity at some point in the future.

Anecdotal evidence from programme participants suggests that while only a very small number of participants have so far started ventures following *Enterprisers*, a much larger number have become engaged actively in entrepreneurship-related activities. Past participants have started enterprise clubs and societies at their home institutions, others have become active members of their local enterprise societies and networks, while others have become student enterprise champions/facilitators, responsible for working with undergraduate and postgraduate students from their own university. Such activities represent positive engagement and constitute a small but notable step along the enterprise pathway. Longer-term tracking should reveal the nature of the entrepreneurial career paths which participants pursue in the future.

5. Conclusion

From a practical perspective one conclusion is that a research design of the type presented here enables the isolation of cause and effect, and provides systematic data as to whether a programme is, or is not, effective. The importance of the six-month follow-up survey is very apparent. Had the research stopped after the post-programme survey, one would have concluded, incorrectly, that both confidence and intention were dramatically enhanced. It would seem that *Enterprisers* has established a foundation of entrepreneurial self-confidence.

The measures and data collected employed here now permit further analysis to identify which specific programme elements are associated with this positive

outcome. Future research work will explore characteristics of the programme as perceived and reported on the post-programme survey about such things as – for each participant – the speakers which attracted them and the activities which most interested them. Differences across individuals can be related to the change data to investigate which factors contributed most to the growth of self-confidence, and inversely which parts of Enterprisers have little if any impact. Such findings will help the process of programme development and refinement.

Treating programmes as quasi-experiments (Campbell and Stanley 1963) helps to establish a deeper understanding of entrepreneurial development. Enterprisers was originally planned and organised with a general expectation that positive change in entrepreneurial intention would follow. The evaluation presented in this paper, which draws upon the evaluation of a sizeable number of offerings of Enterprisers, casts doubt on this belief, and contradicts the view in the literature that increasing self-efficacy predicts heightened entrepreneurial intention. A possible view is that entrepreneurial career or skills self-confidence as used here is not perhaps the form of self-efficacy which is the most relevant to enhancing intent. Alternatively, it may be that self-efficacy is a prerequisite, as in a necessary but not sufficient condition, for intent, or some other complex relationship may be at play. Whatever the nature of this relationship, the research presented here, which uses Enterprisers as a field experiment, demonstrates that self-confidence in entrepreneurship can increase without a sustained positive change in intention. Thus, findings suggest there is not a simple cause and effect relationship between entrepreneurial self-confidence and entrepreneurial intention.

Further research using the instruments and methodology adopted here is being undertaken to explore the impact of other entrepreneurship programmes. One programme being evaluated is the Encouraging Dynamic Global Entrepreneurs (EDGE) programme which comprises a taught immersion programme with parallels to Enterprisers, but also includes a period of authentic experience in entrepreneurial ventures. Use of these common assessment instruments and methods have generated early findings which suggest that while the EDGE and Enterprisers programmes deliver similar positive short-term changes in self-efficacy and intentions, the changes with respect to intentions are sustained after six-months among participants in EDGE, whilst they are not for those on Enterprisers. This raises questions about the possible role of authentic mastery and the contribution of experiential and vicarious learning to the development of self-efficacy and entrepreneurial intentions. These and other questions are forming the focus on on-going research in the domain of enterprise education, exploring self-efficacy and intentions.

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