DOES AN ENTREPRENEURSHIP EDUCATION HAVE LASTING VALUE? A STUDY OF CAREERS OF 4,000 ALUMNI

Julian E. Lange  
Babson College, langej@babson.edu

Edward Marram  
Babson College

Ajay Solai Jawahar  
Babson College

Wei Yong  
Babson College

William Bygrave  
Babson College

Recommended Citation
Lange, Julian E.; Marram, Edward; Jawahar, Ajay Solai; Yong, Wei; and Bygrave, William (2011) "DOES AN ENTREPRENEURSHIP EDUCATION HAVE LASTING VALUE? A STUDY OF CAREERS OF 4,000 ALUMNI," Frontiers of Entrepreneurship Research: Vol. 31: Iss. 6, Article 2.  
Available at: http://digitalknowledge.babson.edu/fer/vol31/iss6/2

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DOES AN ENTREPRENEURSHIP EDUCATION HAVE LASTING VALUE? A STUDY OF CAREERS OF 4,000 ALUMNI

Julian Lange, Babson College, USA
Edward Marram, Babson College, USA
Ajay Solai Jawahar, Babson College, USA
Wei Yong, Babson College, USA
William Bygrave, Babson College, USA

ABSTRACT

We studied the influence of entrepreneurship education on intentions to become entrepreneurs and becoming full-time entrepreneurs with a sample of 3,775 Babson College alumni who graduated from 1985 to 2009. There was overwhelming evidence that taking two or more core entrepreneurship elective courses positively influenced students’ intention to become an entrepreneur and their becoming an actual entrepreneur both at the time of graduation and long afterward. Writing a student business plan also had a significant influence, but it was not as strong as taking two or more core courses.

INTRODUCTION

Does entrepreneurship education increase undergraduate and MBA students’ intentions to be entrepreneurs? Do those intentions actually lead to the founding of new ventures? And if so, do those ventures outperform ones started by entrepreneurs without formal entrepreneurship education? This paper deals with the first two issues: the influence of an entrepreneurship education on entrepreneurial intentions and on actually becoming an entrepreneur; a second paper (Lange, et al., 2011) deals with the effect of entrepreneurship education on performance when starting up and operating a business. To answer these questions we surveyed approximately 4,000 alumni who graduated from Babson College during a 25-year period, 1985-2009; 63% had taken one of more of three core entrepreneurship elective courses and 37% had taken none.

For a topic as important as this one, there are comparatively few prior articles on the effect of entrepreneurship education. And those few are flawed by one or more methodological shortcomings such as small sample size, lack of a control group, sample bias, mingling part-time and full-time entrepreneurs, and an extremely short time span; all of which are addressed in our study. We believe that our results provide new insights about the value of entrepreneurship education for undergraduate and MBA students. Our findings are important not only for students and educators, but also for researchers and those who support entrepreneurship education, including policy makers, foundations, and benefactors.

LITERATURE SURVEY

When the teaching of entrepreneurship in higher education was beginning to gain traction in the mid-1980s, Peter Drucker (1985)—one of the legendary management philosophers of all time—wrote, “The entrepreneurial mystique? It’s not magic, it’s not mysterious, and it has noth-
ing to do with genes. It’s a discipline. And like any discipline, it can be learned.” And if it can be learned, it presumably can be taught. Twenty years later when entrepreneurship was being taught at more than 1600 U.S. colleges and universities, Drucker’s assertion was cited by Kuratko (2005) when he wrote, “It’s becoming clear that entrepreneurship, or certain aspects of it, can [emphasis in the original] be taught. Business educators and professionals have evolved beyond the myth that entrepreneurs are born, not made.” Alas, Drucker offered no empirical evidence to support his assertion.

Contrary to Drucker’s rejection of genetics in the making of an entrepreneur, Nicolaou and Shane (2009) recently used elementary molecular genetics to argue that a person’s entrepreneurial predisposition is determined at conception by parental DNA; but they offered no direct empirical evidence to support their genetic theory. They suggest, however, that environmental factors may also be important determinants of whether a fetus grows up to be an entrepreneur; and one of their factors is education. So if Nicolaou and Shane’s concept turns out to be true, entrepreneurs are born and can be made even better by educators such as Kuratko (2003) who confidently declared, “the question of whether entrepreneurship can be taught is obsolete.”

But surely the important question is not whether entrepreneurship can be taught; rather it is whether such teaching produces entrepreneurs, and if so, are they better entrepreneurs? After all, business schools are professional schools just as law schools, medical schools, and engineering schools are and should be measured by the success of the careers of their graduates. In the next section we will summarize empirical evidence on whether or not entrepreneurship education is effective.

Empirical studies

Gorman, Hanlon, and King, in a 1997 review of articles about teaching entrepreneurship stated, “Not surprisingly most of the empirical studies surveyed indicated that entrepreneurship can be taught, or at least encouraged, by entrepreneurship education.” But Gorman et al. (1997) had considerable reservations about the quality of the research evaluating the effectiveness of entrepreneurship courses. Their misgivings included the following: Some samples were biased because students were not screened for their entrepreneurial predisposition before enrolling in a course of entrepreneurship instruction; most studies were cross-sectional; measurement of key variables was based largely on self-reporting; few research designs incorporated both pre- and post-testing; and almost none had an underlying conceptual framework from which hypotheses were derived. Gorman et al. also found that descriptive statistics for samples were often inadequate, and in some cases, it was impossible to determine whether the course was delivered to undergraduate, MBA, or continuing education students.

Ten years after Gorman et al. (1997) published their review, Pittaway and Cope (2007) produced a systematic literature review, SLR, of entrepreneurship education articles. Pittaway and Cope “used entrepreneurship journal rankings to identify key journals in the field: in rank one there were four journals, in rank two there were 10 journals, in rank three there were 47 journals. The citation indexes of all 61 journals from 1980-2004 were systematically searched using the root term ‘education’.” Then they extended their search to include articles in other journals that had been cited in articles in all the rank one entrepreneurship journals (Journal of Business Venturing, Entrepreneurship Theory and Practice, Small Business Economics, Entrepreneurship and Regional Development) and three of the rank two entrepreneurship journals (Journal of Small Business Management, International Small Business Journal, and Enterprise and Innovation Management Studies). Impact criteria were used to rank articles for quality; also they were reviewed according
to thematic focus and impact level. The findings of their systematic literature review indicated that entrepreneurship education had an impact on student propensity and intentionality; but what remained unclear are the extent of its impact on graduate entrepreneurship activity and whether or not it makes graduates more effective entrepreneurs. They concluded that the careers of entrepreneurship education graduates should be examined longitudinally and in more detail. They concurred with the NCGE (2004) report, which advocated research into the performance of entrepreneurship education graduates in action as actual entrepreneurs.

Research papers released after the above reviews were made have not unequivocally resolved whether or not entrepreneurship education is worthwhile; noteworthy examples include Zhao, Siebert, and Hills (2005); Souitaris, Zerbinati, and Al-Laham (2007); Oosterbeek, Praag, and Ijsselstein (2008); and Weber, von Graevenitz, and Harhoff (2009).

In summary, empirical evidence tends to confirm that entrepreneurial intentions can be positively influenced in the short term by entrepreneurship courses; but there remains considerable doubt about whether there is any long-term effect. And what remains in total doubt for want of credible evidence is whether those latent intentions turn into nascent activity followed by the subsequent launching of new ventures. More than a quarter of century after he made it, Drucker’s (1985) assertion has yet to be confirmed by valid and reliable research.

Theory literature

In the last fifty years or thereabouts, theoreticians have incorporated psychological concepts to explain entrepreneurial behavior. Initially they used situational and personality measures most notably the need for achievement (McClelland, 1961) and then the need for internal control (Brockhaus, 1982), but they did not make much headway in predicting entrepreneurial activity until they turned to self-efficacy, intention, and the theory of planned behavior (Krueger, Reilly, and Carsrud, 2000).

When applied specifically to entrepreneurship education those concepts predict that courses in entrepreneurship improve a students’ self-efficacy, which influences students’ career plans and increases their intention to be entrepreneurs; or sometimes they learn that they are not suited for a career as an entrepreneur and their intentions decrease. That is possibly why some empirical researchers found that elective entrepreneurship courses had a positive effect of students’ intentions, whereas others found that compulsory entrepreneurship courses had a negative effect. Elective courses attract mainly students with prior-inclination to become entrepreneurs, while compulsory courses must be taken by all students regardless of their prior-inclination toward or against entrepreneurship.

According to Krueger et al. (2000) intention models are ideal for explaining entrepreneurial behavior because in psychology literature intention is the best predictor of planned behavior, especially when the behavior is rare, hard to observe, and has unpredictable time lags; which some entrepreneurship theoreticians regard as an apt description of the process of becoming an entrepreneur (e.g., Bird, 1988; Katz and Gartner, 1988; Krueger and Brazeal, 1994).

Intention-based theories of entrepreneurial behavior hinge on the belief that the decision to take up a career as an entrepreneur is planned behavior, which most academic researchers seem the take as a given or at least a reasonable assumption (e.g., Davidsson, 1995; Autio, Keeley, Klofsten & Ulfstedt, 1997; Kolvereid, 1996; Krueger et al., 2000). Krueger at al, (2000) put it this
way, “Although it is possible that some will argue otherwise, it seems evident that much of what we consider ‘entrepreneurial’ activity is intentionally planned behavior. Witness the tremendous emphasis on the business plan in virtually every academic and practical treatment on starting a new business. Even in cases where a unique catalyzing event like being downsized may spur the individual to the entrepreneurial act, there are often indications of a long time interest and desire to be in business for one’s self.”

Intention-based theories of entrepreneurship initially focused on an individual’s nascent behavior before actually becoming a entrepreneur (e.g., Boyd & Vozikis, 1994; Krueger, 1993; 1994; Krueger & Brazael, 1994; Matthews & Moser, 1995; Reynolds, 1995; Scherer, Brodzinsky & Wiebe, 1991; Scherer et al, 1989; Scott & Twomey, 1988). Then intention models were extended to include the decision to become an entrepreneur as a career choice (Krueger & Carsrud, 1993; Krueger, et al., 2000; Fayolle, Gailly, & Lassas-Clerc, 2006) because there is a strong link between intention and actual behavior (Ajzen, 1991; Ajzen, and Fishbein, 2000; Sheppard, Hartwick & Warshaw, 1988).

The theory of planned behavior underpins several recent articles dealing with the evaluation of the influence of entrepreneurship education on students’ entrepreneurial intentions (e.g., Zhao, H., Seibert, S. E., and Hills, G. E.; 2005; Fayolle, Gailly, & Lassas-Clerc, 2006; Wilson, Kickul, & Marlino; 2007). We will rely on those articles in the section as we develop a conceptual framework and derive hypotheses.

**Theory**

**Conceptual framework**

Nicolau and Shane (2010) posit that individuals are born with innate entrepreneurial characteristics—some with more than others. Then as a child develops, socialization and education enhance or inhibit those genetic endowments. Most socialization in childhood is parental. Parents who are entrepreneurs provide their children with day-to-day contact with the world of business and they pick up entrepreneurial awareness (e.g., Aldrich, Renzulli, and Langton, 1998; Dunn and Holtz-Eakin, 2000; Hout and Rosen, 2000). According to Fairlie and Robb (2007), adolescent work experience in the family business is a major influence on entrepreneurial aspirations. And Lentz and Laband (1990) suggest that in some instances the child develops the know-how to run a business. Other socialization that may enhance an adolescent’s proclivity for entrepreneurship is working for a small business, or actually starting a small one while still in high school. Falck, Heblich, and Luedemann (2010) found that having an entrepreneurial peer group had a positive effect on the entrepreneurial intentions of 15 year-olds but it was moderated by individualism. On the other hand, Lerner and Malmendier (2007) in a study of a sample of Harvard Business School students found that exposure to a higher share of peers with a pre-business-school entrepreneurial background led to lower rates of entrepreneurship. Part of the explanation of the difference between the two findings is that peer group influence diminishes with age (Falck et al. 2010). We did not specifically include peer influences as a separate variable in the models that we tested, but we acknowledge that it was covertly included in other variables such as whether or not a student wrote a business plan and whether or not an alumnus worked in a small business (both will be explicated later in this section).

Students with entrepreneurial intentions who are contemplating a future career as an entrepreneur may select a college or a university because of the reputation of its entrepreneurship program so that they can increase their self-efficacy. The research reported in this paper evaluated the effect
of core courses in a prominent entrepreneurship education program. The courses are designed to increase students’ self-efficacy and increase their entrepreneurial intentions; however, they also provide students with the opportunity for self evaluation so in some cases students’ intentions decline if their self-judgment tells them that they do not measure up for a career as an entrepreneur.

According to Bandura (1986) an individual’s self-efficacy can be influenced by role modeling and vicarious experience, enactive mastery, social persuasion, and judgments about one’s self (Zhao et al., 2005). The core courses that we are evaluating employ a variety of teaching methods encompassing Bandura’s four components. The principal classroom pedagogy uses the case method with plenty of class visits by entrepreneurs, many of whom are featured in the cases; thereby it enables students to look vicariously at entrepreneurship. Other vicarious opportunities include students’ interviewing entrepreneurs one-on-one and writing an analysis of what they learned; examining issues in small businesses and recommending solutions; and working on consulting projects. Developing a business plan and in some instances starting an actual business develops enactive mastery; likewise computer simulation of managing growing businesses, field studies, and consulting. Social persuasion is provided by mentors and advisors, who usually are practicing entrepreneurs, angel investors, and others involved with entrepreneurship and small business; and it is also provided by fellow students, alumni, administrators, and very importantly by faculty of whom 50% are present or retired entrepreneurs. Throughout the courses students continually have opportunities to judge their ability to handle the stress, anxiety, and ambiguity that comes with starting and growing a business or in some instances failing.

The core courses are holistic and comprise topics dealing with multiple facets of self-efficacy; perhaps the best example is the business plan. Many entrepreneurship educators believe that writing a business plan affects self-efficacy more than any other entrepreneurship pedagogy because it puts into practice what students have learned in business school, especially in entrepreneurship courses; students receive feedback on their plans from faculty, peers, and others; and they usually write their plans with one, two, or three fellow students, so in the process they get opportunities to compare their entrepreneurial skills with those of their peers. It is not surprising that writing a business plan is the most frequently taught entrepreneurship topic at most business schools (Hills, 1988; Honig, 2004). Hence it is reasonable to propose that writing business plans as a student increases entrepreneurial intentions and likelihood of actually sta

Other factors to be considered when evaluating entrepreneurial intention are age and gender because numerous empirical studies show that both are important factors in an individual’s propensity for entrepreneurship. For example, the Global Entrepreneurship Monitor (GEM), which is the most extensive worldwide study of nascent entrepreneurs, shows that nascent activity, which is the first step to put intention into action, peaks when would-be entrepreneurs are in their early 30s and then steadily declines. GEM also reported that in high income countries men are 33% more likely than women to be active entrepreneurs (Minniti, Arenius, & Langowitz, 2005); and (Reynolds, Carter, Gartner, Greene, & Cox, 2002) found that in the U.S. men are twice as likely as women to be nascent entrepreneurs.

Some students with entrepreneurial intention start businesses before they graduate and embark upon careers as entrepreneurs immediately after graduation. While others with entrepreneurial intention begin their post-graduation careers as employees, presumably delaying the decision to become an entrepreneur until a future time. As they grow older, a number of factors affect whether or not alumni actually leave their jobs as employees and start new ventures; among
those factors are opportunity costs, job dissatisfaction, and self-efficacy. Alumni who are earning good incomes and are satisfied with their jobs are less likely to leave their employment than their counterparts who have low incomes and are dissatisfied with their jobs. Another factor that may influence employees is the effect of their work environment on their self-efficacy. It is likely that entrepreneurial self-efficacy of alumni employed by small businesses—especially if they are owner-managed—will increase more than that of their cohorts in large companies because they will gain more skills relevant to running a small business and will probably see more role models. Nanda and Sørensen (2010), for example, investigated peer effects in the workplace and found that having coworkers with entrepreneurial experiences increased an individual’s likelihood of becoming an entrepreneur.

Undergraduates are younger than MBA students, so at the time of graduation and for several years afterward they have lower opportunity costs for becoming an entrepreneur compared with being an employee simply because they are paid less than MBAs. Also, recent undergraduates generally have lower personal living costs. What’s more they probably have less perceived career risk because they are younger. Hence, although their core courses are very similar, we differentiate undergraduates from MBAs in our models.

We also differentiate part-time students from full-time students because most part-time students, almost all of them MBAs, have full-time jobs, which we reason might give some of them more entrepreneurial socialization and mastery, hence increased self-efficacy. On the other hand Babson’s entrepreneurship program has strong experiential content, aimed at increasing students’ self-efficacy; what’s more, full-time students get more socialization from their peers simply because they are with them on campus… what else… full time.

Hypotheses

For those students who immediately embarked on careers as full-time entrepreneurs upon graduation, we propose the following hypotheses:

\[ H1a: \text{Students who took one core entrepreneurship elective course were more likely to become entrepreneurs immediately upon graduation than students who take none.} \]

\[ H1b: \text{The more core entrepreneurship elective courses that students took, the more likely they were to become entrepreneurs immediately upon graduation.} \]

\[ H1c: \text{Students who wrote a business plan were more likely to be full-time entrepreneurs immediately upon graduation than those who did not write one.} \]

For alumni who did not embark on entrepreneurial careers immediately upon graduation, we propose the following hypotheses:

\[ H2a: \text{At graduation, students who took one core entrepreneurship elective course were more likely to have intentions to become entrepreneurs as some time in the future than students who took none.} \]

\[ H2b: \text{At graduation, the more core entrepreneurship elective courses that students took, the more likely they were to have intentions to be entrepreneurs.} \]
H2c: At graduation, students who wrote a student business plans were more likely to have intentions to become entrepreneurs in the future than students who did not.

For alumni who became entrepreneurs at a future time instead of immediately upon graduation, we propose the following hypotheses:

H3a: Alumni who took one core entrepreneurship elective course when they were students were more likely to become entrepreneurs in the future than alumni who took none.

H3b: The more core entrepreneurship elective courses that alumni took when they were students, the more likely they were to become entrepreneurs in the future.

H3c: Alumni who wrote a student business plans were more likely to become entrepreneurs in the future than alumni who did not.

And finally, for alumni who were employees and had not yet embarked on careers as entrepreneurs we propose the following hypotheses:

H4a: Alumni were more likely to intend become entrepreneurs in the future if they took one core entrepreneurship elective courses when they were students than those who took none.

H4b: The more core entrepreneurship elective courses that alumni took when they were students, the more likely they were to intend to become entrepreneurs in the future.

H4c: Alumni were more likely to intend become entrepreneurs in the future if they wrote a student business plan than those who did not.

All hypotheses 1a through 4c will be moderated by the following factors that influence entrepreneurial intentions:

- Whether or not a student started a full-time business before enrolling at Babson College.
- Whether or not one or both parents were entrepreneurs when a student was growing up.
- Whether the person was an undergraduate or MBA student.
- A student’s gender.

Hypotheses 4a, 4b, and 4c will also be moderated as follows:

- Alumni who have higher income as employees are less likely to intend to become entrepreneurs in the future.
- Alumni who are dissatisfied with their jobs are more likely to intend to become entrepreneurs in the future.
- Entrepreneurial intentions to start a business will first increase with age, reach a peak, and then decline as alumni grow older.
- Alumni who are employed by small businesses are more likely to intend to become entrepreneurs in the future.

**Method**

Babson College, an undergraduate and MBA business school, introduced its first entrepreneurship course in the mid-1960s. The program steadily grew so that by the mid-1980s it had a cluster of three core elective entrepreneurship courses that covered the entire entre-
entrepreneurial process from nascent entrepreneurs through to harvest and beyond. The courses are Entrepreneurship and New Ventures, Financing Entrepreneurial Ventures, and Managing Growing Businesses. Two variations on those three courses were added to the core in recent years. The program was ranked in the top tier by Gartner and Vesper (1997) in their evaluation of entrepreneurship education programs.

We emailed a 55-question survey to all 14,920 alumni for whom the school had an email address. We followed up the initial email with two subsequent ones. The response rate was 27.4%. The analyses presented in this paper were restricted to 3,775 alumni who graduated during the 25-year period, 1985 through 2009; 41.8% had bachelor degrees and 58.2% masters—almost entirely MBAs with a few MSs; 72.3% had been full-time students, 27.7% part-time, of whom nearly all were MBAs; 32.4% were women, 67.6% men; and their average age was 37. Before they enrolled at Babson 7.1% had been full-time entrepreneurs and 38.5% expected to become an entrepreneur sometime in the future. When they were growing up, 40.0% of them had one or both parents who were full-time entrepreneurs. Sixty seven percent took at least one core entrepreneurship elective course at Babson and 33% took none.

Nine hundred and thirteen alumni (24.2%) who had founded or co-founded one or more businesses for which they worked full time were classified as entrepreneurs. On average, those businesses had $5.5 million of annual revenue, 27 employees, and were 5.5 years old. Alumni entrepreneurs had started a total of 1300 full-time businesses as some had started more than one.

Results & Discussion

We used binary logistic regression analysis to test our 12 hypotheses; we controlled for students’ prior-proclivity for a future career as an entrepreneur before they enrolled at Babson. The summary of the results are presented in Tables 1, which looks at students at the time when they graduated, and Table 2, which looks at alumni. Table 3 lists the significance tests of the 12 hypotheses and also lists the significance of the control and moderating variables.

Courses. Hypotheses 1b, 2a, 2b, 3b, 4a, and 4b are supported; but 1a and 3a are not. It means that taking only one entrepreneurship course was not correlated with becoming a full-time entrepreneur but it was correlated with student and alumni intentions to become entrepreneurs. Taking two core entrepreneurship elective courses correlated with becoming an entrepreneur and intending to become one both for students at graduation and for alumni afterward; likewise taking three or more courses, but at an even higher level of significance. The coefficient, B, increases as the number of courses taken increases, and the level of significance is astronomically high, so it is clear that taking two or more core entrepreneurship elective courses influenced both intending to become an entrepreneur and actually becoming an entrepreneur.

Business Plan. Hypotheses 1c, 2c, and 4c are supported; but 3c is not. Writing a student business plan correlated both with student and alumni intentions to become entrepreneurs and with students becoming full-time entrepreneurs immediately upon graduation, but not with alumni becoming entrepreneurs. We think that part of the explanation is that when students become full-time entrepreneurs immediately upon graduation they are implementing business plans that they wrote as students, whereas when alumni start businesses some time after graduation the businesses are unlikely to be related to the plans they wrote as students.
The coefficient, B, for writing a business plan was strikingly lower than the coefficient for taking three or more courses in every model where the coefficients were significant (Models 1, 2, and 4); and the coefficient, B, for writing a business plan was also lower than the coefficient for taking two courses in every model where the coefficients were significant, but the difference was not as striking. It clearly shows that taking two or more core entrepreneurship elective courses has greater influence than writing a student business plan on both intending to become an entrepreneur and actually becoming an entrepreneur. In Models 2 and 4, the influence of writing a business plan was lower than taking just one core entrepreneurship elective course and higher in Model 1. We think it was higher in Model 1 because students were implementing their business plan to start a new business. We surmise that inspiration (Souitaris et al. 2007) has a hand in explaining this difference between taking courses and writing a business plan, because if students take more courses, they see more entrepreneurs.

Summary of findings

1. There is overwhelming evidence that taking two—or better yet three—entrepreneurship courses influences intentions to become entrepreneurs and to become actual entrepreneurs. Taking only one course does not have nearly as strong an influence. We think it may be because some students take one course and conclude that they don’t want to be entrepreneurs.

2. There is powerful evidence that writing a business plan as a student influences both students’ entrepreneurial intentions and their becoming actual entrepreneurs; and it influences the intentions of alumni to become entrepreneurs but not their actually becoming entrepreneurs.

3. There is also strong evidence that the influence of taking entrepreneurship courses endures long after graduation. We controlled for students’ graduation date in 5 year intervals and found the intervals were significant from 1995 through 2009 for alumni becoming actual entrepreneurs and were significant from 2000 to 2009 for alumni intentions to become entrepreneurs.

4. We found no significant effect due to having parents who were entrepreneurs. This is contrary to the findings of some other researchers that we cited earlier in this paper. One possible explanation is that entrepreneurship education trumps parental effects.

5. Males were more likely than females to intend to become entrepreneurs and actually become entrepreneurs.

6. There was no difference between undergraduates and MBAs in intentions to become entrepreneurs and actually becoming entrepreneurs either when they were students at graduation or later when they were alumni.

7. There was hint (p = 0.059) that the higher their income, the less likely that alumni intend to become entrepreneurs.

8. The greater their job dissatisfaction, the more likely that alumni have intentions to become entrepreneurs.

9. Full-time students were more likely to have intentions to become entrepreneurs at graduation and later as alumni but they were not more likely than part-time students to become actual entrepreneurs.

10. Founding a full-time business before enrolling at Babson is the strongest influence on a student becoming a full-time entrepreneur at graduation and alumni becoming entrepreneurs. For alumni entrepreneurs, it overshadows all other influences. But it does not influence student or alumni intentions to become entrepreneurs.

11. The control variable for students’ proclivity for entrepreneurship before enrolling at
Entrepreneurial cognition at Babson and their expectation to have entrepreneurial careers afterward was highly significant in all four models.

Implications

**Educators.** Core entrepreneurship courses do influence entrepreneurial intentions and the decision to embark on a career as an entrepreneur. Writing a business plan also has an influence but not as strong as taking courses. It implies that educators should not stop teaching how to write business plans but they should not overemphasize it.

**Students.** Taking one core entrepreneurship course helps students explore entrepreneurship as a career. Taking more than one course influences students’ intentions to be entrepreneurs and increases the likelihood that they will actually become entrepreneurs.

**Policy makers and supporters of entrepreneurship education.** Entrepreneurship education does influence students entrepreneurial intentions and in some cases those intentions are translated into careers as full-time entrepreneurs, who add to the economy by creating goods, services, and jobs. The 913 alumni in our sample founded or co-founded companies that have created more than 25,000 jobs for an investment of $50,000 per job. Support for entrepreneurship education programs like the one examined in this paper is worthwhile.

**Researchers.** There is a need to see if the results described in this paper are replicable at other institutions of higher education to see which aspects of it may be generalizable. There is also a need to see if some of the effects such as the lack of parental influence on intentions hold up in other settings. The findings about business plans are intriguing because they add fuel to the debate about the value of teaching business plans (e.g., Honig, 2004).

We acknowledge possible deficiencies in our research method. Two of the principal ones are that the data are self-reported and the sample may be biased by uneven response rates from non-entrepreneurs, would-be entrepreneurs, and entrepreneurs. We included some safeguards to address those concerns. For instance, our email asking alumni to complete our questionnaire was carefully designed to be neutral with respect to the careers of alumni and responses were not anonymous (but respondents’ anonymity was guaranteed). And of course, we examined alumni of just one school, which is recognized as being at the forefront of entrepreneurship education, so our results may not be generalizable.

CONTACT: Julian E. Lange; langej@babson.edu; (T):781-239-5013; (F):781-239-4178; Arthur M. Blank Center for Entrepreneurship, Babson College, Wellesley, MA 02457-0310.

NOTES

1. Syllabi of core courses are available from the lead author.
2. The complete questionnaire is available from the lead author.

REFERENCES


### Table 1: Student Full-time Startups and Student Intentions at Time of Graduation

<table>
<thead>
<tr>
<th>Model 1</th>
<th>At graduation, students became full-time entrepreneurs (H1a, H1b, H1c).</th>
<th>B</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected to be a future entrepreneur before enrolling at Babson</td>
<td>1.393</td>
<td>61.787</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Founded full-time business before coming to Babson</td>
<td>1.373</td>
<td>64.953</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Parent entrepreneur</td>
<td>.102</td>
<td>.521</td>
<td>.470</td>
<td></td>
</tr>
<tr>
<td>Gender, Female = 0, Male = 1</td>
<td>.493</td>
<td>7.005</td>
<td>.008</td>
<td></td>
</tr>
<tr>
<td>Babson degree: BS = 0, Masters=1</td>
<td>.279</td>
<td>2.986</td>
<td>.084</td>
<td></td>
</tr>
<tr>
<td>Student status: Part-time = 0, Full-time = 1</td>
<td>.235</td>
<td>1.796</td>
<td>.180</td>
<td></td>
</tr>
<tr>
<td>Total number of core entrepreneurship courses taken, Dummy</td>
<td>29.415</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 core entrepreneurship courses taken, Dummy (1)</td>
<td>.345</td>
<td>2.058</td>
<td>.151</td>
<td></td>
</tr>
<tr>
<td>2 core entrepreneurship courses taken, Dummy (2)</td>
<td>.808</td>
<td>11.194</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>≥3 core entrepreneurship courses taken, Dummy (3)</td>
<td>1.143</td>
<td>21.517</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Wrote student business plan at Babson</td>
<td>.672</td>
<td>10.779</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-5.269</td>
<td>258.743</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model 2</th>
<th>At graduation, students had intentions to start business in the future (H2a, H2b, H2c).</th>
<th>B</th>
<th>Wald</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected to be a future entrepreneur before enrolling at Babson</td>
<td>2.920</td>
<td>301.928</td>
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<td></td>
</tr>
<tr>
<td>Founded full-time business before coming to Babson</td>
<td>1.42</td>
<td>.275</td>
<td>.600</td>
<td></td>
</tr>
<tr>
<td>Parent entrepreneur</td>
<td>.158</td>
<td>2.441</td>
<td>.118</td>
<td></td>
</tr>
<tr>
<td>Gender, Female = 0, Male = 1</td>
<td>.459</td>
<td>23.224</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Babson degree: BS = 0, Masters=1</td>
<td>-.163</td>
<td>1.975</td>
<td>.160</td>
<td></td>
</tr>
<tr>
<td>Student status: Part-time = 0, Full-time = 1</td>
<td>.278</td>
<td>5.244</td>
<td>.022</td>
<td></td>
</tr>
<tr>
<td>Total number of core entrepreneurship courses taken, Dummy</td>
<td>108.409</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 core entrepreneurship courses taken, Dummy (1)</td>
<td>.787</td>
<td>48.317</td>
<td>.000</td>
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</tr>
<tr>
<td>2 core entrepreneurship courses taken, Dummy (2)</td>
<td>1.288</td>
<td>71.734</td>
<td>.000</td>
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</tr>
<tr>
<td>≥3 core entrepreneurship courses taken, Dummy (3)</td>
<td>1.586</td>
<td>55.702</td>
<td>.000</td>
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</tr>
<tr>
<td>Wrote student business plan at Babson</td>
<td>.517</td>
<td>25.974</td>
<td>.000</td>
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<tr>
<td>Constant</td>
<td>-1.423</td>
<td>77.026</td>
<td>.000</td>
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</tbody>
</table>

Number of observations = 3344
Number of full-time entrepreneurs immediately at graduation = 251
-2 Log likelihood = 1538
Cox & Snell R-square = 0.113
Nagelkerke R-square = 0.254
Chi-square test:
P<0.000001

Number of observations = 3075
Number intending to start business = 1942
-2 Log likelihood = 2859
Cox & Snell R-square = 0.325
Nagelkerke R-square = 0.443
Chi-square test:
P<0.000001
## Table 2: Alumni Full-Time Startups and Alumni Intentions

<table>
<thead>
<tr>
<th>Model 3</th>
<th>Alumni became full-time entrepreneurs any time after graduation (H3a, H3b, H3c).</th>
<th>Model 4</th>
<th>Alumni still intending to become future entrepreneurs (H4a, H4b, H4c).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>B</strong></td>
<td><strong>Wald</strong></td>
<td><strong>Sig.</strong></td>
</tr>
<tr>
<td>Expected to be a future entrepreneur before enrolling at Babson</td>
<td>1.196</td>
<td>88.615</td>
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<tr>
<td>Founded full-time business before coming to Babson</td>
<td>3.512</td>
<td>201.385</td>
<td>.000</td>
</tr>
<tr>
<td>Parent entrepreneur</td>
<td>.146</td>
<td>1.508</td>
<td>.220</td>
</tr>
<tr>
<td>Gender, Female = 0, Male =1</td>
<td>.695</td>
<td>26.330</td>
<td>.000</td>
</tr>
<tr>
<td>Babson degree: BS = 0, Masters=1</td>
<td>-.159</td>
<td>1.398</td>
<td>.237</td>
</tr>
<tr>
<td>Student status: Part-time = 0, Full-time = 1</td>
<td>-.037</td>
<td>.061</td>
<td>.805</td>
</tr>
<tr>
<td>Graduated 2009-2005, Dummy</td>
<td>-2.180</td>
<td>121.191</td>
<td>.000</td>
</tr>
<tr>
<td>Graduated 2000-2004, Dummy</td>
<td>-1.215</td>
<td>43.719</td>
<td>.000</td>
</tr>
<tr>
<td>Graduated 1990-1994, Dummy</td>
<td>-.135</td>
<td>.565</td>
<td>.452</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>.043</td>
<td>.804</td>
</tr>
<tr>
<td>Age Squared</td>
<td></td>
<td>-.001</td>
<td>.910</td>
</tr>
<tr>
<td>Personal Income</td>
<td></td>
<td>-.088</td>
<td>.305</td>
</tr>
<tr>
<td>Career Dissatisfaction</td>
<td></td>
<td>.097</td>
<td>.517</td>
</tr>
<tr>
<td>Employed by Small Business</td>
<td></td>
<td>-.063</td>
<td>.531</td>
</tr>
<tr>
<td>Total number of core entrepreneurship courses taken, Dummy</td>
<td></td>
<td>29.095</td>
<td>.000</td>
</tr>
<tr>
<td>1 core entrepreneurship courses taken, Dummy</td>
<td></td>
<td>.018</td>
<td>.013</td>
</tr>
<tr>
<td>2 core entrepreneurship courses taken, Dummy</td>
<td></td>
<td>.502</td>
<td>.005</td>
</tr>
<tr>
<td>≥3 core entrepreneurship courses taken, Dummy</td>
<td></td>
<td>.867</td>
<td>.000</td>
</tr>
<tr>
<td>Wrote student business plan at Babson</td>
<td></td>
<td>-.048</td>
<td>.727</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td>-1.988</td>
<td>73.311</td>
</tr>
</tbody>
</table>

Number of observations = 3067
Number started full-time business any time after graduation = 557
-2 Log likelihood = 2165
Cox & Snell R-square = 0.214
Nagelkerke R-square = 0.350
Chi-square test: P<0.000001

Number of observations = 2382
Number intending to start business = 1254
-2 Log likelihood = 2655
Cox & Snell R-square = 0.236
Nagelkerke R-square = 0.315
Chi-square test: P<0.000001
Table 3. Summary of the significance of the B coefficients in the regressions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Students at graduation</th>
<th>Alumni after graduation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full-time entrepreneur</td>
<td>Intention to be an entrepreneur</td>
</tr>
<tr>
<td>1 core entrep’r’ship course</td>
<td>H1a 0.151</td>
<td>H2a 0.000</td>
</tr>
<tr>
<td>≥3 core entrep’r’ship courses</td>
<td>H1b 0.000</td>
<td>H2b 0.000</td>
</tr>
<tr>
<td>Wrote student business plan</td>
<td>H1c 0.001</td>
<td>H2c 0.000</td>
</tr>
<tr>
<td>Expected to be a future entrepreneur before enrolling at Babson</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Founded full-time business before coming to Babson</td>
<td>0.000</td>
<td>0.600</td>
</tr>
<tr>
<td>Parent entrepreneur</td>
<td>0.470</td>
<td>0.118</td>
</tr>
<tr>
<td>Gender, Female = 0, Male =1</td>
<td>0.008</td>
<td>0.000</td>
</tr>
<tr>
<td>Babson degree: BS = 0, Masters=1</td>
<td>0.084</td>
<td>0.160</td>
</tr>
<tr>
<td>Student status: Part-time = 0, Full-time = 1</td>
<td>0.180</td>
<td>0.022</td>
</tr>
<tr>
<td>Graduated 2009-2005, Dummy</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Graduated 2000-2004, Dummy</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Graduated 1995-1999, Dummy</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Graduated 1990-1994, Dummy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.410</td>
<td></td>
</tr>
<tr>
<td>Age Squared</td>
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</tr>
<tr>
<td>Personal Income</td>
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<td></td>
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<tr>
<td>Career Dissatisfaction</td>
<td></td>
<td></td>
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<tr>
<td>Employed by Small Business</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>