

# 10 Entrepreneurial knowledge flows and new venture creation

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## Introduction

Entrepreneurship can be defined as the process by which new ventures are created (Gartner 1988). One of the most dominant research streams in the field of entrepreneurship is the study of antecedents to new venture creation (Reynolds and Miller 1992; Kreuger and Brazeal 1994; Venkataraman 1997). A primary research question in this area has been, 'What are the characteristics of entrepreneurs and the entrepreneurial learning processes that result in more incidents of business start-up efforts?' This chapter is an empirical examination of this topic. The focus of this chapter is the determination of the impact of knowledge flows in entrepreneurship, that is, the combination of general knowledge of the entrepreneur and the influx of new specific knowledge learned during the entrepreneurial process. Framed a bit differently, three specific research questions emerge that guide this investigation (performance in this case is defined as the incidents of new venture creation):

- How does general knowledge possessed by the entrepreneur affect new venture creation?
- How does the learning process during start-up activities affect new venture creation?
- What are the interaction effects of general and specific knowledge on new venture creation?

Although this topic has received dramatic growth in academic and practitioner attention over the past decade, there are some gaps in the literature. These gaps relate to the content of investigation and the methods utilized. Specific content deficiencies include the need to study entrepreneurship earlier in the process (to learn more about how new ventures come into being) and to consider not only the backgrounds and traits of entrepreneurs (considered general knowledge herein), but also the process of how the new venture is launched (considered new knowledge herein) (Gartner 1988; Venkataraman 1997). Weaknesses in the methods of published studies related to these issues include small sample sizes, unclear and varying performance measures and the lack of controls for moderating variables.

General knowledge of the entrepreneur is often operationalized as backgrounds and traits of entrepreneurs relating primarily to education and experience (Woodworth *et al.* 1969; Brush 1991; Jo 1996; Gartner 1999). Over the past twenty years, studies linking existing general knowledge to entrepreneurial performance have produced dramatically different or inconclusive results, as will be described later in this chapter. The testing of specific knowledge learned during the start-up process, often operationalized as formal assistance such as through small business assistance programs (Robinson 1982; Chrisman *et al.* 1987; Nahavandi and Chesteen 1988; 1989), has generated conclusions of positive links to performance, but the studies have been subject to small sample sizes with little or no control comparisons (e.g. entrepreneurs who do not seek assistance), leading to questionable validity.

Another opportunity for additional investigation relates the impact of general knowledge and specific knowledge on performance, when controlling for each other and studying interaction effects. The systematic study of main and interactive effects, which has not been adequately addressed in the literature, is the primary contribution of this chapter. 'By building off of three distinct literature bases – entrepreneurship, resource-based theory (RBT) and the knowledge-based view (KBV)/organizational learning (OL) – we are able to understand better how certain types of knowledge and mechanisms for transferring knowledge impact entrepreneurial performance'. The entrepreneurship literature is the anchor for the study, as it provides a population for testing, variables for consideration and impact opportunities in terms of strategies for individuals and macro-policy recommendations. The RBT and the KBV/OL inform the entrepreneurial literature by offering additional constructs and categories for study (general knowledge, specific knowledge and performance) and relationships to investigate (impact of specific knowledge on performance given general knowledge and the interaction effects of specific knowledge and general knowledge). The goal is to provide more explanatory power in this field of inquiry by building a more compelling model that not only includes variables previously tested independently, but also tests their combined direct and interaction effects.

The first section of this chapter sets the stage with a brief look at the key issues in the entrepreneurial literature and a general discussion of opportunities in existing theory for explaining the start-up phenomenon. This section is followed by a discussion of a conceptual model that guides this research project. Five hypotheses are presented from a review of the entrepreneurship and other supporting literature. Next, the testing is presented with a description of the dataset, methodology, and results. Finally, the discussion section describes conclusions, limitations, implications and further testing opportunities.

## **Theoretical backdrop**

### ***Entrepreneurship***

The starting point for this investigation is a review of relevant entrepreneurial literature. Classic works described the importance of entrepreneurship and its role in US business history (Schumpeter 1934; Chandler 1962). In the 1980s,

academic researchers began more formally studying entrepreneurship as a distinct literature base. Much of the early work focused on defining entrepreneurship and developing constructs for study. The field then struggled to identify common characteristics or traits of successful entrepreneurs for a number of years. Later analysis supported early claims that trait analysis was insufficient to explain entrepreneurial performance, as less than 7 percent of the variance in entrepreneurial performance was attributable to an entrepreneur's individual characteristics (Baum *et al.* 2001). A seminal piece in 1988 provided clarity on both of these issues (the definition of entrepreneurship and the study of traits). First, the definition offered for entrepreneurship was that of 'new venture creation' which helped identify parameters for entrepreneurship and also distinguished it from innovation (Gartner 1988; Venkataraman 1997). Second, there was a call to investigate not only entrepreneurs' backgrounds and traits but also the entrepreneurial start-up process and entrepreneurial behavior – especially the learning processes thereof (Gartner 1988).

Other researchers supported this expansion of focus to include both entrepreneurs' background and behavior. Cognitive factors were investigated (Schwenk 1988; Gatewood *et al.* 1995) as well as biases and heuristics (Busenitz and Barney 1997). The entrepreneurial background research continued during the 1980s with a focus on experience (Vesper 1980; MacMillan *et al.* 1985; Duchesneau and Gartner 1990) and education (Vesper 1980; Van de Ven *et al.* 1984; Stuart and Abetti 1990). This chapter will investigate both the background and behavior effects on new venture performance.

The final research area within the entrepreneurial literature covered in this chapter is the impact of external assistance on the start-up process. Studies have examined external assistance provided to entrepreneurs, with many claiming positive impact on new venture creation (Robinson 1982; Chrisman *et al.* 1987; Nahavandi and Chasteen 1988; and Chrisman 1999) and a few claiming less or no impact (Lamont 1972; Sandberg and Hofer 1987; Dennis and Phillips 1990). This chapter tests this tension and summarizes the varying constructs, methods and gaps in previous empirical papers.

### ***Gaps in literature and areas for further investigation***

A review of the entrepreneurial literature provides guidance as to where contribution opportunities exist. Specifically, there are five primary opportunities that led to the development of this particular research study. The first two opportunities represent gaps in the content of the literature and the next three represent problems in the methodologies of studies.

#### ***Study new venture creation earlier in the start-up process***

Operating within our definition of entrepreneurship as the creation of a new venture or a distinct new business (Gartner 1988), much of entrepreneurial research could be better classified as small business research. Research on entrepreneurship

is also often conducted as a study of the entrepreneur on an individual basis. This usually includes selection of existing entrepreneurs for study. The typical method for examining pre-venture activities is to survey entrepreneurs after the fact. This retrospective basis of data generation is limited as the responses are subject to recollection and survivorship bias.

The serious gap in knowledge about what takes place before the new venture is created, has been noted from sociological, psychological and strategic perspectives. Sociologists, in their study of organizations at the population level, note that decisions made at the earliest phase of organizational formation have long-lasting and often irreversible impact on the eventual performance (Aldrich *et al.* 1989). The psychology lens surfaces the importance of personality factors and cognitive sense-making during the start-up process (Learned 1992; Krueger and Brazeal 1994). Finally, strategy researchers hold that strategic planning and formal assistance during the start-up phase can impact performance (Robinson 1982; Chrisman 1999).

The reasons for the lack of study of the early stages of entrepreneurship are evident. The first problem is identification of the entrepreneur. Traditional studies have used data sources such as new business filings, small business assistance clients, and other such existing company databases. These approaches, however, only cover a small subset of the total entrepreneurs in existence at any given time (Aldrich *et al.* 1989). Another problem involves costly methodologies. Attempts to survey early-stage entrepreneurs are complicated and quite expensive (Chrisman 1999). In many cases, researchers have had to settle for smaller sample sizes and less statistical power. To truly study the early-stage entrepreneur, you must identify entrepreneurs who are actively trying to start a business and survey them during the process. Since only between 3 and 8 percent of the general population is involved with the creation of a new venture, this identification requires a large sampling set (Reynolds and Miller 1992). This chapter is entirely focused on the pre-venture process and is the result of a large-scale multiple-year research project over several years that includes an original sample of over 30,000 individuals (more thoroughly explained in the methodology section).

### *Study both entrepreneurial backgrounds and the start-up process*

Many of the studies thus far in the field have focused on either backgrounds or the start-up process, but not both. Specific examples of these studies will be provided in the next section. The intent here is to advance the research stream by testing for direct and interactive effects of background conditions and learnings that occur during start-up activities. This is an area where the KBV/OL makes a theoretical contribution. For example, knowledge is often operationalized as an individual variable (Grant 1997) with links to performance and sources of knowledge, that go well beyond formal education. Thus it is important to consider additional sources of knowledge such as experience in the industry and formal assistance from trained professionals. This study includes traditional knowledge variables such as formal education as well as experience and assistance variables.

*Increase the sample size*

As previously discussed, it is difficult to obtain adequate sample sizes in entrepreneurial studies, given the difficulties in identifying individuals involved in the start-up process. For example, a review of the entrepreneurial literature related to topics covered in this chapter reveals relatively small sample sizes: education background testing – 71 (Carter *et al.* 1996); experience – 26 (Duchesneau and Cartner 1990) and 33 (Katz 1990); entrepreneurial intention – 20 (Bird 1988).

The study presented in this chapter involves a sample of over 30,000 individuals selected at random from the US population to yield a group of over 1,200 entrepreneurs (492 with usable entrepreneurship outcome variables). The random element of the selection is important to note as many of the studies in this field are based on convenience samples, such as all the firms seeking small business program assistance who respond to a survey. This will be discussed more thoroughly in the methodology section of this chapter.

*Identify clear performance measures*

The entrepreneurial field initially based its performance measures in a similar fashion to other more established disciplines such as economics and accounting. Traditional measures such as sales growth, profitability and return on investment, however, often led to more confusion than clarity, given the changing dynamics of an entrepreneurial organization and the difficulty of comparison. For example, sales growth is a difficult measure for entrepreneurs as start-up companies go through dramatic revenue swings and profitability often eludes new ventures for several years after start-up. Additionally, industry effects have been shown to have greater impact on performance than firm-specific characteristics in some cases.

As the field gravitates toward more study of the pre-venture process (based on a definition of entrepreneurship as the creation of a new venture or business entity), the dependent performance variables will likely change as well. Given the positive economic impact of new businesses in an economy and the clear delineation, the performance measurement is often the dichotomous variable of new venture creation/organizational formation (Learned 1992; Chrisman 1999).

*Control for moderating effects*

The issue of adequate controls during empirical testing represents the most significant opportunity for advancing theories. The vast majority of studies of entrepreneurial backgrounds (past general knowledge) and process (new specific knowledge learned) have been conducted in isolation without adequate controls. This makes generalization and comparison suspect. For example, experience has been cited as a major factor influencing new venture creation (Duchesneau and Gartner 1990; Stuart and Abetti 1990; Krueger 1993), but in these empirical studies, no controls were introduced for new experience gained during the start-up process or gleaned from the experience of others through advisement and/or consultation. And studies examining the impact of specific knowledge

have traditionally not controlled for the effect of general knowledge (previous experience and/or education) (Chrisman *et al.* 1987; Nahavandi and Chasteen 1988; Chrisman 1999). Likewise, studies examining the effects of the educational backgrounds of entrepreneurs on performance (Cooper 1971; Brush 1991; Jo and Lee 1996) have not controlled for specific entrepreneurial-related education obtained during the start-up process such as with educational courses. In recent years, researchers have been addressing this issue with databases such as the one described herein that contain control samples.

The RBT and the KBV/OL will also aid in investigating this aspect. The RBT holds that it is the unique combination of resources that leads to competitive advantage (Penrose 1959; Barney 1996). The KBV suggests that knowledge-based resources are increasingly important for success in the modern age. OL provides arguments for the value of studying the learning process and its impact on performance. Thus, the combination of knowledge resources and their interactions represents an important avenue of research and is one of the primary contributions of this chapter.

### ***The nascent entrepreneur and intention***

With a goal of understanding pre-venture learning activities and antecedents, a researcher is faced with a challenging primary data-gathering situation. Relying on existing entrepreneurial organizations can only provide partial answers at best and efforts must be directed earlier in the process. Researchers have coined the term ‘nascent entrepreneur’ to represent an individual with intent to start a business (Reynolds and Miller 1992; Chrisman 1999), and this nascent entrepreneur has become the subject of several recent entrepreneurial investigations.

The construct of intention has been documented and tested in entrepreneurial literature over the past 13 years. Using certain psychological constructs, an entrepreneur’s intention was first posited to have a direct effect on performance in a study based on interviews of 20 entrepreneurs (Bird 1988). Intention was also proposed as one of the four main properties in defining a new venture itself (Katz and Gartner 1988). Estimates of percentages of the general population with entrepreneurial intention range from 3 to 8 percent (Reynolds and Miller 1992; Dennis, 1997). Estimates of eventual links to performance (actual start-up) have been documented from 33 percent (Katz 1990) to 48 percent or more (Carter *et al.* 1996).

## **The model**

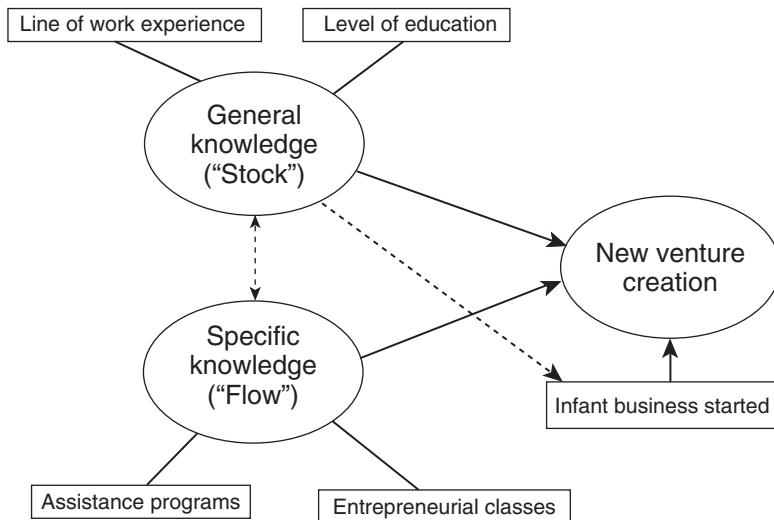
### ***Introduction and overview***

The starting point for testing in this chapter is the nascent entrepreneur, who by definition possesses intention to start a business. The focus is on the general knowledge (background) and new specific knowledge learned during the start-up process (behavior). The direct relationships of each will be tested to support or refute previous empirical conclusions. The unique aspect of this model is the testing of potential moderating effects of each construct on the other’s relationship to

performance. This chapter will test the relationship between general knowledge and start-up occurrence, controlling for specific entrepreneurial knowledge learned during the start-up process. It will also test the moderating impact (if any) of general knowledge on the new knowledge start-up occurrence relationship and the interaction effects of specific and general knowledge.

This methodological contribution is important for a number of reasons. First, is the goal for increased explanatory power, multivariate investigations have become more common. By considering the effects of co-variation and partialling out effects of other variables, researchers gain a more accurate estimation of the impact of individual independent variables on dependent variables. The key question is, ‘Will the general and specific knowledge effects on start-up occurrence hold when controlling for each other?’ For example, for an entrepreneur with advanced education and significant experience, additional knowledge transfer attempts through formal counseling and/or classes may have more impact than they would have for a less educated or experienced entrepreneur. This is based on the theory of absorptive capacity that posts an increased ability to take advantage of new knowledge given more similar previous knowledge (Lane and Lubatkin 1998). It is also possible that an entrepreneur with less education or experience is more likely to take advantage of assistance programs, and therefore may alter start-up occurrence outcomes.

The dependent variable in this study is new venture creation status. Our dependent variable is a dichotomous variable of new venture creation – either the new venture was created or it was not. See Figure 10.1 for a diagram of the model guiding this research. Below is an explanation of each of the variables and specific hypotheses for testing.



*Figure 10.1* The entrepreneurial knowledge flows model.

**General knowledge**

In the entrepreneurial literature, general knowledge is often captured in the research stream by focusing on the certain events in an entrepreneur's background. Two primary indicators discussed and tested are an entrepreneur's experience and education – elements that constitute knowledge of past learnings. The construct of 'general knowledge' is then composed of two measurement variables: experience and the education gained prior to the point when a nascent entrepreneur acknowledges the intent to start a company and takes active steps towards starting a business. Another way to view the differentiation between general and new specific knowledge is to think of them as stocks and flows, which is a model developed in more established organizations (Dierickx and Cool 1989). Entrepreneurial organizations differ from large organizations as that their resource stock base is smaller – perhaps even just one individual – and they rely more on information flows. In this case, the stocks represent the background of the entrepreneur and the flows refer to the acquisition of additional knowledge (learning) resources through formal assistance programs and/or entrepreneurship classes.

The first general or 'stock' variable for study is experience. The study of experience has a deep history in entrepreneurial literature. In 1980, Karl Vesper reviewed several key studies on the topic and concluded that would-be entrepreneurs should 'seek work experience in several functional areas, preferably including marketing and finance as well as line-of-work and to take advantage of opportunities to participate in initiation of new ventures as educational trials in preparation for the 'main event' (Vesper 1980: 35).

A review of the key studies on the impact of experience indicates commonality in construct development but varying results. As shown in Table 10.1, most studies operationalize experience as a business function (e.g. marketing, finance, accounting, operations), entrepreneurial (first-hand experience with entrepreneurship or family exposure) and line-of-work (previous time spent working in the start-up industry). This chapter will focus on line-of-work experience, as it has a great deal of support in the literature as an explanatory variable related to projected success in new venture launches. This variable is also closely linked to the underlying absorptive capacity theory that suggests that the impact of new knowledge is dependent upon similar past experiences (Lane and Lubatkin 1998). 'Line-of-work' experience pertains to specific industry experience that is similar to the anticipated industry of the new venture. The line-of-work to performance relationship has been identified as an important variable in the literature (Lawyer *et al.* 1963; Brush 1991; Jo and Lee 1996).

The RBT offers insights into how specific resource combinations lead to competitive advantage that then translates to abnormally high returns (Barney 1996). The primary resource in new venture creation is the entrepreneur, and experience represents an aspect worthy of study. One aspect of experience is based upon the management position the entrepreneur is required to fulfill. Entrepreneurs are often called to play a number of roles in their start-up businesses, such as Chief Executive Officer (CEO). Another research stream providing input to this



Table 10.1 Entrepreneurial experience testing

Author	Operationalization	Results
Lawyer <i>et al.</i> (1963)	Line-of-work Business functions	Prior experience in the line-of-work and a variety of business functions leads to greater success in entry and subsequent survival
Brush (1991)	Line-of-work	Occupational experience linked to business survival and growth
Jo and Lee (1996)	Line-of-work Business functions	Mixed – managerial and entrepreneurial negative; line-of-work positive
Hoad and Rosko (1964)	Business functions	Prior experience, when combined with education, led to great success
Woodworth <i>et al.</i> (1969)	Business functions	Type of experience matters (selling, finance, other)
Shapero (1972)	Business functions	Variety of business functions helps performance
MacMillan <i>et al.</i> (1985)	Business functions General business	Study of 100 venture capitalists exhibited support for importance of 'track record'
Gartner (1999)	Business functions	Experience improves start-up performance
Duchesneau and Gartner(1990)	Business functions Exposure (parents) Prior entrepreneur	More successful entrepreneurs raised by entrepreneurial parents, broad business experience and prior entrepreneur experience
Collins and Moore (1970)	Prior entrepreneur	Experience with entrepreneurship impacts performance
Lamont (1972)	Prior entrepreneur	No support for added value of start-up experience
Van de Ven <i>et al.</i> (1984)	Prior entrepreneur	Start-up experience negatively linked to performance
Sandberg and Hofer(1987)	Prior entrepreneur	No significant influence of start-up experience on new venture performance
Krueger (1993)	Breadth/positiveness of experience	Prior exposure positively linked to performance

discussion is the study of top management in established organizations. Overall, empirical studies have shown support for the impact of the backgrounds of CEOs on the eventual performance of their respective firms. For example, years of service is posited as an explanatory variable in predicting corporate strategies and ultimate performance (Hambrick and Mason 1984). Theoretical support for the import of line-of-work experience could be that familiarity with the nuances of a particular industry (more knowledge) can lead to better focus on key issues, anticipation of potential problems, and connections to industry players.

The first hypothesis, then, attempts to incorporate the goal of entrepreneurship as the creation of a new venture and to describe the relationship of experience in that line-of-work:

H1: Previous experience with the line-of-work/industry of the planned venture is positively related to the likelihood of new venture creation.

The other element of general knowledge is education. Although not tested as extensively as experience, an entrepreneur's education has been cited as an important background factor in predicting entrepreneurial start-up success. Early testing of education and the impact on entrepreneurial start-up success used 'one or more years of college' as the educational indicator (Hoad and Rosko 1964). The results showed that more successful entrepreneurs tended to have more advanced education (which led to the highest level of success when combined with experience). Also, they noted that education without experience led to a higher likelihood of failure, suggesting the need to test for interaction effects. Woodworth *et al.* (1969) also found support for a positive effect of more education on entrepreneurial success. Education also became a source of entrepreneurial ideas (Vesper 1979).

Continued investigation of this issue led to mixed results. Explanations for the variance in results could lie in the effect of certain controlling elements that have not been considered. Examples include gender and the nature of the type of start-up effort, such as those requiring more technical backgrounds. Education was found not to have significant impact for general firm formation (Sandberg and Hofer 1987) and even negative impact beyond the master's degree (Stuart and Abetti 1990). Other studies found the opposite effect and claimed that education has a positive impact on entrepreneurial performance. In a study of 191 women-owned businesses, education was found to affect business survival and growth (Brush 1991) and high-technology start-ups (Cooper 1971). One study found that education led to higher profitability but not higher growth (Jo and Lee 1996). A more recent study found support for education in general, linking it to increased new venture success (Gartner 1999).

Overall, education is generally considered to have an impact on new venture creation efforts. Theoretical support for this argument would be that the education indicator could represent other qualities that affect the likelihood of eventual new venture creation such as work ethic or intelligence quotient (IQ). It is clearly an important element of general knowledge and warrants testing for impact on performance. One of the potentially important control elements that must be considered is the impact of specific knowledge on the general knowledge attained through educational programs. For example, an entrepreneur with less education may be more apt to go to assistance programs for help during the entrepreneurial process, thereby increasing the chances of success in launching the new business.

The Top Management Team (TMT) literature base has investigated the impact of formal education and posits that the amount of formal education impacts performance (Hambrick and Mason 1984) by capitalizing on innovation gains

due to the underlying differences of the individuals as represented by their educational pursuits. This provides additional support for the second hypothesis:

H2: Level of formal education is positively related to the likelihood of new venture creation.

### *Specific knowledge*

Specific knowledge pertains to knowledge learned by the entrepreneur during certain activities occurring during the start-up process. Incorporating the RBT and the KBV/OL, it could be argued that entrepreneurial start-up efforts have significant gaps in their knowledge resource 'stocks' that can be greatly impacted by the flow of specific knowledge from formal assistance programs, which build on the collective experiences of years of working with start-up efforts. Research in this area increased during the 1990s, largely in response to the call for more behavior investigation (moving beyond traits and backgrounds). The RBT has surfaced as a useful lens to apply to the entrepreneurship literature and the issue of assistance programs (Chrisman and McMullan 2000). The research has generally focused on two areas: formal assistance programs and classes/workshops on entrepreneurship.

From a theoretical perspective, it would appear that there should be support for improved chances of new venture creation with the addition of new knowledge. This would be particularly true for new entrepreneurs seeking assistance on strategic or operational assistance. One of the major studies claiming support for outsider assistance was Robinson's paper in 1982. Outsider assistance improved an entrepreneur's chances of new venture creation due to better strategic planning (Robinson 1982). Table 10.2 summarizes other major research

*Table 10.2* Entrepreneurial assistance program testing

<i>Author</i>	<i>Testing</i>	<i>Results</i>
Robinson (1982)	SBDC clients	Found support for support programs due to better strategic planning
Nahavandi and Chesteen (1988)	Mail survey of 123 SBDC clients	Behavior that results in accessing new knowledge results in better performance
Chrisman <i>et al.</i> (1987)	474 SBDC clients in GA/SC	Outsider assistance helped subsequent performance
Chrisman (1989)	249 SBDC clients	Strategic assistance valued; administrative and operating assistance not valued
Duchesneau and Gartner (1990)	Entrepreneurs	More successful entrepreneurs used assistance
Dennis and Phillips (1990)	High tech start-ups	No relationship at the state level of assistance and start-up performance
Coyle (1992)	Minnesota Outreach	Described assistance program efforts for entrepreneurs
Chrisman (1999)	SBDC clients	Outsider assistance increased number of new ventures

contributions related to the impact of formal assistance programs that are incorporated herein.

Most of the studies found support for the positive impact of assistance on entrepreneurial performance. One major exception was a high technology start-up investigation that indicated no significant impact of the assistance programs (Dennis and Phillips 1990). Theories suggest that in some cases the assistance does not prove valuable if it is not well grounded or if it is already known (Chrisman 1989). This suggests a need to test for interaction effects of general knowledge; however, none of the studies reviewed included controls for previous knowledge (addressed in the final two hypotheses). Overall, there seems to be support in the literature for a positive link between use of assistance programs and the chance of new venture creation:

H3: Level of use of formal assistance programs is positively related to the likelihood of new venture creation.

Another element of entrepreneurial behavior that may impact the start-up process is the attainment of specific knowledge through entrepreneurial classes or workshops. Although this proposition has not been explicitly and empirically tested, it follows the same logic as the knowledge search through formal assistance programs as described above. This variable is distinct from general education as it pertains to a special topic of study – entrepreneurship. By exploring this variable, the inferred proposition inherent in the KBV of cumulative effects of knowledge resources, whereby more is better, can be tested. Accordingly, this leads to the next hypothesis:

H4: Taking entrepreneurial-related classes/workshops during the start-up process is positively related to the likelihood of new venture creation.

### ***Interaction effects***

Another gap in the literature is the void of interaction effect testing of general and specific knowledge on start-up performance. Each has been tested in isolation, but not together. As a result, we may have an incomplete understanding of the relative importance of these independent variables and may miss important relationship issues that may lead to new conclusions about the new venture process.

The KBV/OL theoretical perspective offers some theoretical guidance that can inform our study of this process. Specifically, absorptive capacity is a research stream that analyzes the effectiveness of new specific knowledge on performance. Although typically analyzed at the organizational level, this concept offers lessons for individual study as well. For example, one key concept is that the existing general knowledge base greatly influences the ability to capitalize on new knowledge opportunities (Mangematin and Nesta 1999). It has also been suggested that the combinative capabilities for absorbing knowledge is directly related to the level of prior related knowledge (Van den Bosch *et al.* 1999). The RBT can also

inform this argument. Specifically, research has shown that simultaneous pursuit of exploiting existing resources while exploring new resource combinations leads to increased performance (Wernerfelt 1984). The entrepreneurship setting offers a rich environment for testing the relationship between existing general and new resources of a more specific nature.

In our model, this leads to a potential moderating variable situation where general knowledge can moderate the impact of new specific knowledge on performance, given the absorptive capacity argument. By exploring these issues, we can develop a deeper understanding of the relative importance of types of knowledge and knowledge acquisition mechanisms on new venture creation. This also presents a more holistic understanding of the knowledge flows in the entrepreneurial process and results in a much fuller model with additional explanatory power. The final hypothesis is:

H5: The impact of specific entrepreneurial knowledge on the likelihood of new venture creation is moderated by previous general knowledge (higher levels of use of formal assistance programs and taking entrepreneurial classes will result in a higher likelihood of new venture creation given more experience and a higher level of general education).

## **Empirical testing**

### ***Dataset***

The data for this study were gathered as part of an ongoing Panel Study of Entrepreneurial Dynamics (PSED) sponsored by the Entrepreneurial Research Consortium (ERC), which involves over 45 different international academic and government institutions. The population was a random selection of over 30,000 individuals who were surveyed by telephone and through the mail. General background information was gathered and summarized, specifically identifying which of the individuals were nascent entrepreneurs. The screening processes, along with women and minority over-sampling efforts, resulted in a sample group of 1,261 nascent entrepreneurs with over 800 variables and responses. Follow-up surveys were conducted after 12 months to evaluate the status of the start-up effort. Since the performance data are critical to this study, only cases with such information available were selected for study. This resulted in a final sample size of 492 entrepreneurs, with particular weightings based on their representation of the overall population. See an extensive discussion on the background and methodology in the book chapter by Reynolds in *Advances in Entrepreneurship, Firm Emergence, and Growth*, Vol. 4 (Reynolds 2000). Note that this is a dynamic database that continues to grow as annual follow-up interviews with the entrepreneurs continue for longitudinal purposes. The data used for this chapter were analyzed as of May 2001, and expansions and additional waves of data have been collected since that point.

The independent variables studied include experience in the start-up industry (EXP), years of education (EDU), contact with assistance programs (HELP) and

entrepreneurship classes/workshops taken (CLASS). Experience (EXP) is the only continuous variable in the dataset as it represents total years of experience of the entrepreneur in the intended line of business. Education (EDU) represents the level of education the entrepreneur has achieved at the time of the survey. The education (EDU) variable is an interval variable that is based on the number of years of formal education achieved, with a range of 7 to 20. This variable is also analyzed in four categories for interaction effects with the following four categories: high school (hs), some college (hs+), college (coll) and graduate (grad). This allows for more explanatory power, and is chiefly helpful because using the single education (EDU) variable in logistic regression would force a straight line – a straight line would not be meaningful, as these data are not linear. Finally, the dependent variable is a nominal variable – a dichotomous assessment of whether or not a new venture was created (STAT).

### ***Methodology and results***

The first step of analysis was to review the data utilizing the frequency distributions and descriptive statistics. The software utilized was SPSS Version 10.0. The next step was to examine correlations to identify covariance relationships. Note that since most of these variables are nominal, great caution must be taken in reaching causation and directional conclusions. Finally, logistic regression was utilized to separate the main effects of the variables, general knowledge/new specific knowledge learned categories and interaction effects. Logistic regression was chosen over linear regression (such as ordinary least squares regression) primarily because the dependent variable is categorical and the predicated values are likely to lie outside the observed data range of 0–1. As the distributions of independent variables violate the multivariate normality assumption (see below), logistic regression was selected over discriminant analysis.

A review of the frequencies and descriptive statistics reveals the following observations. Experience (EXP) is skewed to the left with 25 percent of the entrepreneurs having no experience in the intended start-up industry and 40 percent having 2 years or less. This may be the result of respondents indicating a desire to change jobs and viewing entrepreneurship as a tool by which to do so. At the right end of the frequency distribution, those entrepreneurs with over 25 years of experience comprise only 10 percent of the entire population. This may suggest that as entrepreneurs age and become more established in their careers, they are less apt to consider attempting to launch a new business.

The education variable (EDU) is based on the number of years of education achieved by the entrepreneur. The minimum is 7 and the maximum is 20, with the majority between 12 and 16; these numbers represent high school, some college and college educations. To facilitate detailed interactions and testing between education levels (since the distribution of education years is not normal), additional dummy variables for education were created. The four sub-categories of education include: high school, some college, college degree and graduate. A separate analysis of these four categories of education seems to be distributed as

we would expect given the US educational distribution – high school (15 percent), some college (41 percent), college degree (24 percent) and graduate (20 percent).

The two variables associated with new knowledge learned during the start-up process include HELP (contact with formal assistance programs) and CLASS (a class or workshop in entrepreneurship). Both variables are dichotomous responses, coded as 0 for no and 1 for yes. Only 17 percent of the entrepreneurs actually utilized formal assistance programs, while over 40 percent took a class or workshop related to entrepreneurship. This has implications for the reach of small business assistance programs (perhaps not as great as previously thought) and for studies that exclude entrepreneurs not seeking assistance in their sample populations (given the magnitude of this group, they should be incorporated in comparison and control modes).

Finally, 32 percent of the nascent entrepreneurs actually started the new venture within one year, which is slightly below previous estimates of between 33 percent (Katz 1990) and 48 (Carter *et al.* 1996). It is also interesting to note that of the 30,000 in the original sample, 1,261 were considered nascent entrepreneurs or 4 percent, which falls within previous estimates of between 3 and 8 percent (Reynolds and Miller 1992; Dennis 1997). See the full descriptive statistics in Table 10.3.

*Table 10.3* Descriptive statistics

	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Mean</i>	<i>S.Dev.</i>	<i>Yes (%)</i>	<i>No (%)</i>
Experience (EXP)	486	0	60	9.16	10.66	N/A	N/A
Education (EDU)	491	7	20	14.98	2.08	N/A	N/A
High school (hs)	73	0	1	0.15	0.36	N/A	N/A
Some college (hs+)	199	0	1	0.40	0.49	N/A	N/A
College degree (coll)	119	0	1	0.24	0.43	N/A	N/A
Post college (grad)	100	0	1	0.20	0.40	N/A	N/A
Assistance (HELP)	491	0	1	0.17	0.38	17.1	82.9
Class/Workshop (CLASS)	492	0	1	0.41	0.49	40.9	59.1
Status of start-up (STAT)	492	0	1	0.33	0.47	32.8	67.2

The correlation analysis (see Table 10.4) was conducted to examine if these variables, many of which have been tested independently in the past, have intercorrelations that would affect conclusions about their respective contributions toward to explaining the incidents of new venture creation. Note that as all of these binary correlations include at least one nominal variable, directional conclusions should be drawn with caution. The experience variable (EXP) showed significant correlation to two sub-equation variables ('hs' or high school and 'grad' or graduate work), but not to education as measured on an interval basis between 7 and 20 (EDU, the education variable). Experience (EXP) was, however, significantly correlated to the use of formal assistance programs (HELP), such as the Small Business Development Association. This suggests that entrepreneurs of a particular experience level are more or less apt to seek assistance.

For example, on an intuitive level, it would seem reasonable that entrepreneurs with less experience would be more likely to seek help. The education sub-variables all correspond appropriately to the overall education variable, as one would expect. Two of the education sub-variables, 'hs' and 'grad,' also correlate with the assistance variable; this may be an area of investigation for future research.

One other correlation with significance worth noting is the link between the use of formal assistance programs (HELP) and the use of entrepreneurial class/workshop (CLASS). This could tie to underlying personality similarities such as motivation or the desire to learn. The most important finding from the correlation analysis is that all of the variables in isolation do not correlate with the dependent variable STAT, which indicates whether or not a new venture was created, except for one. HELP and STAT are correlated (Pearson correlation of 0.078 and significance of 0.042 at the 0.05 level), which implies some relationship between entrepreneurs who utilize assistance programs and those who successfully launch new ventures.

Another interesting finding comes from the logistic regression analysis. As shown in Table 10.5, three models were analyzed utilizing hierarchical logistic regression. 'Model 1' represents the general knowledge variables of education and experience. The results show that this model is insignificant and represents a low R-squared value between 0.005 and 0.006 (Cox and Nagelkerke, respectively), indicating that, at most, that only 0.6 percent of the variance could have attributed to these variables. The contribution of this finding is that the explanatory power of education and experience combined is not significant, which contradicts certain previous studies' claims of importance. 'Model 2,' which includes new knowledge variables of the use of formal assistance programs and taking an entrepreneurship course/workshop, does not improve the overall picture; 'Model 2' boasts an increase of chi square of only 2.989, a model R-squared of 0.011 to 0.015 (Cox and Nagelkerke, respectively) and overall insignificance. The contribution here is that, from a predictive perspective, those entrepreneurs seeking assistance and taking classes do not fall into a significantly different group as evaluated by the dependent variable of new venture creation. Finally, when interaction variables are introduced in 'Model 3,' there is a jump in explanatory power. The R-squared of the model is now between 0.039 and 0.055, which indicates that between 3.9 and 5.5 percent of the variance can be explained. Although this is still low, the change in chi square is 14.287. Although not significant as an explanatory model, this model has a dramatically higher chi square than those models not considering such interactions. A summary of the results is shown in Table 10.6.

## **Discussion**

### ***Conclusions***

Perhaps the most interesting result from this analysis is the lack of empirical support for certain dominant theoretical propositions. Specifically, only one of the four independent variables, the use of formal assistance programs, had direct



Table 10.4 Correlations pearson correlation (sig.), 1 tailed test; bold denotes sig. (0.05/0.01)

	EXP	EDU	hs	hs+	coll	grad	HELP	CLASS	STAT
EXP	1								
EDU	0.065(0.078)	1							
hs	-0.097(0.016)	-	1						
hs+	0.038(0.202)	-	-	1					
coll	-	0.388(0.000)	0.344(0.000)	-	1				
	0.061(0.092)	0.278(0.000)	-	0.236(0.000)	-				
grad	0.097(0.016)	0.744(0.000)	-	0.466(0.000)	-	1			
HELP	0.088(0.027)	0.184(0.000)	-	0.231(0.000)	0.417(0.000)	0.286(0.000)			
			-	-	0.006(0.444)	0.149(0.000)	1		
CLASS	0.034(0.227)	0.039(0.195)	0.147(0.001)	0.009(0.422)	-	0.038(0.202)	0.210(0.000)	1	
			-	0.060(0.092)	-	0.04(0.163)			
STAT	0.012(0.397)	0.037(0.209)	-	-	0.007(0.438)	0.044(0.167)	0.078(0.042)	0.018(0.343)	1
			0.018(0.348)	0.032(0.237)					

*Table 10.5* Logistic regression results

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
-2 log likelihood	607.303	604.314	590.027
Cox and Snell – R-squared	0.005	0.011	0.039
Nagelkerke – R-squared	0.006	0.015	0.055
Chi square	2.188	5.177	19.464
Chi square significance	0.823	0.638	0.193
Increase in chi square (block)	N/A	2.989	14.287
Increase in chi square sig. (block)	N/A	0.224	0.075
% class correct	67.8	67.8	69.1

*Model 1* = Experience + Education; *Model 2* = Model 1 + Assistance + Classes; *Model 3* = Model 2 + Interactions.

effects on the likelihood of new venture creation. This research project was designed to address many of the aforementioned weaknesses in the literature, specifically studying a greater number of entrepreneurs, studying them earlier in the process, and studying them with more controls than has been done in the past. After doing so the relationships and paradigms long held to be true in entrepreneurship, such as the belief that more education and relevant work experience will aid in entrepreneurial pursuits, are now called into question.

There are three primary conclusions from this research. First, general recipes for entrepreneurship success are dangerous and specific attribute theory is incomplete. Hypotheses 1 (experience affects incidence of new venture creation),

*Table 10.6* Summary of results

<i>Hypothesis Number</i>	<i>Description</i>	<i>Results</i>
H1	Previous experience with the line-of-work/industry of the planned venture is positively related to the likelihood of new venture creation	Not supported
H2	Level of formal education is positively related to the likelihood of new venture creation	Not supported
H3	Level of use of formal assistance programs is positively related to the likelihood of new venture creation	Supported
H4	Taking entrepreneurial-related classes/worksh ops during the start-up process is positively related to the likelihood of new venture creation	Not supported
H5	The impact of new knowledge on the likelihood of new venture creation is moderated by previous knowledge (use of formal assistance programs and taking entrepreneurial classes will result in a higher likelihood of new venture creation given more experience and a higher level of education)	Supported

2 (education affects incidence of new venture creation), and 4 (taking entrepreneurial classes affects incidence of new venture creation) were not supported by the data, indicating that there are no significant arguments for prescribed recommendations relating to experience, education and classes to increase new venture creation. The logistic modeling, which included the explanatory power of the variables together, did not show significance; this lends further support to the need to search for additional explanatory variables and cautions not to rely on incomplete models claiming to predict entrepreneurial performance. Possible avenues for the development of additional variables that may help explain the ultimate performance of starting a business may lie in social network theory or more likely in the learning processes entrepreneurs undertake as they pursue their start-up objectives.

Second, formal assistance programs may indeed have impact on the incidence of new venture creation, given the support for Hypothesis 2 in this study. This finding is in alignment with previous studies drawing the same conclusion. The important contribution in this study is that the testing included entrepreneurs who sought the assistance as well as those who did not seek such help, which has not been tested previously. Since over 65 percent of the entrepreneurs in this study had only two years or less of relevant experience, and those with less experience are more likely to pursue assistance programs, this is a particularly important area for entrepreneurship policy recommendations. The analysis also surfaced data related to the use of such formal assistance programs, specifically that only 17 percent of nascent entrepreneurs took advantage of such programs. Further analysis into the availability, access and awareness of these programs may dramatically affect the number of start-ups in a particular region or country.

Third, interaction and moderation effects should be given more attention in studying these topics. Given the support for Hypothesis 5, certain entrepreneurs may benefit more from formal assistance and classes based on their respective backgrounds relating to education and experience. This lends partial support to absorptive capacity arguments that suggest that it is not the individual antecedents that are important, but the combination thereof. Or perhaps it is a case of 'necessary' but not 'sufficient.' This may represent the most intriguing finding from a research perspective. The use of the KBV and OL theoretical lens may inform entrepreneurship insofar as working toward a better understanding of why certain types of assistance have more impact on the likelihood of new venture creation. Ultimately, this may suggest a more tailored strategy toward assistance that is based upon the background of the respective entrepreneur. This would be an advancement in the causation arguments in entrepreneurship, which have moved from traits to process. Perhaps it is more important to continue to investigate both, and do so simultaneously for greater explanatory power in the creation of new ventures.

### ***Future directions***

Moving forward, this chapter introduces several topics for further investigation. For example, from a social network perspective, 'What is the impact of an

entrepreneur's start-up team or social network on general or specific knowledge?' From a KBV perspective 'How might the specific breadth and depth elements of knowledge change the outcomes?' From a learning perspective, 'If exposure to knowledge opportunities does not differentiate the results, what specifically about the learning process itself may make the difference?' One of the goals of this chapter was to integrate multiple theoretical lenses to better inform the entrepreneurial literature, consistent with the call articulated by Shane and Venkataraman (2000) in their seminal entrepreneurial research paper. There is also an opportunity to use the findings here to test additional propositions related to TMT backgrounds and process links to performance – and both are important. Overall, the lack of significance of some of the historically important variables for new venture creation is a caution against general recipes for entrepreneurs and a call for more study of how the entrepreneurs truly learn what is necessary for success.

It is important to discuss some limitations of the current study. For example, logistics regression on panel data may be biased if the cases under study did not have the same probability to reach the end state. Additionally, the dependent variable in this study, new venture creation, may produce different results if the study included more time for the start-up process. Another tool that may be used on the PSED database or similar datasets for such investigations would be event history techniques. Finally, alternative measures exist that may alter the conclusions reached herein. Such measurement variables available, but not studied in this project, include work history, previous job title, number of years of paid experience, prior entrepreneurial experience, number of courses taken and school major. The primary purpose of this study was to begin the exploration of theoretical claims with one of the best emerging entrepreneurial databases available. As the database and performance tracking continues to grow and to be studied, more insights are sure to follow.

Studying the learning process could be a fruitful stream of research (Sexton *et al.* 1997). Although specific entrepreneurial traits may elude specification and verification, the emphasis on how and what entrepreneurs learn is clearly of import (Smilor 1997). Additionally, on a more positive note, this study confirms the impact of formal assistance programs in the enhancement of new venture creation likelihood, but the search for additional variables explaining the variance in new venture creation is a worthy pursuit. In fact, the PSED dataset contains additional variables for study as well. This study represents a contribution in that direction and provides empirical testing of certain entrepreneurial learning propositions.

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