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Editor
Tennessee Tech University

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Ismet Anitsal
Editor
Tennessee Tech University

FACTORS INFLUENCING ENGINEERING STUDENTS' INTENTION TO PARTICIPATE IN ON-CAMPUS ENTREPRENEURIAL ACTIVITIES

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ABSTRACT

This study investigates factors that influence the intention of engineering students to participate in entrepreneurial activities during their university life. This is necessary in order to understand why some students lack interests in on-campus entrepreneurial activities. The results show that the students' intentions are significantly related to their attitude toward entrepreneurship, perceived feasibility, barriers and opportunity cost. Selecting and training potential entrepreneurial students to join those programs/activities based on their traits are also found important. The findings contribute to the research on entrepreneurial behaviors of students on campus and have implications for designing effective entrepreneurial programs and activities to foster student entrepreneurship.

Keywords: Intention to participate in on-campus entrepreneurial activities, engineering students

INTRODUCTION

Entrepreneurship is playing important roles in the long-term economical development and competitiveness of a region. Across the globe, growing numbers of universities are pursuing research in entrepreneurship and establishing education programs, courses, activities and services to promote entrepreneurial spirit and train entrepreneurs (Gray, 2006; Jones & English, 2004). The entrepreneurial activities/programs (business plan competitions, technology transfer and innovation projects, successful entrepreneur talks, and other entrepreneurship related activities) and services (innovation centers, entrepreneurship and consulting centers) implemented in campus are mainly directed to students as future entrepreneurs.

The idea of becoming an entrepreneur is increasingly attractive to students as it is considered as a valuable way of participating in the labor market without losing one's independence (Martinez, Mora, & Vila, 2007). Further, the desirability of self-employment is

also related to the raising unemployment rate (Reynolds, Miller and Makai, 1995; Reynolds, Storey & Westhead, 1994) and public policies (e.g. providing good infrastructure for new ventures, tax benefits, and incubation programs) on encouraging entrepreneurship and innovation industries (Lee et al., 2006). Besides, increasing disappointment with traditional occupations in large companies (Kolvereid, 1996) is another reason for the entrepreneurial phenomenon (Jackson & Vitberg, 1987). The work values related to self-employment (independence, challenge and self-realization) have become increasingly desirable (Luthje & Franke, 2003).

In order to design effective programs/services that stimulate entrepreneurial activities, yet is attractive to students, policy makers and educators have to know what factors are decisive in influencing students' intention to participate in the entrepreneurial activities. Therefore, the purpose of this study is to investigate the factors that influence the students' intention to participate in entrepreneurial activities when they are studying on campus. This study will contribute to the design of entrepreneurship programs/services aiming at fostering and assisting potential student entrepreneurs to create their own ventures. It focuses on entrepreneurship related activities on campus. Participating in these activities, such as business plan competitions, entrepreneurship workshops or campus incubation programs, is a possible preparatory work a student entrepreneur may undertake before he/she goes for the real world business (Ames, 1989; Kahrs, 1995; Maitland, 1996). Such activities may be classified as activities of a typical nascent entrepreneur who plans, assembles resources and recruits people to incorporate the company (Katz & Gartner, 1988). Furthermore, campus entrepreneurial programs or activities are learning opportunities for students. Participation in campus entrepreneurial activities will improve their knowledge and skills with enhanced desirability and feasibility (Peterman & Kennedy, 2003) and subsequently increase their intention and likelihood to explore an entrepreneurial career (Souitaris et al., 2007).

INTENTION-BASED MODELS

Intention is defined as a state of mind directing a person's attention and action towards a behavior, such as behaviors related to entrepreneurship (Bird, 1988). Social psychology offers robust and parsimonious models of behavioral intentions with considerable proven predictive value for many behaviors. The meta-analyses of Kim and Hunter (1993) have shown that intentions are a good predictor of behaviors (with 30% of variance explained), and attitudes effectively predict intentions (with 50% of variance). Two intention-based models have been identified most popular in entrepreneurship literature. They are Theory of Planned Behavior (TPB) (Ajzen, 1991) and Entrepreneurial Event (SEE) Model (Shapero, 1982). Both models have been proved robust and valid in predicting intentions to engage in entrepreneurial activities (Krueger et al., 2000).

In TPB, intention is determined by three factors, namely, attitude toward behavior (how favorable an appraisal the person has of the behavior), subjective norm (perceived social pressure

to perform the behavior), and perceived behavioral control (perceived ease or difficulty of performing the behavior) (Ajzen, 1991). In SEE, intention depends on perceived desirability (degree to which a person feels an attraction towards a given behavior), perceived feasibility (degree to which the person feels able to perform the behavior) and propensity to act (volitional aspects of intentions) (Shapero, 1982). The two models actually present a high level of mutual compatibility (Krueger et al., 2000). Perceived behavior control in TPB and perceived feasibility in SEE share a common concept associated with perceived self-efficacy (Bandura, 1986), which reflects the perceived ability to execute a target behavior (Ajzen, 1987). Moreover, TPB's other two attitude measures correspond to SEE's perceived desirability share the concept related to the willingness to carry out the behavior (e.g. entrepreneurship) (Krueger et al., 2000).

Considering their large compatibility, our work as shown in Figure 1, starts from an integration of these two models. The merits of the integration have been demonstrated in entrepreneurship studies. For example, Autio et al. (1997) and Henry, Hill, and Leitch (2003) studied the entrepreneurial intention of university students with their integrated models, combining TPB and SEE, as well as extending them to include other factors such as personal backgrounds. Their models were generally supported. Further, Linan (2004) developed a view of entrepreneurship education considering the integration of the two models and found supportive results. In the present study, the intention of students to participate in entrepreneurial activities in university is concerned. Behind this concern, students who join the entrepreneurial activities are assumed to be interested in entrepreneurship. That is, their intention toward entrepreneurship is intrinsically linked to their intention to participate entrepreneurial activities (e.g. business plan competition), which needs careful planning. It is hard to envision a planned behavior without intention to perform that behavior (Ajzen, 1975, 1991, 2005). Therefore, the intention models proved valid in predicting intentions to engage in entrepreneurial activities are suitable to be used in the present study to predict the intention of students to participate in entrepreneurial activities. This study confines the analysis to students' intention and behavior relating only to on-campus entrepreneurial activities (e.g. business plan competitions, entrepreneurship workshops/seminars, and incubation program, utilization of any university support for starting a business) which are typical preparation process of nascent entrepreneurs who assemble resources and recruit people to incorporate the company (Katz & Gartner, 1988).

HYPOTHESES AND CONCEPTUAL MODEL

The conceptual model of this study is shown in Figure 1. According to the intention-based models, participation in campus entrepreneurial activities is the result of a relevant intention (Ajzen, 1991; Bird, 1988). Attitude tends to take a big part of variance of behaviors (Ajzen & Fishbein, 1980; Ajzen & Madden, 1986) and many researchers have recognized and proved the importance of domain-specific attitudes in understanding entrepreneurial decisions (Atio et al., 1997; Davidsson, 1995; Kolveried, 1996; Robinson et al., 1991). Attitude toward

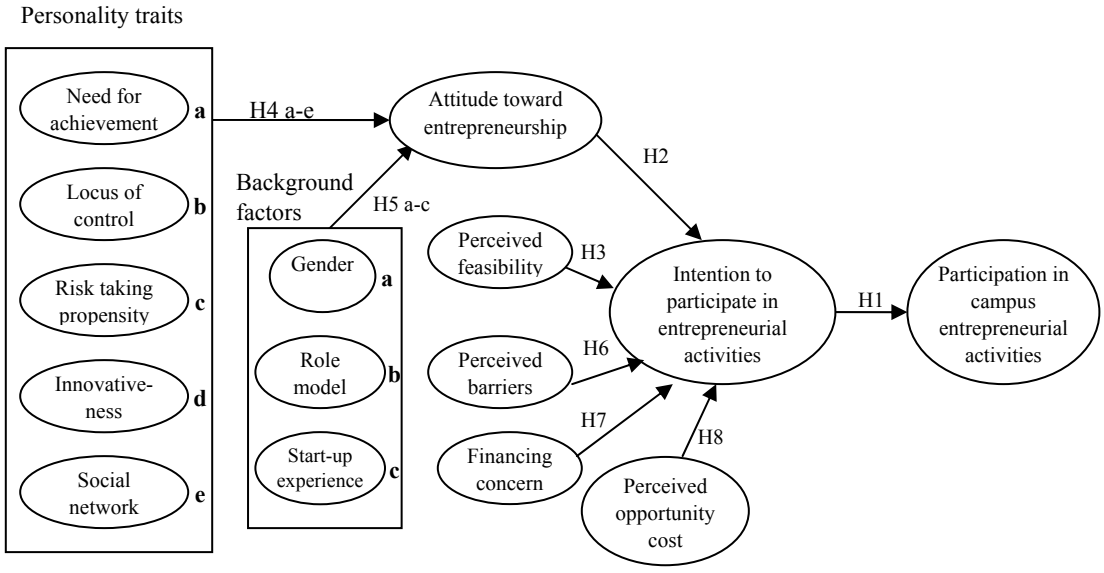
entrepreneurship, in the context of this study, reflects if the students have favorable or unfavorable perceptions about entrepreneurship (Ajze, 1991). If they have a positive attitude, they will show great interest in taking part in entrepreneurial activities in campus, which enables them to learn more about entrepreneurship and acquire practical experience. Perceived feasibility (perceived behavioral control) (Krueger, 1993; Krueger et al., 2000) is another important factor influencing the intention to engage in entrepreneurial activities (Krueger et al., 2000; Shapero, 1982). In this study, students who perceive high feasibility are more confident. They feel more capable to carry out entrepreneurial activities successfully and have strengthened intention to take part in these activities. Therefore, we have the following hypotheses:

H1 *Participation of engineering students in the on-campus entrepreneurial activities is related to their participating intentions.*

H2 *The intention of engineering students to participate in the on-campus entrepreneurial activities is related to their attitude toward entrepreneurship.*

H3 *The intention of engineering students to participate in the on-campus entrepreneurial activities is related to their perceived feasibility to carry out the activities successfully.*

Figure 1: The Conceptual Model



Our conceptual model also extends the intention model to personal level factors, such as personality traits and background factors. In the domain of entrepreneurship studies, the personal factors have been found significantly influence entrepreneurial attitude (Autio et al., 1997; Davisson, 1995; Kolvereid, 1996; Luthje & Franke, 2003). Although personality traits have been criticized for their weak direct relationship with entrepreneurial intention (Gartner, 1989, 1990; Robinson et al., 1991), they are important to the entrepreneurial process and decisions

(Brandstatter, 1997; Shaver & Scott, 1991). Certain personality traits have been well found to be important facilitators for entrepreneurial activities. They include need for achievement (Koh, 1996; Langan-Fox & Roth, 2005; McClelland, 1985), locus of control (Bonnett, 1991; Entrialgo et al., 2000; Rotter, 1966; Utsch & Rauch, 2000), risk-taking propensity (Brockhaus, 1980; Raab et al., 2005; Shaver & Scott, 1991; Stewart & Roth, 2001), innovativeness (Ho & Koh, 1992; Johnson, 1990; Koh, 1996), and social network (Aldrich & Zimmer, 1986; Hills, Lumpkin, & Singh,1997). Luthje and Franke (2003) who analyzed the causes of entrepreneurial intention among 512 engineering students found that personality traits indirectly influenced entrepreneurial intention through their effect on attitude. Further, certain personal background factors have been found to have consistent relationships with entrepreneurship (Autio et al., 1997; Stanworth et al., 1989; Tkachev & Kolvereid, 1999). For example, gender (de Wit & van Winden, 1989; Matthews & Moser, 1995; Reynold, 1995), role models (Davidsson, 1995; de Wit & van Winden, 1989), and related experience (Davidsson, 1995) have been shown to be related to people's attitude toward entrepreneurship. Therefore, in this study, it is reasonable to assume that personality traits (need for achievement, locus of control, risk-taking propensity, innovativeness and social network) and background factors (gender, role model, start-up experience) are related to the attitude of students toward entrepreneurship.

H4a-e *(a) Need for achievement; (b) Locus of control; (c) Risk-taking propensity; (d) Innovativeness; (e) Social network is related to the attitude of students toward entrepreneurship.*

H5a-c *(a) Gender; (b) Role model; (c) Start-up experience is related to the attitude of students toward entrepreneurship*

In addition to personal factors, external factors (contextual factors or environmental factors) are highly concerned by recent research on entrepreneurial intention (Autio et al., 1997; Franke & Luthje, 2004; Luthje & Franke, 2003). The empirical study of Luthje and Franke (2003) has shown that perception of external factors (perceived contextual barriers and support) directly affect the entrepreneurial intention of students. Further, in another study of the two authors, they investigated the factors that lead to different levels of entrepreneurial intention across student populations and found that variance in the intentions is basically explained by the significantly different entrepreneurial environments the students perceived (Franke & Luthje, 2004). In the present study, the focus is the intention of students to participate in the on-campus entrepreneurial activities, which is intrinsically related to their entrepreneurial intention, and thus it is assumed that external factors also exert an impact on the student's participation intention of entrepreneurial activities on campus. Our conceptual model proposes a direct impact of external factors, such as perceived barriers, financing concern, and perceived opportunity cost on the intention of students toward participating in entrepreneurial activities on campus. Lack of business ideas and calibre (Fiet, 2001) and entrepreneurial skills and knowledge (Fiet, 2001; Hood and Young, 1993) are salient barriers to entrepreneurship perceived by students, especially

engineering students who are usually short of business training and are less alert in their ability to create or respond to entrepreneurial opportunities (Craig & Johnson, 2006). Financing concern (Fiet, 2001) is one of the important factors determining the entrepreneurial intentions. Financing concern (Fiet, 2001) inherently influences the entrepreneurial decisions, as it determines the capital-"soft infrastructure" to support entrepreneurship and business formation (George & Prabhu, 2003). For on campus engineering students, this is particularly a big concern, such as how to obtain financial support, how to manage finance and cash issues, and whether they will earn money from the entrepreneurial endeavor. Thus, financing concern is considered as an important external factor that affects the students' intention to participate in the entrepreneurial activities. Lastly, opportunity cost is considered. For the students on campus, academic studies appear to be most important. The entrepreneurial activities (e.g. business plan competition) usually demand a lot of effort and time (e.g. several months) on careful planning and active participation. The students may worry that they need to sacrifice much time for study and other activities if they join the entrepreneurial activities. That relates to opportunity cost the students perceive. Taking into account the external factors, we formulate the following hypotheses:

H6 *Intention of students to participate in the on-campus entrepreneurial activities is related to their perceived barriers in these activities.*

H7 *Intention of students to participate in the on-campus entrepreneurial activities is related to their financing concerns.*

H8 *Intention of students to participate in the on-campus entrepreneurial activities is related to their perceived opportunity costs for participating in these activities.*

METHODS

Survey and Participants

A survey was conducted in a university in Hong Kong. An on-line questionnaire was designed and an invitation was sent to students in the engineering department. Students were asked to complete the survey within 10 days, during which 2 reminding emails were sent to follow up for reply. Incentives of lucky draw for a fashionable gadget "iPod Touch" for completed questionnaires were used. Totally 155 completed questionnaires were received with an 82% of usable response rate. Of the participants, 127 were male engineering students and 28 were females. About 25% of the participants reported that they had participated in the entrepreneurial activities, while 75% reported that they had not participated before. Sixty percent of the respondents were undergraduate students, while 40% were postgraduates. Most of the students (65%) were in year 1 or 2, while 35% were in their final year of study.

Design of the Questionnaire

The questionnaire, as shown in the Appendix, was developed based on the conceptual model in Figure 1. Eight sets of variables were developed: intention to participate in on-campus entrepreneurial activities, attitude toward entrepreneurship, perceived feasibility, perceived barriers, financing concern, perceived opportunity cost, personality traits (need for achievement, locus of control, risk-taking propensity, innovativeness, and social network), and background factors (gender, role model, and start-up experience). All variables, except for the background factors, were measured in a 7-point Likert Scale. Respondents were instructed to indicate the extent to which they agreed or disagreed with each statement with 1 representing strongly disagree to 7 representing strongly agree.

The construct of intention in this study is different from the measure of entrepreneurial intention (Autio et al., 2001; Kolvereid, 1996). The statements were used to assess the intention of the engineering students to participate in on-campus entrepreneurial activities, which include business plan competitions, business incubation program, entrepreneurship training, workshops and utilization of university services to explore entrepreneurial activities. These activities are common preparation taken by a nascent student entrepreneur who wants to explore starting a business. The construct was thus based on 5 statements. The Cronbach's Alpha for this construct was 0.90 (n=155, standardized scores used), as shown in Table 1.

Table 1: Validity And Reliability Of The Constructs

Item	INT	ATT	PFE	PBA	FIN	POC	NACH	LOC	RT	IN	SN
1	0.78	0.90	#	0.73	0.71	0.74	0.68	0.54	0.59	0.66	0.78
2	0.80	0.65	0.84	0.68	0.79	0.77	0.75	#	0.54	0.80	0.81
3	0.87	0.91	0.84	0.64	#	0.57	0.82	0.71	0.78	0.82	0.86
4	0.86	0.77	#	0.81	0.72	0.79	0.79	0.68	0.74	0.80	0.84
5	0.89	0.89	0.73	0.55	#	0.84	0.82	0.79	0.72	0.79	0.80
6	-	0.92	#	0.67	0.77	#	0.78	0.78	0.80	0.77	0.78
7	-	#	0.85	0.79	-	-	0.81	0.76	0.79	0.70	0.71
8	-	0.82	0.53	0.72	-	-	0.81	0.77	0.81	0.64	0.74
9	-	-	-	0.79	-	-	-	-	-	-	0.80
Total	3.54	4.95	2.93	4.56	2.23	2.81	4.89	3.67	4.23	4.50	5.64
% Variance	70.80	70.67	58.69	50.71	55.69	56.22	61.11	52.37	52.89	56.25	62.63
Cronbach's alpha	0.90	0.93	0.81	0.88	0.73	0.80	0.91	0.84	0.87	0.89	0.93

 # deleted items

INT: intention to participate in entrepreneurial activities; ATT: attitude toward entrepreneurship; PFE: perceived feasibility; PBA: perceived barriers; FIN: financing concern; POC: perceived opportunity cost; NACH: need for achievement; LOC: locus of control; RT: risk-taking propensity; IN: innovativeness;SN: social network

Attitude toward entrepreneurship was measured by 8 statements, which were developed based on the items used by Davisson (1995) with modifications to fit the purpose of this study. The statements cover topics like attitudes towards building a business, ideal career and the perceived image of a successful entrepreneur. The Cronbach's Alpha for this construct was 0.93 (n=155, standardized scores used).

Statements for the construct of perceived feasibility were developed based on the items used by Peterman and Kennedy (2003) with modification to assess the perceived capability of engineering students to perform the entrepreneurial activities. Eight construct statements were developed to measure how confident the students were in their skills, knowledge, and calibres in winning in a business plan competition, or making any success in exploring entrepreneurship on campus. The Cronbach's Alpha was 0.81.

Following the aim of this study, perceived barrier was defined specific to the barriers or difficulties perceived by the engineering students to participate in the campus entrepreneurial activities. Construct statements (9 items) were designed to reflect the degree to which the students perceived barriers to participate the activities, such as lack of skill or knowledge, lack of business idea, lack of partners, required time and effort, incompatible personal characters, and any perceived difficulties adverse to success. The Cronbach's Alpha for this construct was 0.88.

The construct of financing concern refers to the concerns of engineering students about their financing issues regarding initiating entrepreneurial activities. Six statements were developed to reflect the worries of the students about if they could obtain capital for a new business or if they could earn money finally while they had to support their family & their own living, or they needed to repay their student loans. These considerations are pragmatic to the students and may affect their intention to engage in entrepreneurial activities. The Cronbach's Alpha for this construct was 0.73.

Perceived opportunity cost, in this study, relates to the evaluation of the students regarding participation in the campus entrepreneurial activities which demands a lot of time and effort. Six statements for this construct were used to gauge the student's view on how entrepreneurial activities might affect their other activities, such as certain risk in academic score, graduation date, and time for other activities. The Cronbach's Alpha for this construct was 0.80.

Personality traits involve 5 variables. Need for achievement, locus of control, risk-taking propensity, and innovativeness were measured by 8 statements respectively. Social network was measured by 9 statements. Need for achievement was developed based on the items used by King (1985) and the Cronbach's Alpha was 0.91. Locus of control was developed based on Rotter's (1966) scale with a Cronbach's Alpha of 0.84. Items for risk taking propensity, innovativeness, and social network were developed based on the items used in Jackson Personality Inventory (Jackson, 1994). The values of Cronbach's Alpha for these three variables were 0.87, 0.89, and 0.93 respectively.

It can be seen from Table 1, factor analysis with principal components extraction showed that for each construct, the items were converged into one factor with high factorial weights (>0.5) explaining over 50 percent of variance. The values of Cronbach's alpha (greater than 0.7) also showed a good internal reliability of the constructs (Nunnaly, 1978). Thus, the variables used in this study were valid and reliable.

Background information was also collected. Referring to the items used in Davidsson (1995), the following background information was included: gender, role models, and start-up experience. In order to develop a more detailed profile to the students, additional background data were collected, such as degree the students were studying and time to graduation. All the background factors were measured in a nominal scale.

Finally, the actual participation of the students in the on-campus entrepreneurial activities was measured by 4 items. The students were asked if they had participated in business plan competitions, other entrepreneurship related training programs or activities, or making use of resources/supporting services offered by the institute. Such dichotomous measurement was commonly used in entrepreneurial literature and has been applied by the studies of Krueger et al. (2000), Peterman and Kennedy (2003) and Souitaris et al. (2007).

RESULTS

The proposed conceptual model was tested using SPSS 15.0. To test hypothesis 1 depicting the relationship between intention to participate the entrepreneurial activities and actual participation, the mean values of intention to participate in entrepreneurial activities on campus of two subgroups were compared. One group was the students who had never participated in any campus entrepreneurial activities and the other group was those who had participated in any one or more of the entrepreneurial activities. The ANOVA results show that the two subgroups were significantly different (F-value =6.19, df=1, $p<0.05$). That is, intention to participate and actual participation is related. Thus, hypothesis 1 was accepted.

Hypothesis 2, 3, 6, 7, & 8 were tested by Pearson correlation analysis and the results are shown in Table 2. It can be seen that except financing concern, all variables were significantly related to participation intention of students to entrepreneurial activities on campus. That is, the intention of the students to join the campus entrepreneurial activities is related to their attitude toward entrepreneurship, perceived feasibility, barriers, and opportunity cost. Further, perceived barriers (-0.34, $p<0.01$) and opportunity cost (-0.35, $p<0.01$) respectively had a negative relation to participation intention. That is, the higher level of barrier or difficulty and opportunity cost or loss the engineering student perceived, the lower their intention to engage in entrepreneurial activities. Thus, Hypothesis 2, 3, 6, 7, & 8 were accepted. Hypothesis 7 was rejected indicating that financing concern was not a significant factor to influence the students' intention to participate the campus entrepreneurial activities.

Table 2: Effects of Attitude, Perceived Feasibility, Barriers, Financing Concern and Opportunity Cost on Participation Intention			
Hypotheses	Variables	Coefficients	Result
H2	Attitude	0.60(**)	Accepted
H3	Perceived feasibility	0.44(**)	Accepted
H6	Perceived barriers	-0.34(**)	Accepted
H7	Financing concern	0.01	Rejected
H8	Perceived opportunity cost	-0.35(**)	Accepted
(**) Correlation is significant at the 0.01 level (2-tailed)			

The impact of personal level factors (personality traits and backgrounds) is shown in Table 3 and Table 4. It can be seen (in Table 3) that need for achievement, locus of control, risk-taking propensity, innovativeness and social network were significantly related to attitude toward entrepreneurship ($p<0.01$). Thus, Hypotheses 4a- 4e were accepted. The positive relations showed that the personality traits of the students facilitated their attitude toward entrepreneurship.

Table 3: Effect of Personality Traits on Attitude toward Entrepreneurship			
Hypotheses	Variables	Coefficients	Result
H4a	Need for achievement	0.51(**)	Accepted
H4b	Locus of control	0.40(**)	Accepted
H4c	Risk-taking propensity	0.48(**)	Accepted
H4d	Innovativeness	0.48(**)	Accepted
H4e	Social network	0.41(**)	Accepted
(**) Correlation is significant at the 0.01 level (2-tailed)			

Table 4 shows the impact of background factors on attitude toward entrepreneurship. None of the background factors of the students was significantly related to their entrepreneurial attitude. That is, no significant difference between male and female students regarding their entrepreneurial attitude. Those who had entrepreneur family and who did not also had similar attitude toward entrepreneurship. In addition, the start-up experience of the students did not facilitate their entrepreneurial attitude. Thus, hypotheses H5a-5c were rejected.

In summary, the results of this study show that whether the engineering students will join the entrepreneurial activities offered by the institute depends on their intention to participate in these activities. Such participating intention is further related to the students' attitude toward entrepreneurship, their perceived feasibility, barriers, and opportunity cost. Moreover, the entrepreneurial attitude of the students is related to their personality traits such as need for achievement, locus of control, risk-taking propensity, innovativeness, and social network. Background factors of the students and their financing concern are not found significant in the conceptual model.

Table 4: Effect of Background Factors on Attitude toward Entrepreneurship							
Hypothesis	Variables	Sum of Squares	df	Mean Square	F	Sig.	Result
H5a	Gender	2.24	1	2.24	2.26	0.14	Rejected
H5b	Role model	0.15	1	0.15	0.15	0.70	Rejected
H5c	Start-up experience	1.32	1	1.32	1.32	0.25	Rejected

DISCUSSIONS AND IMPLICATIONS

This study provides empirical evidence that the combined intention-based model successfully explains the actual behavior of participating in on-campus entrepreneurial activities. It shows that participation in the entrepreneurial activities is significantly related to the students' intention to participate, which is influenced by attitude toward entrepreneurship and perceived feasibility. These confirm the studies on intention models (Ajzen, 1991; Shapero, 1982) and are consistent with the findings of previous empirical studies on entrepreneurship (Kolveried, 1996; Krueger et al., 2000).

Different from the existing research on the intention of students to create a new business (Souitaris, et al., 2007; Tkachev & Kolvereid, 1999), this study focuses on the intention of students to participate in on-campus entrepreneurial activities and the consequent behavior of the intention, namely, the actual participation in these activities. Most researchers found it very difficult to correlate the intention model with the eventual behavior of pursuing an entrepreneurial career, as there is always time lag between intention and behavior. A nascent entrepreneur may spend a few years to prepare for his/her eventual launch of innovative business. The resources required for a longitudinal study and tracking of such cases are prohibitively large. This study adopted a less ambitious and pragmatic approach. The study was used to correlate the intention with campus behaviors. The time lag is short enough to be studied. It is understood that on-campus entrepreneurial activities may not confirm the student's entrepreneurial career choice. In the perspective of education in entrepreneurship, the measure of participation in on-campus entrepreneurial activities, to a certain extent, reflects the students' willingness to learn and explore more about entrepreneurship. As students experience and explore more about the subject risky career, their attitudes towards entrepreneurship may then be changed. In the perspective of picking a career choice, maintaining student's participation to take in knowledge of entrepreneurship is to prevent such career choice being circumscribed (Gottfredson, 2002) from their lists of feasible choices. In both perspectives, the entrepreneurial intention of students will be increased when they participate more in related campus activities.

Further, the results are also in line with the study by Luthje and Franke (2003) that personality traits (need for achievement, locus of control, risk-taking propensity, innovativeness, and social network) and perceived external factors (perceived barriers and opportunity cost) play a significant role in the entrepreneurial intention model of engineering students. The findings

indicate that the decision of engineering students on engaging in the on-campus entrepreneurial activities is to some extent related to their personality traits. This study suggests that those who are in charge of the institute entrepreneurial programs or services may select the right students to join the programs and activities, particularly those with a high achievement motivation, an internal locus of control, a risk taking propensity, and those who are creative and sociable.

The perception of barriers (such as skills, knowledge and entrepreneurial ideas) and perceived opportunity cost (such as the influence on academic studies, graduation date and other activities) do influence students' intention to join the on-campus entrepreneurial activities. These perceptions can be changed by relevant education and training. Such training and education programs assist students to remove their perceived barriers and difficulties, which are adverse to participating in the entrepreneurial activities. In addition, the image of entrepreneurship as a carrier alternative as well as the entrepreneurial culture should be intensified and supported in the university environment. These approaches may motivate more students to join the on-campus entrepreneurial activities.

Next, attitude toward entrepreneurship had the highest relation (0.60, $p<0.01$) with the intention of engineering students to participate in the on-campus entrepreneurial activities. It indicates that entrepreneurial attitude is more important than other factors in forming the participation intention. In order to develop or enhance a favorable entrepreneurial attitude, those who are in charge of the entrepreneurial programs and activities may convey messages or information about the campus entrepreneurial activities to students through all possible channels, such as sharing forums by successful graduate entrepreneurs and student innovation workshops, not limited to formal entrepreneurship branded events (e.g. business plan competition). These activities are relatively casual, simple, and easy to attract students. These may catch more attention of students on the campus entrepreneurial activities and help to raise their interest in these activities.

It is noted that financing concern of the students was found insignificant to intention to participate in the entrepreneurial activities. One possible explanation for this is that the entrepreneurial programs and activities offered on campus are normally supported by the university and sponsored by the government. The students believed that sufficient funding or loan should be provided and thus they did not worry much. The financing factor, compared with other barriers (skills, knowledge & idea generation) and opportunity cost, was less important in making a decision on participating in the entrepreneurial activities. It may also be due to the fact that this study is only about on-campus entrepreneurial activities while previous are about future entrepreneurial behaviors. This needs more research to distinguish.

Finally, the background factors of gender, role model and start-up experience were found insignificant in the conceptual model. The result is different from the previous studies (Davidsson, 1995; Wang & Wong, 2004). This could be because of the limited data set of this study. For example, over 80% (127) of the respondents were male engineering students, less than

20% (28) were females. Bias could exist and affect the comparison results. Considering these limitations, further studies should be conducted to test the proposed model with a larger sample with males and females evenly distributed, in order to obtain more convincing results.

CONCLUSION

The present study investigates the relationship between students' entrepreneurial intention and participation in campus entrepreneurial activities. It is perhaps the first of this kind. It identifies the critical factors related to the students' decision on engaging in the campus entrepreneurial activities. The results provide important references for future research on entrepreneurial behaviors of students on campus and offer valuable advice on designing an effective entrepreneurship programs to nurture students' entrepreneurial intention by removing their perceived barriers and difficulties which are adverse to their entrepreneurial initiates.

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APPENDIX -QUESTIONNAIRE

1. Personal background

1.1. Gender: Male ___ Female ___

1.2. Degree studying: undergrad ___ Master ___ Doctorate ___

Time to graduation: 1 __ 2__3__4__5__ 6 ___ years

Someone in my family is an entrepreneur ___

No one in my family is an entrepreneur ___

I have worked in a start-up company before. Yes ___ No ___

2. Attitude toward entrepreneurship and personality

Please let us know how you agree or disagree to the statements below. If you strongly agree, tick box 7; if you strongly disagree, tick box 1.

How do you agree or disagree with the statement?		Strongly disagree--Strongly agree						
2.1	I always want to set up and down a business.	1	2	3	4	5	6	7
2.2	I admire those who can build a successful business from innovative technologies.	1	2	3	4	5	6	7
2.3	To be an entrepreneur is my ideal career.	1	2	3	4	5	6	7
2.4	I do not want to work as an employee following instructions of others.	1	2	3	4	5	6	7
2.5	The most satisfactory career is running one's own business.	1	2	3	4	5	6	7
2.6	Establishing my own business is one of my major personal goals.	1	2	3	4	5	6	7
2.7	I prefer working in a large corporation with a steady job with good prospects..	1	2	3	4	5	6	7
2.8	Run-my-own-business is a job I do not want to miss during my career life.	1	2	3	4	5	6	7
2.9	My aim in life is to make a long list of successful achievements.	1	2	3	4	5	6	7
2.10	I like to do my best in whatever work I undertake.	1	2	3	4	5	6	7
2.11	I frequently desire to do something of great significance.	1	2	3	4	5	6	7
2.12	I often desire to be successful in doing something very significant.	1	2	3	4	5	6	7
2.13	For pleasure and happiness one must enrich the record of one's achievements.	1	2	3	4	5	6	7
2.14	I have a great need for performance feedback.	1	2	3	4	5	6	7
2.15	I am happiest when I am successful in work.	1	2	3	4	5	6	7
2.16	Achievements motivate me more than anything else.	1	2	3	4	5	6	7
2.17	I will sometimes stretch out on a limb to get the things I want.	1	2	3	4	5	6	7
2.18	I would enjoy trying every means to make my way into an exclusive club or private party.	1	2	3	4	5	6	7
2.19	If the possible reward will be very high, I would not hesitate putting my money into a new business that may fail.	1	2	3	4	5	6	7
2.20	People have told me that I seem to enjoy taking chances.	1	2	3	4	5	6	7
2.21	The thought of investing into stock excites me.	1	2	3	4	5	6	7
2.22	I enjoy taking risks.	1	2	3	4	5	6	7
2.23	Taking risks does not bother me if the gains involved are high.	1	2	3	4	5	6	7
2.24	I would enjoy the challenge of a project that could mean either a promotion or loss of job.	1	2	3	4	5	6	7
2.25	Whether or not I get to be a leader depends mostly on my ability.	1	2	3	4	5	6	7
2.26	Whether or not I get into a car accident depends mostly on how good a driver I am.	1	2	3	4	5	6	7
2.27	When I make plans, I am almost certain to make them work.	1	2	3	4	5	6	7
2.28	How many friends I have depends on how nice I treat people.	1	2	3	4	5	6	7

How do you agree or disagree with the statement?		Strongly disagree--Strongly agree						
2.29	I can pretty much determine what will happen in my life.	1	2	3	4	5	6	7
2.30	I am usually able to protect my personal interest.	1	2	3	4	5	6	7
2.31	When I get what I want, it is usually because I work hard for it.	1	2	3	4	5	6	7
2.32	My life is determined by my own action.	1	2	3	4	5	6	7
2.33	I prefer work that requires original thinking.	1	2	3	4	5	6	7
2.34	I am always seeking new ways to look at things.	1	2	3	4	5	6	7
2.35	Original ideas have occurred to me at almost any time of the day.	1	2	3	4	5	6	7
2.36	I enjoy thinking of original plans on which to work.	1	2	3	4	5	6	7
2.37	I often surprise people with my novel ideas.	1	2	3	4	5	6	7
2.38	People often ask me for help in creative activities.	1	2	3	4	5	6	7
2.39	I hope to develop new techniques in my field of work.	1	2	3	4	5	6	7
2.40	I like to experiment with various ways of doing the same thing.	1	2	3	4	5	6	7
2.41	I have contacts with people in various fields.	1	2	3	4	5	6	7
2.42	I can find people who can provide various information I need.	1	2	3	4	5	6	7
2.43	I am able to talk intelligently to people in a wide variety of occupations.	1	2	3	4	5	6	7
2.44	I can strike up a conversation with someone if I want.	1	2	3	4	5	6	7
2.45	It is not difficult for me to state my opinion in front of a group.	1	2	3	4	5	6	7
2.46	I am pretty good at planning and organizing activities to achieve my goal.	1	2	3	4	5	6	7
2.47	I can find partners and work with them for common goals.	1	2	3	4	5	6	7
2.48	When working with a group, I can personally influence the results.	1	2	3	4	5	6	7
2.49	I can cheer people up even in the situation of failures	1	2	3	4	5	6	7

3. Financing concern

Please let us know how you agree or disagree to the statements below. If you strongly agree, tick box 7; if you strongly disagree, tick box 1.

How do you agree or disagree with the statement?		Strongly disagree--Strongly agree						
3.1.	I can earn money from the campus entrepreneurial activities.	1	2	3	4	5	6	7
3.2.	I need to support my family for the coming few years.	1	2	3	4	5	6	7
3.3.	I do need income to support my university study.	1	2	3	4	5	6	7
3.4.	I need to spare a lot of my time for part-time job in order to support my current living.	1	2	3	4	5	6	7
3.5.	I need to earn savings for further studies.	1	2	3	4	5	6	7
3.6.	The capital for entrepreneurial activities is a burden to me.	1	2	3	4	5	6	7

4. Perceived opportunity cost

Please let us know how you agree or disagree to the statements below. If you strongly agree, tick box 7; if you strongly disagree, tick box 1.

How do you agree or disagree with the statement?		Strongly disagree--Strongly agree						
4.1.	The time effort required for entrepreneurial programs or activities is not too much. I can spare ample time to cover it without affecting my current campus activities.	1	2	3	4	5	6	7
4.2.	I have a very busy schedule. I cannot participate in entrepreneurial activities without giving up some of my favourite or important activities (such as	1	2	3	4	5	6	7

How do you agree or disagree with the statement?		Strongly disagree--Strongly agree						
	coursework, studying, sports, part-time, or making friends)							
4.3.	Entrepreneurial programs and activities are very demanding. I may have to delay my graduation date if I participate in a serious manner.	1	2	3	4	5	6	7
4.4.	I am risking my academic score if I spend too much time on entrepreneurial program.	1	2	3	4	5	6	7
4.5.	I can manage my time. Entrepreneurial activities will not affect my other campus activities.	1	2	3	4	5	6	7
4.6.	It is easier for me to win in a business plan competition than to win in others, such as sports or academic awards.	1	2	3	4	5	6	7

5. Perceived barriers

Please let us know how you agree or disagree to the statements below. If you strongly agree, tick box 7; if you strongly disagree, tick box 1.

How do you agree or disagree with the statement?		Strongly disagree--Strongly agree						
5.1.	I do not have the skills and knowledge to participate in any entrepreneurial programs or activities.	1	2	3	4	5	6	7
5.2.	I cannot identify any technology opportunity that is worth pursing in campus.	1	2	3	4	5	6	7
5.3.	I cannot assemble a complete team for entrepreneurial activities. All my friends are not knowledgeable in business.	1	2	3	4	5	6	7
5.4.	Entrepreneurial programs and activities are very difficult for me. I do not think I can make any success out of them.	1	2	3	4	5	6	7
5.5.	It will take a long time and great effort before I can accomplish any significant result from entrepreneurial activities.	1	2	3	4	5	6	7
5.6.	I do not have entrepreneurial ideas.	1	2	3	4	5	6	7
5.7.	I am not social enough to be successful in any entrepreneurial activity.	1	2	3	4	5	6	7
5.8.	My presentation and communication skills are not good enough for the activities.	1	2	3	4	5	6	7
5.9.	My character may not be suitable for the program.	1	2	3	4	5	6	7

6. Perceived feasibility

Please let us know how you agree or disagree to the statements below. If you strongly agree, tick box 7; if you strongly disagree, tick box 1.

How do you agree or disagree with the statement?		Strongly disagree--Strongly agree						
6.1.	I am sure of myself in performing the on-campus entrepreneurial activities.	1	2	3	4	5	6	7
6.2.	If I participate in the on-campus entrepreneurial activities, the chances of success would be very high.	1	2	3	4	5	6	7
6.3.	It is easy for me to carry out the on-campus entrepreneurial activities.	1	2	3	4	5	6	7
6.4.	I believe in myself in performing the on-campus entrepreneurial activities.	1	2	3	4	5	6	7
6.5.	I can expand my social network to students in different faculties, and to the business community, if I participate in the entrepreneurial activities.	1	2	3	4	5	6	7
6.6.	I know enough to participate in the on-campus entrepreneurial activities.	1	2	3	4	5	6	7
6.7.	If I participate in the on-campus entrepreneurial activities, I would be ready to work hard.	1	2	3	4	5	6	7
6.8.	The support provided by the University will be very useful for me to carry out the entrepreneurial activities successfully.	1	2	3	4	5	6	7

7. Intention to participate in campus entrepreneurial programs

Please let us know how you agree or disagree to the statements below. If you strongly agree, tick box 7; if you strongly disagree, tick box 1.

How do you agree or disagree with the statement?		Strongly disagree--Strongly agree						
7.1.	I like to participate in university-organized or public business plan competitions.	1	2	3	4	5	6	7
7.2.	I like to attend the seminars, talks, workshops or mixer-parties relating to entrepreneurship.	1	2	3	4	5	6	7
7.3.	I like to enrol in campus entrepreneurship training programs.	1	2	3	4	5	6	7
7.4.	I want to seek university help to start my own business.	1	2	3	4	5	6	7
7.5.	I like to contact university units to seek help in exploring founding my own business.	1	2	3	4	5	6	7

8. Participation in on-campus activities related to entrepreneurship

Have you participated in any business plan competitions?

Answer: YES _____ NO _____

Have you enrolled in an on-campus entrepreneurial training programs or activities (e.g. innovation projects, successful entrepreneur talks)?

Answer: YES _____ NO _____

Have you make use of any university's help to start my own business?

Answer: YES _____ NO _____

Have you contacted any university department for assistance in establishing or to explore the feasibility of establishing your own business?

Answer: YES _____ NO _____

TRENDS IN THE MARKET FOR ENTREPRENEURSHIP FACULTY FROM 1989-2010

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ABSTRACT

The purpose of this article is to educate schools and candidates about opportunities available for employment within the field of entrepreneurship in higher education. Data is provided from June, 1989 through June, 2010 on advertised candidates and positions throughout the world. The article examines the trends over the past 21 years with a primary focus on how the current economic crisis is affecting the job environment. The findings of this study show that the field has matured in regards to tenure track and non tenure track positions. Implications and recommended strategies are discussed for both candidates and school administrators.

INTRODUCTION

The purpose of this article is to examine what affect the economic crisis from 2007-2009 has had on the job market for entrepreneurship faculty. More specifically, the research question that will be answered for this study will be: What affect has the economic crisis of 2007-2009 had on the job market (positions at Schools of Business and Management and candidates) in the field of entrepreneurship? The results of this study are critical to the future development and legitimacy of the field of entrepreneurship.

ECONOMIC CRISIS 2007-2009

The economic crisis of 2007-2009 will go down as the second worst economic catastrophe since the Great Depression in the 1930's. The Standard and Poor's 500 (S&P 500), one of the most popular indicators of the U.S. economy, had dropped to an intra-day low at 666.79 on March 6, 2009 from an intra-day high of 1576.09 on October 11, 2007 for a collapse of 57.7% (S&P 500 Index, 2009). World-wide stocks had decreased on average by approximately 60%. This was the second worst stock market crash in the history of the U.S. Not since the Great Depression had we seen a crash of this magnitude where the stock market dropped 89% from 1930 to 1932. During that period the stock market did not fully recover until 1954, 22 years later.

The economy was dealing with a triple whammy; a drop off in consumer spending, the housing bust, and the subprime financial disaster (over leveraged firms, which eventually lead to the collapse of Bear Stearns, the first Wall Street investment bank to fail since the Great Depression) (Finkle, forthcoming).

Other depressed global economic indicators included the collapse of the auto industry (bankruptcy of General Motors), the significant increase in unemployment rates, pay cuts, the elimination of pension and health care benefits, deflation, etc. Shanty towns had popped up all over the U.S.; something that the country had not seen since the Great Depression.
Unemployment in the U.S. surpassed 9 percent in May, 2009 for the first time in more than 25 years, underscoring forecasts that the economy will be slow to pull out of the worst recession in half a century (Chandra, 2009).

People across the world were in total shock and disbelief. In the U.S., home values and retirement accounts were evaporating. The Case-Shiller index, an index of the average price of residential housing for the top 20 cities in the U.S., fell 19% during the first three months of 2009. The index plummeted 32.2% from its peak in July 2006 and had been down every month for 32 months (Christie, 2009).

Whitney Tilson (2009), founder of the hedge fund T2 Partners and author of the recently published book called *More Mortgage Meltdown*, predicted the crisis in December 2007. He stated, "We are going through the biggest asset bubble in history and it is going to take years to unwind. We are in the seventh inning of U.S. residential housing price declines. If you include losses and write-downs, we are only one-half of the way through the residential crisis. When looking at the totality of the housing crisis (including commercial real estate, Jumbo prime, prime, and HELOC loans), we are only one-third of the way through the entire real estate bubble."

In early 2009, U.S. retirement accounts also dropped by an average of 40% or $3.4 trillion (Brandon, 2009). It was one of the most disheartening times the world had ever seen. Many U.S. retirees saw their pensions cut in half and many were forced to go back to work or rely on their families to support them.

To combat the global economic problems, countries around the world used stimulus programs to boost their economies. In the U.S., several programs were created. The most notable program was the American Recovery and Reinvestment Act of 2009, which was in the process of stimulating the economy with $787 billion. The program was designed to assist U.S. citizens with lower taxes and tax credits, an increase in unemployment and social welfare benefits, and an increase in spending in education, health care, infrastructure, and energy (Internal Revenue Service, 2009). The program combined with other stimulus packages assisted in the recovery of the U.S. economy where the stock market gained almost 80% from its lows on March, 2009 through April, 2010.

ECONOMIC CRISIS AND ACADEMIA

Academia has also been hit by the economic crisis. Endowments have been hit hard losing an average of 18.7% between July 1, 2008 and June 30, 2009. The University of Pennsylvania, one of the best-performing endowments during the crisis, lost only 16.8% in fiscal 2009, about half of the performance of Harvard and Yale (Ryder, 2010).

Schools have also been hit hard by a loss of state tax revenue. A record number of foreclosures have contributed to a significant decrease in state tax revenues all over the U.S. Additionally, business and individuals are not paying as much taxes. Furthermore, companies have laid off millions of employees and unemployment remains extremely high.

College leaders are worried about what comes next. The billions of dollars in federal stimulus aid to plug shortfalls in state education budgets have helped to limit the damage, but the money has not prevented all of the cuts to college budgets. Most states spent the bulk of the stimulus money they received for education on elementary and secondary schools, and roughly 20 percent on public colleges. In one state, Wisconsin, none of that federal aid went to higher education. In California, officials estimated that appropriations for public colleges in the 2010 fiscal year were 13 percent below the 2008 amount even after including $663-million in stimulus money (Kelderman, 2009). It may get worse for California as they were projected to have a budget shortfall of $19.9 billion in 2010 (Office of the Governor, 2010).

Overall, schools are hurting financially. Furthermore, students are hurting as their families' wealth has been diminished and there are fewer jobs available.

LITERATURE REVIEW

Research on trends in the market for entrepreneurship faculty has been performed by Finkle and Deeds (2001; 2002) and Finkle (2006; 2007; 2008; 2010). Research initiated with Finkle and Deeds' (2001) inaugural study that used institutional theory (Meyer & Rowan, 1977; Scott, 1987; 1995) to discover if Schools of Business and Management were incorporating entrepreneurship into their faculties, which in turn would enhance the legitimization of the field. The study investigated jobs and candidates from 1989 through 1998 and found that the field of entrepreneurship was becoming increasingly institutionalized through the dramatic increase in rankings of entrepreneurship programs, press coverage, and demand for entrepreneurship faculty. However, they asserted that the field was still not fully institutionalized because most of the positions had been either non-tenure track or untenured assistant professorships.

During the study's time frame, faculty fought to legitimize the field of entrepreneurship. They fought to substantiate the research and tried to overcome the stigma that entrepreneurship belonged in trade schools. At the time of the study, more traditional faculty questioned the legitimacy of the entrepreneurship journals and lack of rigor in the theoretical developments within the field. Tenure was difficult to earn. Departments of entrepreneurship were virtually

non-existent and few pure entrepreneurship faculty existed. During this period faculty usually had to have an area in a more established field like business policy or organizational behavior with a secondary or tertiary area in entrepreneurship.

Finkle (2007) examined the job market for entrepreneurship faculty (jobs and candidates) from 1989-2005. He found that the field of entrepreneurship was increasing its institutionalization on a number of fronts. For example, Schools of Business and Management had committed more resources to hiring a larger number of tenured or tenure track faculty. Finkle found that the ratio of tenure track positions per candidate improved from a low of .43 positions per candidate in 1994/95 to 1.78 positions per candidate in 2004/05 (+314%). The results of this study confirmed that entrepreneurship was becoming increasingly institutionalized within Schools of Business and Management.

Finkle (2010) found that entrepreneurship was one of the fastest growing areas in higher education. The findings indicated that in the academic year 2007/08 there were 366 job openings at schools and 231 candidates seeking positions in entrepreneurship. The data showed the enormous rise of international positions and candidates. The number of international positions nearly doubled from 34 in 2006/2007 to 76 in 2007/08. The number of international candidates was 44 in 2006/2007 and grew to 62 in 2007/08. The data was proof that entrepreneurship was being institutionalized on a global basis. The article also looked at other trends and made recommendations to candidates and schools in regards to the job market.

Overall, previous research indicates that the field was in a growth mode and was becoming increasingly legitimate on a global basis.

METHODOLOGY

The collection of data for the study was the most exhaustive and detailed of any academic study focusing on jobs and candidates in the field of entrepreneurship. It involved the daily process of collecting data from a variety of sources. Some of the older data was collected through micro fiche from the *Chronicle of Higher Education*.

A variety of sources were used to collect the data. The majority of the information came two sources: the *Academy of Management's* Job Placement Board and *The Chronicle of Higher Education's* weekly online newspaper.

A number of web sites were also used to collect data: United States Association for Small Business and Entrepreneurship (USASBE) (http://usasbe.org/); Academic Keys for Business Education (http://business.academickeys.com/seeker_job.php); University 500 (http://www.university500.com/);); American Marketing Association (http://academicplacement.marketingpower.com/search/); Financial Management Association (http://www.fma.org/); RE Ladder (http://www.reladder.com/); Mid Atlantic Higher Education Consortium (http://www.midatlanticherc.org/home/); Academic Careers Online (http://www.academiccareers.com/); Academic Employment Network

(http://www.academploy.com); University Affairs (http://www.universityaffairs.ca); HigherEdJobs.com (http://www.higheredjobs.com/); Jobs.ac.uk http://www.jobs.ac.uk; Times Higher Education Supplement (http://www.timeshighereducation.co.uk); Career.edu (http://www.career.edu); UniJobs.com.au (http://www.UniJobs.com.au);

Data was also collected through direct e-mails on a variety of networks and directly from universities themselves. It must be noted that due to the tremendous growth of the field of entrepreneurship, other areas such as marketing and finance were also included in the study.

A similar methodology to Finkle and Deeds (2001) and Finkle (2007; 2010) was used to evaluate the data. The data was divided into academic years (e.g., 2009/10). Data was then broken into two categories; January through June (spring) and July through December (fall). Candidates and positions that were found in each subset were dropped from one of the subsets. For example, if Ted Baker advertised for a job in fall 2009 and spring 2010 he was counted only once as a candidate.

OVERVIEW OF TABLES

Three tables were developed to evaluate the trends in the market for faculty and schools. Table 1 evaluates the number of positions and candidates dating back from June, 1989 through June, 2010. The table also examines the desired interest level of a candidate or school (e.g., Primary, Secondary, or Tertiary). International jobs and candidates were also located in Table 1. Table 2 shows the number of tenure track candidates and positions from June, 1989 through June, 2010. The percentages indicate the percentage of candidates and positions that were tenure track. Table 3 shows the percentage of candidates and positions and the fields that they cross-listed with on their advertisement. For example, if Tim Pollock was on the market seeking a job, he might list Business Policy, Entrepreneurship and International Management as his three areas.

Table 1: Number & Level of Interest in Entrepreneurship for Candidates & Positions, June, 1989-June, 2010

Table 1 shows the number of positions and candidates from June, 1989 to June, 2010. The table also examines the desired interest level of a candidate or school (e.g., Primary, Secondary, or Tertiary). International jobs and candidates are also located in Table 1.

When examining the number of jobs, we have seen the numbers increase progressively from 1989 through 2007/08 where it peaked at 366 jobs. However, in 2008/09, the heart of the recession, that number dropped significantly to 242 jobs or a drop of 34%. At the end of 2009/10 the number of jobs increased to 306 or an increase of 27% over the previous year.

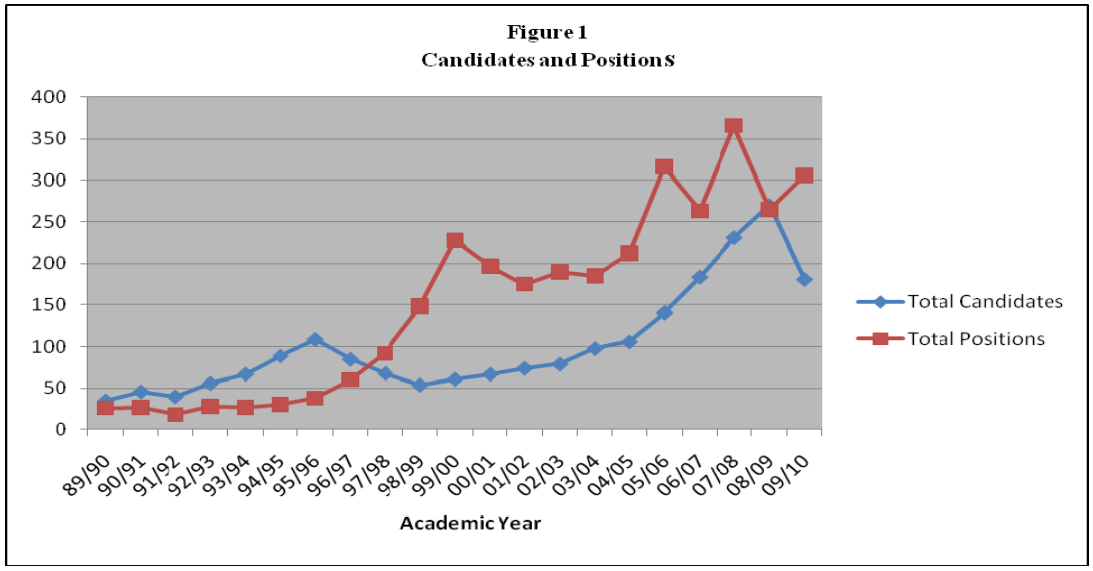
The examination of the number of candidates shows an increase from 35 in 1989/90 to a high of 270 in 2008/09. By 2009/10 the number of candidates decreased to 181 or a decrease of 33% over the previous year.

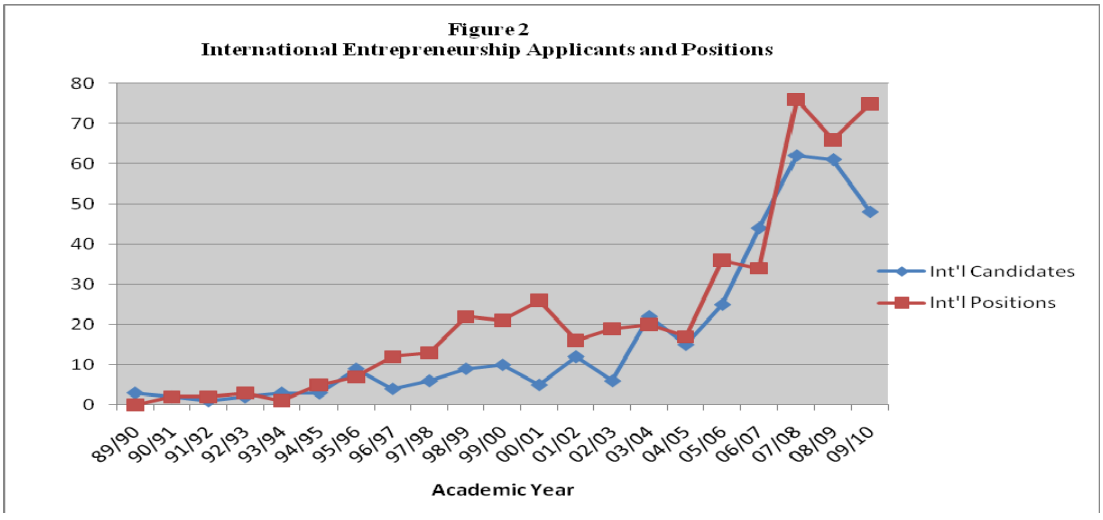
Table 1: Number & Level of Interest in Entrepreneurship for Candidates & Positions 1989-June 2010										
	Candidates w/Primary Interest	**Positions w/Primary Assignment**	**Candidates w/2nd Interest**	**Positions w/2nd Assignment**	**Candidates w/Tertiary Interest**	**Positions w/Tertiary Assignment**	**Int'l Candidates**	**Int'l Positions**	**Total Candidates**	**Total Positions**
Academic Yr. 89-90	5	5	15	12	15	9	3	0	35	26
Academic Yr. 90-91	3	9	23	6	20	12	2	2	46	27
Academic Yr. 91-92	7	12	20	3	13	3	1	2	40	18
Academic Yr.92-93	6	16	23	3	27	9	2	3	56	28
Academic Yr. 93-94	10	18	32	6	25	3	3	1	67	27
Academic Yr. 94-95	15	20	45	4	29	6	3	5	89	30
Academic Yr. 95-96	24	20	50	9	35	9	9	7	109	38
Academic Yr. 96-97	19	36	35	18	31	6	4	12	85	60
Academic Yr. 97-98	20	50	25	26	23	16	6	13	68	92
Academic Yr. 98-99	16	58	10	45	28	46	9	22	54	149
Academic Yr. 99-00	17	92	17	67	27	69	10	21	61	228
Academic Yr. 00-01	15	82	25	56	27	59	5	26	67	197
Academic Yr. 01-02	24	54	28	65	24	56	12	16	74	175
Academic Yr. 02-03	31	83	19	50	29	57	6	19	79	190
Academic Yr. 03-04	35	74	33	67	30	44	22	20	98	185
Academic Yr. 04-05	33	94	40	65	33	53	15	17	106	212
Academic Yr. 05-06	33	141	59	104	49	82	25	36	141	316
Academic Yr. 06-07	62	111	63	82	57	64	44	34	184	263
Academic Yr. 07-08	90	165	87	90	54	111	62	76	231	366
Academic Yr. 08-09	57	128	106	63	107	74	61	66	270	265
Academic Yr. 09-10	42	153	48	68	91	85	48	75	181	306

The ratio of jobs per candidate in 2009/10 was 1.69. This ratio is very favorable to candidates seeking employment.

International Market

Figure 2 depicts the number of international positions and candidates. The table shows that when the collection of the data for the study began in 1989 there were 0 advertised positions. By 2007/08 we saw the largest number of international positions, 76. This past year's numbers remained strong at 75.

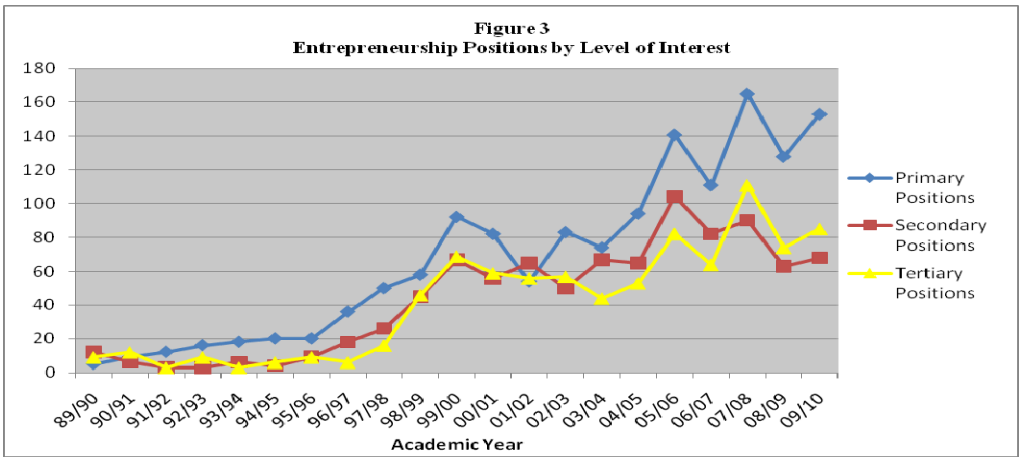


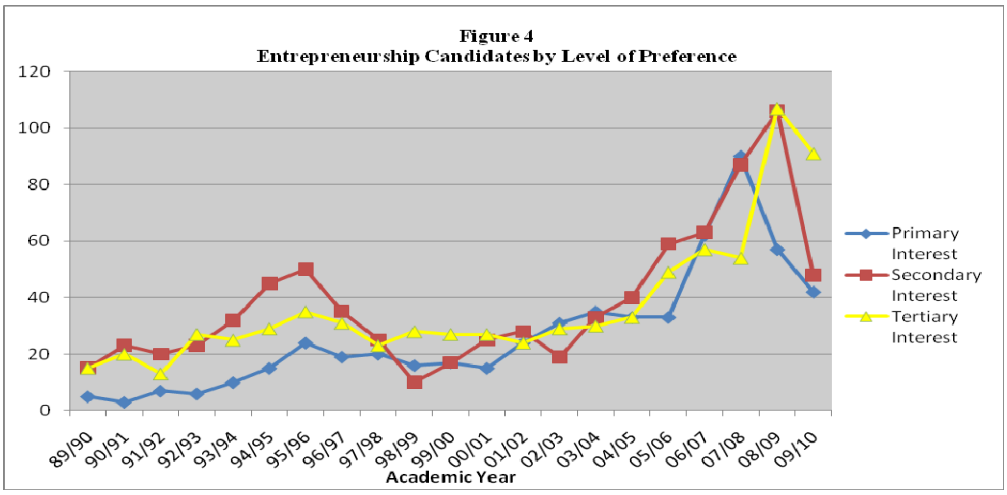


The number of international candidates has grown from 3 in 1989 to a new all time high of 62 in 2007/08. By 2009/10 that number dropped to 48 for a decrease of 23%. In 2009/10 the ratio of international jobs to international candidates was 1.56.

Level of Interest

Figures 3 and 4 are based on the data from Table 1. The figures show the number of positions and candidates by their level of interest (e.g., Primary, Secondary and Tertiary). The number and percentage of jobs with entrepreneurship as their primary field of expertise in 2009/10 was 153 (50%). Secondary and tertiary numbers were 68 (22%) and 85 (28%), respectively.





The number of candidates in 2009/10 that sought positions with entrepreneurship as their primary field of expertise was 42 (23%). Secondary and tertiary numbers were 48 (27%) and 91 (50%), respectively. The numbers indicate that entrepreneurship, as a primary area for candidates, was not as popular as 2007/08.

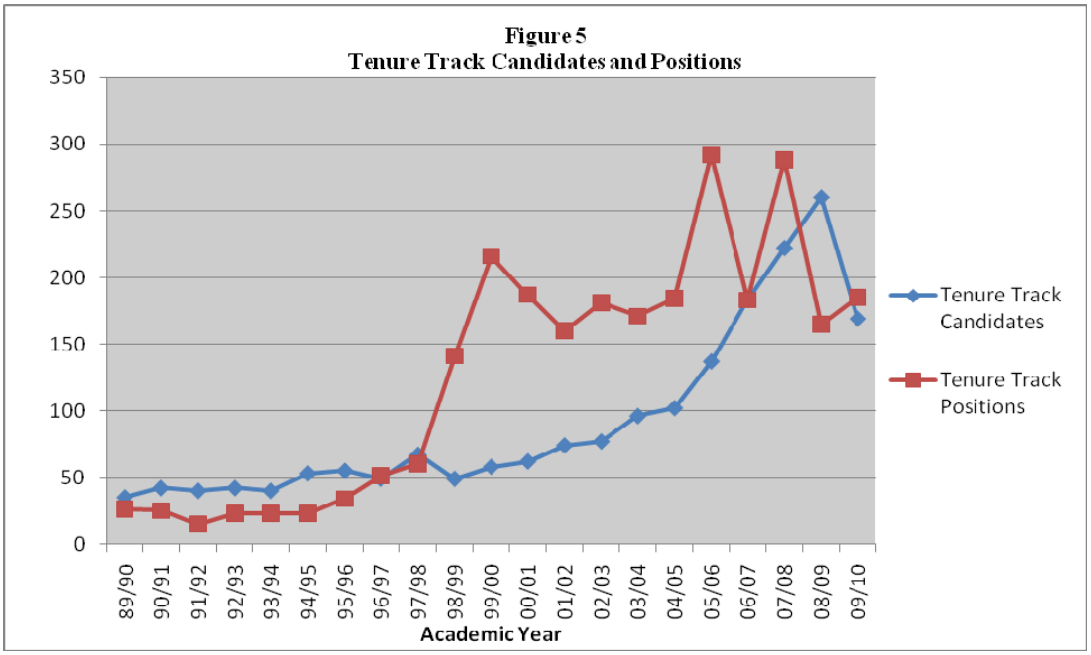
When examining the primary interest ratios (153/42), there were 3.64 primary jobs for every primary candidate. These odds were much more favorable to candidates coming out with a primary area in entrepreneurship. It appears that candidates are hedging their bets with more established fields like Business Policy/Strategic Management, Organizational Behavior, etc.

Table 2: Rank of Tenure Track Candidates & Positions, June, 1989-June, 2010

Table 2 shows the academic rank advertised by tenure track candidates and positions from June, 1989 through June, 2010. The table also shows the percentages of candidates and positions that were tenure track.

Table 2: Rank of Tenure Track Candidates & Positions, 1989-June 2010														
	Candidates							Positions						
Academic Year	Assistant	Associate	Full	Endowed	Open	Total	%	Assistant	Associate	Full	Endowed	Open	Total	%
89/90	24	4	2	0	5	35	100	19	0	0	3	4	26	100
90/91	34	4	1	0	3	42	91	19	0	0	3	3	25	93
91/92	29	5	1	0	5	40	100	10	1	0	3	1	15	83
92/93	29	4	2	0	7	42	75	15	0	0	4	4	23	82
93/94	30	4	1	0	5	40	60	18	0	1	3	1	23	85
94/95	46	2	0	0	5	53	60	14	2	0	2	5	23	77
95/96	51	1	0	0	3	55	50	22	2	1	5	4	34	89
96/97	48	1	0	0	5	49	58	23	6	0	8	14	51	85
97/98	63	0	0	0	4	67	99	41	4	3	5	7	60	65
98/99	37	3	0	0	9	49	91	58	17	5	10	51	141	95
99/00	47	1	1	1	5	58	95	88	21	3	23	81	216	95
00/01	49	1	0	0	12	62	84	52	16	4	18	97	187	95

Table 2: Rank of Tenure Track Candidates & Positions, 1989-June 2010														
	Candidates							Positions						
Academic Year	**Assistant**	**Associate**	**Full**	**Endowed**	**Open**	**Total**	**%**	**Assistant**	**Associate**	**Full**	**Endowed**	**Open**	**Total**	**%**
01/02	60	4	1	0	9	74	100	81	34	4	3	38	160	91
02/03	56	12	4	0	5	77	97	81	33	14	12	41	181	95
03/04	66	11	6	2	11	96	98	63	40	8	13	47	171	92
04/05	75	8	4	0	15	102	96	64	59	9	17	35	184	87
05/06	87	24	0	2	24	137	97	71	110	14	24	73	292	92
06-07	98	52	3	1	29	183	99	71	55	8	13	36	183	69
07-08	185	20	6	4	7	222	96	84	107	12	17	68	288	79
08-09	209	34	10	5	2	260	96	69	46	12	22	16	165	66
09-10	144	18	6	0	1	169	93	74	47	14	17	33	185	60



The most obvious and significant trend in the table is the recent drop in the number and percentage of tenure track positions. There has been a decline in the percentage of tenure track positions starting in 2002/03 from 92% (181 positions) to 2009/10 at 60% (185 positions). The good news is that the number of tenure track positions remains about the same, but that does not bode well for the field as the number of tenure track positions was 292 in 2005/06 and 288 in 2007/08.

The numbers tell us that schools are decreasing their resources for full-time tenure track positions in entrepreneurship. Given the state of the economy this is not a surprising finding.

In 2009/10 the advertised ranks of the specific tenure track positions were: 74 (40%) assistant, 47 (25%) associate, 14 (8%) full, 17 (9%) endowed chair, and 33 (18%) open. The advertised ranks of the specific tenure track candidates were: 144 (85%) assistant, 18 (10%) associate, 6 (4%) full, 0 (0%) endowed chair, and 1 (1%) open. Despite the drop in tenure track openings, there were still 17 tenure track endowed chair openings.

These findings are very encouraging for senior faculty seeking to move to new institutions. The data shows that there is a shortage of senior entrepreneurship faculty.

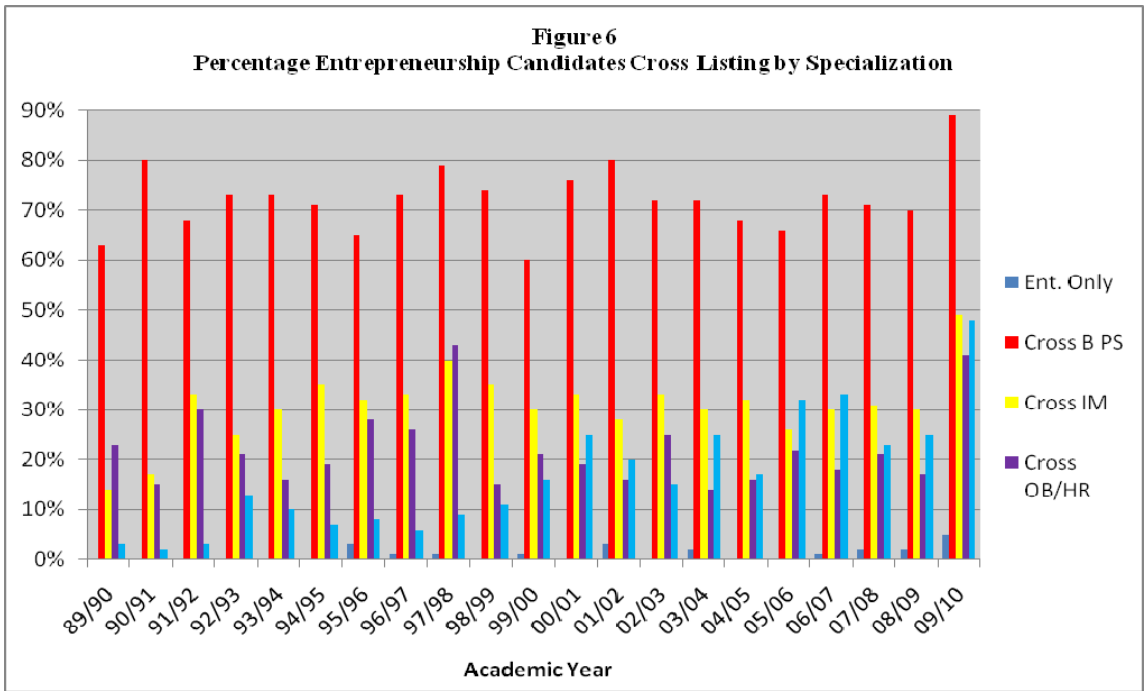
Table 3: Percentage of Applicants & Positions Cross-Listed by Field, June, 1989-June, 2010

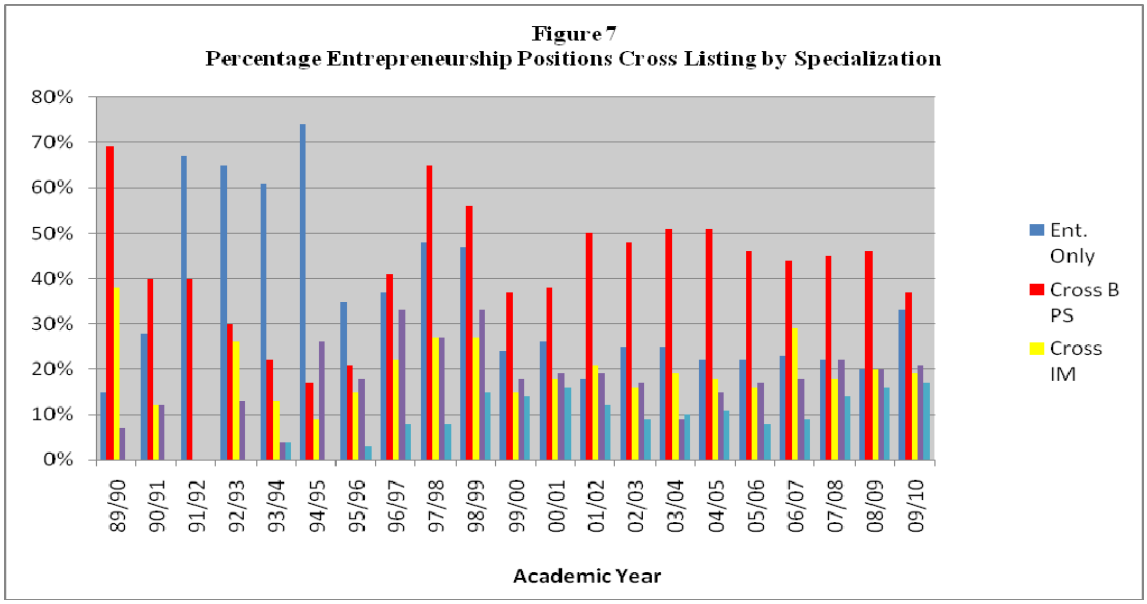
Table 3 and Figures 6 and 7 show the different fields that schools and candidates advertise. For example, Indiana University may be seeking to hire a candidate with a primary area in entrepreneurship, but also seeking supporting areas in Business Policy and Technology and Innovation Management. In this situation all three of these areas in the table would be counted. If Indiana only wanted a faculty member with an area in entrepreneurship, then the entrepreneurship only category would be checked.

Similar to Finkle (2007; 2010), the table is broken down into five categories: Entrepreneurship only, Strategy, International, OB/HR (Organizational Behavior/Human Resources Management), and TIM (Technology and Innovation Management). Each category has a percentage, which indicates the percentage of jobs or candidates in that were listed on that advertisement.

For 2009/10, the table shows that the most popular areas, which are cross-listed with entrepreneurship for applicants are: Strategy, International, Technology and Innovation Management, and OB/HR. The most popular areas for jobs are Strategy, OB/HR, International, and Technology and Innovation Management. Schools seeking candidates with a focus in entrepreneurship only was at its highest level in 11 years at 33%. Candidates that had a focus in only entrepreneurship were at its highest level ever at 5%.

Table 3: Percentage of Applicants & Positions Cross-Listed by Field, 1989-June 2010										
	Candidates					Positions				
Academic Year	**Entrepreneurship Only**	**Strategy**	**International**	**OB/HR**	**TIM**	**Entrepreneurship Only**	**Strategy**	**International**	**OB/HR**	**TIM**
89/90	0%	63%	14%	23%	3%	15%	69%	38%	7%	0%
90/91	0%	80%	17%	15%	2%	28%	40%	12%	12%	0%
91/92	0%	68%	33%	30%	3%	67%	40%	0%	0%	0%
92/93	0%	73%	25%	21%	13%	65%	30%	26%	13%	0%
93/94	0%	73%	30%	16%	10%	61%	22%	13%	4%	4%
94/95	0%	71%	35%	19%	7%	74%	17%	9%	26%	0%
95/96	3%	65%	32%	28%	8%	35%	21%	15%	18%	3%
96/97	1%	73%	33%	26%	6%	37%	41%	22%	33%	8%
97/98	1%	79%	40%	43%	9%	48%	65%	27%	27%	8%
98/99	0%	74%	35%	15%	11%	47%	56%	27%	33%	15%
99/00	1%	60%	30%	21%	16%	24%	37%	15%	18%	14%
00/01	0%	76%	33%	19%	25%	26%	38%	18%	19%	16%
01/02	3%	80%	28%	16%	20%	18%	50%	21%	19%	12%
02/03	0%	72%	33%	25%	15%	25%	48%	16%	17%	9%
03/04	2%	72%	30%	14%	25%	25%	51%	19%	9%	10%
04/05	0%	68%	32%	16%	17%	22%	51%	18%	15%	11%
05/06	0%	66%	26%	22%	32%	22%	46%	16%	17%	8%
06-07	1%	73%	30%	18%	33%	23%	44%	29%	18%	9%
07-08	2%	71%	31%	21%	23%	22%	45%	18%	22%	14%
08-09	2%	70%	30%	17%	25%	20%	46%	20%	20%	16%
09-10	5%	89%	49%	41%	48%	33%	37%	19%	21%	17%





DISCUSSION

The purpose of this article was to answer the following research question: What affect has the economic crisis from 2007-2009 had on the job market (positions at Schools of Business

and Management and candidates) in the field of entrepreneurship? The results of this study are critical to the future institutionalization and legitimacy of the field of entrepreneurship.

Table 1 examined both tenure track and non tenure track positions combined. The findings show that the number of jobs with an area in entrepreneurship peaked at 366 in 2007/08, during the beginning and mid stages of the economic crisis. This number is quite encouraging as it shows that entrepreneurship continues to be in a growth mode. However, it must be noted that academia typically lags the economy.

In the heart of the recession in 2008/09, the number of jobs decreased significantly by 28% (111) to 265.

During the past year, 2009/10, as we came out of the recession the number of jobs has risen back to 306. This was still 16% below the high point of 366 jobs in 2007/08. These are encouraging numbers. Despite the economic downturn, there are over 300 jobs available for faculty seeking a faculty position in entrepreneurship. It must be noted that these include part-time, instructors, visiting professors, non tenure track, and tenure track positions.

Table 1 also showed that the number of candidates with an area in entrepreneurship. In 2007/08 there were 231 candidates or 1.58 jobs per candidate. However, the following year, 2008/09, the number of candidates increased by 17% (39) dropping the number of jobs per candidate to .98.

By 2009/10, the number of candidates dropped to 181, 33% below the high point in 2008/09. This increased the number of jobs per candidate to 1.69. It must be noted that these numbers only focus on people who are advertising for positions. This does not include people who already have positions at schools and apply for positions discretely.

Table 2 examined tenure track positions and candidates. In 2007/08, there were 288 tenure track positions and 222 tenure track candidates for a ratio of 1.3 tenure track positions per tenure track candidate. By 2008/09, there were 260 tenure track candidates and 165 tenure track positions for a ratio of .63 tenure track jobs per candidate. In the past year, 2009/10, there were 185 tenure track positions and 169 tenure track applicants for a ratio of 1.1 tenure track jobs per candidate. The field is starting to see a comeback in the number of tenure track positions.

The findings of Table 2 show that the percentage of tenure track positions has been decreasing significantly since 2002. Starting in 1989/90, 100% of the positions were tenure track. However, over the past three years we have seen the percentages decrease from 79% (2007/08) to 66% (2008/09) and 60% (2009/10). This is an alarming trend. A forthcoming report by the U.S. Department of Education on tenure shows that over the past three decades, the proportion of college instructors in academia who are tenured or on the tenure track plummeted from 57% in 1975 to 31% in 2007. The report entitled, “Employees in Postsecondary Institutions, Fall, 2009," is expected to show that that proportion fell even further in 2009. If you add graduate teaching assistants to the mix, those with some kind of tenure status represent a mere quarter of all instructors (Wilson, 2010). Compared to these numbers, the field of entrepreneurship is in relatively good shape with 60% of their advertised positions being tenure track.

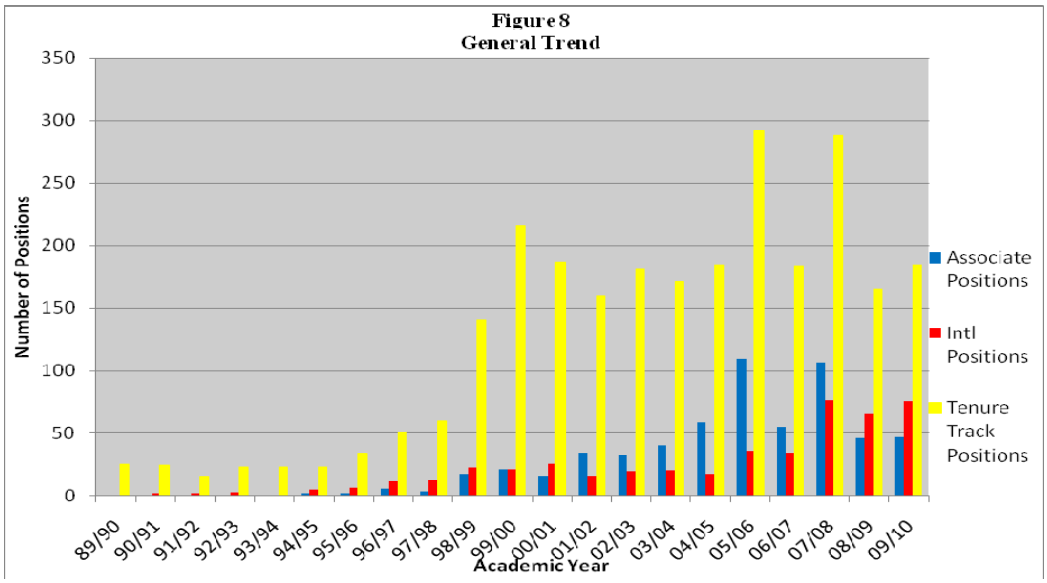
This should be no surprise to the field as entrepreneurship plays such a vital role in the economic development of countries all over the world. Educating people who can start, innovate, build or buy businesses is crucial to the economic development of the world. It is essential that schools continue to invest heavily in entrepreneurship to enhance their region's economic viability.

This study also confirms Finkle's (2007) finding that Schools of Business and Management have become increasingly institutionalized. This can be seen in Table 2 by examining the advertisement for senior level faculty (Associate, Full, Endowed Chairs, and Open Positions). Advertisements for senior level faculty significantly outnumber the advertisements for assistant professors. This is indicative of programs that are seeking more experienced professors to either build or grow a program. Senior faculty give schools the ability to legitimize their programs overnight by hiring the right faculty member. Since entrepreneurship is still a relatively new field, it is crucial to hire the right faculty that are in tune with the school's mission.

Another positive note for the field is the strong increase in the number of schools that are looking for candidates with a primary area in entrepreneurship. The past three years have been very strong with numbers at 165, 128, and 153. This compares with candidates seeking a primary position in entrepreneurship at 90, 57, and 42. This is a sign that more schools are valuing entrepreneurship as they recruit an increasing number of candidates with a primary area in entrepreneurship.

The findings of this study show how the field continues to be institutionalized globally by the increase in international candidates and positions over the past three years. Over the past three years there were 76, 66, and 75 international positions. This compares with international candidates at 62, 61, and 48. This is also a sign that more schools are valuing entrepreneurship as they recruit an increasing number of candidates.

In summary, the findings of this study confirm the trend that entrepreneurship is becoming increasingly legitimized within Schools of Business and Management. Even within the face of the economic crisis, the field is holding up well with 306 job openings (185 tenure track) over the past year



RECOMMENDATIONS TO CANDIDATES

There is good news and bad news for candidates. The good news is that the economy is slowly recovering and schools are increasing the number of faculty in entrepreneurship (non tenure track and tenure track). In 2009/10 there were 1.1 jobs per tenure track candidate. Furthermore, due to the lackluster economy, the decrease in the number of candidates seeking positions in 2009/10 may have been partially caused by fear. The worst economic environment since the Great Depression may have caused people to remain conservative. Not being able to sell their house may also have contributed to this.

As a result, in 2008/09 there were 260 candidates and in 2009/10 there were only 169 candidates. In this volatile environment, savvy candidates can take risks and apply for desirable jobs. This is especially true for senior level faculty where the demand remains very strong. However, it will remain extremely competitive for top positions at top schools.

The bad news is that there are only 74 assistant professor positions for 144 candidates in the past year. It must be noted that 33 of these jobs were listed as open so these candidates could be eligible for these jobs as well. Despite this, vying for a tenure track position in this economy is extremely competitive. Candidates need to pull out all of the plugs in order to become gainfully employed. It is recommended that candidates come out with at least two refereed journal publications before entering the market. It is also recommended that candidates do the following: (1) build relationships everywhere you go, (2) attend conferences (and present) to market yourself even if you have to pay for the cost, (3) obtain three strong letters of recommendation, (4) have your professors contact schools to find out if there is going to be any opening and (5) read the *Chronicle of Higher Education*; there are several sections on job search strategies.

RECOMMENDATIONS TO COLLEGES OF BUSINESS AND MANAGEMENT

The past three years have been difficult for Colleges of Business and Management. The economic crisis has hit both public and private schools. Public schools face significant revenue shortfalls because of cutbacks from government funding. Donors have also been decreasing their donations. One way that schools appear to be filling the financial void is through hiring non tenure track faculty. As stated previously, the overall trend in academia for the past 30 years has been to hire less tenure track faculty. This is also the trend in the field of entrepreneurship.

Overall, data from the study show that over the past year there were 1.1 tenure track positions per tenure track applicant. However, this does not include faculty members at institutions with current positions applying for these jobs. It is difficult to estimate how many established scholars apply for these positions. However, based on the numbers in the study, we can assume that given the tight job market, schools should have the ability to choose quality candidates.

Given the tight resources at schools over the past few years, most faculty have received little to no pay raises. As a result, the field may see an increase in the number of senior level faculty willing to move over the next few years. Overall, it is currently a buyer's market for schools.

On a negative note, schools advertised for 153 primary positions in 2009/10 and there were only 42 candidates with a primary interest. This number is troubling to the field. There are not enough faculty coming out with a primary interest level in entrepreneurship. Schools may have to hire practitioners to fill this void or recruit established scholars in the field from other institutions.

LIMITATIONS

There were a few limitations associated with this study. This study incorporated many new web sites in the development of the data. Despite this, gathering international data on positions and candidates may not be 100% comprehensive. Other limitations were discussed in an earlier study by Finkle (2007): (1) advertised positions may not have received funding or were never filled; (2) some schools and candidates do not advertise, but contact each other indirectly; and (3) sudden retirements or professors switching universities may skew the results, and (4) some positions may not be filled for whatever reasons in one year and then they are counted again in the following year.

FUTURE RESEARCH

Future research can be done in a number of areas to evaluate the institutionalization and legitimization of the field of entrepreneurship. Research needs to be done on the status of

entrepreneurship faculty as to what percentage of their courses they teach are entrepreneurship. Studies on tenure of entrepreneurship faculty are needed as well. Finkle, Stetz, and Mallin (2007) examined the research records and perceptions of tenure requirements of 108 faculty members who taught entrepreneurship and earned tenure between 1964 and 2002. The sample was broken down based on the primary focus of the school (research versus teaching) and time frame, 1964-1988 versus 1989-2002. Significant differences were found between faculty members' perception of the College's stated requirements for teaching, research, and service compared to the faculty member's own perceived requirements for teaching, research, and service. Furthermore, research schools were found to have a significantly larger amount of A, B, and C refereed journal publications, books authored, and chapters in books. Finally, the findings indicate that 60% of successful tenure candidates at research schools had a least one publication in a top management journal, compared to only 13% at teaching schools.

Future research can update the results of this study by examining whether or not entrepreneurship faculty are earning tenure and what their research records are comprised of at the time of tenure.

Future research also needs to be done on entrepreneurship centers. Finkle and Kuratko (2004; 2006), Finkle, Kuratko, and Goldsby (2006), Finkle (2007), and Finkle, Menzies, Goldsby, and Kuratko, (2010) have studied centers. Finkle et. al., (2006) examined the characteristics of 146 entrepreneurship centers in the United States. Finkle, et. al., (2010) examined the financial aspects of 300 (176 in the U.S.) entrepreneurship centers world-wide. Future studies can be done to see how entrepreneurship centers are incorporated into universities and the various roles that they play.

Studies on salaries are needed to determine if entrepreneurship faculty are making comparable salaries to their colleagues in other departments within Schools of Business and Management. Longitudinal studies should also be done to determine if entrepreneurship faculty earn administrative positions at schools. This, in turn, would make the field more legitimate in the eyes of the institution.

CONCLUSION

This study examined how the economic crisis has affected jobs and candidates seeking employment within the field of entrepreneurship. The findings of the study show that the economic crisis has had a significant negative impact on the field, with the biggest hit occurring during 2008/09, the heart of the financial crisis. The field appears to have reached its height in terms of job opportunities in 2007/08. However, the field is coming back strong. Time will only tell if the field of entrepreneurship will continue in its growth mode or remain in a mature stage.

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21ST CENTURY KNOWLEDGE, SKILLS, AND ABILITIES AND ENTREPRENEURIAL COMPETENCIES: A MODEL FOR UNDERGRADUATE ENTREPRENEURSHIP EDUCATION

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ABSTRACT

The emphasis on knowledge, service, and information in the new economy creates space for more new firms to emerge, and exerts pressures on existing companies to hire employees with higher level skills in order to compete successfully. The increased demand for a highly skilled workforce has contributed to the rising importance of obtaining a college education. However, recent studies indicate that newly hired college graduates do not excel in these higher-level knowledge and information based skills at the level that employers desire. Entrepreneurs have also indicated that the shortage of highly skilled workers inhibits the growth and development of new entrepreneurial firms. In response to this there have been multiple calls for educators at all levels to recognize the challenges and opportunities in today's economy and to ensure that students develop the "21st century" knowledge, skills, and abilities (KSAs) they need. A closer look at these 21st century KSAs alongside research and data on entrepreneurial competencies reveals a meaningful overlap between the two. This overlap can be developed into a useful heuristic to determine appropriate outcomes for assessment of undergraduate entrepreneurship programs. Sample outcomes and program assessment processes are illustrated and discussed.

INTRODUCTION

As the "new" economy of the 21st century continues to develop around knowledge, service, and information based activities, a company's ability to create and commercialize knowledge has become tantamount to its ability to generate sustainable returns (Apte, Karmarkar, & Nath, 2008; Audretsch & Thurik, 2000; Black & Lynch, 2003; *Ewing Marion Kauffman Foundation*, 2007). This emphasis on knowledge, service, and information creates space for more new firms to emerge, but also pressures existing companies to hire employees with higher level skills in order to compete successfully. Among other things, this demand for a more highly skilled workforce has contributed to the rising importance of obtaining a college education. Today in the U.S. a college degree is generally considered a necessary step on the way to a vital career however, recent studies indicate that newly hired college graduates are not as adept in these higher-level knowledge and information based skills as employers expect and

need (Cavanagh, Kay, Klein, & Meisinger, 2006; *ASTD*, 2009). In addition, practicing entrepreneurs have indicated that the shortage of highly skilled workers inhibits the growth of their own companies as well as the development of new entrepreneurial firms (*Ewing Marion Kauffman Foundation*, 2007). In light of this, and in order to ensure the ability of the U.S. to compete effectively in the global economy, there have been multiple calls for educators at all levels to recognize the challenges and opportunities in today's economy and make the necessary changes to educational programs to ensure that students develop the "21st century" skills and abilities they need. The core set of 21st century skills include capabilities in analytical problem solving, innovation and creativity, self-direction and initiative, flexibility and adaptability, critical thinking, and communication and collaboration skills (Autor, Levy, & Murnane, 2007; Boyd & Vozikis, 1994; Cavanagh et al., 2006; Goldin & Katz, 2008; *Ewing Marion Kauffman Foundation*, 2007; Pink, 2008; Porter, Ketels, & Delgado, 2007; Scherer, Adams, & Wiebe, 1989; Wagner, 2008).

Simultaneously, the new economy and the opportunities perceived for new ventures in the areas of knowledge and service have contributed to the groundswell of interest and program development in entrepreneurship education. The number of courses offered in entrepreneurship at institutions of higher education grew from just a few in the 1970s to well over 1600 by 2005, suggesting that today, undergraduate entrepreneurship programs offer widespread fertile ground for students to develop entrepreneurial skills and abilities. However, the current and dominant pedagogical approach to undergraduate entrepreneurship programs in the U.S. stresses a linear and relatively abstract process of new venture creation (Edelman, Manolova, & Brush, 2008; Hills, 1988; Honig, 2004; Kourilsky, 1995; Soloman, Duffy, & Tarabishy, 2002), which typically emphasizes business planning and deemphasizes understanding and development of entrepreneurial competencies – the knowledge, skills, and abilities that contribute to an individual's ability to become an entrepreneur. Moreover, when undergraduate entrepreneurship programs are evaluated, success is often defined (and measured) in terms of the number of business plans completed and entered into competitions, student intentions to start a business, and/or the actual launching of a new business (USASBE, 2010). This definition of program success continues despite evidence that new college graduates starting up businesses are quite rare, and most entrepreneurial activity is performed by 35-54 year olds after significant work experience (Fairlie, 2010; Georgellis & Wall, 2000; Shane, 2008). At best, this suggests there are significant conceptual and methodological challenges for evaluating undergraduate entrepreneurship programs, and at worst it suggests these programs may be pursuing the wrong outcomes. A closer look at the KSAs demanded for success in the new economy alongside research and data on entrepreneurial competencies reveals a meaningful overlap between the two. In addition, this overlap can be developed into a useful heuristic to determine more appropriate outcomes for assessment of undergraduate entrepreneurship programs.

ENTREPRENEURIAL COMPETENCIES AND 21ST CENTURY KSAs

The term "21st century skills" has pervaded recent literature in the field of education with particular regard to the US's ability to compete on a long-term basis in the global economy (Brooks, 2008; Pink, 2005; *Rising above the gathering storm*, 2007; Vockley, 2008). Research across U.S. industries suggests that the number of high skilled information workers increased from 37% of the workforce in 1950 to almost 60% in 2000 (Apte et al., 2008). The growing demand for a workforce with higher level skills has contributed to the rising importance of obtaining a college education. From 1973 to 2000, Carnevale and Derochers (2002) found that the percentage of workers with some postsecondary education increased by 110%, and the percentage of workers with bachelor's degrees increased by over 120% over the same time period. Today in the U.S. a college degree is generally considered a necessary step on the way to a vital career and evidence suggests that individuals with bachelor's degrees earn higher salaries, have better professional mobility, and have more leisure time than those with high school or associates degrees (Day & Newburger, 2002; *Institute for Higher Education Policy*, 1998). While college students and their families are certainly aware of the importance of becoming a college graduate, recent studies indicate that newly hired graduates have not mastered these higher-level knowledge and information based skills at the levels that employers expect and need. Empirical data gathered by the American Society for Training and Development (ASTD) revealed that companies rank Leadership, Critical Thinking, and Creativity among the highest skills desired of new employees, and between 10 and 20% of organizations surveyed, rated college graduates as deficient in these skills (*ASTD*, 2009). Moreover, practicing entrepreneurs have also indicated that the shortage of skilled workers inhibits the growth of their own companies and the development of new entrepreneurial firms (*Ewing Marion Kauffman Foundation*, 2007). In particular, the Kaufmann Foundation notes that workers "who not only have twenty-first century skills and knowledge, but who have no fear in putting those skills to work to generate and to commercialize (or help commercialize) new ideas, products, and services" are required for continued success in entrepreneurship in the US (*Ewing Marion Kauffman Foundation*, 2007). As a result of these recent findings, there have been multiple calls for educators at all levels to recognize the challenges and opportunities in today's economy and make the necessary changes to educational programs such that students develop "21st century" knowledge, skills, and abilities (KSAs) they will need as employees, managers and business owners in the new economy (Lemke et al., 2003; *Rising above the gathering storm*, 2007; *Tough Choices or Tough Times*, 2007; Vockley, 2008; Wagner, 2008).

Many non-governmental organizations have developed structured and comprehensive definitions of 21st century KSAs based on demographic, economic, and educational research, and the contributions of experts in the field (Cavanagh et al., 2006; Lemke et al., 2003; *Tough Choices or Tough Times*, 2007; Vockley, 2008). While the categorization of these KSAs can differ slightly depending on the organization articulating them, the underlying components of

them remain relatively and substantively consistent. As such, the specific 21st century KSAs described and incorporated here are based primarily on the work of the Metiri Group, the North Central Regional Educational Laboratory, and the Partnership for 21st Century Skills. These organizations developed categorizations and descriptions of 21st century skills through an investigative processes that included research and reviews on characteristics of the Net-Generation (young people born between 1982 and 1991), business and industry reports on workforce trends, analysis of nationally recognized skill sets, and input and data from educators (Lemke et al., 2003; Vockley, 2008). Figure 1 illustrates the four major categories of 21st century KSAs and their components. Although many of the frameworks for 21st century skills in the education literature are directed at primary education institutions and programs, recent research about the newly employed and current workforce suggests that US college graduates fall short of expectations regarding their skills and abilities in these areas (Cavanagh et al., 2006; *ASTD*, 2009; Lemke et al., 2003; *Ewing Marion Kauffman Foundation*, 2007; *Tough Choices or Tough Times*, 2007; Vockley, 2008).

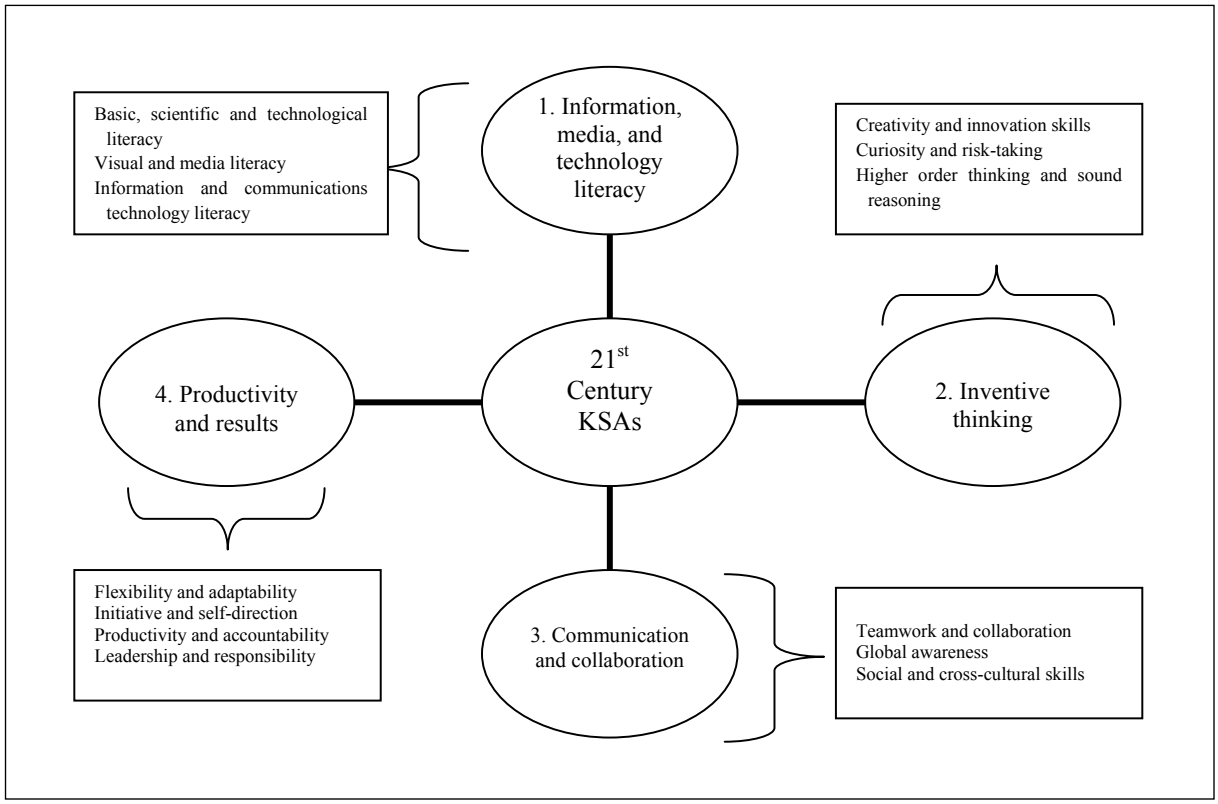
Alongside development of 21st century KSAs, researchers investigating entrepreneurial competencies have produced a multitude of theoretically and empirically supported concepts, including human capital (Gimeno, Folta, Cooper, & Woo, 1997; Shane, 2000), social capital and social skills (Aldrich & Zimmer, 1986; Baron & Markman, 2000; Burt, 1992), self-efficacy (Boyd & Vozikis, 1994; Chen et al., 1998; Markman et al., 2002; Scherer et al., 1989) and creativity (Gilad, 1984; Timmons, 1978; Ward, 2004; Whiting, 1988), that have demonstrated a relationship to entrepreneurial activity. Generally speaking, stronger competencies in these areas are related to increased likelihood of engaging in entrepreneurial activity and/or entrepreneurial success (c.f. Markman, 2007). While many specific entrepreneurial competencies have been identified, they appear generally to fall into three major categories: cognitive, social, and action-oriented. A more in-depth analysis of identified entrepreneurial competencies reveals a pattern that demonstrates, perhaps not surprisingly, significant and relevant connections between the KSAs relevant for the 21st century. These connections are articulated below and illustrated in Figure 2.

Entrepreneurial competencies: Cognitive

Seminal theories in the field of entrepreneurship (e.g. Kirzner, 1979; McClelland, 1967; Schumpeter, 1942) and recent research alike (Gaglio, 2004; Haynie, Shepherd, Mosakowski, & Early, 2010; Mitchell et al., 2002; Mitchell & Busenitz, 2007; Singh, Baum, & Bird, 2008) have emphasized the notion that entrepreneurs have distinct ways of thinking which increase their likelihood of identifying opportunities and developing new ventures to exploit those opportunities. Moreover, this "entrepreneurial mindset" is thought to be not only distinct, but also learnable and able be developed with by deliberate practice (Baron & Henry, 2006; Mitchell, 2005). In addition, the distinct ways in which entrepreneurs process information and approach problems contributes to their abilities in opportunity recognition and development, and

serves as a basis for understanding why only some individuals become entrepreneurs (Allinson, Chell, & Hayes, 2000; Bygrave & Hofer, 1991; Douglas & Shepherd, 1999; Keh, Foo, & Lim, 2002). These ideas are described as "entrepreneurial cognitions" and refer to "the knowledge structures that people use to make assessments, judgments, or decisions" (Mitchell et al., 2002, p. 97). Active search, entrepreneurial alertness, and creativity have all been identified as methods through which entrepreneurs recognize and develop opportunities (DeTienne & Chandler, 2004).

Figure 1: 21st Century Knowledge, Skills and Abilities



Several studies have generated evidence that actively searching for information is an important factor in the recognition of opportunities by entrepreneurs (Baron, 2006; Fiet et al., 2004; Gilad, Kaish, & Ronen, 1989; Shane, 2003). Within this research, authors note that to be successful entrepreneurs must conduct searches systematically (Fiet et al., 2004) and must possess superior search skills to have an advantage over others in opportunity recognition (DeTienne & Chandler, 2004). The *Information, media, and technology literacy* category of 21st century KSAs refers to the ability to think and reason logically in an effort to solve complex, open-ended problems, a skill set that contributes directly to the ability to actively and successfully conduct searches. The 21st century economy is characterized by an overwhelming amount of information and information literacy is tantamount to the ability to generate meaning

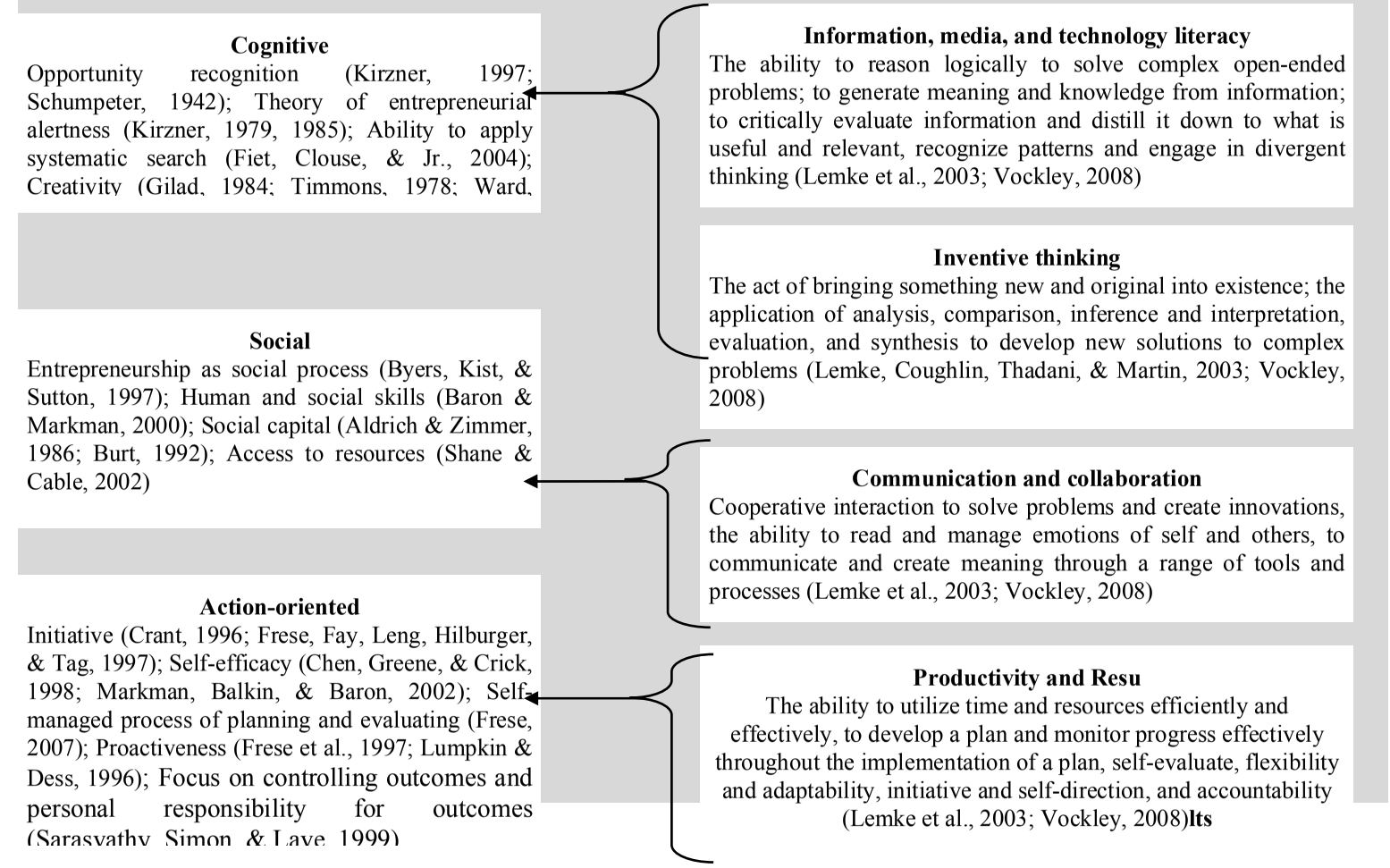
and knowledge from information. In addition, information literacy emphasizes the ability to critically evaluate information and distill it down to what is useful and relevant – a key component of successful active search involving the evaluation of identified opportunities (Hills & Shrader, 1998).

Entrepreneurial alertness is another aspect of the entrepreneurial mindset that contributes to opportunity recognition. Introduced by Kirzner (1985), the concept of alertness as a distinguishing cognitive ability of entrepreneurs is predicated on the notion that opportunities are sometimes recognized by individuals who are not actively searching for them, but who have developed an ability to recognize them when they appear (Baron & Henry, 2006; Gilad et al., 1989). The translation of alertness into opportunity requires making connections between seemingly unconnected things and understanding how those connections translate into an opportunity. Baron (2006) argues these kinds of opportunity recognition skills manifest in the individual's ability to recognize patterns, and can be developed by learning to "focus on the most relevant factors and to search for connections between these variables or changes" (Baron, 2006, p. 116). Pattern recognition and divergent thinking abilities are key elements of the *Information, media, and technology literacy* category of 21st century KSAs (Lemke et al., 2003).

Other entrepreneurial scholars have indicated that keys to alertness lie in individual cognitive abilities of intelligence and creativity (Busenitz, 1996; Shane, 2003). These abilities are argued to give entrepreneurs an advantage in recognizing new solutions and imagining new products and services. Creativity and innovation are at the core of the *Inventive thinking* category of 21st century KSAs, and by definition involve the act of bringing something new and original into existence. Inventive thinking also requires sound higher order thinking skills, allowing the application of analysis, comparison, inference and interpretation, evaluation, and synthesis to develop new solutions to complex problems (Lemke et al., 2003). It is this combination of intelligence and creativity that leads to the ability of entrepreneurs to evaluate multiple ideas to determine the true opportunities (Hills & Shrader, 1998; Keh et al., 2002).

Entrepreneurial cognitions have also demonstrated a positive impact on the likelihood of an individual to establish an actual venture (Forbes, 1999). Launching a new venture often involves doing so in the absence of all the relevant data (Busenitz & Barney, 1997) and requires utilization of some method for moving ahead successfully with the information available (Forbes, 1999). Entrepreneurs are thought to develop and apply heuristics in these situations in order to act decisively in the face of uncertainty (Busenitz & Barney, 1997; Tversky & Kahneman, 1974). The *Information, media, and technology literacy* and *Inventive thinking* categories of 21st century KSAs represent critical KSAs needed to create such heuristics, by emphasizing the critical evaluation of existing information and application of that evaluation for decision making in creative ways.

Figure 2: Entrepreneurial competencies and 21st century KSAs



Entrepreneurial competencies: Social skills

The relationships individuals have and develop with others generate important connections and networks that impact the likelihood and success of their participation in entrepreneurial activity (Adler & Kwon, 2002; Aldrich & Zimmer, 1986; Burt, 1992; Nahapiet & Ghoshal, 1998; Shane & Cable, 2002). These relationships are the basis of an entrepreneur's social capital; an intangible resource created through social relationships that creates access to both tangible and intangible resources through knowing others (Adler & Kwon, 2002; Burt, 1992; Nahapiet & Ghoshal, 1998). An entrepreneur's social network and social capital can connect them to opportunities they may have missed and are also instrumental in giving entrepreneurs access to resources necessary to start a new venture (Audia & Rider, 2005; Shane & Cable, 2002; Sorenson & Audia, 2000).

Byers and colleagues (1997) suggest that entrepreneurship education needs to include a greater emphasis on social processes and social behavior. Baron and Markman (2000) note specific social skills, including the ability to accurately assess others, adapt to changing and different social situations, initially and consistently portray a good impression of self to others, and to successfully persuade others, that they argue impact the success of the entrepreneur. Baron and Markman (2000) also note that these skills are trainable and can be developed by individuals. The *Communication and collaboration* category of 21st century KSAs is particularly concerned with the development of these social skills. This category emphasizes the ability to interact cooperatively to solve problems and create innovations, to read and manage emotions of self and others, and to communicate and create meaning through mechanisms (Lemke et al., 2003).

Entrepreneurial competencies: Action-oriented

Entrepreneurship simply does not exist without actions on the part of the entrepreneur to manifest and exploit a recognized opportunity (Frese, 2007; Schumpeter, 1935). Frese's action theory of entrepreneurship describes entrepreneurship as a conscious process of establishing goals, planning for goal achievement, monitoring execution, and adjusting for success (Frese, 2007). In addition, the concepts of initiative, self-management, self-efficacy and personal responsibility for success have all been associated with entrepreneurial actions and success (Boyd & Vozikis, 1994; Chen et al., 1998; Frese, 2007; Frese & Fay, 2001; Sarasvathy et al., 1999). Moreover, recent research indicates existing businesses are changing their organizational structures to include greater decentralization, an increased use of self-managed and cross-functional teams, and flatter management structures (Black & Lynch, 2003; Ellis, 2003; Osterman, 2000; Tiernan, Flood, Murphy, & Caroll, 2002) emphasizing the importance of individual initiative and accountability for the employee.

The *Productivity and results* category of 21st century skills is organized around the concepts of drivers of productivity and the autonomy necessary to act. These are the

development of initiative and self-direction, accountability and responsibility, ane flexibility and adaptability. Key skills sets include planning skills, the ability to monitor progress, and adapt/alter plans. This category reflects the need for independent motivation, action and decision-making required of both entrepreneurs and effective employees in today's economy.

IMPLICATIONS AND EXAMPLES FOR PROGRAM ASSESSMENT

While the proliferation of undergraduate entrepreneurship programs across the US may project that the question of whether or not entrepreneurship can be taught has generally been answered, little evidence has been provided to support an answer. This may be in part due to a disconnect between the typical outcomes and pedagogical approaches of many undergraduate entrepreneurship programs and identified entrepreneurial competencies that correspond to highly valued KSAs for the 21st century economy.

Many entrepreneurial programs evaluate their success based on businesses that graduates start or intend to start. However, data on new venture establishments consistently suggests most businesses are started by individuals older than 35 (Fairlie, 2010) and that younger entrepreneurs (ages 18-24) make up only about 3% of all entrepreneurs in the U.S. (Shane, 2008). The importance of prior industry experience offers a viable explanation for this empirical reality, and suggests that undergraduate entrepreneurship programs may be better served by different measures of success. While detailed and nuanced industry knowledge is arguably beyond the scope of most undergraduate entrepreneurship programs, the development of 21st century KSAs is not. Moreover, arming students with strong 21st century KSAs arguably gives them a much better chance at securing employment from which to garner specific and important industry knowledge. Therefore, undergraduate entrepreneurship programs may be more successful in measuring and demonstrating program outcomes by emphasizing and assessing the development of convergent 21st century KSAs and entrepreneurial competencies in their graduates. While a complete guide for assessment is beyond the scope of the article, two examples are given to illustrate how undergraduate entrepreneurship programs might interpret and implement outcomes based on the previous discussion of entrepreneurial competencies and 21st century KSAs.

Table I illustrates an example of a learning outcomes matrix for an entrepreneurship track in an undergraduate business major. The outcomes (across the top of the matrix) are extracted from the previous discussion on entrepreneurial competencies and 21st century KSAs and measured in terms of the five course offerings of the program (listed down the left side of the matrix). For each course the extent to which the learning outcome is introduced, developed, or mastered in the course is identified in the matrix. Developing such a matrix allows for a comprehensive look at the program and subsequent contributions of each course toward the overall student learning goals.

An appropriate next step would be to create a process and tool through which to assess the outcomes for levels of student mastery. This could include a pre and post test on one or more

learning outcomes for students at beginning and ending stages of their coursework in entrepreneurship, or an application of rubrics to identify the developmental level of students on each learning outcome. For example, Table II illustrates an example of a rubric for complex problem solving. In addition, the American Association of Colleges and Universities (AAC&U) coordinated more than 100 faculty and other experts in an effort to develop rubrics for major learning outcomes, as part of a larger project designed to bring together the American Association of State Colleges and Universities (AASCU) and the Association of Public and Land-grant Universities (APLU) to work collectively on the development of leadership and student assessment across these institutions to improve student learning. Among the rubrics created by this AAC&U program are problem solving, creative thinking, teamwork, information literacy and integrative and applied learning. These rubrics correspond to KSAs identified in this paper as relevant and useful outcomes for undergraduate entrepreneurship programs, but can also be tailored for specific program emphases (e.g. new product development process).

Table 1: Sample learning outcomes matrix for undergraduate entrepreneurship program

Learning outcomes / **Program courses**	Complex problem solving	Creativity/ innovative thinking	Teamwork and collaboration	Planning and executing	Adaptability	Self-direction	Communication skills (written and oral)
Introductory course	I	ID	ID	ID	I	ID	D
Entrepreneurial policy	D	D	D	D	D	D	D
Small business management	D		D	D		D	D
Strategic management	M	DM	DM	M	M	DM	M
Practicum	M	DM		DM	M	M	M

Learning outcome introduced: I, Learning outcome developed: D, Learning outcome mastered: M

CONCLUSIONS

All of this is not to say that start-up intentions or the actual establishment of a new venture are not ultimately good and appropriate goals for entrepreneurship students. However, it is to suggest that more immediate learning goals related to the likelihood and success of entrepreneurship may be better measures of success for undergraduate entrepreneurship programs. These outcomes represent competencies that will be useful in gaining employment in the 21st century economy (an important precursor to entrepreneurship in most instances) as well as starting a new venture. In addition, these outcomes represent learnable and measurable knowledge, skills and abilities that can more effectively demonstrate the value and success of an undergraduate entrepreneurship program.

Table 2: Rubric for evaluating complex problem solving ability			
	Emerging	**Developing**	**Mastering**
Accurately identifies, and describes the problem, question, or issue.	Does not attempt to or fails to identify and describe the problem accurately. May describe symptoms of the problem or characterize the problem in an erroneous way.	Generally describes the problem or issue accurately, though some aspects are incorrect or confused. Nuances and key details may be missing or glossed over.	Clearly identifies the problem and describes its nature accurately. Recognizes and includes descriptions of embedded or implicit aspects of the issue.
Recognizes and considers the role of context and underlying assumptions.	Does not consider contexts or assumptions in the definition of the problem. Analysis is based on biases and/or unrecognized false assumptions.	Considers and describes the role of relevant contexts and assumptions regarding the problem, although in a limited way. Analysis includes relevant evidence, but may not transcend all assumptions or explain the impact of specific contexts.	Analyzes the problem with a detailed and awareness of context, and underlying assumptions. Considers other related contexts. Describes the impact of context and basis for questioning assumptions. Addresses the implications and incorporates this into process of solution development.
Demonstrates complex process of analysis, utilizing appropriate sources of data and evidence.	No evidence of search, selection or source evaluation skills. Generally summarizes information provided without analysis or evidence. May be unable to distinguish between facts, opinions, and value judgments. Process is simplistic, inappropriate, or not related to problem .	Demonstrates adequate skill in searching, selecting, and evaluating sources for analysis. Discerns fact from opinion and may recognize bias in evidence. Analytical process is relatively sound but may be routine and somewhat obvious.	Evidence of search, selection, and evaluation skills; including recognition and inclusion of uniquely valuable sources. Analysis includes questions of accuracy, relevance, and completeness. Analytical process reflects clear organization of ideas, and ability to prioritize based on importance and impact.
Integrates other perspectives and disciplines.	Works from a single perspective and fails to discuss other disciplines or apply other ways of knowing. Adopts a single idea or limited ideas with little question. Avoids challenging or discomforting ideas. Offers little integration of perspectives and little or no evidence of consideration of other possible approaches.	Incorporation of multiple perspectives and comparison of ideas from other disciplines. Ideas are investigated and integrated, in a somewhat incomplete way. Engages challenging ideas tentatively or in ways that oversimplify or ignore potential conflict or contradictions. Acknowledges and integrates different ways of knowing.	Integrates multiple perspectives and disciplines in analysis. Considers and applies a range of sources and successfully integrates even disparately different perspectives, disciplines, or approaches.
Identifies novel solutions, recognizes alternatives solutions, and implications and consequences of proposed solution(s)	Fails to identify viable solutions, implications, and consequences, or solution is a simple replication of an existing solution and/or does not address initial problem. Alternative solutions are not identified or do not differ from main solution. Implications of proposed solutions are not considered or are assumed not to exist.	Solutions proposed appropriate address the underlying issue in problem and offer at least some improvement and novelty over existing solutions. Alternatives may not be fully developed or may be dismissed without appropriate evidence. Recognizes possible implications although these may not be fully defined.	Novel solutions are proposed based on expressed understanding of alternative solutions and implications of all. Proposed solutions may represent connections between different perspectives or disciplines and offer an improvement over any existing solutions. Implications are discussed and weighed against the benefits and challenges of implanting the solution.

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TEAM-BASED LEARNING TO ENHANCE CRITICAL THINKING SKILLS IN ENTREPRENEURSHIP EDUCATION

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ABSTRACT

An adaptation of Team-Based Learning (TBL) to the teaching of an introductory course in engineering entrepreneurship has been surprisingly transformative. TBL has three outcomes of particular interest to our entrepreneurship course design. First, TBL teaching is not didactic (learn-recite) but dialectic (reasoning oriented) with activities that revolve around the essential components of critical thinking skills. Second, the small-group peer learning structure dramatically increased student participation in class discussions (we have seen participation rise from 20% to as high as 70% on TBL class days). Third, the immediate (real-time) feedback associated with the TBL technique enhances real-time learning that appears to positively impact subject retention. This paper explores the "strides and stumbles" with a two-year experience teaching entrepreneurship, with and without TBL techniques.

BACKGROUND

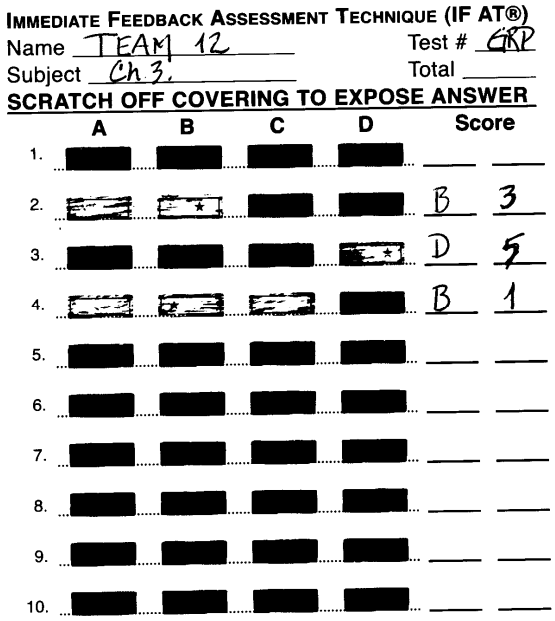
Team-based learning (TBL) is an instructional strategy that has differences and similarities with problem-based learning (PBL). TBL and PBL are similar in the objective to promote high levels of student interaction in the class learning setting. Further, both methods require (or, work best) when students adequately read and consider subject facts and concepts in advance of class – that is, that the mind-set of the student is to *know* concepts and then use class time to *apply* concepts. Class activities are designed less around learning facts and more on application of information. PBL and TBL use case studies to some extent as a focus of discussion to link the class to real-world problems. Differences between PBL and TBL can be summarized in two ways:

- PBL involves a small-group activity over several days that is decoupled from and does not typically require interaction with other groups in the large-group setting. In contrast, the TBL framework involves multiple group-to-group interactions within a single class period, for which instantaneous feedback on decisions and performance occurs; every group sees the outcomes of decisions by other groups in real-time at the same time. This framework draws on instructor skills in different ways, as highlighted in our second bullet-point.

- The TBL framework places different demands on the instructor. As opposed to being the so-called "sage on the stage" the teacher-centered didactic approach gives way to the instructor role as a facilitator (so-called "guide on the side"). And, while PBL and TBL do require more work in advance by the instructor, there may be required new facilitator skills within TBL to successfully manage multiple groups and their interactions in the large-group setting. The instructor must be both an expert *and* a facilitator.

Books by Michaelson *et. al* (1984, 2008) outline the theory and use of TBL in several settings (engineering, finance, social sciences). Numerous examples in medical education arose in our literature search, including a two-year observational study on TBL effectiveness at ten medical schools (Thompson et. al, 2007). No studies on the use of TBL in entrepreneurship education were found, so the present work intended to highlight key features and outcomes of TBL as implemented at the Institute for Management and Engineering at Case Western Reserve University (CWRU). A complete description of the TBL can be found elsewhere (Michaelson *et. al*, 1984), so here we simply prove a brief overview of the method as applied at CWRU. For brevity, the narrative to follow blends a description of each TBL step with additional comments pertaining to the CWRU process implementation. Overall there were seven major components to our TBL process:

1. Students study assigned readings outside of class.
2. A 30 – 45 minute "mini-lecture" is provided by the instructor at the beginning of class to answer any questions on the assigned reading and to highlight important concepts.
3. The in-class TBL process is then launched with each student individually taking a 5 to10 question multiple choice exam, the "Individual Readiness Assessment" (IRA). After 10-15 minutes the exam session is concluded and the exam submitted to the instructor.
4. Immediately upon completion of the IRA, students gather in pre-assigned groups to retake the same multiple-choice exam, this time the team deciding (or just coming to a consensus) on the correct choice. A folder is provided to each team with an immediate feedback form (IFF) so they can self-assess performance in "real-time"; this is the "Group Readiness Assessment" (GRA). Figure 1 provides an example of the IFF developed by Epstein (2009) and used in the CWRU implementation. The class reconvenes "as a whole" after the IFF and a representative from each team shares with the class their answer choice and any issues with the class. The instructor facilitates the Q&A from each group and records GRA test results on the board for all groups to see each others' results.


IMMEDIATE FEEDBACK ASSESSMENT TECHNIQUE (IF AT®)
Name TEAM 12 Test # GRP
Subject Ch 3. Total
SCRATCH OFF COVERING TO EXPOSE ANSWER

	A	B	C	D	Score	
1.						
2.					B	3
3.					D	5
4.					B	1
5.						
6.						
7.						
8.						
9.						
10.						

Figure 1. Immediate Feedback Form (Epstein, 2009)

5. After the instructor has a sense that critical concepts have been mastered, the students remain in their groups and proceed to the "Grand Challenge" (GC). The GC is a case application of entrepreneurship concepts in the "real-world" typically involving a mix of ethics, organizational development, finance, technology, etc. Most important is that the GC is based on actual situations with known outcomes; this is important since there is limited data presented in the problem and students are presented with one of three choices as an outcome of their problem analysis.
6. Upon completion of the GC the instructor then reconvenes the class as a whole and then, again, the instructor facilitates the Q&A from each group and records GC results on the board for all groups. The ambiguity of the problems admits multiple perspectives and the lively class discussion draws on the instructor facilitation skills to ensure class concepts are reinforced.
7. Peer evaluation is an important part of the process and was given as an after-class on-line homework assignment; to simplify the process we used the CATME system.

A critical component of the TBL process is the development of the individual readiness assessment and grand challenge. It is proposed by Michaelson (2008) that in order for the TBL to be most effective, care must be taken to adhere to the "3Ss" throughout:

- All individuals and group efforts are centered on the *same problem*.
- Course concepts are used to make and defend *specific choices*.
- The specific choices of the group work are public and *simultaneously reported*.

Overall, each TBL session requires considerable preparatory time (offline) by the instructor and along with the extensive amount of grading to be performed after the TBL, it is often remarked that TBL is a very labor-intensive technique. In comparison to the classic lecture-format, the instructor must:

- Ensure that each group is properly formed (critical with a diverse, international class),
- Foster the idea that students are accountable for their own learning (dialetic format),
- Readiness assessments and grand challenges must be carefully designed to focus on the application of specific concepts,
- Feedback to students and groups must be immediate.

As a result, TBL was used on select days throughout each semester, not as replacement for every class session.

It is important to briefly mention two instruments that facilitated the TBL implementation effort. The first concerns the formation and evaluation of teams, and the second addresses the measurement of critical thinking skills.

1. The CATME tool was developed by a team lead by Matthew W. Ohland, Associate Professor, Engineering Education, Purdue University (CATME, 2008). This was a highly effective tool that helped in team formation and gathered peer evaluation data to assess team member effectiveness.
2. The Critical Thinking Skills rubric developed by Washington State University (2008) was used as a self-assessment technique for each student at two points throughout a given semester. Though elective self-assessment is limited, the form allowed the instructor to develop a sense of student progress on the development of CTS. The process of assessing CTS is not a part of the conventional TBL process, it was simply introduced as a way for the instructor to begin establishing some cause and effect between teaching techniques and student CTS outcomes.

STRIDES AND STUMBLES

Changing the direction of a course from simply presenting and testing on concepts to the situation where students are required to use the concepts is potentially risky. The present work was not without some "learning moments" and for the sake of simplicity we have divided the discussion into "strides and stumbles." Four unanticipated "stumbles" occurred:

1. **Increased workload.** Although several case studies warned about the increased workload associated with TBL, these warnings were not taken seriously. Failure to anticipate preparatory and grading time suggests that TBL novices try to identify a colleague to help launch TBL or where team-teaching can be accommodated.
2. **Grading complexity**. TBL is a multi-dimensional process and at least five elements of the process can be subject to grading or general assessment (IRA, GRA, GC, Class participation, Peer Review). Developing a grading profile to weigh the various elements and integrate into a single TBL "grade" required several iterations.
3. **Tolerating silence.** At the outset and for some subsequent TBL sessions, students or groups may have to pause for some time prior to answering a question or responding to a comment. The natural inclination of the instructor was to jump in to "help" but this interfered with allowing the students time to "process then report."
4. **Simultaneous coaching and evaluation** During the phase of the process involving groups "reporting out" a single instructor must manage the process of coaching with questions while simultaneously evaluating student reasoning. This is an overwhelming (tiring?) aspect of the TBL experience. Add observers to the class.

It seemed that the (long-term) "strides" associated with TBL outweighted the (sort-term) "stumbles" and could be characterized in three ways:

1. **Enhanced class participation.** The entrepreneurship course weighted class participation as much as 25% of a student grade. Thus the instructor has a mechanism for monitoring class participation in a grade book. Prior to TBL the class participation was at the 15%-25% level. Student participation in class discussions was as high as 70% on TBL class days.
2. **ESL engagement.** Although diversity is welcome in entrepreneurship discussions, typically English as a Second Language (ESL) students (and even shy domestic students) seem reluctant to share their opinions in the larger class sessions. The small-group supportive structure appeared to encourage many to speak up; particularly when these students represented their group, they had some prior peer approval which seemed to empower them to share their thoughts.
3. **Improved class readiness**. Anticipating the IRA prior to class, many students (self-reported) that they made a stronger effort to at least review chapter materials prior to

class. Recitation of chapter concepts in class discussion underscored that some form of preparatory work had been performed.

IMPACT ON CTS

End-of-semester evaluations for 3 consecutive semesters revealed the memorable and enjoyable class experience provided by the TBL experience. But to several critics a question remained: "Was this just fun or was it educational?"

Activities to improve student CTS – long before the implementation of the TBL – included the selection of the University of Washington CTS rubric for data collection. Although a significant amount of data has been collected, it is illustrative to point out changes in just one dimension of the CTS. As shown in the chart below, there was a dramatic change in the ability to "develop an individual hypothesis" before and after TBL. While the nature of the data collection method is subject to more scrutiny, instructor evaluations of student essays concur with the statistics and suggest a causal relation.

		Develop individual hypothesis	
		2008	2009
Week +6	Mean	4.320	4.429
	SD	0.912	0.598
Baseline	Mean	4.267	4.139
	SD	0.640	0.816
Delta	Mean	0.053	0.290
	SD	0.272	-0.218
Imrovement Mean		**1.2%**	**14.5%**

Figure 2. CTS improvement: Develop Individual Hypothesis

SUMMARY

Entrepreneurship requires the ability to make choices within a context of ambiguity and limited data. Moving from individual, quantitative, directed thinking about a well-defined engineering problem to unbounded, qualitative, self-directed decision-making challenges many students, and our experience is that TBL has an impact on fostering these competencies. We have also discovered that implementing TBL takes what is otherwise a "large" class (40 students) and restores a "small class" feeling.

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ENTREPRENEUR EDUCATION: DOES PRIOR EXPERIENCE MATTER?

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ABSTRACT

Purpose – The purpose of this paper is to explore the development of entrepreneurship education in Malaysia and to examine whether prior entrepreneurial experience has an effect on the development of entrepreneurial characteristics, behaviour and intention.

Methodology – Data was collected via a self-administered questionnaire survey. The population comprised of students of a higher learning university.

Findings – The results shows that there are significant difference between groups that have prior experience compared to those who do not have prior entrepreneur experience in terms of entrepreneurial characteristics, behaviour and intention.

Practical Implications – These findings provide valuable insight for educators and policy makers in formulating syllabuses and policies to enhance the effectiveness of entrepreneur education. This paper proposes that students should be encouraged to obtain entrepreneurship exposure as early as possible to develop their entrepreneurial characteristics, behaviour, and intention.

Originality/value – This study provides an insight into a relatively neglected area of entrepreneurship education research based on a sample of young undergraduates in a higher learning institution in Malaysia.

Keywords – Entrepreneur, Entrepreneur Education, Malaysia, Prior Experience, Intention, Behaviour, Higher Education.

Paper Type – Research Paper

INTRODUCTION

The importance of entrepreneurship education on the economic future of a nation has been much lauded by researchers, for example, Cheng et al. (2009), Heinonen and Poikkijoki, (2006) and McKeown et al. (2006). In their research, entrepreneurship education is more than creating a new business venture, but also denotes the understanding of the essence of entrepreneurship such as learning to be innovative, i.e., thinking out of the box, high readiness to change and being able to integrate and synthesize experience, skills and knowledge to create, innovate and evaluate abundant entrepreneurial opportunities they are trained to identify. According to Cheng et al. (2009), entrepreneurship education brings important returns to graduates and also to society in terms of encouraging the society as a whole to be more responsive towards new technology changes. In their research, Heinonen and Poikkijoki (2006) also report that entrepreneurial behaviour is an innovative approach that constitutes a viable platform for economic development in any society.

Given the importance of entrepreneurship education on the economic future, it has sparked a worldwide interest towards building and ingraining these entrepreneurship skills, values and behaviour into the new generation of the citizens especially fresh graduates. Higher learning education is seen as one of the platform to encourage entrepreneurship among the younger generation (McKeown et al., 2006). Hence, this has led to a greater scrutiny on the effectiveness of entrepreneurship education in higher education. Nevertheless, there seems to be some differences of opinion among researchers in terms of whether entrepreneurship can be taught, posing some interesting findings aimed towards education institutions (Dickson et al., 2008; Henry et al., 2005; Kirky, 2004).

Against this backdrop, this research therefore aims to explore whether prior experience (from parents and respondents' self-experience) would have an effect on the outcomes of entrepreneurial courses being taught in universities in terms of entrepreneur values, characteristics and intention.

LITERATURE REVIEW

Development of Entrepreneurship in Malaysia

The importance of entrepreneurship activities is undeniably crucial for the development and sustainability of the economy. It has been acknowledged that entrepreneurship plays an important role in an economy and can lead to economic growth (Fauziah et al., 2004). The economic crisis that hit Malaysia has shown that it is risky to be overly dependent on foreign direct investment (FDI) to stimulate economic growth as there is a high tendency for foreign investors to withdraw their investments and relocate to new destinations that are able to offer lower labour costs (Normah, 2007). Entrepreneurship activities have always been equated to be

the activities undertaken by small and medium enterprises (SMEs) and these SMEs play a crucial role towards the development of a nation's economy. In the context of Malaysia, the importance of entrepreneurship towards the of the country's economy can be seen where 99.2% of business establishments are SMEs, employing 5.6 million of the workforce and contributing about 32% of the gross domestic product (SME Corp, 2010). The important role that entrepreneurs play through SMEs in the economic growth of various Asian nations can be shown Table 1.

Table 1: International SME Development and Growth

Country	Measures used in the definitions of SMEs	% of total establishment	% of total workforce	% of SME contribution to GDP
Malaysia (2005)	Employment and sales	99.2	56.4	32.0
Japan (2004)	Employment and assets	99.7	71.0	55.3
Chinese Taipei (2004)	Employment, sales capital	98.0	76.9	40.0
Korea (2003)	Employment and assets	99.8	86.5	49.4
Thailand (2002)	Employment and fixed assets	99.6	69.0	38.9
Singapore (2004)	Employment and fixed assets	45.0	45.0	25.0
Germany (2003)	Employment and sales	99.7	79.0	49.0
China (2004)	Employment, sales and assets	99.0	75.0	56.0
Philippines (2003)	Employment and assets	99.6	70.0	32.0
Source: SME Annual Report 2008				

From the Table 1 above, we can conclude that the SMEs in developed countries such as Japan and China SMEs contribute more than 55% towards their national GDP and more than 70% of the total workforce, demonstrating the crucial role that SMEs play in the development of the countries' economies.

As mentioned above, in the context of Malaysia, the government is deploying supporting mechanisms and formulating policies to assist and support entrepreneurs such as providing funding, physical infrastructure and business advisory services (Mohammad Arriff and Syarisa Yanti, 2003). The National SME Development Council was set up in August 2004 to formulate and implement the direction and strategies for the development of SMEs (Normah, 2007). Key achievements of the Council are shown in Table 2.

Besides that, recent measures have been made by Bank Negara Malaysia to assist SMEs to manage the impact of higher costs. It provides avenues for SMEs to seek assistance and enhance efficiency and productivity via an RM 700 million assistance facility which provides financing at 4% per annum as well as advisory services in managing costs. There is also a RM 500 million SME modernisation facility and tax exemption on machinery and equipment (Bank Negara, 2008). The Malaysian Government has also launched the Entrepreneur Development Fund, the Bumiputera Entrepreneurship Project Fund, the Asia Japan Development Fund, the

Credit Guaranteed Corporation Scheme and the Franchise Development Programme (Ramayah and Zainon, 2005).

Table 2: Key achievements of the National SME Development Council

Access to Financing
Establishment of SME Bank
New Trade Financing Products for SMEs
RM300 million Venture Capital Funds for Agriculture Sector
RM1 billion Special Fund for Overseas Project Financing
Sustainable Microfinancing Framework
Transformation of Credit Guarantee Corporation
Strengthening of Bank Pertanian Malaysia
Additional allocation of RM2.5 billion for Fund for Small and Medium Industries 2 and New Entrepreneurs Fund 2
Capacity Building
Formation of the SME Marketing Committee
Agro-based Industry Development Programme
Financial advisory services by Bank Negara Malaysia, SME Bank, EXIM Bank and commercial banks
Business advisory services by Ministry of Entrepreneur and Cooperatives Development and SMIDEC
Technopreneur Development Programme for microelectronics
Open Source Adoption in office automation and tools for SMEs
Set-up of two Landscape Industrial Village and Exposition centres
Hypermarket Promotional Programmes
Retail Technology Venture Partner Development Programme
SMIDEX 2006 and ASEAN + 3 SME Convention
Information Infrastructure
Publication of SME Annual Report 2005
Launch of SMEinfo Portal
Launch of HRD Training Portal
Launch of Agri-Bazaar Portal
Census on Establishment and Enterprise 2005
Physical Infrastructure
Set-up of Franchise Mediation Centre
Set-up of Agri-Food Business Development Centre
Set-up of Landscape Industry Resource Centre
Source: Bank Negara Malaysia, 2007

Entrepreneurship Education

Before going into the definition of entrepreneur education, exploring and understanding its core concept that is entrepreneurship is important. Is it solely a process of setting up a new venture? Or is it a concept referring to a list of behavioural patterns and characteristics that a person should have before being recognised as an entrepreneur?

According to Hisrich et al. (2005) entrepreneurship can be defined as a dynamic process of creating incremental wealth where the wealth is created by individuals who undertake the risks involved in terms of equity, time and career. The authors mentioned that entrepreneurship can also be defined as a process of creating something new with by devoting time, and effort by assuming the financial, psychic and social risks and as a return, receiving the rewards of monetary and personal satisfaction. On the other hand, Bygrave (1989) as cited by Heinonen and Poikkijoki (2006), defined entrepreneurship as "a process of becoming, and the change involved usually takes place in quantum leaps in a holistic process in which existing stability disappears". However, it is generally agreed that entrepreneurship does not necessarily focus only on creation of new firms but also can take place in existing organizations. Hence the word "intrapreneurship" can be defined as entrepreneurship within an existing organisation where the intentions and behaviours of members of the organisation deviate from the routine and customary way of managing business (Heinonen and Poikkijoki, 2006).

Entrepreneurship education on the other hand, refers to a collection of formalised teachings that inform, train and educate learners who are interested in setting up a business or small business development (Berchard and Toulouse, 1998). Entrepreneurship education can be also be defined as skills that can be taught and the characteristics that can be engendered to enable the individual to develop new and innovative plans (Jones and English, 2004 as cited in Mastura and Abdul Rashid, 2008). Cheng et al. (2009) argues that entrepreneurship education has traditionally been narrowly define as education that provides the needed skills to set up a new business and defined entrepreneur education as more than a business management or starting a new business. It is about "learning", learning that integrates experiences, skills and knowledge and the preparedness to start a new venture. Jamieson (1984), as cited by Henry et al. (2005), categorises entrepreneurship education into three categories that are:

a) Education about enterprise – Mainly to create awareness and educating students on the various aspects of setting and running a business from a theoretical perspective.
b) Education for enterprise – More towards preparing aspiring entrepreneurs for a career in self-employment with the objective of encouraging them to set up and run their own business. In this category, the focus is towards teaching students the practical skills needed for small business set-ups and management, and most often geared towards the preparation of a business plan.

c) Education in enterprise – Refers to courses aimed in helping individuals to adopt an enterprising approach. Focuses on management training for established entrepreneurs and is geared towards sustaining growth and future development for the business.

Laukkannen (2000) on the other hand distinguished two areas of entrepreneurship education:

a) Education about entrepreneurship that involves studying the theories on entrepreneurship and views entrepreneurship as a social phenomenon.
b) Education for entrepreneurship that focuses on developing and encouraging the entrepreneur process.

As for Garavan and O'Cinneide (1994), entrepreneurship education can be categorised into four categories namely:

a) Education and training for small business ownership – Provides practical help in making the change from ordinary employment to self-employment. Instructions provided on how to raise finances, legal consideration, choosing premises and so on.
b) Entrepreneurial Education – Focuses on creation of new entities centered on creating a novelty product or service.
c) Continuing Small Business Education – Focuses on enabling people to enhance and update their skills
d) Small Business Awareness Education – Aims at creating and increasing awareness among people to consider entrepreneurship as a career alternative. It is usually suitable for inclusion into secondary school syllabuses and undergraduate programmes.

Entrepreneurship Education in Malaysia

The interest in entrepreneurship education has reached an unprecedented growth in Malaysia due to the emergence of the knowledge based economy (Cheng et al., 2009; Fauziah et al. 2004). In an effort to create more entrepreneurs, the Malaysian government through the collaborations between the Ministry of Entrepreneurship and Corporate Development with public universities has recommended the implementation of compulsory entrepreneurship courses for all public university students (Mastura and Abdul Rashid, 2008). As a result of the strong initiatives from the government to promote an enterprise culture among the school and university graduates, education institutions, especially higher education institutes are entrusted with a new task which is to develop the entrepreneurial talent among young graduates (Fauziah et al., 2004). This serves as a catalyst for entrepreneurship education in higher learning institutions, where

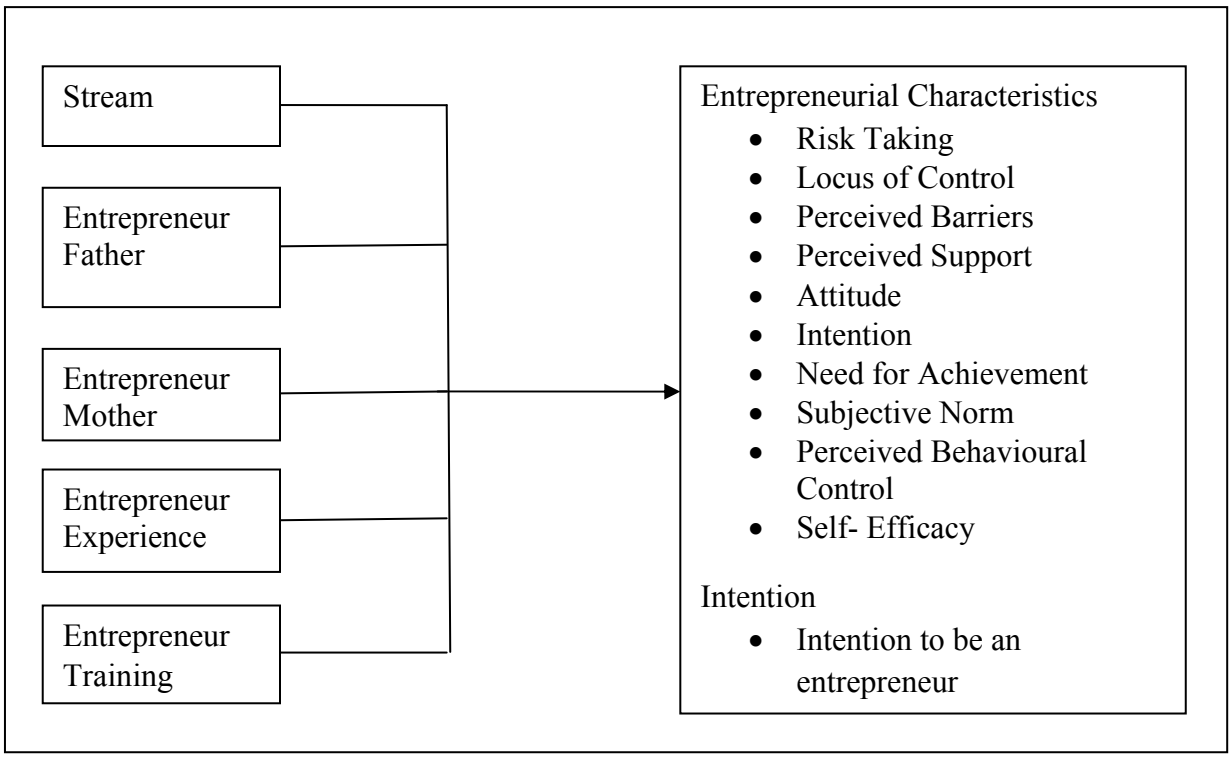
almost all universities and higher learning institutions are now offering entrepreneurship courses as core or elective courses or as a major subject. For example, University Science Malaysia (USM) is now offering entrepreneurship as a compulsory subject. The same can be said of Multimedia University (MMU) which has launched its Bachelor of Multimedia (Media Innovation and Entrepreneurship) degree programme with entrepreneurship as a core course. Besides that, MMU also offers Introduction to Cyberpreneneurship as a compulsory subject for all its students (Cheng et al., 2009). Another example can be seen is University of Malaya (UM) which also offers entrepreneurship subject at the Department of Business Strategy and Policy. Universiti Kebangsaan Malaysia (UKM) has made Information Technology and Entrepreneurship a compulsory subject for students enrolled in the Bachelor of Science in Information Technology programme (Cheng et al., 2009; Fauziah et al., 2004).

Currently, the most commonly used method or mode of delivery in teaching entrepreneurship is via lectures where as more interactive methods, such as case studies, invited guest speakers and interaction with successful entrepreneurs are less employed (Cheng et al., 2009). A study done by Ooi (2008) yields significant results on the role of universities in promoting entrepreneurship and students inclination towards entrepreneurship. In his research, Ooi (2008) found that the image of entrepreneurship is positively related to students' inclination towards entrepreneurship. astura and Abdul Rashid (2008) in their research concluded that entrepreneurship education does have an impact on students' inclination towards entrepreneurship where a majority of the students surveyed in their research showed interest to be entrepreneurs themselves. A more recent research conducted by Cheng et al. (2009) showed otherwise. Their research revealed that the level of knowledge and understanding on the meaning and purpose of entrepreneurship education among students in Malaysia is still considerable low and a 40.7% from their samples believed that entrepreneurs are born; hence leading to a belief that entrepreneurship education is a waste of time. They concluded that the level of effectiveness of entrepreneurship education in Malaysia can still be improved by reviewing the current curriculum and having a more appropriate entrepreneurship programme.

RESEARCH MODEL

This proposed framework is an adaptation from the model of Theory of Planned Behaviour (TPB) proposed by Ajzen (1991). This theory is originated from the Theory of Reasoned Action (TRA) that explains the relationship between attitudes and behaviour. TRA is further improvised by Ajzen (1991) with an additional factor that predicts behavior; perceived behavioral control (Archer et. al, 2008). For the purpose of this study, we endeavour to examine the influence of affective factors such as education and role model on entrepreneur characteristics based on variables proposed in the Theory of Planned Behaviour via a test of differences on these affective factors.

Figure 1: Research Model for the importance of prior experience on development of entrepreneurial characteristics.



METHODOLOGY

Data for this study was collected via a self-administered questionnaire survey which was divided into two parts. The first part consisted of 10 sections. Nine of the sections consisted of statements with 7-point Likert scale (1= strongly agree, 7= strongly disagree) were used to measure the level of risk taking (3 item), locus of control (3 items), perceived barriers that hinders respondents' perceived support (3 items), attitude (3 items) intention (3 items), need forachievement (4 items), subjective norm (4 items), perceived behavioural control (3 items) and self efficacy (3 items). The last section consisted of three items to measure the intention to be an entrepreneur. The second part of the questionnaire contained questions about the profile of respondents. Besides the normal profile questions such as age and gender, specific questions that are crucial for the purpose of this research, such as respondents' prior experience as an entrepreneur and whether they have undergone any entrepreneurship courses or training, were also asked.

The data was gathered from students of Universiti Sains Malaysia (USM). In this survey, 450 questionnaires were distributed, out of which, 420 questionnaires were usable.

Goodness of Measures

According to Pallant (2007), reliability can be assessed by measuring internal consistency which refers to the degree to which the items that make up the scale are measured in the same underlying attribute. One of the commonly used methods is Cronbach's coefficient alpha.

As shown in Table 3, there are 10 variables used in this study with the number of items for each variables shown. In this current study, all the variables have good internal consistency where all the Cronbach alpha's values exceeded the acceptable level of 0.5.

Table 3: Reliability coefficients for major variables in this study

Variable	Number of item	Cronbach alpha
Risk Taking	3	0.824
Locus of control	3	0.647
Perceived Barriers	3	0.576
Perceived Support	3	0.709
Attitude	3	0.773
Intention	3	0.899
Need of Achievement	4	0.887
Subjective Norm	4	0.873
Perceived Behavioural Control	3	0.842
Self- Efficacy	3	0.895

RESULTS AND FINDINGS

The profile of respondents is presented in Table 4. The majority of the respondents were females (74.8%). As for ethnicity, the majority of the respondents were Malays followed by Chinese, Indians and others. Most of the respondents have attended at least one entrepreneurship training programme or course. In terms of prior experience as an entrepreneur, only 21% out of the total respondent stated that they have prior experience as an entrepreneur.

Table 5 provides a brief insight into the mean and standard deviations for the variables assessed. All the mean values exceeded the value of 4, except for perceived variable control which recorded a value of 3.81. This revealed that most of the respondents are inclined to take risks and lean more towards the internal locus of control. Respondents are concerned with the barriers that entrepreneur have to overcome. Besides that, respondents also showed they have a high level of perceived support to be an entrepreneur and have the right entrepreneur attitude. In addition, respondents have high need for achievement with high subjective norm to encourage

them to pursue a career as an entrepreneur. Respondents too project high self efficacy and most importantly, majority of respondents show a great interest to be entrepreneurs in the future.

Table 4: Profile of the respondents

Item	Frequency	Percentage
Gender		
Male	106	25.2
Female	314	74.8
Ethnicity		
Malay	276	65.7
Chinese	20	4.8
Indians	80	19.0
Others	44	10.5
Types of study pursued	412	98.1
Undergraduate	8	1.9
Masters		
Stream of Study		
Arts	260	61.9
Science	160	38.1
Attended any entrepreneur courses or training		
Yes	268	63.8
No	152	36.2
Self employed before		
Yes	88	21
No	332	79
CGPA		
Below 2.00	22	5.2
2.00-2.33	52	12.4
2.34-2.67	130	31.0
2.68-3.00	134	31.9
3.01-3.33	56	13.3
3.34-3.67	12	2.9
Above 3.67	4	1.0

Table 5: Descriptive statistics of major variables			
Item	Variable	Mean	Standard Deviation
1	Risk Taking	4.22	1.36
2	Locus of Control	4.73	1.21
3	Perceived Barriers	4.22	0.81
4	Perceived Support	4.71	0.92
5	Attitude	4.60	1.20
6	Intention	4.22	1.31
7	Need for Achievement	5.24	1.02
8	Subjective Norm	4.08	1.16
9	Perceived Behavioural Control	3.81	1.17
10	Self- Efficacy	4.16	1.15
*Mean is based on 7 point Likert scale, 1= not at all accurate, 7=very accurate			

Table 6: Differences in major variables by streams of study			
Variable	Mean		t-value
	Arts	Science	
Risk Taking	4.06	4.47	3.05*
Locus of Control	4.60	4.93	2.61*
Perceived Barriers	4.25	4.18	0.90
Perceived Support	4.70	4.72	0.15
Attitude	4.67	4.48	1.56
Intention	4.35	4.01	2.56*
Need for Achievement	5.26	5.22	0.38
Subjective Norm	4.19	3.90	2.48*
Perceived Behavioural Control	3.94	3.61	2.80*
Self- Efficacy	4.30	3.93	3.22*
*$p<0.05$			

This study also examined if there are any differences in entrepreneur characteristics, behaviour and intention of students to be an entrepreneur. Based on Table 6, there seems to be significant differences in terms of risk taking, locus of control, intention, subjective norm, perceived behavioural control and self-efficacy between arts and science students. In terms of risk taking, it seems that respondents from the science streams have higher mean scores compared to arts stream respondents. However, in terms of the need for achievement, subjective

norm and self-efficacy, art stream respondents seem to surpass their science stream counterparts in terms of their mean readings. Respondents from the arts stream also seem to have a higher inclination to be entrepreneurs compared to their science streams counterpart. The same has been reported in the research carried out by Ramayah and Zainon (2005) whereby young graduates from Arts streams have a higher mean reading in terms of their intention to be entrepreneurs.

This research also aimed to examine if having a father or a mother in the family who is an entrepreneur would have an effect on the characteristics and intention to be an entrepreneur amongst students in higher learning institution. Table 7 indicates that there is a significant difference between respondents whose fathers are an entrepreneur and respondents whose fathers are not. The significant differences can be observed in terms of the subjective norm and perceived behavioural control where the mean figures for respondents whose fathers are entrepreneurs tend to have higher a mean.

However, as for mother being an entrepreneur in the family, there is significant difference on risk taking, moreover a mother who is an entrepreneur will influence her children to be more daring in taking risk as compared with mums who is not an entrepreneur.

The factor of whether either parent will influence the intention to be an entrepreneur appears to be of little important as there is no significant difference in terms of intention as shown in Table 7.

Table 7: Differences in the major variables based on parents influence as entrepreneur

Variable	Mean (Father)		t-value	Mean (Mother)		t- value
	Entrepreneur	Non-entrepreneur		Entrepreneur	Non-entrepreneur	
Risk Taking	4.08	4.32	1.78	3.97	4.28	1.90*
Locus ofControl	4.79	4.68	0.87	4.54	4.77	1.57
Perceived Barriers	4.24	4.20	0.55	4.13	4.24	1.33
Perceived Support	4.73	4.69	0.36	4.81	4.68	1.20
Attitude	4.69	4.54	1.25	4.66	4.59	0.51
Intention	4.30	4.16	1.03	4.45	4.16	1.84
Need for Achievement	5.26	5.23	0.37	5.29	5.23	0.43
Subjective Norm	4.23	3.70	2.30*	4.24	4.04	1.46
Perceived Behavioural Control	4.05	3.64	3.55*	4.22	3.71	3.65
Self- Efficacy	4.24	4.10	1.31	4.30	4.13	1.22

*$p<0.05$

Table 8 below shows the significance differences detected in entrepreneurial characteristics. One way ANOVA analysis indicated that there are no significant differences among groups based on prior experience and training in terms of perceived support, attitude and the need for achievement whereas the remaining characteristics showed that there are significant differences among the groups. This table also shows that young graduates who have never had any prior entrepreneurial experience and never attended any entrepreneurship courses or training before reported to have higher mean scores in terms of perceived barriers. This might be due to the lack of exposure and knowledge on entrepreneurship that lead them to perceive that it is more difficult to be an entrepreneur as compared with the other three groups shown in Table 8. Another interesting finding was that the researchers would like to highlight through Table 8 is that the means scores showed that young graduates with prior entrepreneurial experience and those who have attended entrepreneurship courses or training tend to have higher mean readings in all entrepreneurial characteristics except for perceived barriers.

Table 8: Differences in the major variables by prior entrepreneurial experience and training

		Mean*		
Items	No prior entrepreneurial experience and never attended any entrepreneur courses/training	No prior entrepreneurial experience but attended entrepreneur courses/training before	Have prior entrepreneurial experience but have not attended any entrepreneur course/training	Have prior entrepreneurial experience, and attended entrepreneur courses/training
Risk Taking Locus of Control Perceived Barrier	4.42a 4.68a 4.36b	3.91a 4.63a 4.20a	3.79b 4.23a 3.88a	4.81c 5.21b 4.11a
Perceived Support	4.47a	4.84a	4.52a	4.82a
Attitude	4.47a	4.66a	4.35a	4.74a
Intention	4.01a	4.14a	4.12a	4.84b
Need for Achievement	5.06a	5.39a	4.97a	5.24a
Subjective Norm	3.94a	4.04a	3.98a	4.44b
Perceived Behavioural Control	3.57a	3.77a	3.33a	4.48b
Self -Efficacy	3.84a	4.23a	3.37b	4.76c

*Means with the same superscripts are not significantly different; means with different superscripts are significantly different at $p<0.05$

DISCUSSION

Entrepreneurship education does have an impact towards entrepreneur intention and entrepreneur careers. This is confirmed by researchers such as Matlay (2008); Ramayah and Zainon (2005) and Souitaris et al. (2007) to name a few. However, the effectiveness of delivering entrepreneurship education should also be given priority. This relates to the approach of teaching business to students as mentioned in a research study done by Solomon (1989) as cited in Kirby (2004), whereby Solomon reported "Even in USA, the hotbed of entrepreneurship, courses designed to introduce student to the principles of business management have tended to teach students how to become proficient employees instead of successful business persons". The same has been ascertained the research done by Cheng et al. (2009), who found that most entrepreneurship courses (84.4%) are conducted through lectures. This method of delivery would give very little opportunity for students to develop entrepreneurial skills and characteristics as lectures are usually a one-way communication method. A more holistic approached should be used in teaching entrepreneur courses to give students (with or without prior entrepreneur experience) an opportunity to developing their skills, attributes and behaviour of a successful entrepreneur rather than focus solely on teaching students about entrepreneurship (Kirky, 2004).

Besides that, entrepreneur education should not only start at the higher education levels but should be instilled in primary and secondary schools. As shown in Table 8, respondents who already have some entrepreneurial experience and also have undergone an entrepreneurship course seem to have higher mean readings compared with the other two groups. This implies that it would be beneficial for students to be exposed to entrepreneurship at a young age, so that the entrepreneurship education objective would be better achieved if both experience and theory are instilled by the time they graduate from universities. Schools can implement project-based evaluation, rather than that based solely on examination. Results can be based on profit or market awareness of new products and services that students create or improvise. This approach not only exposes them to some of the real life issues like managing a business, but at the same time it would also help to build and develop skills, attitude and behaviour of an entrepreneur, which is the ultimate objective of entrepreneur education. All these skills, attitude and behaviour of entrepreneurs are not only important for potential entrepreneurs, but also for future employees in any organisation.

In addition, governments play a crucial part in promoting entrepreneurial education. Government need to set strong and sound policies which reflects their support for entrepreneurship. For example, to make transformation in the current educational system that embeds entrepreneurship, creativity and innovation in the syllabus. Besides that, the government must also work closely with other stakeholders such as academics, business and Non-Government Organisations (NGOs) community in developing and implementing policies at the national, regional and local levels.

Limitations

One of the limitations of this research is the sample which was limited to respondents who are students from Universiti Sains Malaysia. Future research in this area should enlarge the population of studies to all undergraduates of higher learning institutions irrespective of whether they are public or private learning institutions. Another future research direction of interest might be to compare and examine whether any significant differences exists between students from public and private higher learning institutions in terms of entrepreneur characteristics.

CONCLUSION

This research has illustrated how prior entrepreneur experience can actually develop graduates' entrepreneur characteristics. This is important regardless if whether they wish to set up their own business in the near future or not. Entrepreneurship education and exposure should be encouraged at every possible opportunity and should be emphasised as early as possible. Hence, policy makers, academician and parents should make it a point to encourage entrepreneur experience among our younger generation.

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DOES ENTREPRENEURSHIP EDUCATION HAVE A ROLE IN DEVELOPING ENTREPRENEURIAL SKILLS AND VENTURES' EFFECTIVENESS?

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ABSTRACT

The purpose of the paper is to examine the impact of entrepreneurship education and training on the development and enhancement of entrepreneurial skills that may be essential to improve ventures' effectiveness. One hundred and seventy entrepreneurs and prospective entrepreneurs were surveyed in the United States to determine their motivations for business ownership and assess their perceived factors that may have contributed to the success or failure of their ventures. The findings clearly indicate that there is causal linkages between entrepreneurial education (managerial skills), social competence (interpersonal skills), and to a greater degree, basic entrepreneurial training skills and ventures' effectiveness. They were statistically significant confirming prior expectation of the significant value of entrepreneurship education. The data demonstrates that the entrepreneurial education and training programs appear to create openness, confidence, and trust among the participants in this study. However, the type of entrepreneurship education must be coupled with content that is rich in learning principles, innovation, and reflection in order to enhance ventures' effectiveness.

INTRODUCTION:

Entrepreneurial firms including small and medium-sized enterprise (SMEs) make indispensible contribution to the market economics. They are an essential part of the renewal process that encompasses and defines the market economies. These firms play an important role in the innovations that lead to technological change and productivity growth. In the short term entrepreneurial firms are about change and competition because they change market dynamics. They also create an opportunity for millions of women, minorities, and immigrants to achieve success. (Kuratko and Hodgetts, 2004). In recognition of this , Higher Education Institutions (HEI) have been supported through government policy to provide training programs for SMEs aimed at developing a higher level of skills that will support small business growth (Gordon , Hamilton and Jack 2010).

Entrepreneurship Education

Current entrepreneurial education consists of a chronologically based approach. That is, business entry has become one of the most broadly addresses entrepreneurial subjects in current curricula (Kuratko, et. al, 2004). This business entry concept has become a sort of umbrella for the analytical, social, leadership and innovative skills that entrepreneurs rely on to achieve success. Business entry also identifies various sources of venture capital that may be available to entrepreneurs in need of funding. Furthermore, the teaching of the ability and willingness to make decisions based on imperfect or incomplete knowledge has been taught as an important issue for entrepreneurial education.

There are many challenges facing entrepreneurs and they should be well prepared before implementing their idea. "Entrepreneurship is risky mainly because so few of the so-called entrepreneurs know what they are doing. They lack the methodology. They violate the elementary and well-known rules. "It needs to be systematic, managed based on purposeful innovation" (Drucker, 1985, P.14). "Entrepreneurs possess skills, many of which are embedded within us. We can uncover these hidden traits, and develop them sufficiently to become a successful entrepreneur" (Kaplan and Warren, 2010 P. 8). As Peter Drucker says, "Entrepreneurship is nothing more than a discipline and, like every discipline, it can be learned." Drucker's main point is that innovation is not an activity limited to a special class of people (Drucker, 1985, P.24).

Entrepreneurial Skills

The skills that are required by entrepreneurs fall into three distinct categories: technical skills, business management skills, and personal entrepreneurial skills. Technical skills include written and oral communication, technical management, and organizing skills. Business management skills are managerial skills like planning, decision making marketing and accounting. Entrepreneurs also should have personal skills such as innovation, risk taking, and persistence (Henry et.al, 2005).

Students can learn these skills through effective entrepreneurship education to become successful entrepreneurs , Rae defines the term "entrepreneurial learning as learning to recognize and act on opportunities through initiating , organizing , and managing ventures in social and behavioral ways" (Rae, 2006, P. 16) . Although there seems to be wide variations in the personalities and characteristics of each kind of entrepreneur, the willingness to undertake risk and the possession of entrepreneurial skill sets are common themes prevalent in every style.

Understanding the role of entrepreneurial education on the creation of this willingness to undertake risk and the development of an entrepreneurial skill set is the focus of this study. It is against this background that this research is set. More explicitly, we deal with the question. What

is the impact of entrepreneurship education on the development and enhancement of entrepreneurial skills that may be essential to improve ventures efficiency and effectiveness as perceived by entrepreneurs and prospective entrepreneurs?

This paper reviews prior research regarding entrepreneurial education programs mainly in the United States, England, France and Germany and highlight some major challenges related to that issue. The next section derives the framework proposed to evaluate entrepreneurial education programs. In the third section we present the results of the survey analysis of operating and prospective entrepreneurs and their assessment of the entrepreneurship education programs that they have been involved in these programs for several years, and the final section we discuss implications and further research avenues.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK:

The following is the review of curriculums from randomly selected institutions of higher education in the United States, United Kingdom, France and Germany in order to assess the nature, content and type of entrepreneurial education offered by those schools.

Figure 1: A Random Sample of Entrepreneurship Education offerings by some institutions

	Innovation	Exploiting Market Opportunities	VRIO	Viability	Business Planning	Growth Strategies	Interna-tional Business	Resource Obtaining	Exit Strategies
Purdue	Yes	Yes	No	Yes	No	No	No	No	No
Syracuse	Yes	Yes	No	Yes	No	No	No	No	No
Penn State	Yes	Yes	No	Yes	Yes	No	No	No	No
New York State	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Cal – Berkeley	No	Yes	No	Yes	No	No	No	No	Yes
DePaul	No	Yes	No	No	Yes	No	No	Yes	Yes
Ohio State	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dartmouth	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Notre Dame	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No
Yes	78%	100%	11%	89%	67%	44%	11%	67%	44%
No	22%	0%	89%	11%	33%	56%	89%	33%	56%

Note: VRIO: value, rareness, immutability and organization

Figure 1 helps to explain what business schools are currently offering in the line of entrepreneurship education. Most universities do offer entrepreneurship education that does foster innovation, exploit market opportunities and explore the viability of an entrepreneurial venture. At the other end of the spectrum, most universities are not offering courses dealing with

international business and VRIO (value, rareness, immutability and organization) analysis. On middle ground, there appears to be a split between those colleges offering business planning, growth strategies, resources obtainment and exit strategies. Some of the courses we thought were more noteworthy are the following:

Ohio State University

Ohio State University appears to have an excellent entrepreneurship programme. This university covered every point that we believe should be covered in entrepreneurship education. In addition, Ohio State university students have a business plan competition available to them that has the potential of yielding a one hundred thousand dollar cash prize to the best business idea presented (Ohio State University, Deloitte Business plan competition, Web Nov, 2009). Further, Ohio State University offers a realistic and practical entrepreneurship education curriculum. One other brief note is that Ohio State University was the only university we found to have a curriculum that implemented the use of business plan software. Perhaps this is a minor detail, but being able to effectively use software to expedite the creation of sound business plans could be of significant importance to entrepreneurship education.

Syracuse University

Syracuse University offers an undergraduate degree, an MBA with a concentration on entrepreneurship, an MS in entrepreneurship, and a PHD in entrepreneurship. Some of the courses offered at the graduate level include managing new product development, marketing strategies for the diffusions of innovation, and opportunity recognition and ideation .Graduate students also participate in the D'Aniello Entrepreneurship Internship. Students work directly with an entrepreneur, president or senior executive in a high growth, innovative company in Syracuse metropolitan area (Wittman, 2009).

University of Pennsylvania

The University of Pennsylvania has also undergraduate, MBA, and PHD degrees in entrepreneurial management. Some sample course titles are "Change, Innovation, and Entrepreneurship ", "Private Equity in Emerging Market", and eHealth: Business Models and Impact among others (Wittman, 2009)

Lancaster University (UK)

Lancaster University in England conducted a study of the regional economic development impact of a university led entrepreneurship education programs for small business

owners in England. To deal with these issues a qualitative approach to the research was used to examine the situations of five SME owner/ managers who participated in the Lancaster University LEAD programs between 2004 and 2006. Participants for this study were originally interviewed at the beginning and in the middle of the programs and follow up interviews were carried out by the lead author of this study (Gordon, Hamilton, and Jack, 2010). The result clearly indicated there was a positive impact of entrepreneurship education program that is for small business owners that are rich in principle innovation and reflection, which makes this, program a unique programme. This programmeme was a useful tool to knowledge transfer, innovative and competitive advantage (Gordan, Hamilton, and Jack, 2010).

At LMU Munich School of Management in Germany, Weber, Graevenitz and Dietmate (2009), developed a theoretical model of Bayesian Learning in which entrepreneurship education generates signals which help students to evaluate their own aptitude for entrepreneurial tasks. The results of their study provide support for the notion that the student receives valuable signals and learn about their own type in the entrepreneurship courses and education.

In France and Belgium, Fayolle, Gailly and Lassas – Clerc (2006) , proposed the theory of planned behavior (TPB) model. In this theoretical framework the formation of intention depends upon attitudes toward behavior, subjective norms and perceived behavioral control, and is a good predicator of the behavior. In sum, their approach focuses on the impact of entrepreneurship education programs (EEP) in terms of evolution of students' attitude and "mindset", rather than only in terms of business created. EEP objectives include raising entrepreneurial awareness and mindset, learning how to innovate and develop new activities, or simply discover what entrepreneurship is about.

Even from this basic and limited look at what major and non-major universities are offering in the way of entrepreneurship education, some limitations of traditional entrepreneurship education become evident. The first of these is that entrepreneurship education is fragmented at most universities. This means that entrepreneurship students are not getting a broad enough education involving their role in a free market economy.

Another important consideration is that the availability of internship, apprenticeships and mentoring opportunities may be sparse for those students who wish to be entrepreneurs. Further, even when practical training opportunities are available, it is oftentimes difficult for universities and industries to cooperate. Finally, departmental resistance to change in curriculum could present an inflexible environment where implementing a new entrepreneurship education program may range from difficult to impossible (Kaplan and Warren, 2010, Krueger, 2002).

SUCCESS VARIABLES

Most entrepreneurial studies have focused on a few sets of variables that contribute to the success of entrepreneurs' ventures: (1) the psychological and personality traits of entrepreneurs; (2) the managerial skills and training of entrepreneurs; (3) and the external environment with

respect to psychological and behavioral traits (Bensing, Chu, and Kara, 2009). Ibrahim and Goodwin (1986) found four success factors: entrepreneurial values, managerial skills, interpersonal skills, and environmental characteristics. The entrepreneurial values were psychological in nature and included characteristics such as intuition, extroversion, attitude toward risk, flexibility, and a sense of independence. Managerial skills included variables' such as having a niche strategy, an effective budget system, experience, education and a simple organizational structure. The interpersonal skills factors were comprised of good customer relations, good employee relations, and good interpersonal skills, (Chu, Benzing and NcGee, 2007). Finally, the environmental characteristics included interest rates, taxes and governmental assistance. (Cetindamar, 2005).

Measuring Venture Effectiveness

A number of variables can be used to measure organizational effectiveness. The most common measures are financial, such as increase in sales or revenues, increase in venture capital, increase in profitability, and so forth. Effectiveness can be defined by measures such as number of customers, products, locations, employees, or other characteristics that could be quantified, such as innovation, creativity, and new ideas (Coluter, 2003 : Kaplan and Warren , 2010).

Alternatively, Likert proposed four different main management systems that companies adopt: Exploitive–Authoritative, Benevolent-Authoritative, Consultative, and Participative-group. Likert contended that the fourth system, Participative –Group, was ideal for the profit-oriented and human-concerned organization, as with entrepreneurial ventures, as it made optimum use of human assets (Accel Team, 2007). Likert (1973) proposed that entrepreneurship ventures effectiveness can be measured by using several variables including performance (profitability, sales, ROI, and market share), adaptability (flexibility, willing to change, adopt and innovate), and satisfaction (achieving venture's objectives and achieving needs for employees and entrepreneurs).

Despite its importance to developed and developing countries and popularity in the business and academic press, there is little empirical research that clearly links entrepreneurial education (skills) to overall venture effectiveness. Consequently, more information is needed to obtain a more realistic assessment of such a relationship which may have significant implications for the design and implementation of training courses for both prospective and operating entrepreneurs.

RESEARCH FRAMEWORK

The preceding discussion provides a basis for the research framework; It identifies several variables including entrepreneurial education- managerial skills, interpersonal skills, social competence and basic entrepreneurial training skills. The causal linkage among these

variables is assumed to influence organizational effectiveness (performance, adaptability and satisfaction). The research models views these variables as important elements to entrepreneurship ventures and are linked to organizational effectiveness as shown in Figure 2. In addition, several hypotheses were developed to guide this investigation of these relationships.

Hypothesis 1: There will be a positive correlation between the development of managerial skills through entrepreneurial education programs and perceived ventures' success factors.

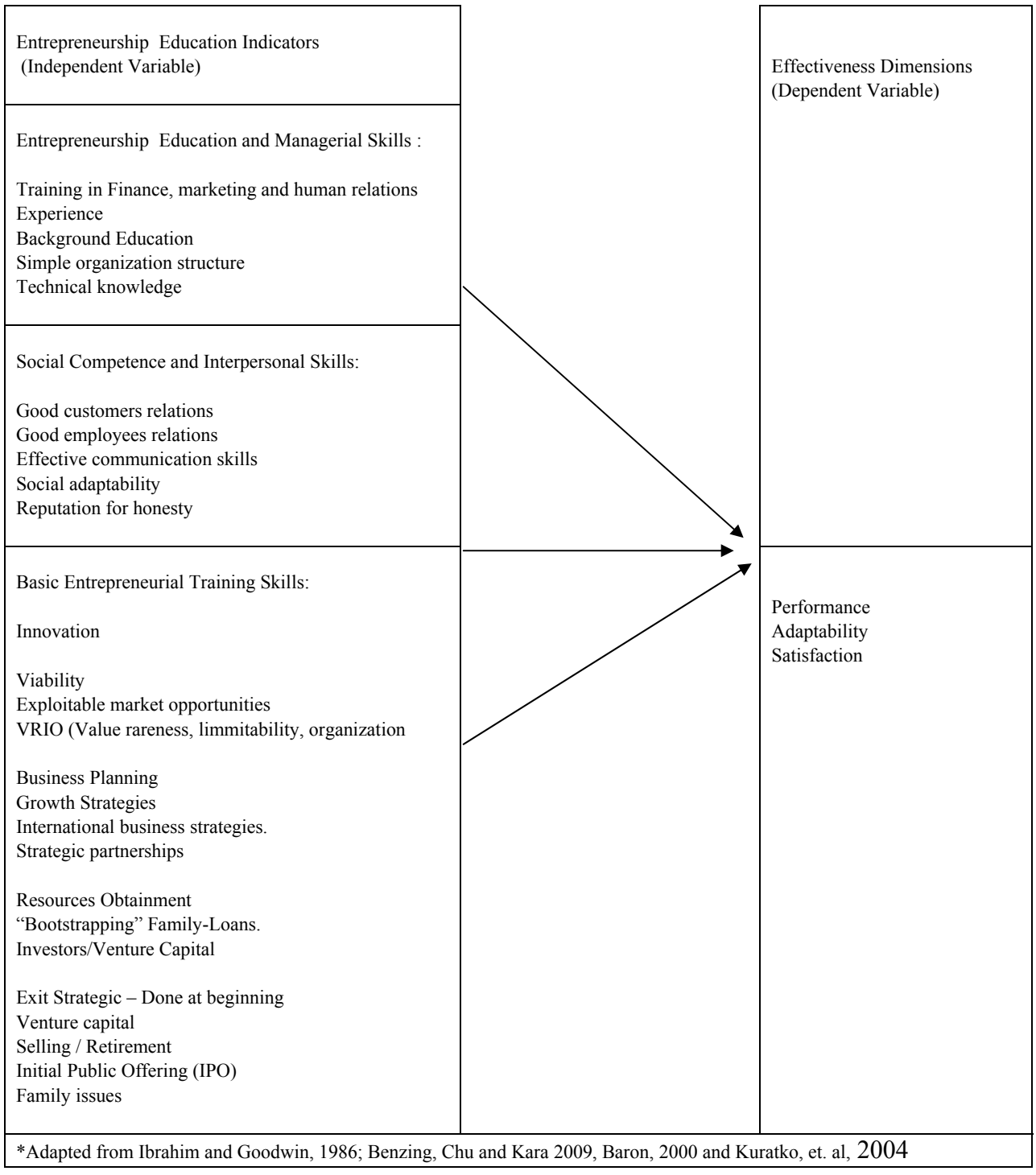
Hypothesis 2: There is a general tendency among surveyed participants in this study to give more credit to entrepreneurial effectiveness in regards to entrepreneurial educational training rather than to other factors.

Hypothesis 3: There will be a positive correlation between entrepreneurial education and organizational effectiveness in this study.

METHODOLOGY

In order to test the research hypotheses a survey of entrepreneurs Group (a) and prospective entrepreneurs Group (b) was developed and distributed to five hundred individuals throughout the United States. The majority of entrepreneurs in group (a) were enrolled in training courses on "how to improve your business through entrepreneurial education," and those individuals were engaged in entrepreneurial ventures for several years. The names of individuals were generated randomly from "a Computer Data Base Disclosure "and records of students at several universities throughout the United States. Group (b) was composed of people wishing to become entrepreneurs or planning to launch their first business ventures. All of the subjects in this group were trainees enrolled in several courses entitled "how to start your own business" conducted by several business development centers at several American Universities, who expressed their preference for starting their own business rather than looking for jobs after graduation .

Figure 2: The Relationship Between Entrepreneurship Indicators and Ventures' Effectiveness



*Adapted from Ibrahim and Goodwin, 1986; Benzing, Chu and Kara 2009, Baron, 2000 and Kuratko, et. al, 2004

The definition of the Small Business Enterprise (SBE) or entrepreneurs venture used in the study is based on the number of employees and is currently used by the World Bank (2007a) and European Commission (2003). According to both sources, an SBE has less than 250 employees and most of them less than fifty employees in the developing countries. Study participants were selected randomly to represent a range of organizational sizes and a variety of industries and were enrolled not only at the first tier universities but some were also randomly selected from second and third tier universities throughout the United States. This study was conducted from April 2009 to June 2010. A total of two hundred questionnaires were returned for a response rate of about forty percent. Thirty questionnaires were not acceptably completed, thus reducing the response rate to thirty four percent. The remaining one hundred and seventy were usable questionnaires and these responses were analyzed in this study. An average survey took thirty minutes to an hour complete, and was sent via traditional mail and on-line systems to collect data from respondents. Out of the 170 questionnaire that were usable in this study, 100 questionnaires were from group A, the same individuals who studied and trained in the selected universities in our survey. 70 questionnaires came from prospective entrepreneurs.

Measures

The three page questionnaire was divided into four parts. The first part consisted of items dealing with motivations and reasons for deciding to own business. The second part consisted of items dealing with the perceived factors that may have contributed to the success or failure of ventures among survey respondents. The third gathered demographic characteristics about the participants of the survey to ensure the results represent the broad range of the population. Finally, the fourth part consisted of items dealing with measures to assess the effectiveness of the entrepreneurship ventures as a result of entrepreneurship education and training from the perspective of survey respondents.

To measure organizational effectiveness, the authors used a Likert's Profile of Organization Characteristics because, unlike other potential measures, it allowed addition to be made to the questionnaire in order to assess overall effectiveness with specific new programs or initiatives such as entrepreneurship (Likert , 1973). Several variables were identified as being significant for the purpose of this study. First , there were the elements used to measure the independent variables- entrepreneurial education managerial skills interpersonal skills, social competence skills and basic entrepreneurial training skills with measures (derived from Ibrahim and Goodwin , 1986; Markman and Baron , 2003 and Rae, 2006). The second variable focused on the elements used to measure the dependent variable-organizational effectiveness that included performance (profitability, sales, market share), adaptability (flexibility, willingness to change), and satisfaction (to include satisfaction of achieving the venture's and employee goals and as well as willingness to advance with the entrepreneur objectives). Some of these measures

of effectiveness are used by several authors (Likert , 1973 : Coulter , 2003: Kalan and Warren , 2010).

The Likert instrument has been shown to have acceptable levels of reliability and validity across a variety of setting. The instrument is based on a scale of 1 to 5 (a Likert 5 type rating scale), with 5 being the most effective level and 1 the least effective level. A reliability test was conducted for indices of organizational effectiveness to enhance their credibility. The coefficient alpha for this study was above 0.76. Most researches consider an alpha at 0.70 to be an acceptable criterion for adequate scale reliability. In addition to the scales described above, basic demographic questions, including gender, age, job status , industry type , and annual sales , were included in the survey. Furthermore, several characteristics of responding individuals were compared between earlier and later respondents to provide an indication of non-response bias. This analysis showed no significant differences in the two samples. This result offered some assurance and reliability about the representativeness of the responding individuals.

Measurement tools were also developed to analyze the findings and evaluate the results. By using both the descriptive statistics and the ANOVA, the results could be analyzed and validated. Also, multiple regression models were developed to test the relationship between entrepreneurial education and training indicators and effectiveness indicators in this study (Stockburger, 2007).

RESULTS

Motivations of Entrepreneurs

Respondents were asked to rate seven reasons for deciding to own a business. The results are shown in Table 1 using a 5 point Likert scale, with 5 being "extremely "important" and 1 being 'the least important." The scale used in this study was developed by Benzing, Chu, and Kara (2009) and has been used in studies of entrepreneurs in Turkey and other developing countries. It was found that the seven most important motivations were "to find a job as self employed," "to have job security," "public recognition," "to increase income," "to diversify and advance family business," "to be able to used past experience-education and training," and "to support more advanced projects such as backward integration."

Given the fact that the United States in a state of recession for the past few years, where unemployment is high (around 9%), economically unstable, and a great deal of changes in the global and the domestic environments, becoming a business owner is not only a way to increase income, but it can also be a way to survive. These finding support previous studies not only in the U.S.A., but also around the world (Palich, 2008; Chu et.a1, 2007; Kaplan and Warren, 2010) regarding motivations to engage in entrepreneurial action.

Table 1: Factors influencing the individual's decision to become an entrepreneur		
Factors	Number of Respondents	
Find a job as self employed (desire for independence)	25	30*
Have job and income security	20	15
Public recognition and have fun	18	14
Financial rewards (increase income).	12	12
To advance family business Diversity	10	11
Need for achievement (use past experiences and education)	9	11
Support more advanced projects (backward integration)	6	8
Total	100	
Note: Sum totals may exceed 100 due to the fact that some participants selected more than one item.		

Furthermore, respondents were asked to rate twelve factors that may have contributed to the success of entrepreneur's ventures. On a five-point Likert scale, with five (5) being "exceptional" and one (1) being "very weak." The scale and the factors used in this study were developed by Ibrahim and Goodwin (1986) and have been used in studies of entrepreneurs in Canada, the United States, and other studies. It was found that the most effective factors that contributed to the success of entrepreneurs' ventures (in perspective) in this study were "managerial skills and training of entrepreneurs," social competence and interpersonal skills," "Access to Capital'" Support from family and friends." Good products at competitive prices," "Good Customer service," Previous business experience" "Hard Work," and other factors.

The inter-and intra-group attitude towards the appropriate training and managerial skills of the entrepreneur was almost identical. There was no significant difference at a level of 0.05 between the two groups. On a scale ranging between 1 (very weak) to 5 (exceptional), the majority of scores in each group (70% in group a , and 80% in group b) fell around category 4 (strong) on the scale, There was also no significant difference at a level of 0.05 between males' and females' attitude towards the entrepreneurial educational and training. Within the group of entrepreneurs, individuals whose fathers were entrepreneurs and those in their middle age (40-55) were more emphatic about the value of entrepreneurial education than the rest of the group members. The difference was statistically significant at the 0.05 level and also confirms hypothesis 1 in this study, which showed a positive and significant relationship between entrepreneur's education and perceived ventures' success factors.

With respect to the factors leading to entrepreneurial success, the role of entrepreneurial education and training was the first choice for 70% of members of group (a) and social competence and interpersonal skills for 60% of them. Surprisingly access of capital, good product and service and hard work factors came last on the list with only 31% believing it should be number one. Subjects in group (b) gave a slightly different response. Both entrepreneurial

education and effective management shared the first position with 50% of this group. With respect to the type and nature of entrepreneurial education, the majority 68% of both group (a) and group (b) expressed support for curriculum that include real-life examples of cases based on reflection and interactions through entrepreneurial learning process, rather than typical courses, which are based most of the time on exams, readings and few discussions. These findings provide support for previous studies by (Gordon, Hamilton and Jack, 2010; Weber; Graevemitz and Dietmar 2009) regarding the type of entrepreneurship educational that is needed for effective entrepreneurs.

As for the reason behind one's decision to become an entrepreneur, the need for achievement and security (job and income) was on the top of the list among the two groups which suggests that Mc Clelland's theory is more universally relevant than previously assumed (McClelland, 1961 ; McClelland et. al., 2003). Hypothesis 2 predicts that there is a general tendency among surveyed participants in this study to give more credit for entrepreneurial effectiveness to entrepreneurial education than to environment factors. These findings, as well as the statistical analysis across different groups in this study, provide evidence to substantiate hypothesis 2, regarding the effects of entrepreneurial educational /training on entrepreneurs' success and effectiveness (see table 2).

Table 2: Difference in the perception of the entrepreneurial education value among the two groups

	No.	Mean	Std.	DF	ANOVA SS	Mean Square	F Value	Prob.	Significant Diff.
Entrepreneurs	100	4.86	0.24						
Prospective Ent.	70	4.54	0.02	2	0.12	0.005	0.07	0.9712	No
Total	170								

Relationship between Entrepreneurial Education Indicators and Ventures' Effectiveness Dimensions

A major objective of this study is to determine the relationship between entrepreneurial education indicators (independent variable) and organizational or ventures' effectiveness dimensions (dependent variable) as defined in the research model. Hypothesis 3 predicts a positive relationship between entrepreneurial education indicators scores and organizational effectiveness scores. In order to prove this substantive hypothesis, it is necessary to reject the null hypothesis which predicts the absence of relationship between independent and dependent variables.

The Pearson Product-moment Correlation ® was calculated for entrepreneurial education dimensions and effectiveness dimensions to measure the strength, direction and statistical significance of relationship between the independent and the dependent variables with

individuals as the unit of analysis. Table 3, Pearson Correlation Coefficients for entrepreneurial education and effectiveness clearly indicates a positive relationship between all measures. It is, therefore, appropriate to reject the null hypothesis, and to state, with more than 95 percent confidence (P< .05) with the most significant relationship between effectiveness and basic entrepreneurial training skills dimensions that a positive relationship was found between entrepreneurial educations dimensions and organizational effectiveness dimensions.

Table 3: Pearson Correlation Coefficients for Entrepreneurial education Indicators and Effectiveness Dimensions

Entrepreneurs' Indicators	Performance (1)	Adaptability (2)	Satisfaction (3)	Effectiveness (1+2+3)
Entrepreneurs' education and managerial skills	0.68	0.60	0.52	0.64
Social Competence and interpersonal skills	0.56	0.54	0.60	0.54
Basic Entrepreneurial Training Skills	0.74	0.70	0.72	0.70

Further analysis of the relationship between entrepreneurial education and organizational effectiveness dimensions was done with the use of multiple regression analysis. This analysis determines the proportion of variance in organizational effectiveness scores explained by entrepreneurial education scores. Table 4 presents the results of this analysis, which indicated a positive relationship between measures of entrepreneurial education indicators and effectiveness as reflected in the multiple regression ratios. The results show that 79 percent of the variation in performance, 62 percent of the variation in a adaptability, and 59 percent of the variations in satisfaction are explained by linear regression on the entrepreneurial education dimensions. The F-ratios indicate that these linear associations are statistically significant at P<.05.

The causal link between entrepreneurial education, social competence, and, basic entrepreneurial training skills and organizational effectiveness was statistically significant confirming prior expectations and complementing previous studies (Baron, 2000; Krueger, 2002; Kaplan and Warren, 2010). This study points to a positive impact of entrepreneurial education, social competence and basic entrepreneurial training on organizational effectiveness in terms of higher performance, flexibility and satisfaction, thus improving competitiveness and profitability.

Table 4: Results of Regression Analysis of Entrepreneurial education and effectiveness

Dependent Variable (Effectiveness)	Multiple Regression	Regression Square (R^2)	F-ratio
Performance	0.82	0.79	5.52
Adaptability	0.70	0.62	6.68
Satisfaction	0.68	0.59	7.40
Effectiveness (1+2+3)	0.78		10.50
Note: All P<.05.			

CONCLUSION / IMPLICATIONS

The purpose of this study was to examine the impact of entrepreneurship education on the development and enhancement of entrepreneurial skills that may be essential to improve ventures' efficiency and effectiveness. In addressing our concern this study presents a number of interesting findings and has implications for researchers, practitioners and policymakers.

First the attitudinal results presented in this study provide support for the claims of proponents that entrepreneurial education still overshadows other aspects in explaining a small business entrepreneurship's success or failure in many societies. Although it is an elusive variable and methodologically problematic to measure, entrepreneurship education is still perceived as a major determinant of entrepreneurial success, as was the case in this study. A sample of one hundred and seventy subjects comprising two groups- entrepreneurs' and prospective entrepreneurs were surveyed. The results showed almost identical attitudes among the members of the groups towards the entrepreneurial education and training as being outstanding factors for success and have significant essential value to any entrepreneurship venture.

Second, this survey of entrepreneurs in the United States indicates that like many other entrepreneurs around the world, the primary motivations for owning a business are to find a job (desire for independence), to increase income, obtain job security, need for achievement, to advance family business and to support more advanced projects. According to this survey's results, entrepreneurs in the United States believe the most important small business enterprise (SME) success items are education and training of entrepreneurs and social competence, which include honesty, and good social skills. Both interpersonal and managerial skills shared the top positions with all the surveyed groups in this study, at the same time, they viewed government support and political involvement as relatively unimportant to their success.

Third, the causal linkages between entrepreneurial education (managerial skills), social competence (interpersonal skills) and, to a greater degree basic entrepreneurial training skills and organizational effectiveness was statistically significant confirming prior expectation. This study points to a positive impact of entrepreneurial education and training including the content and nature of entrepreneurship education that is based on interactions, reflections and drawing on action learning principles which motivate entrepreneurs to be innovative and be creative in their ventures .

Implications

As shown in this paper, many researchers believe that entrepreneurship can be taught effectively (Kaplan & Waren, 2010; Henry et. al. 2005: Drucker, 1985; Kuratko, et. al. 2004). However, the major consideration as we go forward should not be a matter of whether or not it

can be taught, but how it should be taught. The objective of entrepreneurial education should be to equip entrepreneurs and prospective entrepreneurs with the necessary skills required to face the challenges in designing and implementing a new business venture. This can be achieved in well designed educational curriculum supported by various case studies, business plans, projects, and based on reflection and interactions in the learning process. By allowing entrepreneurs to interact with each other, and with other essential entities in the operating environment this will provide encouragement to think outside the box and be creative (Rae, 2006, Henry et. al. 2005. Kuratko, et. al, 2004).

The data demonstrates that the entrepreneurial education and training programmes appear to create openness, confidence and trust among the participants in the study. Trust appears to play a big role in the way individuals were prepared to engage with entrepreneurial instructors and staff and with each other. It is social trust that is seen to facilitate coordination and co-operation between individuals and firms outside the educational setting which is so essential for any ventures success.

For those involved in entrepreneurship education, this study demonstrates that the creation of trust and sociability are key aspects for the long-term success of the experience of engaging potential entrepreneurs, small business owners and educators. However, this must be coupled with content, that is rich in learning principles, innovation and reflection and must go beyond traditional settings in order to enhance ventures effectiveness (Gordon, Hamilton and Jack, 2010).

For researchers, need to confirm empirically the role of reflection in the entrepreneurial learning process drawing on action learning principles, for example, dealing with staff problems or new threats to business activities, developing leadership and/or empower teams to create new ventures. Any entrepreneurship education programme objectives should be raising entrepreneurial awareness and mindset, learning how to innovate and develop new activities, or simply discover what entrepreneurship is about (Fayolle, Gailly and Lassas – Clero, 2006).

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STEM: A PATH TO SELF-EMPLOYMENT & JOBS?

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ABSTRACT

This paper examines the self-employment path of STEM graduates and whether self-employed STEM graduates are associated with larger firms compared to their non-STEM counterparts. The results indicate that graduates with STEM degrees have a lower probability of being self-employed, with the exception of health professionals and individuals with a baccalaureate degree in technology and a Masters degree in computer science. However, self-employed STEM graduates are associated with larger firms. These findings suggest that education policy promoting STEM disciplines may not necessarily result in new firms, but STEM graduates contribute to the growth of employment and subsequently, the economy.

INTRODUCTION

The Small Business Administration (2009) reported that small business creation powers the US economy. However, Shane (2009) warns that promotion of any and all new ventures is misguided, arguing instead in favor of a more efficient policy that focuses on promoting businesses with growth potential. Further, others argue that a policy to promote all new businesses results in sizeable deadweight loss because generally, starts ups tend to create few jobs (Henley, 2005). It therefore appears that the challenge for policymakers is to support economic development while minimizing the deadweight loss associated with creating new firms. In recent years this challenge has resulted in an education policy targeting disciplines believed to further economic growth.

Our research is motivated by the SBA claim that small business is an engine of economic growth and evidence suggesting that economic innovation occurs in highly technical industries, such as computer software and biotechnology (Audretsch, Keilbach, and Lehmann 2006). In response to these claims and evidence, governments at the federal and state levels have initiated programs to promote physical science, technology, engineering, and mathematics (STEM) education. The macroeconomic benefits from promotion of STEM education are expected in the formation of new firms requiring expertise in STEM disciplines. As noted by Shane (2008), not all firms are created equal. Some firms have greater growth potential and hence create more employment opportunities for society. Accordingly, to examine policy promoting STEM, we ask two questions:

How does the rate of self-employment of STEM graduates compare to non-STEM graduates?

How does firm size associated with self-employed STEM graduates compare to firm size associated with self-employed non-STEM graduates?

Using data from the 2003 National Survey of College Graduates (NSCG), we examine these questions. The NSCG provides data for over 100,000 individuals who have attained at least a bachelor's degree, as well as detailed industry information regarding respondent employment history. In addition the NSCG includes detailed information on the academic field of study and the job status, *paid* or *self-employed*, for each respondent. Using the NSCG, we test whether academic study in STEM disciplines promotes self-employment and job creation and therefore supports the educational policy of targeted funding to these disciplines.

PAST RESEARCH ON STEM, EDUCATION, AND SELF-EMPLOYMENT

Why STEM?

In recent decades the skills needed for employment have continued to become more closely related to technology requiring a stronger background in science and engineering. Stine (2009), using US Census Bureau data, reports that the number of workers in science and engineering occupations grew by nearly 800% between 1950 and 2000, which exceeds the 230% growth rate of the labor force and the 490% growth rate of all managers and professionals. The STEM growth rate was more than three times that of the labor force during the 1990s. In addition, evidence of increased demand in STEM occupations is revealed in the lack of unemployment faced by STEM graduates. For example, unemployment in science and engineering occupations was 1.6% in 2006, a year during which the overall unemployment fluctuated between 4.4% and 4.7%. Wadhwa, Rissing, Saxenian, and Gereffi (2007) find that among technology firms founded by immigrants during the period 1995 to 2005, seventy-five percent of the highest attained degrees reflected STEM fields. These findings suggest that efforts, through education, to support STEM should pay off in more jobs.

Advocates for public policy emphasizing STEM education cite data from the Organization for Economic Co-operation and Development (OECD) that shows US fifteen-year-olds doing relatively poorly compared other OECD countries (OECD, 2006). In 2003, US students ranked below the OECD averages in math and science, ahead of only Portugal, Italy, Greece, Turkey, and Mexico on the math literacy scale and Slovakia, Spain, Norway, Luxembourg, Italy, Portugal, Greece, Turkey, and Mexico on the science scale. The US advantage over these countries was not statistically significant, suggesting that the situation could be worse than the ordinal ranking implies. Similarly, advocates cite statistics indicating

that the US graduates fewer engineers than India or China. Wadhwa (2005) suggests that these data are incorrect. His research shows that the United States continues to lead India and China, although he concedes that elementary and secondary science and math education can be improved. Regardless of this discrepancy, the STEM disciplines are considered major sources of increased competitiveness due to the potential for technological innovation and job creation. Public policy promoting STEM disciplines is a response to the perception that the United States needs more STEM graduates to be competitive and maintain job growth in the years ahead.

Various organizations seek to direct attention to American competitiveness, more specifically the ability to innovate. In 2003, the National Science Board (NSB) examined national policy for science and engineering. The metric employed by the NSB compares the ratio of natural science and engineering degrees of the 24-year old population by country. The final report indicated that reduced student interest in STEM-related disciplines threatens economic growth and national security. The concern is motivated by expected increases in retirements combined with forecasted growth of related occupations. The NSB reports forecasted growth in science and technology occupations at three times the rate of all other disciplines. It must be noted that the NSB concern reflects a relative rather than absolute decline. Since the mid-1970s, this ratio has increased in the United States but the ratio has increased more among other developed countries. In 1975 the United States was among the leaders with Finland and Japan but by 1999 had tumbled down the list. Despite its own 50% increase, other countries, including Finland and Japan, doubled and tripled their ratio (National Science Board, 2003). Concern over decline in the future competitiveness of the United States motivated a response from affected special interest groups. These groups can be categorized under two labels: firms facing foreign competition and organizations likely to benefit from increased spending to develop STEM graduates.

One such group, Tapping America's Potential (TAP), is a consortium of business organizations formed in 2005 to promote public investment in basic research, public sponsorship of advanced research, and expansion of the pool of science and engineering graduates. The stated goal of TAP is to double the annual number of science and engineering graduates from 200,000 to 400,000 by 2015. A second consortium of business organizations and well-known technology companies sponsored a task force in 2005 to explore US competitiveness. The resulting report expressed concern that the United States awards fewer science and engineering degrees than either Asia and Europe, foreign students are increasingly remaining at home to pursue study in science and engineering disciplines, and the United States has a smaller share of the worldwide total of science and engineering doctoral degrees (the Task Force on the Future of American Innovation, 2005). Concern is justified by reported data that show Europe publishes more science and engineering academic articles than the United States and the US lead in patent applications is shrinking. The task force makes no recommendations but the implication that the United States must increase the number of students graduating with degrees in science and engineering to remain competitive is clear.

Not everyone agrees, however, that science and engineering specialists alone are the solution to the perceived decline in US competitiveness. Consistent with the NSB and TAP, Liberal Education & America's Promise (LEAP) identifies knowledge of the physical and natural world, quantitative literacy, and information literacy as essential learning outcomes (National Leadership Council, 2007). What makes LEAP unique is that the learning outcomes are broadly defined in the context of liberal education. The position of the National Leadership Council is that a liberal education enhances opportunity and recognition through critical and creative thinking combined with effective communication. *Newsweek* editor, Jon Meacham (2010), makes a similar point that the importance of a liberal education may be greater today than in the past, arguing that the low hanging fruit of innovation has been picked; therefore, ongoing innovation may well depend upon the ability to make connections that might otherwise remain unconnected. His point is that graduates with a (classical) liberal education are capable of making connections that might be missed by those lacking the broad exposure of a liberal education. Meacham and the National Leadership Council do not argue against the need for science and engineering competency; rather, they make the point that science and engineering alone are not likely sufficient.

The America Competes Act (ACT) of 2007 emphasizes the need for more investment in research and education (Stine, 2009). Key provisions include: increased government expenditure on basic research, government sponsorship of advanced research, and government investment in promotion of STEM graduates in order to increase the pool of qualified workers. The underlying assumption in the ACT is that graduates of STEM disciplines disproportionately contribute to innovation and prosperity.

Is Education Associated with Self-Employment?

Many studies have found a positive correlation between human capital variables and self-employment (Aaronson, 1991; Parker, 2004). Generally, additional years of schooling increase the probability of self-employment. Work experience and previous attempts at self-employment are likewise positively associated with self-employment (Wadhwa, Aggarwal, Holly & Salkever, 2009).

In recent years, empirical research has explored the influence of education, specifically educational attainment, in greater detail. Parker and van Praag (2005) treat education as an endogenous variable in a model of self-employment and find that additional years of schooling are associated with lower capital constraints, which in turn increases the probability of transition to self-employment. Koellinger (2008) identifies educational attainment as the key factor explaining variation in the level of innovation among entrepreneurs (Although the focus of our paper is on the educated self-employed, we include a brief overview of schooling and entrepreneurship because we later investigate firm size and type of major.). The empirical analysis distinguishes between entrepreneurs who innovate and those who imitate a successful

commercial firm. For Koellinger, higher levels of education establish knowledge of the current state of science and technology and facilitate opportunity recognition. Baumol, Schilling and Wolff (2009) explore the popular notion of inventive entrepreneurs with minimal schooling. Examination of biographies fails to support this perception. Rather, the authors find that as the complexity of technology increases, the educational attainment of inventors advances faster than that of entrepreneurs. This finding seems consistent with the findings of Koellinger (2008) yet potentially challenging to the purposes of the National Leadership Council, if the emphasis is placed on invention. However, the National Leadership Council can argue that the value to society is not the invention but rather the recognition of the application and development of the resulting commercial opportunity.

Not only is education positively associated with self-employment rates, a positive association exists between education and job creation. Studies utilizing aggregate data from the UK find that education is positively associated with job creation by the self-employed (Cowling, Taylor & Mitchell, 2004). Burke, Fitzroy, and Nolan (2009) confirm this finding among men but find less compelling evidence for self-employed women. Using British micro-level panel data covering the years 1991 to 1999, Henley (2005) examines the determinants of job creation by the self-employed and finds that educational attainment among the self-employed workers is positively associated with creating employment in the United Kingdom.

Despite extensive research examining the relationship between education and self-employment, only limited research has examined the relationship between academic major and self-employment. Dolton, Makepeace, and Inchley (1990) reveal that higher self-employment rates are associated with particular academic fields of study. They analyze British survey statistics and find that self-employment rates are highest for recent graduates in law, architecture, and agriculture. Finnie, Laporte, and Rivard (2002) examine Canadian survey statistics and find that self-employment rates are highest among health graduates. The survey reveals high self-employment rates among graduates of the social sciences and humanities category, which dominates the population of graduates.

The principal contributions to the literature of the present study are, first, the use of U.S. data and, second, the emphasis on STEM graduates and the respective relationship with self-employment and firm size. We investigate whether graduates of a STEM discipline are more often self-employed than graduates of a non-STEM discipline. We then examine the relationship between self-employed and paid STEM graduates and firm size.

THE NSCG MAJORS AND SELF-EMPLOYMENT

The NSCG Dataset and Overview of Self-Employment Paths

The National Survey of College Graduates (NSCG) examines the educational and career characteristics of the United States college-level individuals (sestat.nsf.gov/sestat/sestat.html).

The National Science Foundation conducts this and other surveys to form the SESTAT system (Scientists and Engineers Statistical Data System). The 2003 NSCG surveyed a random sample of individuals living in the United States, under the age of 76, who had received a bachelor's degree or higher prior to 2000. The public-use sample includes data on 100,042 individuals.

Our analysis includes working individuals in the NSCG who are 35 or older. Additional deletions due to missing data reduced the sample to 63,076, of which 10,919 (18.5%) are self-employed.[1] Fairlie (2004) estimates the self-employment rates ranging from 9.3% in 1979 to 9.8% in 2003. The higher than normal self-employment rate in the NSCG is likely due to the fact that the NSCG is limited only to individuals with at least a bachelor's degree and as noted in the previous section, education is positively correlated with self-employment. Further, Parker (2004) finds that older workers are more likely to be self-employed. Given that our sample is limited to educated respondents 35 years old or older to accommodate completion of formal schooling and determination of career paths, it seems reasonable that the self-employment rate of our sample would exceed the national average.

Consistent with the literature, the final dataset includes information on individual characteristics (age, gender, retirement status, and race) and family characteristics (marital status, number of small children, total number of children, and whether the spouse works). Several variables test the relationship between education and academic field of study on self-employment. The human capital effect is captured with several binary variables representing the type of highest degree (a bachelor's degree is the omitted category in the base regression) and the number of years since the individual obtained the highest degree, used as a proxy for experience. Our main question requires that we control for the respondent's bachelor degree field of study, which requires seventeen different categories of academic majors (a grouping of non-science majors is the omitted category).[2] Appendix 1 provides a detailed description of all variables used in the analysis.

Table 1 presents the descriptive statistics for the full sample of the variables used in the analysis separated by paid and self-employed workers.[3] Means tests reveal that self-employed respondents tend to be white, male, married, and more than two years older than paid workers. When we first define STEM as an individual with any STEM-related degree, we find that 43.7% of those who are in paid work and 42.9% of those who are self-employed have some sort of a STEM degree.[4] The difference is statistically significant at the 10% level of significance. The self-employed are more likely to complete a professional degrees (16 percent) compared to paid workers (2.7 percent).

Table 1: Means and Standard Deviations The Self-Employed & Paid Work College Graduates				
	Total Sample n	Paid Workers n	Self-Employed n	T-stat
Personal Descriptives				
Self-Employed	0.19 (.55)			
Age	48.92 (11.88)	48.51 (11.43)	50.72 (13.51)	-25.70***
Female	0.42 (.70)	0.442 (.694)	0.365 (.694)	18.83***
Black	0.07 (.36)	0.080 (.379)	0.033 (.259)	18.00***
Asian	0.08 (.39)	0.084 (0.387)	0.083 (.401)	0.48
Other Races	0.02 (.22)	0.025 (.218)	0.021 (.211)	2.31**
Foreign born	0.16 (.52)	0.164 (.517)	0.161 (.538)	0.79
Previously Retired	0.04 (.29)	0.044 (.043)	0.051 (.334)	-6.73***
Family				
Married	0.79 (.57)	0.787 (.572)	0.820 (.560)	-7.95***
No. Children < 6 YRS.	0.20 (.77)	0.200 (.764)	0.190 (.783)	2.34**
No. Children >= 6 YRS.	0.73 (1.43)	0.735 (1.422)	0.687 (1.470)	4.62***
Spouse Works	0.59 (.69)	0.590 (.687)	0.592 (.716)	-0.41
Degree				
Yrs. Since Highest Degree	21.04 (14.07)	20.34 (13.665)	24.13 (15.052)	-37.48***
Highest Degree= Masters	0.30 (.64)	0.316 (.649)	0.209 (.593)	22.91***
Highest Degree=Doctoral	0.07 (.36)	0.078 (.375)	0.045 (.300)	12.74***
Highest Degree=Professional	0.07 (.35)	0.044 (.287)	0.160 (.527)	-46.34***
STEM				
Any STEM Degree	0.44 (.70)	0.437 (.693)	0.428 (.721)	1.77*
Masters in STEM	0.33 (.66)	0.326 (.655)	0.340 (.691)	-2.93***
PH.D. in STEM	.31 (.65)	0.311 (.647)	0.331 (.686)	-4.03***
Professional Degree in STEM	.31 (.65)	0.311 (.642)	.338 (.685)	-4.56***

Table 1: Means and Standard Deviations The Self-Employed & Paid Work College Graduates				
	Total Sample n	Paid Workers n	Self-Employed n	T-stat
BA Degrees				
Computer Science	0.03 (.25)	0.024 (.222)	.011 (.250)	5.97***
Mathematics	0.04 (.27)	0.041 (.275)	0.032 (.257)	4.25***
Agricultural Science	0.01 (.14)	0.095 (.136)	0.015 (.178)	-5.30***
Biology	0.06 (.35)	0.062 (.334)	0.078 (.393)	-6.83***
Environmental Science	0.01 (.10)	0.006 (.103)	0.003 (.096)	1.52
Physical Sciences	0.03 (.22)	0.026 (.224)	0.023 (.219)	2.15**
Chemistry	0.03 (.24)	0.030 (.238)	0.033 (0.260)	-1.72*
Psychology	0.06 (.33)	0.058 (.325)	0.063 (.354)	-2.15**
Social Sciences	0.11 (.44)	0.109 (.435)	0.120 (.474)	-3.59***
Engineering	0.08 (.39)	0.085 (.340)	0.079 (.394)	2.09**
Health Professions	0.07 (.36)	0.071 (.358)	0.072 (.378)	-0.70
Technology Professions	0.03 (.22)	0.024 (.211)	0.033 (.260)	-5.86***
Management	0.17 (.53)	0.166 (.520)	0.209 (.592)	-10.91***
Sales & Marketing	0.03 (.23)	0.025 (.220)	0.038 (.278)	-7.38***
Fine Arts & Humanities	0.14 (.49)	0.139 (.483)	0.166 (.543)	-7.75***
Other NonScience	0.07 (.36)	0.069 (.363)	0.066 (.363)	1.18

Data Source: National Science Foundation, The 2003 National Survey of College Graduates, weighted for stratification and nonresponse bias. Standard deviations are in parentheses. T-statistics test the difference between the means of paid and self-employed workers. A negative sign on the t-test indicates that the average is larger for the self-employed. ***=statistical significance at the 1 percent level, **=statistical significance at the 5 percent level, and *=statistical significance at the 10 percent level of significance.

STEM Probit Regressions

We next estimate the probability of being self-employed having controlled for factors associated with self-employment, including academic field of study. The dependent variable,

Self-Employment, equals *1* if the individual was self-employed in 2003 and *0* if the individual was in paid work. Table 2 presents the results of a series of probit regressions. The first probit regression controls for any STEM-related academic fields of study; the second probit regression controls for advanced degrees in STEM disciplines; the final two probit regressions control for academic field at the bachelor's and master's levels (Column 3) and the bachelor's and professional levels (Column 4). A likelihood-ratio test indicates an overall good fit to each of the models. [5]

Table 2: Probit Analysis of Self-Employment and College Graduates

	STEM ONLY N=63,076 *(1)*	*STEM by Deg. Level N=63,076* *(2)*	*Post-Bac Degree MA N=19,795* *(3)*	*Post-Bac Degree Professional N=4,183* *(4)*
Constant	-1.452*** (0.035)	-1.452*** (0.035)	-2.232*** (0.076)	-1.858*** (0.328)
Personal Descriptives				
Age	0.006*** (0.001)	0.006*** (0.001)	0.010*** (0.002)	0.009*** (0.003)
Female	-0.148*** (0.009)	-0.148*** (0.009)	-0.112*** (0.020)	-0.141*** (0.034)
Black	-0.454*** (0.020)	-0.454*** (0.020)	-0.388*** (0.042)	-0.439*** (0.067)
Asian	-0.026 (0.019)	-0.026 (0.019)	-0.041 (0.037)	-0.018 (0.063)
Other Races	-0.076*** (0.029)	-0.076*** (0.028)	0.052 (0.056)	-0.508*** (0.106)
Foreignborn	0.074** (0.014)	0.074*** (0.012)	0151*** (0.028)	-0.240*** (0.049)
Previously Retired	0.082*** (0.020)	0.083*** (0.020)	0.130*** (0.035)	-0.212*** (0.082)
Family				
Married	0.013 (0.014)	0.013 (0.014)	-0.038 (0.029)	0.038 (0.049)
No. Children < 6 Yrs.	0.060*** (0.008)	0.060*** (0.008)	0.100*** (0.017)	0.001 (0.027)
No. Children >= 6 Yrs.	-0.001 (0.005)	-0.001 (0.004)	-0.029*** (0.010)	0.064*** (0.015)
Spouse Works	0.037*** (0.011)	0.037*** (0.010)	0.046** (0.022)	0.072** (0.035)
Human Capital				
Yrs. Since Highest Degree	0.015*** (0.001)	0.015*** (0.001)	0.019*** (0.001)	0.010*** (0.003)
Highest Degree= Masters	-0.181*** (0.011)	-0.179*** (0.011)		

Table 2: Probit Analysis of Self-Employment and College Graduates				
	STEM ONLY N=63,076 *(1)*	*STEM by Deg. Level N=63,076* *(2)*	*Post-Bac Degree MA N=19,795* *(3)*	*Post-Bac Degree Professional N=4,183* *(4)*
Highest Degree=Doctoral	-0.301*** (0.020)	-0.294*** (0.020)		
Highest Degree=Professional	0.763*** (0.015)	0.762*** (0.015)		
Major Field of Study				
STEM	-0.068*** (0.009)	-0.084*** (0.015)		
MASTEM		0.006 (0.038)		
PHDSTEM		-0.146* (0.084)		
PROFSTEM		0.1661* (0.091)		
Highest Degree				
Computer			0.277*** (0.050)	
Math			0.117 (0.143)	
Agriculture			0.226 (0.143)	
Biology			0.119 (0.073)	
Environmental Science			0.269* (0.142)	
Chemistry			-0.015 (0.130)	
Physical Sciences			0.118 (0.089)	
Psychology			0.503*** (0.043)	0.722** (0.320)
Social Science			0.312*** (0.072)	
Engineering			0.237*** (0.044)	
Technical			0.744*** (0.062)	
Health			0.531*** (0.046)	0.604** (0.300)
Management			0.366*** (0.029)	

Table 2: Probit Analysis of Self-Employment and College Graduates				
	STEM ONLY N=63,076 *(1)*	*STEM by Deg. Level N=63,076* *(2)*	*Post-Bac Degree MA N=19,795* *(3)*	*Post-Bac Degree Professional N=4,183* *(4)*
Education				-0.412 (0.392)
Social Service			0.374*** (0.041)	-0.552* (0.344)
Sales & MKT			0.644*** (0.059)	
Arts & Humanities			0.344*** (0.039)	
NonScience				0.471 (0.298)
Log-likelihood	-56270***	-56267***	-13408***	-5368***

Data Source: National Science Foundation, The 2003 National Survey of College Graduates. Standard errors are in parentheses. T-statistics test the difference between the means of paid and self-employed workers. ***=statistical significance at the 1 percent level, **=statistical significance at the 5 percent level, and statistical significance at the 10 percent level of significance. Columns (3) and (4) also include controls for seventeen detailed baccalaureate degrees.

Due to the nature of probability models, the coefficients in Table 2 do not represent the marginal effects of individual variables on the dependent variable. Table 3 presents the marginal effects of the variables in the first two columns. We use the coefficients from Column (1) of Table 3 for most estimates, and Column (2) for the advanced STEM degrees. For the base case, the average probability of being self-employed, 20.3 percent, was calculated using the means of all continuous variables and at zero for all binary variables. The base case is a white male with the average number of children, age, and years since obtaining the highest degree, holding a bachelor's degree in nonscience fields, and the spouse does not work. For continuous variables, marginal effects were calculated by adding one unit to the mean to estimate a new probability, then calculating the difference in average probabilities from the base case. Binary variables were "turned on" and the difference in average probabilities was calculated from the base case. Marginal effects for the personal descriptive and family variables are available from the authors on request.

Table 3. Marginal Effects of the Main Variables	
Variable	*Marginal Effect*
Age	0.002
Female	-0.039
Black	-0.104
Asian	-0.007
Other Races	-0.021

Table 3. Marginal Effects of the Main Variables	
Variable	*Marginal Effect*
Foreign born	0.022
Previously Retired	0.024
Married	0.004
No. Children < 6 Yrs.	0.017
No. Children >= 6 Yrs.	0.000
Spouse Works	0.011
Yrs. Since Highest Degree	0.004
Highest Degree= Masters	-0.047
Highest Degree=Doctoral	-0.074
Highest Degree=Professional	0.270
STEM	-0.019
MASTEM	0.002
PHDSTEM	-0.045
PROFSTEM	0.050

Data Source: National Science Foundation, The 2003 National Survey of College Graduates. Marginal effects estimated by the authors using Table 3, Column 1 coefficients for all but the advanced degree effects, which come from Column 2. The average probability for our base case was calculated at the means of all continuous variables and at zero for all binary variables. For continuous variables, marginal effects were calculated by adding one unit to the mean to estimate a new probability, then calculating the difference in average probabilities from the base case. Binary variables were "turned on" and the difference in average probabilities was calculated from the base case.

The variables controlling for personal characteristics and education are in the direction expected. We find that self-employment is positively associated with age, marriage, having younger children and a working spouse. In addition whites and males are more likely to be self-employed. We focus on the human capital-related effects. First, the marginal effect of years since receiving one's highest degree (a proxy for experience) is 0.004 (Table 3, Row 12). This effect suggests that it would take about two and one-half years of experience to increase the probability of being self-employed by one percentage point. Second, the results reveal that advanced degrees generally reduce the probability of self-employment. Compared to respondents completing only a bachelor's degree, completion of a Masters degree reduces the likelihood of self-employment by 4.7 percentage points while completion of a doctoral degree reduces the likelihood of self-employment by 7.4 percentage points. Only those with a professional degree have an average probability of being self-employed (27 percentage points) that exceeds individuals with only a bachelor's degree. A STEM degree lowers the average probability of being self-employed by 1.9 percentage points. However, when controlling for the level of the STEM degree, a professional STEM degree increases the average probability of being self-employed by an additional 5 percentage points. The STEM Masters degree also has a positive effect, although the effect is negligible in this model (0.2 percentage points).

Since it appears that professional and Masters level degrees have some impact on the path to self-employment, we control for academic field of study in the next two probit regressions. Column (3) of Table 2 includes all academic majors with a Masters degree; Column (4) includes only those individuals with professional degrees. We find that a number of STEM-related Masters level degrees have a positive association to self-employment compared with the non-science majors (the omitted category in this regression). In addition, the professional health degree is positively associated with being self-employed. Note also that the addition of specific degrees does not substantially change the coefficient on the base case variables, with the exception of older children, which is now positive and statistically significant in the professional degree model.

The STEM Path to Self-employment

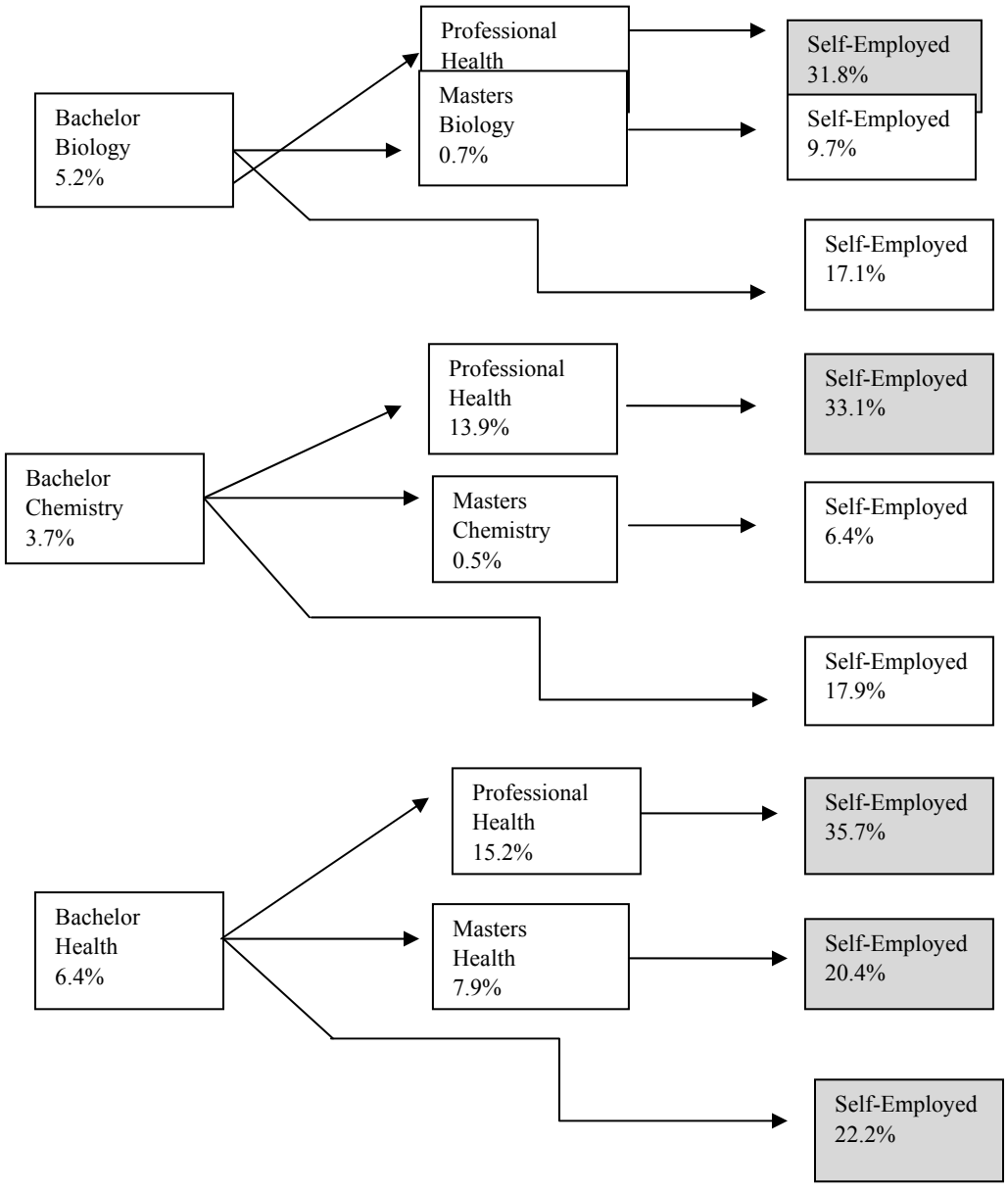
Rather than provide a very large table for each of the marginal effects for the many variables in these regressions, we present flow charts for selected STEM majors to demonstrate how the choice of major and degree leads to self-employment. Self-employment probabilities are estimated with the coefficients from the regressions in Columns (3) and (4) from Table 2. The first probability in the flow charts is the percent of those in the sample with a particular major (e.g., 5.2% of the sample attained a bachelor's degree in biology). The second probability is conditional on the individual having the major. The self-employment probability is estimated at the means of the variables in the regressions, and zeros for all binary variables, except those variables of interest (e.g., the 31.8% probability of being self-employed in the first flow chart controls for having a bachelor's degree in biology, a professional degree in health, at the means of age, years since highest degree, number of children, white males without a working spouse and not previously retired.)

There are 1,870 individuals (17.3% of the sample) who attained a professional degree. Three STEM-related baccalaureate degrees (biology, chemistry, and health) are associated with a relatively high attainment of a professional health degree and high probabilities of being self-employed. Figure 1 demonstrates that even though the probability of being an undergraduate major in biology, chemistry, or health is low, many of these individuals who pursue a professional health degree are more likely to be self-employed than those who stop at the baccalaureate level. This result is not surprising since doctors, dentists, chiropractors, and optometrists, for example, often set up or join a practice.

Further, those who attain a baccalaureate then a Masters degree in health have a 20.4% probability of being self-employed. Clearly, there are individuals who initiate their path to self-employment during college. Also, if an individual receives only a baccalaureate degree in STEM fields, the probability of being self-employed is relatively low, with the exception of a health baccalaureate degree, which leads to a self-employment probability of 22.2%. It appears

that the health degree path to self-employment is not an easy one, but yields high rates of self-employment for those who continue on the path.

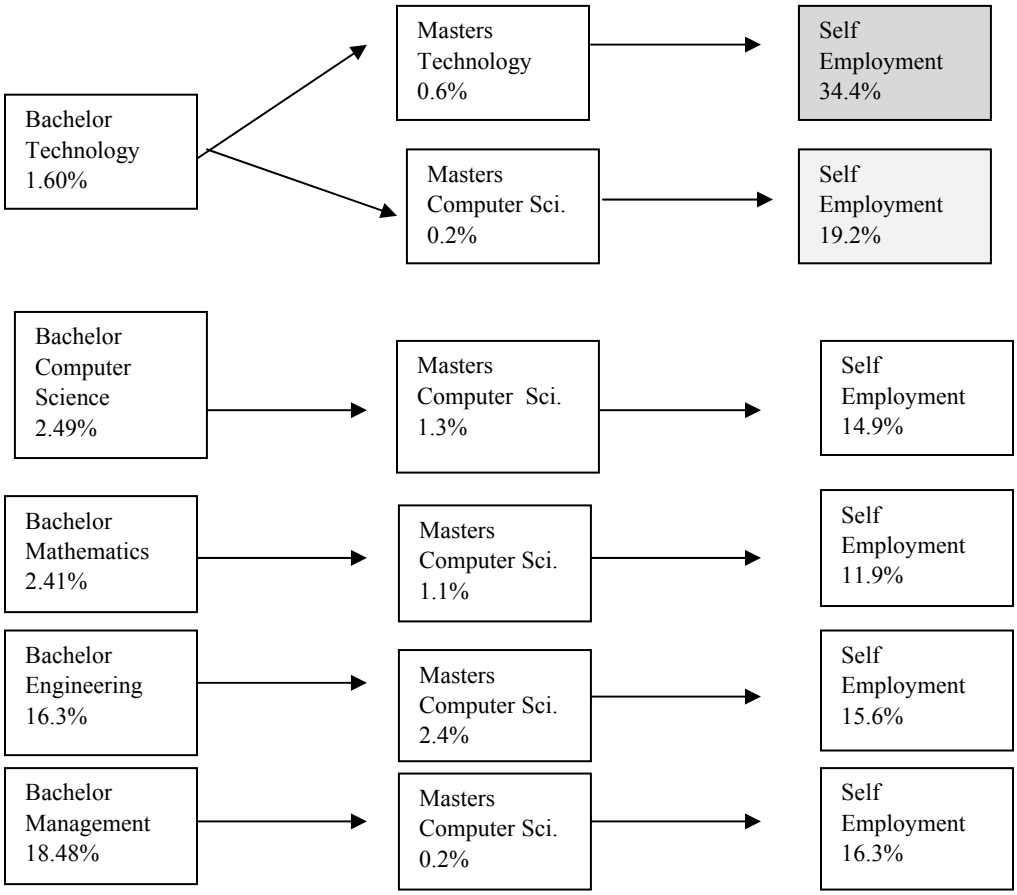
Figure 1: The Science Path to Self-Employment Via Health Degrees



As Figure 2 demonstrates, technology majors, who do not have a high probability of self-employment with only a baccalaureate degree,[6] have a high probability of being self-employed if they attain a Masters degree in a technology-related field (34.4%). Technology majors who go

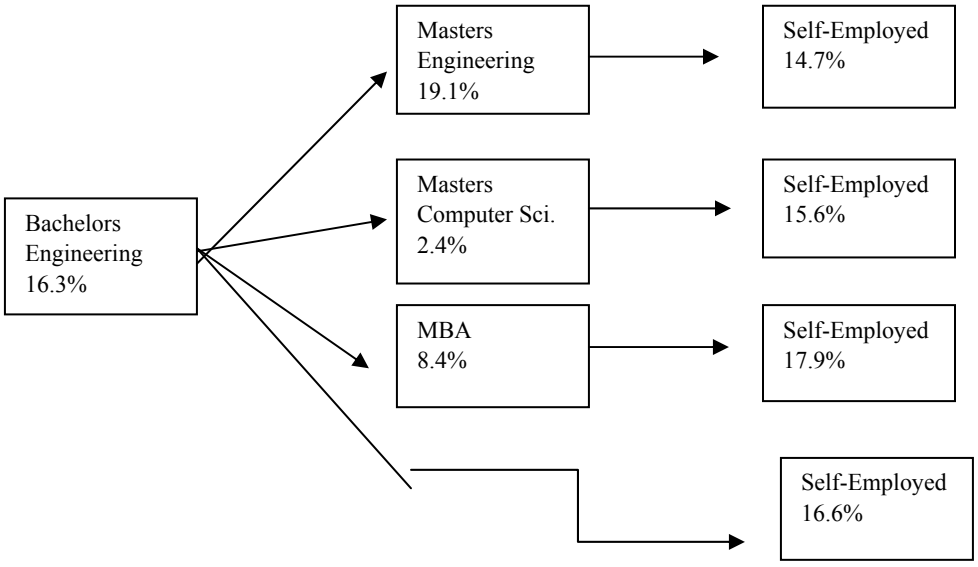
on for a Masters in computer science have an average probability of being self-employed (19.2%). Four baccalaureate majors are more likely to attain a Masters degree in computer science compared to technology or other undergraduate degrees: computer science, mathematics, engineers, and management. None of these paths yield a higher probability of being self-employed than that of the individual with a baccalaureate degree in a technology field.

Figure 2. The Technology or Computer Science Path to Self-Employment



In Figure 3, we find that for engineering baccalaureates, none of the paths yield self-employment probabilities greater than the sample mean of 19%. It is possible that engineers tend toward paid work because their human capital is highly rewarded within the typical company structure.

Figure 3. The Engineering Path to Self-Employment



These above STEM paths are the more likely ones that end in self-employment. Others, such as those where individuals who specialize in biology, chemistry, or the physical sciences, have low self-employment rates and are not reported here. In addition, some non-science majors have high rates of self-employment. For example, psychologists develop practices alone and with others, much like those in the health field. Individuals who attain only a bachelor's degree in psychology have a relatively high rate of self-employment (21.8%), while professional psychologists have a 31.4% rate of self-employment (These results are available from the authors). These self-employment rates are higher than the rates for many in the physical sciences or technology.

STEM graduates and firm size

The previous section suggests that STEM majors, except for those in health fields, are not generally self-employed compared to non-STEM majors. A subsequent question we ask is, are STEM majors associated with small firms typically considered the engine of growth for society? As noted in the introduction, the statement "small business is an engine of economic growth" is a generally accepted principle, often leading to governmental support for small firms. The Bureau of Labor Statistics reports that firms with less than 100 employees accounted for 46% of the employment growth from 1992 through 2005; when adding firms with less than 500 employees

to the total, the percentage increased to 65% (Helfand, Sadeghi, & Talan, 2007). We therefore examine whether the STEM degree is associated with small firms.

Ideally, detailed employment data over time would enable one to examine job growth rates. However, the 2003 NSCG dataset offers only categories of firm size by number of employees. Therefore, we examine the relationship between STEM education and firm size, defined as large or small.[7] Because we are also interested in self-employment versus paid employment, we can examine whether a STEM degree is associated with four employment situations:

Let j=0 when an individual is self-employed with a small firm;
j=1 when an individual is a paid worker in a small firm;
j=2 when an individual is self-employed with a large firm;
j=3 when an individual is a paid worker in a large firm.[8]

For our purposes, a multinomial logit analysis is employed to investigate how a STEM degree is associated with the probability of being in one of the four employment situations. The multinomial logit model assumes that the dependent variable represents several categories that have no special order but the categories are associated with a set of individual characteristics. The model is defined as:

$$\ln\left(\frac{\pi_{ij}}{\pi_{im}}\right) = x'_i\beta_j \qquad j = 1,2,3 \tag{1}$$

where π_{ij} represents the probability that individual i is situated in employment j. When $j=m$, the model assumes a referent case, which in our model is the probability of being self-employed with a small firm. Thus, the estimation process results in three different logit regressions, where the probability of being in employment situation j is compared to the probability of being self-employed with a small firm.

The effect of each independent variable is best examined with an odds ratio estimate. The odds ratio examines the odds of one event occurring in relation to another, given a particular regressor. For example, if the odds of being self-employed with a large firm equaled the odds of being self-employed with a small firm for the STEM degree, the odds ratio would be 1. If the odds ratio is greater than 1, then STEM is more highly associated with the categories represented by the numerator in Eq.(1). The x'_i represents the individual characteristics that are associated with the employment situation and the β_js are parameters to be estimated. We include whether or not an individual has a STEM degree, the age of the individual, and a series of industry binary variables, based on classifications from the NSCG. The omitted industry is public administration.

Table 4: Multinomial Logit Estimation of the Probability of Employer Size & Self/Paid Employment							
	N (1)	Large & Paid (2)	Odds Ratio (3)	Large & SE (4)	Odds Ratio (5)	Small & Paid (6)	Odds Ratio (7)
Intercept	n.a.	7.802*** (0.160)		0.651** (0.295)		4.966*** (0.165)	
STEM	n.a.	0.444*** (0.022)	1.559	0.440*** (0.044)	1.552	0.032 (0.025)	1.032
Age	n.a	-0.049*** (0.001)	0.952	-0.032*** (0.002)	0.968	-0.036*** (0.001)	0.964
Agriculture/Forestry, Fishing	272	-7.792*** (0.227)	0.000	-2.336*** (0.371)	0.097	-4.636*** (0.195)	0.010
Mining/Gas Extraction	917	-2.966*** (0.193)	0.052	0.321 (0.326)	1.378	-2.831*** (0.216)	0.059
Construction	1,028	-6.170*** (0.158)	0.002	-1.644*** (0.292)	0.193	-3.626*** (0.160)	0.027
Manufacturing	8,019	-3.271*** (0.153)	0.038	0.625*** (0.273)	1.868	-2.776*** (0.158)	0.062
Wholesale Trade	1,494	-4.814*** (0.158)	0.008	-0.698*** (0.156)	0.498	-3.045*** (0.276)	0.048
Retail Trade	2,335	-4.982*** (0.161)	0.007	-0.758*** (0.152)	0.469	-3.630*** (0.276)	0.027
Transportation	790	-3.531*** (0.173)	0.029	0.638** (0.296)	1.894	-2.954*** (0.188)	0.052
Information Services	1,698	-3.501*** (0.163)	0.030	0.236 (0.288)	1.265	-2.605*** (0.170)	0.074
Finance, Insurance & Real Estate	3,775	-4.490*** (0.151)	0.011	-0.604** (0.274)	0.547	-3.469*** (0.156)	0.031
Commercial Services	10,144	-5.514*** (0.149)	0.004	-1.375*** (0.271)	0.253	-3.632*** (0.152)	0.026
Education Services	15,032	-1.598*** (0.156)	0.202	-1.220*** (0.308)	0.295	-1.057*** (0.159)	0.347
Health-Related	6,077	-4.856*** (0.150)	0.008	-2.009*** (0.280)	0.134	-3.762*** (0.155)	0.023
Social Services	874	-4.701*** (0.066)	0.009	-1.662*** (0.355)	0.190	-2.144*** (0.167)	0.117
Entertainment	1,005	-5.532*** (0.157)	0.004	-1.228*** (0.289)	0.293	-3.576*** (0.161)	0.028
Personal Services	1,458	-4.922*** (0.159)	0.007	-1.778*** (0.342)	0.169	-1.912*** (0.159)	0.148
Log-Likelihood Ratio		30021.36***					

Data Source: National Science Foundation, The 2003 National Survey of College Graduates. Standard errors are in parentheses. The likelihood ratio tests the overall fit of the multinomial model. ***=statistical significance at the 1 percent level, **=statistical significance at the 5 percent level, and statistical significance at the 10 percent level of significance. The odds ratio examines the difference in the log of the odds between the category represented in the column and self-employed with a small firm. The Small/Large cutoff is 100 employees.

Table 4 presents the multinomial logit results. The likelihood ratio test indicates that the model fits the data well (We report the statistical significance of the estimated coefficients, but given the large sample size, the high level of statistical significance is to be expected.). The important relationship is that of STEM to the probability of each employment situation. The results indicate that an individual with a STEM degree is 1.56 times more likely to be in paid work in a large firm and 1.55 times more likely to be self-employed with a large firm compared to self-employment with a small firm. The odds ratio of 1.032 in Column (7) indicates that the STEM graduates have about the same odds of being either in a small firm as a paid worker or self-employed. These results indicate that individuals with STEM degrees are not associated with the type of firms normally considered growth engines for society.

The AGE coefficient indicates that growing older is associated with self-employment and small firms. There has been recent research on how age and self-employment are positively related, especially after retirement (Fairlie & Kapur, 2009), thus the result is expected. The odds of being self-employed with a large firm compared to being self-employed with a small firm are greater for those working in mining and gas extraction, manufacturing, transportation, and information services (compared to the referent industry, public administration). The odds ratio estimates are generally less than 1 for all other industries, suggesting that self-employment with a small firm has higher odds of occurring compared to either the odds of paid work in a large firm or small firm for those industries.

A considerable amount of theory and empirical research is dedicated to the role of firm size in explaining variation in wages. Much of this literature seems to offer insight into our findings related to firm size. Barth, Cordes, & Haber (1987) examine firm size and employee characteristics. They assume that monitoring costs increase with higher number of employees thereby assigning a comparative advantage in monitoring to smaller firms. Accordingly, large firms are to inclined hire more productive workers requiring less monitoring. Education, experience, and age are identified as observable variables associated with low monitoring costs. Our findings show that highly educated STEM workers are associated with larger firms as are older workers.

More interestingly for our purposes, an expansive literature explains the observed wage premium that accrues to skilled labor. Griliches (1969) popularized the notion that skilled labor and capital are complementary, which contributes to the greater productivity of skilled labor compared to unskilled labor. Idson and Feaster (1990) note that it is not surprising that small and large employers differ in terms of key variables such as education. Whereas firms are assumed to maximize profits, a hedonic model of choice accommodates worker heterogeneity. Idson and Feaster posit that independently-minded workers will trade income for the independence more likely to exist in a smaller firm. In contrast larger firms will attract and retain workers more comfortable in an interdependent production process. Although intuitively appealing, the choice is complicated by the observed complementarity between skilled labor (human capital) and physical capital. Savoye (1994) reports that larger firms are often

characterized by greater production complexity and larger expenditures on research and development. Accordingly, highly educated STEM graduates may very well maximize utility by choosing paid employment with a large firm that combines the physical capital with the human capital of the STEM graduate. In short, the opportunity cost associated with self-employment may be too substantial in light of the paid employment opportunities.

CONCLUDING REMARKS

This paper examines whether STEM majors contribute to self-employment, and whether self-employed STEM majors are associated with larger firms compared to their non-STEM counterparts. The results of this study indicate that only select STEM-related paths lead to self-employment. Notably, individuals with professional health degrees have relatively high probabilities of being self-employed. In addition, individuals with a technology degree who move on to a Masters degree in computer science also have a relatively high probability of being self-employed. Other STEM majors are not typically on the self-employment path. The results suggest that public dollars allocated to the promotion of STEM graduates do not create a lot of new businesses.

We also find that those with a STEM degree are more likely to be employed in a large business rather than small, whether paid or self-employed. This result combined with the previous result suggest that it is not generally likely that added emphasis on STEM will lead to economic development at least through the generation of small firms leading to substantial innovation and growth.

STEM may promote growth via other mechanisms, such as innovations leading to growth through larger business. Perhaps those STEM majors in paid work have the luxury of being innovative without personal risk. Indeed, our data indicates that STEM majors in paid work, especially those with a Ph.D., have a higher estimated number of patents compared to self-employed non-STEM majors.[9]

Shane (2008) indicates that public policy needs to be selective to promote firms that contribute to the economy. Our analysis shows that self-employed STEM graduates tend to be associated with the largest firms. Accordingly, policy promoting STEM disciplines may not necessarily result in more new firms, but STEM graduates are associated with firms that create greater employment opportunities to the benefit of society overall.

This study is a beginning step to better understand whether the focus on STEM is warranted. Our findings suggest that STEM graduates are more likely to work as paid employees in large firms. What role do these employees play? Are they primarily in research areas where the growth of the firm is enhanced? Second, do these workers later become the owners of small firms where their large firm experience is an asset? The next question we need to address is the extent to which technology driven firms are engines of economic development whether small or large.

ENDNOTES

1 It is important to note that the NSCG employs a sampling method that controls for stratification by groups and nonresponse bias. Thus, SESTAT includes a weighting factor that we use in this analysis. The weighting factor slightly changes the statistical results of the subsequent analysis, but by very little. For example, the unweighted percentage of self-employed is 17.3 percent; the weighted percentage is 18.5 percent. We employ the weights in most of our analyses, but use the unweighted frequency distributions in some tables to avoid confusion between counts and percentages; all results are available on request.

2 The NSCG offers thirty-one separate "minor" categories of academic disciplines. Some of these categories contained very small groupings and were therefore combined when necessary (e.g., Earth Science is part of Physical Sciences), while other groups seemed to be natural for agglomeration (e.g., Engineering sub-disciplines). We kept as many separate categories for the STEM disciplines as possible.

3. Ideally, we would have liked to have added a third category, self-employed and paid. However, the NSCG only reports information on the primary job, which limits us to the dichotomous category of self or paid work.

4. The GAO reports that the percentage of degrees awarded in 2003-04 to STEM majors was 27% (GAO, 2006). Our higher rate occurs because the individual can have a STEM degree from the baccalaureate, Masters, Ph.D., or professional level, over a number of years, not at one particular point in time.

5. The log-likelihood value is used in a Chi-square test on whether the variables in the model jointly contribute to the explanation of the variance in the probability of self-employment.

6. The probability of an individual with a bachelor's degree in a technology field becoming self-employed is 13.6%. Estimation by the authors is available on request.

7. There is no common definition of small firm. In some instances, a small firm is defined by revenues and industry; in others it is defined by the number of employees. We opted to define small firms as 100 employees or less simply because the definition has been used by government agencies, such as the Bureau of Labor Statistics.

8. Due to data limitations, we cannot state that the individual started the firm, only that the individual currently owns a firm of a certain size. Thus, the estimation process examines only the employment situation in 2003 in order to see whether STEM degrees are associated with small or large firms, paid or self-employment.

9. A weighted multiple regression of patents against self-employment status, STEM, degree status interacted with STEM, and controls for baccalaureate degrees indicates that individuals with a Ph.D. in a STEM field and in paid work have an average of .44 more patents than self-employed nonSTEM individuals. This result is not inconsequential since the average number of patents for the sample is 2. Results of the regression are available on request.

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Appendix 1. Description of Variables
2003 National Survey of College Graduates

Descriptives	
Self-Employed	1 if self-employed (incorporated and not incorp.); 0 if paid employment.
Age	Age of the individual.
Female	1 if female.
Black	1 if Black.
Asian	1 if Asian.
Foreignborn	1 if born outside of the United States.
Previous Retirement	1 if previously retired.
Family	
Married	1 if married.
No. Children < 6 yrs.	Number of children below the age of 6.
No. Children >= 6	Number of children age 6 or greater.
Spouse Works	1 if the spouse works.
Education	
Yrs. Since Highest Degree	Years since individual obtained their highest degree.
Highest Degree= Masters	1 if highest degree is a Masters degree.
Highest Degree=Doctoral	1 if highest degree is a Ph.D., DSc. EDD. or other doctoral degree.
Highest Degree=Professional	1 if the highest degree is a J.D., M.D. DDS, or other professional degree.
Major Field of Study	
Computer Science	Computer and Information Science, Computer Systems, any other Computer Science Major.
Mathematics	Applied Math, General Math, Operations Research, Statistics, Actuarial Science, any other Math Major.
Agricultural Science	Animal, Food, Plant or any other Agricultural Science Major.
Biology	Biochemistry, General Biology, Botany, Molecular Biology, Ecology, Genetics, Microbiology, Nutrition, Pharmacology, Physiology, Zoology, and other Biology Major.
Environmental Science	Environmental Science, Forestry, Other Conservation Majors.
Physical Sciences	Astronomy, Physics, Earth Science, and other Physical Sciences.
Chemistry	General Chemistry.
Psychology	Educational, Clinical, Counseling, Experimental, General, Industrial Organizational, Social, and all other Psychology Majors.
Social Sciences	Agricultural Economics, Economics, Public Policy, International Relations, Political Science, Public Administration, and Public Affairs, Anthropology,

Appendix 1. Description of Variables 2003 National Survey of College Graduates	
Descriptives	
	Criminology, and Sociology, Ethnic Studies, Religion, Theology, and Philosophy, Social Work, History, Linguistics, Philosophy of Science, Geography, History of Science, any other Social Science Major.
Engineering	Aerospace, Chemical, Architecture, Civil, Computer, Electrical, Industrial, Mechanical, Agricultural, Bio Engineering, Engineering Science, Environmental, General, Geophysical, Materials, Metallurgical, Mining, Naval, Nuclear, Petroleum, and all other Engineering Majors.
Health Professions	Audio/Speech, Health Services Administration, Health/Medical Assistant, Health Technology, Pre-Med, Dentists/Optometry, Nursing, Pharmacy, Psychological Therapy, Public Health, Other Health Majors.
Technology Professions	Computer Programming, Data Processing, Electrical Technology, Industrial Technology, Mechanical Technology, other Technology Majors.
Management	Accounting, Business Administration & Management, General Business, Managerial Economics, Financial Management, Agricultural Business.
Sales	Marketing, & Marketing Research.
Social Services	Social Work and related fields.
Fine Arts & Humanities	Drama, Fine Arts, Music, Other Performing Arts Majors, English, Liberal Studies, History, Foreign Language and other related majors.
NonScience	Any major not listed above.
Source: 2003 National Survey Of College Graduates, Summary Documentation, PCG03.pdf.	

CREATIVITY IN THE ENTREPRENEURSHIP CLASSROOM

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ABSTRACT

Creativity is a critical skill for entrepreneurs and entrepreneurship training. In this study the scores of eighty-nine students, in a beginning entrepreneurship class, on a creativity survey and a divergent thinking test, are compared with those of forty-two students in a required public speaking class. Findings show that students who enrolled in the entrepreneurship class perceived themselves as more creative after the class and did better on divergent thinking (generated more ideas and a greater range of ideas) than students not enrolled in the class in pre and post tests. Additionally, practice in divergent thinking exercises increased the entrepreneurship students' abilities to generate a greater number and range of ideas, but not their approaches to creative problem solving. Recommendations for the entrepreneurship curriculum are given.

INTRODUCTION

A recent study identified the consistent decline since 1990 in creativity scores of U.S. students on the Torrance test of creativity (Bronson & Merryman, 2010). At the same time, a 2010 American Management Association study identified creativity and innovation as one of the four critical skills needed for business success today and in the future. A study of CEOs identified creativity as the number one leadership competency of the future (Bronson & Merryman, 2010).

Is this decline in creativity a problem for the entrepreneurship classroom? Is it important to include creativity exercises in an already full entrepreneurship curriculum? In this study the authors review the relationship between creativity and entrepreneurship, and study the effectiveness of including divergent thinking exercises in the entrepreneurship classroom.

The Relationship Between Creativity and Entrepreneurship

Creativity has been identified by several researchers as related to entrepreneurship. Yar Hamidi, Wennberg and Berglund (2008) found that high scores on creativity tests and prior entrepreneurial experiences were both positively associated with entrepreneurial intentions, and

contended that creativity should be considered in models of entrepreneurial intentions. Golshekoh, Gholamreza, Mirsaladin, Askary, and Alireza (2010) also found a positive relationship between scores on creativity tests and entrepreneurship. Fillis and Rentschler (2010) found a link between creativity and motivation, actualization and innovation. Several other studies have identified motivational traits and creativity as important factors in entrepreneurial activity and success (Baum, Locke, & Smith, 2000; Stewart & Roth, 2001).

Sternberg and Lubart (1999) defined creativity as the ability to produce work that is both novel (original, unexpected) and appropriate (useful, adaptive concerning task constraints). Using this definition Youl-Lee, Florida, and Acs (2004) contended that "entrepreneurship is a form of creativity and can be labeled as business or entrepreneurial creativity because new businesses are original and useful (p.882)."

Sternberg and Lubart's definition includes the elements generally associated with creativity: the development of divergent thinking (generating lots of unique ideas) followed by convergent thinking (combining these ideas into the best result). Divergent thinking (problem finding) is often associated with the arts and humanities and tested by creativity tests, while convergent thinking (problem solving) is often tested in intelligence tests and identified as more associated with science and technology (Atherton, 2010). Creativity tests, unlike IQ tests, require a multitude of responses rather than a single response (Hocevar, 1981).

Creativity and Entrepreneurship Education

In 1994, Timmons argued that creativity should be central to entrepreneurship education. Morrison and Johnston (2003) argued that creativity was so important it should be introduced into the entrepreneurship curriculum widely and not confined to a specific course. In a survey of the chairs/directors of the top twenty-five U.S. undergraduate programs in entrepreneurship as identified by *Entrepreneur* magazine for the years 2009 and 2010, 79% of chairs agreed that courses in creativity/innovation were very important in an entrepreneurship program (Schmidt , Soper & Bernaciak, 2011). Enhancing creativity and innovation was listed as one of the five skills by entrepreneurs in Malaysia in which more training was needed (Josoh, Ziyae, Asimiran, Kadir, 2011), indicating that the U.S. is not alone in its creativity deficit.

Most of the assessment of creativity in the entrepreneurship classroom has been to assess the convergent creativity of a project produced by an individual or group through scales or ratings of peers, instructors, or judges. This data can be collected through cases, simulations or real life presentations such as business contests and presentations. In the study of the Top 25 Undergraduate Entrepreneurial Programs, all programs used this approach in teaching creativity (Schmidt, et. al. 2011).

Less focus has been on the assessment of the divergent creativity in the entrepreneurship classroom or in expanding the creative approaches used by students. This data can be collected through creativity tests. Although the most common test of divergent thinking is the Torrance

test of creativity (Coren, 1995), other divergent thinking tests are: picture-word tests in which subjects are asked to write as many reactions to the picture as they can in one minute, and the alternative-uses tests in which subjects are asked to think of alternate uses for a variety of common objects such as a shoe, pencil, etc.. The range of divergent thinking responses can be measured in several ways: fluency (number of ideas generated); flexibility (variety of ideas, categories or perceptions); elaboration (the ability to add to or build off of the idea); originality (the ability to create fresh, new ideas); complexity (the ability to conceptualize many layers or difficult concepts); imagination (inventing new categories); curiosity (the use of probing questions about the idea); risk taking (to be courageous, willing to stand apart) (Wilson, 2004) .

Why is divergent thinking critical?

The 2010 AMA study stressed that the increased importance of creativity in the future comes from changes in the nature of work, global competition, pace of change and organizational structure. As different cultures (based on different values) approach problem solving and problem finding differently (Choi, Koo, & Choi, 2007); the need to think in new ways will be critical in the global economy. This difference in approaching creativity and problem finding has already been recognized between fields. Berglund and Wennberg (2006) found in comparing engineering students and business school students (both groups in entrepreneurship programs) that while they had similarities in creativity test scores, they did not differ in approaches to creative problem solving/finding when the fields (engineering, business) emphasized different creative issues and methods. Divergent thinking exercises help students develop multiple approaches to problem-finding/solving.

Current Study

The current study examines whether students enrolled an entrepreneurship class perform better in the number of ideas generated (fluency) and the range/variety(flexibility) of ideas, are more confident of their creativity, and use more creative approaches then students not in entrepreneurship courses. The study also examines whether practice in divergent thinking exercises increases entrepreneurship students' abilities in generating the number of ideas, range of ideas, and range of creative approaches used.
The following hypotheses are advanced.

Hypothesis One: *Students in the entrepreneurship class will generate more ideas and a greater range of ideas than students not enrolled in the entrepreneurship class.*

Hypothesis Two: *Students in the entrepreneurship class will perceive themselves as more creative and will report engaging in*

more creative approaches than those not in the entrepreneurship class.

Hypothesis Three: *Practice in divergent thinking activities will increase entrepreneurship students' abilities to generate ideas and to expand the range of ideas.*

METHOD

Eighty-nine students enrolled in the first course of an entrepreneurship minor and forty-two students enrolled in basic communication public speaking courses were given two picture-word tests and two creativity surveys. The entrepreneurship course is an elective course in an entrepreneurship minor and the public speaking course is a required university course for all students. While both courses value creativity; one in generating ideas for presentations, the other in generating ideas for projects; exercises in divergent thinking were done in the entrepreneurship class and not in the public speaking class.

Student populations in both courses were of freshman and sophomore rank and there were no substantial gender differences in class composition. All of the students attended a private Midwestern university in the U.S. and both classes were semester long courses running from January to May 2011. Students were given the divergent thinking exercise and the creativity survey during the first week of class in January and again during the last week of class in May.

The exercises to test divergent thinking were picture-word tests. The first picture-word test had a picture of a man in a building with the word "DO" on it. The second picture-word test had a picture of a bobsledder with the word "BE" (Stamp, 2010). The students were shown the picture and asked to generate and write down as many words and ideas they could associate with the picture in one minute. After the papers were collected, students completed a survey about how comfortable they were doing the assignment using a scale from 1 (not comfortable) to 10 (extremely comfortable); how much creativity they think they possessed using a scale from 1(not creative) to 10 (extremely creative); and to indicate from a list of several activities the frequency of the times (never, seldom, frequently, always) they use the activity when they encounter a problem or need to develop a new idea.

The picture-word tests were evaluated by counting the number of responses generated (fluency) and the range/variety (flexibility) of the responses. To assess range/variety, responses were coded and recorded in the following eight categories: simply repeating the images on the picture such as man, briefcase, sled, etc.; identifying action in the picture such as walking, running, etc.; creating a story as to what was happening in the picture such as going to meeting or interview, competing for gold, etc.; creating a broader meaning or metaphor for the picture such as work, IBM, Olympics, etc.; identifying a feeling such as sad, happy, fearful, etc.;

identifying colors; identifying a time frame (past, night, etc.); expressing a sensory experience such as see (blurry), hear (loud), taste (sour) or touch (rough).

The responses to the surveys on comfort level, confidence in creativity, and activities were also tabulated. The number of approaches used to solve a problem was measured by counting the number of times a student selected "always" as a response.

RESULTS

T-tests were used to determine significant differences between the means of various groups (e.g., entrepreneurship students vs. non-entrepreneurship students). H1, which predicted that students in the entrepreneurship class would perform better at divergent thinking activities in generating ideas and in having a wider range of ideas than those not enrolled in entrepreneurship classes, was supported. Students in the entrepreneurship class did perform significantly better than non-entrepreneurship students in both rounds 1 and 2, both in the number of ideas generated and the range (variety) (Table 1).

Table 1: Divergent Thinking Performance

	Mean Entrepreneurship	Mean Non- Entrepreneurship	*t*	*df*	*p*
Ideas Generated Round 1	11.10	8.85	2.44	100	.016
Range of ideas Round 1	4.62	3.97	2.02	74	.047
Ideas Generated Round 2	13.79	9.24	3.89	60	.000
Range of ideas Round 2	4.55	3.90	2.09	39	.043

H2, which predicted that students in entrepreneurship classes would perceive themselves more creative than those not in entrepreneurship classes, had mixed results. There were no significant differences in perceived creativity between the two groups of students in the round one. However, in the second round, entrepreneurship students perceived themselves as significantly more creative than non-entrepreneurship students perceived themselves to be (7.80 vs. 6.57 on the ten-point scale; $t = 2.81$, $p = .007$, $df = 54$).

The second part of H2 which predicted that students in the entrepreneurship class would engage in more creative approaches than those not in the class was not supported. There was no significant difference in the number of creative approaches used by entrepreneurship vs. non-entrepreneurship students in round 1. In comparing round 1 with round 2, entrepreneurship students evidenced no significant difference in the number of creative approaches used, but non-entrepreneurship students increased their average number of creative approaches significantly, from 2.64 to 4.91 ($t = 2.09$, $p = .063$, $df = 10$).

The most common creative approaches for entrepreneurship students in round one were talking, internet and brainstorming. In round two, internet was the most common approach, followed by talking and taking a break. (Table 2)

Table 2: Approaches to Creativity			
Round 1	Mean	Round 2	Mean
Talk with others	3.31	Do an Internet search	3.57
Do an Internet search	3.30	Talk with others	3.24
Brainstorm	2.98	Take a break	2.91
Take a break	2.79	Brainstorm	2.89
Take a walk/move around	2.71	Take a walk/move around	2.86

While not increasing the number of creative approaches used, entrepreneurship students reported significant increases in their use of the internet as an approach to creativity between rounds 1 and 2, from a mean of 3.32 to 3.66 ($t = 3.72$, $df = 43$, $p = .001$). Non-entrepreneurship students evidenced significant increases in the use of mind mapping and word association (Table 3).

Table 3: Significant Increases in Creative Approaches Used by Non-entrepreneurship Students					
	Round 1 Mean Non-entrepreneurship	Round 2 Mean Non-entrepreneurship	*t*	*df*	*p*
Mind mapping	2.00	2.50	2.31	17	.035
Word association	1.78	2.61	3.59	17	.002

H3, which predicted practice in divergent thinking exercises would increase entrepreneurship students' ability to generate ideas (fluency) and the range (flexibility) of ideas received mixed results. The first part that entrepreneur students would generate more ideas was supported. Entrepreneurship students evidenced a significant increase in the number of ideas generated between the two rounds (11.68 to 13.79), as shown in Table 4, whereas non-entrepreneurship students showed no significant difference between rounds.

Table 4: Significant Increase in Ideas Generated					
	Round 1	Round 2	*t*	*df*	*p*
Ideas generated	11.68	13.79	2.33	55	.024

The second part of the hypothesis that entrepreneurship students would increase the range (flexibility) of ideas was not supported. Although entrepreneurship students did not increase the range of their ideas, there was a significant increase in the number of entries within categories in their range. Among entrepreneurship students, in round 1, the most common types of ideas generated were metaphors, or *what it is like*, followed by ideas related to *what one sees* something is, *what one feels,* and then the *actions* one identifies in the picture. There were significant increases between rounds 1 and 2 on the number of ideas related to *feelings, actions and metaphors* (Table 5).

Table 5: Significant Increases in Types of Ideas Generated					
Idea Type	Round 1	Round 2	*t*	*df*	*p*
Feelings	1.73	3.50	4.03	29	.000
Actions	1.00	1.73	2.39	10	.038
Metaphors	3.54	4.56	2.15	47	.036

DISCUSSION

The study supports extant research on the relationship between creativity and entrepreneurship. The findings demonstrate that students who are in entrepreneurship classes do perform better at divergent thinking both in fluency (ideas generated) and in flexibility (range of expressed ideas) both at the beginning and the conclusion of the class compared to their non-entrepreneurship counterparts. The significant increase in the performance of these entrepreneurship students between rounds 1 and 2 also supports the claim that exercises in divergent thinking are important in the entrepreneurship classroom (Schmidt, et. al. 2011) and should be included in course work.

Besides including divergent thinking exercises in the entrepreneurship curriculum the findings suggest several other recommendations. First, the finding that entrepreneurship students had significant changes in their allocation of ideas within categories of their range, but did not expand their range of options for expressing ideas, suggests that instructors should focus on exploring a variety of ways in which divergent thinking can be expressed (originality, elaboration, complexity, imagination) and directly practice these in the classroom to improve the student's range of ideas generated.

Second, while students in the entrepreneurship class did generate more ideas and a wider range, their approaches to creativity did not increase as they did for the non- entrepreneurship students. This finding suggests that the environment (classroom) could be an important factor in developing approaches to creativity. In further analyzing this type of data researchers should look closely at what approaches to creativity are taught and emphasized in the class. Are entrepreneurship classes focusing on very specific types of approaches (internet in this case) rather than exploring a wider variety of approaches? In the global economy, the capacity to recognize and adapt to a variety of creative styles and perspectives will be essential in the future (AMA, 2010). This could mean that classes in entrepreneurship need to incorporate and stress more variety in approaches to creativity to increase student understanding and use of various methods.

Third, while there were no differences in perceptions of creativity between students at the start of the course, at the end of the course entrepreneurship students increased their perception of their creativity potential. This finding suggests that practice in divergent thinking activities can affect perception of and confidence in creativity, and supports Morrison and Johnston's

(2003) argument that creativity should be widespread throughout the entrepreneurship curriculum rather than in a single course.

Limitations and Future Research

The limitations of the study relate primarily to the methodology. First, the frequency scale used for creative approaches should be expanded from a four choices to a ten point scale. This would allow for more clarification of how often a student engages in different approaches. Because of the narrow scale, the study was limited to using "always" for assessment of choices. Second, the courses examined were both freshman/sophomore level courses and the entrepreneurship course was the beginning course in an entrepreneurship minor. Even though the entrepreneurship course was an elective, it is unclear whether students enrolled in it really considered themselves as entrepreneurs or were simply curious about the minor. Conducting the same study with students enrolled in the third or fourth course of the minor would be helpful in validating this perception about entrepreneurship and creativity. Finally, the study should be expanded to have students complete 3 or 4 picture-word tests and surveys in each of the classrooms instead of only the two given. This would provide more information to assess whether the improvement in divergent thinking is due more to the effect of practice in divergent thinking exercises or to the classroom environment (structure) or both. Research has already shown that different fields (Berglund & Wennberg, 2006) approach problem finding and problem solving in different ways. Future researchers may implement the study with student populations from other countries and cultures. The results of the tests could be compared to identify differences or similarities in types of divergent thinking and approaches to creativity between cultures. This research could result in identifying and teaching different approaches to creativity in the classroom that could lead to better understanding and more effective interaction with other cultures.

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RELATIONSHIP BETWEEN STUDENTS' GENDER, THEIR OWN EMPLOYMENT, THEIR PARENTS' EMPLOYMENT, AND THE STUDENTS' INTENTION FOR ENTREPRENEURSHIP

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ABSTRACT

This particular article studies if there is a relationship between (a) the students' fathers' current employment, (b) the students' mothers' current employment, (c) the student' own current employment, (d) the students' gender, and (d) the students' intention to become entrepreneurs after they have completed their undergraduate education?

The study rejected the first null hypothesis: That there is no statistical difference between these students' fathers' employment—and these students' intention to starting a business once they have completed their undergraduate studies. Likewise, it also invalidated the second null hypothesis: That there is no statistical difference between these students' mothers' employment—and these students' intention to starting a business once they have completed their undergraduate studies. The study also rejected the third null hypothesis: That there is no statistical difference between students' own employment—and their intention to starting a business once they have completed their undergraduate studies. However, the study accepted the fourth null hypothesis: That there is no statistical difference between students' gender—and their intention to starting a business once they have completed their undergraduate studies.

RESEARCH METHODOLOGY

QUESTIONNAIRE

A 6-page questionnaire containing 91 questions (variables) was designed for this study for distribution among selected undergraduate students at the Lubin School of Business, Pace University New York during December 2004 – December 2005 period. The 91 variables were classified into the following eight groups:

1. Personal data: Gender, age group, marital status, father's employment, father's income, mother's employment, mother's income, (questions 1-7)
2. Educational data: Current student status, current year of study, degree program, major area of study in the broad discipline of business, grade point average, (questions 8-12)
3. Respondent's employment status, respondent's income, (questions 13-14)

4. Respondent's intention to start own business, work for a family business, work for someone else (Question 15)
5. Reasons for starting your own business (Table 1, questions 16-34)
6. Reasons for not working for someone else (Table 2, questions 35-53)
7. Reasons for not starting your own business (Table 3, questions 54-72)
8. Reasons for working for someone else (Table 4, questions 73-91)

Each of the 76 questions (16-91) included in the four tables had 1-5 possible answers: (a) Unimportant, (b) Important-somewhat (c) Important-average, (d) Important-above average, and (e) Very important.

Of the four tables included in the questionnaire, the students were asked to answer only two of them: Either, answer Tables 1 and 2, or, answer Tables 3 and 4. A note to this effect appeared at the bottom of each table.

COLLECTION AND SELECTION OF DATA

Copies of the questionnaire were sent to the author's faculty colleagues who agreed to allow their students to participate in the study. Of the 435 responses completed by the students, 390 were included for further analysis in this study. Forty-five of these were found unusable for the study for one or more of the following reasons:

1. Did not answer the question about class level
2. Did not answer any question included in the four tables
3. For answering questions, selected a single table or a combination of the tables inconsistent with the guidelines provided.
4. Of the 390 usable responses, 47 were from the first year students, 107 were from the second year students, 112 were from the third year students, and 124 were from the fourth year students. A very likely reason for a relatively smaller number of responses from the first year students, compared to the number of responses from their second, third, and fourth year counterparts, was the fact that the total number of first year students at the Lubin School of Business is generally smaller than their second, third, and fourth year counterparts.

PURPOSE OF THE RESEARCH

The overall purpose of this research is to find if there is a statistical relationship between a number of independent variable and the Lubin School of Business students' intention to become entrepreneurs after they have completed their undergraduate education.

PURPOSE OF THIS ARTICLE

The objective of this particular article, however, is limited to analysing selected questionnaire-variables as presented by the following four hypotheses:

There is no statistical difference between the Lubin students' fathers' current employment—and these students' intention to starting a business once they have completed their undergraduate studies.
Alternate: There is such a statistical difference (based upon the original Ques. #3).

There is no statistical difference between the Lubin students' mothers' current employment ---and these students' intention to starting a business once they have completed their undergraduate studies.
Alternate: There is such a statistical difference (based upon the original Ques. #5).

There is no statistical difference between the Lubin students' current employment—and their intention to starting a business once they have completed their undergraduate studies.
Alternate: There is such a statistical difference (based upon the original Ques. #13).

There is no statistical difference between the Lubin students' gender (male or female)—and their intention to starting a business once they have completed their undergraduate studies.
Alternate: There is such a statistical difference (based upon the original Ques. #1).

The independent variables (fathers' occupation, mothers' occupation, students' occupation, and students' gender) in these hypotheses were tested against the dependent variable (intention to become entrepreneur—the original question #15). All these original five questions (1, 3, 5, 13, and 15; renumbered as 1, 2, 3, 4, and 5, respectively) are presented in Exhibit 1.

Exhibit 1: Questions adapted from the Survey Questionnaire regarding Students' Fathers', Mothers', and their Own Employment

Independent Variables
Sex (check one): (a) Male_ (b) Female_
Your father's employment: (check all that apply):
(a) Has his own business_ (b) Works for someone else_ (c) Is unemployed_ (d) Is retired_ (e) Passed away _
3. Your mother's employment: (check all that apply):
(a) Has her own business_ (b) Works for someone else_ (c) Is unemployed_ (d) Is retired_ (e) Passed away _
4. What is your current employment status (check all that apply):
(a) I have my own business (part time)_; (b) I have my own business (full time)_; (c) I am working part time/full time in a business owned by an immediate family member (spouse, parent, brother and/or sister)_; (d) I work for someone else_; (e) I am currently unemployed_ (f) I am retired_

Dependent Variable
5. After you have finished your education (whether you have attained a degree or not), what do you intend to do (check one):
Start my own business_; Work for a business owned by an immediate family member (spouse, parent, brother and/or sister)_; Work for someone else_

LIMITATIONS OF STUDY

This is a study of the Lubin students who were taking undergraduate business courses (accounting, information system, management, or marketing) at different class levels (first, second, third, or fourth year) during the study period. The 390 students chosen for the study were all different individuals. This is not a study of the same individuals as they progressed from their first year of study through to their fourth year.

SURVEY OF LITERATURE

Several studies have been made dealing with a host of variables that affect intention for entrepreneurship. A sample of these multi-dimensional studies is presented below.

ROLE OF EDUCATION AND TRAINING IN ENTREPRENEURSHIP

A sample of studies in this area of the discipline is presented below:

Kolvereid, and Moen's (1997) study supports the hypothesized relationship between education in entrepreneurship and entrepreneurial behavior, both for actual behavior and for behavioral intentions.

In an analysis of studies of micro-entrepreneurs in (a) Peru (by Dean Karlan and Martin Valdivia), (b) Tanzania (by Lars Oppedal Berge Kjetil Bjorvatn and Bertil Tungodden), and (c) Pakistan (by Xavier Gine and Ghazala Mansuri), Shane (2010) concluded that they don't show consistent evidence that entrepreneurship training improves the performance of micro-entrepreneurs. In short, getting some entrepreneurship training might increase one's performance as a business owner. Then again it might not.

Peterman and Kennedy (2003)—who studied a sample of secondary school students enrolled in the Young Achievement Australia (YAA) enterprise program—concluded that participants reported significantly higher perceptions of both desirability and feasibility of starting a business after completing the enterprise program.

Similarly, Olomi and Sinyamule (2009)—who examined entrepreneurial inclinations among vocational training centres (VTCs) using a sample of 508 trainees from 12 VTCs in Iringa region, central Tanzania—concluded, among others, that a majority of VTC trainees have interest in starting own businesses, motivated primarily by the need to have control over their own lives. perceived chances of getting a job and background of entrepreneurial family are positively associated with interest in entrepreneurial intention.

A study by Brush (et al. June 2003) suggests that there is a need for more faculty members with doctorate in entrepreneurship to meet the demand created by a rapid and sustained growth of universities' undergraduate and MBA offerings in entrepreneurship.

ENTREPRENEURIAL EDUCATION FOR NON-BUSINESS STUDENTS AND INVENTORS

A sample of studies in these areas is presented below.

Souitaris, Zerbinati, and Al-Laham (2007)—who tested effect of entrepreneurship programs on the entrepreneurial attitudes and intentions of science and engineering students—showed that the programs raise some attitudes and the overall entrepreneurial intention and that inspiration (a construct with an emotional element) is the program's most influential benefit.

Knudson et al. (2004) suggest that enhancing entrepreneurship is particularly important in agriculture, and thus should be a priority in developing education programs at land-grant universities.

Levenburg et al. (2006) argue that many nonbusiness majors also possess entrepreneurial characteristics and perceive the need for entrepreneurship curricula. Their findings suggest that although business majors regard their traditional education as adequate preparation to start a new business, the greatest need for entrepreneurship courses and curricula exists within academic disciplines outside of the business school

In an investigation of student and faculty attitudes toward entrepreneurship and entrepreneurship education, Shinnar (2009) found that interest among nonbusiness students suggests a significant opportunity to formally expand entrepreneurship-related education beyond the business school; and that in contrast to previous researchers, there are no significant differences between male and female students regarding interest in entrepreneurship.

In an analysis of biographies of noted inventors and entrepreneurs, Baumol et al. (2009) concluded that the hypothesis—that protracted and rigorous education can impede entrepreneurship—is not supported. They did find that with time, entrepreneurial and inventor education increases as technology grows more complex. However, they also found that the educational attainment of inventors has grown more rapidly than that of entrepreneurs and the educational gap has tended to widen over time.

Rampell (2011) suggested that many young women are postponing their working lives to get more education and there are now more young women in school than in the work force. The next generation of women may have a significant advantage over their male counterparts, whose career options are already becoming constrained.

TESTING, FINDINGS, & DISCUSSIONS

STATISTICAL TESTING

Several statistical techniques, such as chi-square, regression analysis, and t-test, are available to test the validity of a set of data. All the same, only the chi-square technique has been used to test the validity of data used in this research, because the data gathered amply satisfy the

following four primary assumptions of the Pearson's chi-squared test: (a) Independence of observations, (b) large enough expected cell counts, (c) randomness of data, and (d) sufficient sample size (Yates, Moore & McCabe, 1999).

FINDINGS, HYPOTHESES 1 AND 2

A summary of the statistical analysis of data related to the four hypotheses stated above is presented in Exhibit 2. It also shows the decisions reached based on this analysis. It rejects the Null Hypothesis 1: That there is no statistical difference between these students' fathers' current employment—and these students' intention to starting a business once they have completed their undergraduate studies. On the contrary, it endorses the alternate hypothesis, that there is such a statistical difference. The calculated value of $X^{2,}$ 146.980, is larger than the critical (tabulated) value of $X^{2,}$ 13.277, with 4 degrees of freedom, alpha=.01.

It also rejects the Null Hypothesis 2: That there is no statistical difference between these students' mothers' current employment ---and these students' intention to starting a business once they have completed their undergraduate studies. On the contrary, it endorses the alternate hypothesis, that there is such a statistical difference. The calculated $X^{2,}$ 147.830, is larger than the critical (tabulated) value of $X^{2,}$ 13.277, with 4 degrees of freedom, alpha=.01.

Exhibit 2: Relationship between Selected Variables and Students' Intention for Entrepreneurship

Null Hypothesis	Total No. of Respondents	Respondents who want to be Entrepreneurs	X^2 Calculated Value	X^2 Critical Value	Degree of Freedom, a=.01	Decision on Null Hypothesis
There is no relationship between Fathers' Employment and Students' Intention for Entrepreneurship	385	174	146.980	13.277	4	Reject
There is no relationship between Mothers' Employment and Students' Intention for Entrepreneurship	384	173	147.827	13.277	4	Reject
There is no relationship between Students' Employment and Their Intention for Entrepreneurship	402	177	132.125	13.277	4	Reject
There is no relationship between Students' Gender and Their Intention to Become Entrepreneurs	389	181	3.665	6.635	1	Accept

DISCUSSION: FATHERS' OCCUPATION, MOTHERS' OCCUPATION, AND STUDENTS' ENTREPRENEURIAL INTENTION

An extensive survey of literature did not turn up any other study that is closely similar to the Lubin Business School students' studies, i.e., (1) Relationship between the students' fathers' employment and students' intention to starting a business once they have completed their undergraduate studies and (2) Relationship between the students' mothers' employment and students' intention to starting a business once they have completed their undergraduate studies. However, a few studies, as stated below, did delve into these areas with their own variations and arriving at their own conclusions.

Somewhat similar to the findings of the Hypotheses 2 and 3 presented above, a study of 30 successful Canadian female entrepreneurs made by Monica Belcourt (1990) highlighted, among others, the importance of paternal occupation and psychodynamic interactions with both the mother and father.

Likewise, Olomi and Sinyamule (2009)—who examined entrepreneurial inclinations among vocational training centres (VTCs) using a sample of 508 trainees from 12 VTCs in Iringa region, central Tanzania—concluded, among others, that perceived chances of getting a job and background of entrepreneurial family are positively associated with interest in entrepreneurial intention.

Similarly, Hundley's (2006) analysis shows that men with self-employed fathers and higher parental incomes are more likely to be self-employed. The impact of paternal self-employment is leveraged by higher family income, and self-employment is more likely when the father worked in an occupation with task requirements similar to those of an independent business.

Alike, Domke-Damonte and Faultstich's (2008) survey of students in Germany (n = 95) and the United States (n = 147) indicated that parental entrepreneurship and country of origin affect self-perception of entrepreneurial orientation.

Relatedly, Meszaros, Creamer, and Soyoung Lee's (2009) research showed that when all other things are considered, interactions with others, such as counselors and teachers, about career options did not have a significant effect on career interest that overrode the direction provided by parents.

Similarly, Abd-Moen, Abd-Rahman, et al. (2004) surveyed the entrepreneurial attitudes among the IKBN (Institute Kemahiran Belia Negara) trainee youths in Malaysia. Their research showed that the residential area, field area in IKBN and in school, parent's education and fathers' occupation has a significant relationship with entrepreneurial attitudes.

However, unlike the findings of the Hypotheses 2 and 3, Mungai and Velumuri (2011)'s article argues that first, parental influence "may not" exist in case of parents' economic failure in self-employment, and second, that when it does occur, it is more pronounced when the offspring is a young adult.

Similarly, in a study of 51 students belonging to second module postgraduate diploma in management program at Dayananda Sagar Institutions campus, at Bangalore, Kumara and Sahasranam (2009) concluded that the student's academic marks and father/guardian's occupation have little influence on their entrepreneurial characteristics.

FINDINGS, HYPOTHESIS 3

The statistical analysis of data, as presented in Exhibit 2, also invalidates the third null hypothesis which postulated that there is no statistical difference between students' current employment—and their intention to starting a business once they have completed their undergraduate studies. On the contrary, it endorses the alternate hypothesis, that there is such a statistical difference. The calculated $X^{2,}$ 132.120, is larger than the critical (tabulated) value of $X^{2,}$ 13.277, with 4 degrees of freedom, alpha=.01.

DISCUSSION: STUDENTS' OCCUPATION AND THEIR ENTREPRENEURIAL INTENTION

The statistical analysis of Hypothesis 3 suggests that these students' intention to become entrepreneurs is also influenced by what they currently do themselves. They are motivated by who they are; by their own "personality". While defining personality, which conveys different meaning to different people, is outside the scope of the current research, a sample of personality and entrepreneurship intention studies is presented below.

Lüthje and Franke (2003), in a survey of 512 students at the MIT School of Engineering, broadly confirmed that personality traits have a strong impact on the attitude towards self-employment. The entrepreneurial attitude is strongly linked with the intention to start a new venture. The students' personality therefore shows an indirect effect on intentions.

Frank, Lueger, and Korunka's (2007) paper analyses the varying roles of personality factors in business start-up intentions, in start-up success, and in business success. According to them, it can be shown that the significance of personality traits among (potential) business founders decreases in the course of start-up/new business development: from initial start-up intentions, to the start-up process and realization, and on to business success (existence/growth).

By drawing on the "theory of planned behavior," Zellweger, Sieger, and Halter (2011) investigated how intentional founders, successors, and employees differ in terms of locus of control and entrepreneurial self-efficacy as well as independence and innovation motives. They found that transitive likelihood of career intent depends on degree of entrepreneurial self-efficacy and the independence motive.

However, unexpectedly, they saw that high levels of internal locus of control lead to a preference of employment, which challenges traditional entrepreneurship research and suggests that the feasibility of an entrepreneurial career path does not automatically make it desirable. Their findings suggest that students with family business background are pessimistic about being

in control in an entrepreneurial career, but optimistic about their efficacy to pursue an entrepreneurial career.

FINDINGS, HYPOTHESIS 4

The statistical analysis of data, as presented in Exhibit 2, validates the fourth null hypothesis which postulated that there is no statistical difference between the Lubin students' gender—and their intention to starting a business once they have completed their undergraduate studies. The calculated X^2, 3.65, is smaller than the critical (tabulated) value of X^2, 6.64, with 1 degree of freedom, alpha=.01.

DISCUSSION: GENDER AND ENTREPRENEURIAL INTENTION

Similar to the findings of Hypothesis 4 presented above, Olomi and Sinyamule (2009)—who examined entrepreneurial inclinations among vocational training centres (VTCs) using a sample of 508 trainees from 12 VTCs in Iringa region, central Tanzania—concluded that gender and having taken entrepreneurship courses have no significant effects on start-up inclinations.

Likewise, in a study of Indonesian and Norwegian students, Kristiansen and Indarti (2004) found, among others, that age, gender and educational background have no statistically significant impact on the level of entrepreneurial intention. They noted that level of entrepreneurial intention is higher among Indonesian students. The lower level of entrepreneurial intention among Norwegian students is explained by the social status and economic remuneration of entrepreneurs in comparison with those enjoyed by employees in the Norwegian context.

However, several studies arrived at conclusions dissimilar to the one reached in Hypothesis 4 presented above. For example, Gupta, et al. (2009)—who examined the relationship between the gender-role stereotypes and entrepreneurial intentions in U.S., Turkey and India—concluded that, in general, entrepreneurs are perceived to have predominantly male characteristics.

Similarly, Yordanova and Tarrazon (2010)—who explored gender effects on entrepreneurial intentions and identify factors that may account for the gender gap in entrepreneurial intentions in a sample of Bulgarian university students—found that women have lower entrepreneurial intentions than men.

Likewise, Plant and Ren (2010)—who compared the intentionality of students in graduate business programs in the United States and China toward becoming entrepreneurs—found that males in China exhibited a significantly greater intentionality toward self-employment than females did.

Alike, in a study of middle and high school students, MBA students, and early career adults, Wilson, et al. (2009) underscored the importance of entrepreneurial self-efficacy as a key component in understanding entrepreneurship interest and actual career choice. The positive

influence of entrepreneurship education on self-efficacy proved stronger for women than for men.

van der Sluis, Justin et al. (2008) reviewed about a hundred empirical studies to analyze the impact of formal schooling on entrepreneurship selection and performance in industrial countries. Their findings included: (a) that the impact of education on selection into entrepreneurship is insignificant, (b) that the effect of education on performance is positive and significant, and (c) that the returns to schooling in entrepreneurship are higher in the USA than in Europe, higher for females than for males, and lower for non-whites or immigrants.

CONCLUSIONS AND SUGGESTIONS FOR RESEARCH

This research shows that the Lubin School of Business students' intention to become entrepreneurs is related to whatever activities—entrepreneurial or otherwise—their fathers or mothers are engaged in. It further shows that these students' intention to become entrepreneurs is related to whatever activities—entrepreneurial or otherwise--they themselves are currently engaged in. For example, students intend to become entrepreneurs because they currently (a) have their own business (part time); (b) have their own business (full time); (c) are working part time/full time in a business owned by an immediate family member (spouse, parent, brother and/or sister); (d) are working for someone else; (e) are currently unemployed; and/or (f) are retired (Exhibit 1).

This study also indicates that the Lubin School of Business students' intention to become entrepreneurs is not related to their gender—male or female. Statistically, it means that these students' intention to become entrepreneurs is gender-neutral.

Based on the findings of the current research and also those of several studies conducted by other scholars, this author believes that there is need to do research to identify and analyze the role of variables (such as, students' gender, students' fathers' occupation, students' mothers' occupation, and students' own occupation) that help students think about becoming entrepreneurs, or, conversely, help them think about not becoming entrepreneurs. The current research does not explore such variables—it merely suggests that there is such a need.

Further, men and women are rushing back to schools and colleges to enhance their educational background. Women, today, outnumber their male counterparts Rampell (2011). These developments have made it necessary to conduct research in: the type of educational institution they are entering (Public, private, vocational, etc.); the type of education they are pursuing (Arts, sciences, business, computers, entrepreneurship, etc.); which type of education has a better chance of getting jobs; the type of time commitment they are making (Full time, part time); how they would finance their education (Scholarships, loans, personal money, etc.); what types of jobs may be available after they complete their education (Manufacturing, sales, banking, computers, healthcare, etc.).

In addition, we must determine whether the women will continue to get paid less than their male counterparts, even if they may be more qualified. Finally, we must ask how many

teachers with a doctoral degree in entrepreneurship would be needed to meet the growing enrolment in entrepreneurship courses?

AUTHOR'S NOTES

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The questionnaire used for this study represents a substantial revision of the questionnaire containing 62 questions used by this author for the (first of its kind) study of "Intention for Entrepreneurship among Students in India," that was published in the July-December, 2006 issue of the Journal of Entrepreneurship.

While citing other scholars' writings in this article, care has been taken to present their findings as accurately as possible by often using their own words—subject to the limitation of space imposed by this article.

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