

# Using Interactive Management to Identify, Rank and Model Entrepreneurial Competencies as Universities' Entrepreneurship Curricula

The Journal of Entrepreneurship  
23(1) 57-94  
© 2014 Entrepreneurship  
Development Institute of India  
SAGE Publications  
Los Angeles, London,  
New Delhi, Singapore,  
Washington DC  
DOI: 10.1177/0971355713513353  
<http://joe.sagepub.com>



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## Abstract

While the strong influence of entrepreneurial competencies on business performance is recognised, despite some doubts about the teachability of these competencies, a fundamental question has remained unanswered: what are the key entrepreneurial competencies that need to be developed in an entrepreneurship curriculum and how are these competencies interrelated? The current study used Interactive Management (IM) with a group of seven successful entrepreneurs to identify, clarify, rank order and build a consensus model describing the interdependencies between

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12 entrepreneurial competencies. Results indicated that positivity and competitiveness are fundamental drivers of all other competencies in the consensus model. At the same time, determination and inquisitiveness were the most highly ranked competencies. Results are discussed in light of the ongoing challenges of defining the optimal scope and sequence of training in entrepreneurial curricula. This article fulfils an identified need to study specific entrepreneurial competencies that are to be promoted in university students.

### **Keywords**

entrepreneurship education, entrepreneurial competencies, interactive management

Research suggests that entrepreneurs possess certain characteristics or abilities that enable them to identify opportunities, start-up and maintain business ventures, and continue to innovate and add value in the face of ongoing business challenges (Rezaei-zadeh, Cleary, O'Reilly, Abdollahi & Murphy, 2011). In light of the goal to generate entrepreneurial activity and promote the development of entrepreneurial skills and competencies in business education programmes, many scholars now recognise the need to develop a deeper understanding of the core competencies that facilitate the work of entrepreneurs (Tajeddini & Mueller, 2009). The importance of entrepreneurial competencies for the success of business ventures is often highlighted in the literature. For instance, Filatotchev, Chahine, Wright and Arberk (2005) pointed out that the founder's characteristics have a direct impact on the firm's development and success in the long run. However, there is considerable debate regarding the number and nature of competencies that may need to feature in business education programmes. At the same time, there is an emerging consensus that entrepreneurial competencies can indeed be learned—at least to some extent (Blenker & Christensen, 2010; Izquierdo & Deschoolmeester, 2010; Nekka & Fayolle, 2010).

The catalyst for the use of the term 'competency' was Boyatzis's (1982) book *The Competent Manager* (Woodruffe, 1993). There are a variety of definitions of competency in the literature. Spencer and Spencer (1993) define competency as an underlying characteristic of an individual that is causally related to superior performance in a

job or situation. Others have suggested that individual competency reflects who an individual is and what an individual knows and does (Hayton & Kelley, 2006). Our specific definition for entrepreneurial competencies based on the Boyatzis's (1982) definition of competency is: Certain characteristics or abilities of the person that enable him/her to demonstrate the appropriate entrepreneurial behaviour including: identifying opportunities, start-up and maintenance of business (Rezaei-zadeh et al., 2011).

Notably, the concept of competency has become increasingly important in entrepreneurship education. Fendt and Bureau (2010) describe the emergence of entrepreneurship education as a distinct field in the 1980s. Over time, a growing number of Entrepreneurship Education Programmes (EEPs) have appeared, first in the United States where, today, more than 2,200 entrepreneurship courses are offered at over 1,600 schools, and then, more recently, in Europe, where most programmes have been created in the last decade (Janssen, Eeckhout, Gailly & Bacq 2009). Researchers have identified two significant challenges in designing curricula to promote entrepreneurial competencies, specifically, the challenge of defining and designing the optimal scope and sequence of training (Nekka & Fayolle, 2010).

In spite of the large number of studies examining entrepreneurs' traits, there is considerable variation and range in the scope of entrepreneurial competencies that have been identified as critical targets for training (Kumara & Sahasranam, 2009). This variation derives in part from the variation in the range of theories and research methods that shape research in the area (Entrialgo, Fernandez & Vaazquez 2000). In response to this variation across studies, Tajeddini and Mueller (2009) argue that identifying a cluster of relevant traits may be a more useful strategy of describing the entrepreneurial personality, rather than focusing on individual characteristics.

However, even if the scope of training is well defined, with a cluster of entrepreneurial competencies identified as critical targets for training, the issue of optimising the training sequence still needs to be considered. A significant challenge for educators is the optimal design of skill training sequences so that the entrepreneurial competencies that are recognised as valid targets for training are delivered within a logical, orderly, cumulative skill development framework. This should allow for what Bruner refers to as the 'courteous translation of knowledge'

(1960, cited in Lawton, 2011) that is reflective of the epistemology of the domain (entrepreneurship) and sequenced in a developmental process to support conceptual growth and the ability to demonstrate competencies.

The current study seeks to address these critical issues of training scope and sequence by investigating the consensual view of successful entrepreneurs who (i) evaluate the importance of a large set of entrepreneurial competencies derived from a large-scale systematic literature review, and (ii) work to build a consensual structural model as to the logical interdependencies between a core set of entrepreneurial competencies and thus facilitate insights into the logic and sequence of any curriculum that might seek to train these competencies. Advancing upon previous literature in the area, the current study uses Interactive Management (IM) to model interdependencies between entrepreneurial competencies.

Based on Warfield's (1994) science of generic design, the IM process is a system of facilitation and problem solving that helps groups to develop outcomes that integrate contributions from individuals with diverse views, backgrounds and perspectives. Established as a formal system of facilitation in 1980 after a developmental phase that started in 1974, IM was designed to assist groups in dealing with complex issues (Ackoff, 1981; Argyris, 1982; Cleveland, 1973; Deal & Kennedy, 1982; Kemeny, 1980; Rittel & Webber, 1973; Simon, 1960). The theoretical constructs that inform IM, developed over the course of more than two decades of practice, draw from both behavioural and cognitive sciences, with a strong basis in general systems thinking.

The IM approach carefully delineates content and process roles, assigning to participants responsibility for contributing ideas and to the facilitator responsibility for choosing and implementing selected methodologies for generating, clarifying, structuring, interpreting and amending ideas. Emphasis is given to balancing behavioural and technical demands of group work (Broome & Chen, 1992) while honouring design laws concerning variety, parsimony and saliency (Ashby, 1958; Boulding, 1966; Miller, 1956). IM has been applied in a variety of situations to accomplish many different goals, including assisting city councils in making budget cuts (Coke & Moore, 1981), developing instructional units (Sato, 1979), designing a national agenda for paediatric nursing (Feeg, 1988), creating computer-based information systems for organisations (Keever, 1989), improving the U.S. Department of Defense's acquisition process (Alberts, 1992), promoting

world peace (Christakis, 1987), improving tribal governance process in Native American communities (Broome, 1995; Broome & Christakis, 1988; Broome & Cromer, 1991) and training facilitators (Broome & Fulbright, 1995).

The current study presents the first application of IM for understanding the complex system of interdependencies among entrepreneurial competencies. One unique feature of the application of IM in the current study is that successful entrepreneurs, who had extensive experience of the business world, were introduced both to the problem of training entrepreneurial competencies and to a large set of entrepreneurial competencies that have been identified in the scientific literature. As such, both basic and applied science provided a context for the consensual modelling work of the group. In particular, using the constant comparative method (Lincoln & Guba, 1985), the current study first sought to create a comprehensive list of entrepreneurial characteristics based on more than 60 peer-reviewed articles. Then, using IM, participants selected, clarified, modified, ranked and structured a set of 12 highly valued entrepreneurial competencies. In the following, we describe the findings of the literature review and the application of IM to understanding entrepreneurial competencies and their interdependencies.

## **Literature Review**

Using the constant comparative method, 60 peer-reviewed articles were selected for inclusion in the study. The primary objective of the literature review was to provide workshop participants with a comprehensive list of entrepreneurial competencies as identified in the scientific literature. The studies selected for inclusion in the review were conducted in a variety of different contexts and were driven by diverse research goals and hypotheses. However, all of them shared a common focus on examining some entrepreneurial competencies. All studies were published in peer-reviewed scientific journals. Using a large set of keyword searches, including entrepreneurial, entrepreneurial competencies, entrepreneurial characteristics, entrepreneurial skills and entrepreneurship, studies were sourced from scientific databases, such as, ERIC, Science Direct, J Store, Sage and Google Scholar. Other studies were sourced by searching the bibliographies of papers identified in the initial literature review.

By using an iterative process of search and analysis and by discarding irrelevant or poor quality studies, a total of 60 studies were identified as providing a comprehensive list of entrepreneurial competencies. These studies described an overlapping set of entrepreneurial competencies that enable people to identify opportunities, start-up and maintain business ventures, and continue to innovate and add value in the face of ongoing business challenges (see Table 1).

Rather than attempting an exhaustive narrative and critical review of all competencies in Table 1, we describe some of the competencies that are most commonly referred to in the literature. It should be noted that our workshop participants were offered succinct clarification of the meaning of some terms which, though commonly referred to in the literature, were not commonly used terms by entrepreneurs (for example, 'Locus of Control'). At the same time, for each of the identified competencies which workshop participants identified as important they were asked to clarify the meaning of the competency from their perspective. Ultimately, it was the meaning system of study participants that was the central focus of our enquiry.

## **Commonly Identified Entrepreneurial Competencies**

### *Locus of Control*

Locus of control is defined as the perceived control over the events of one's life (Sapuan, 2009). Research suggests that entrepreneurs who believe that they control what happens to them (that is, those with an 'internal' locus of control) are likely to have higher motivation, greater job satisfaction and less anxiety than those who believe that outside influences control their fate (that is, those with an 'external' locus of control) (Pearson & Chatterjee, 2001). Research also suggests that individuals who score highly on measures of internal locus of control tend to carry out more product-market innovation, take more risks and behave more proactively than those who score lower on measures of internal locus of control (Entrialgo et al., 2000).

**Table 1.** A Comprehensive List of Identified and Examined Entrepreneurial Competencies

Entrepreneurial Competency	Definition	Author
Accepting Responsibility Adaptability and Flexibility	Openly accepting the challenge of taking on responsibility for tasks Flexibility is defined as 'the capacity to adapt' across a variety of different situations, timescales, goals and intentions, and areas of business focus (cf. Golden and Powell, 2000)	Kordnaeij et al. (2007) Jahangiri (2008); Tajeddini and Mueller (2009)
Self-confidence	Having confidence in one's ability to accomplish goals, overcome obstacles and succeed where others may fail	
Applied in Orientation	Interested in making an impact and seeing a direct or immediate application of their work, and seeking out real-world application for their efforts	Mendes and Kehoe (2009)
Multi-experience Identity	Having diverse work histories and linking one's previous experiences to current projects, using this diversity of experiences as a springboard for new applications and areas of focus	
Non-traditional Optimistic	Engaging in activities that cannot be easily classified as routine activities Exhibiting exuberance when discussing their career, and expressing great resilience when encountering career barriers and setbacks	
Commercial Understanding Communication Skills	Understanding the commercial environment in which their business is situated The ability to persuade and discuss with various stakeholders, such as, customers, clients, suppliers, competitors, service providers and the like	Izquierdo and Deschoolmeester (2010); Hynes et al. (2009)
Conceptual Skills	The ability to formulate ideas and work with concepts, understanding abstract relationships and conceptual connections	
Practical Work Experience	The experience of working directly in many roles relevant to their current entrepreneurial business context	
Self-understanding ICT Proficient	Awareness of and ability to understand one's own actions Skilled and experienced in understanding and using Information and Communication Technology	

(Table 1 continued)

(Table 1 continued)

Entrepreneurial Competency	Definition	Author
Negotiation	Techniques to help the entrepreneur stand their ground and reach conclusions that they can live with	Keogh (2006)
Creativity	The production of novel ideas that are useful and appropriate to the situation	
Assertiveness	The ability to stand one's ground without being aggressive	
Determination	The ability to continue trying to do something, although it is very difficult	Zali et al. (2007)
Engineering Skills	Possessing engineering and technical skills relevant to the business venture	Izquierdo and Deschoolmeester (2010)
Task Motivation	Being motivated to perform well on task	
Ability to Motivate Others	The ability to motivate others to perform to the best of their ability on tasks	
Venture and Career Evaluation	The ability to evaluate ventures and career opportunities	
Financial Management	The planning, directing, monitoring, organising and controlling of the monetary resources of an organisation	
Integrity	The quality of being honest and having strong moral principles	
Concern for High Quality of Work	A strong focus on optimising the quality of products and business processes	
Seeing the Market from a Different Angle	Taking perspective on the market and opportunities in the marketplace	
Marketing and Sales Skills	Establishing and developing long-term customer relationships, so that the objectives of the parties involved are met. This is done by a mutual exchange and keeping of promises.	
Goal-setting Skills	'The process of deciding what you want to achieve or what you want someone else to achieve over a particular period'	Boojihawon et al. (2007); Kumara and Sahasranam (2009)
Time-management Skills	'Identify needs and wants, rank them in regard to their importance or priority, and then allocate time and resources accordingly'	

Problem-solving Ability	'A behavioural process which (a) makes available a variety of response alternatives for dealing with a problematic situation and (b) increases the probability of selecting the most effective response from among these alternatives'	Sapuan (2009)
Analytical Ability	The ability to deconstruct a problem into its component parts and analyse the relations between those component parts	
Networking and Team-building	Knowledge sharing, team work and learning within the network	
Intuitive Ability (sixth sense)	The reception of information not gained through the recognised physical senses but sensed with the mind	
Need for Achievement	... a factor ... measured by coding an individual's spontaneous thoughts, for the frequency with which he thinks about competing with a standard of excellence, or doing something better than before (McClelland, 1965)	
Leadership/Management	'The management school describes entrepreneurs as persons who organize, own, manage and assume the risk of an economic venture, while the leadership school views entrepreneurs as leaders of people who have the ability to adapt their style to the needs of people.'	
Job Involvement	'The degree to which a person is identified psychologically with his work, or the importance of work in his total self-image'	Maleki et al. (2009)
Experiential Learning	A diverse learning process that occurs at the various intersections of knowledge and experience, as well as through observation, reflection and action	Mars and Hoskinson (2009)
Need for 'Variety'	Need for a job that requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the person	Hackman and Oldham (1976: 257)
Need for Autonomy	'The degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out.'	Schjoedt (2009)
Need for Feedback	'The degree to which carrying out the work activities required by the job results in the individual obtaining direct and clear information about the effectiveness of his or her performance.'	

(Table 1 continued)

(Table 1 continued)

Entrepreneurial Competency	Definition	Author
Belief in Effect of Personal Effort on Outcomes Need for Power	The belief that personal efforts are the most important factor influencing personal success The tendency to desire a position of power for its own sake which may involve a focus on the individual need to be in control above the needs of others	McGhee and Crandall (1968) Barkham (1994)
Decision-making Ability	The mental processes resulting in the selection of a course of action among several alternative scenarios. Every decision-making process produces a final choice. The output can be an action or an opinion of choice.	Kumar Jha (2008)
Estimation Skills	'A rough calculation of the value, number, quantity, or extent of something'	Nekka and Fayette (2010)
Opportunity Identification, Grasping, Evaluation	Relatively sophisticated skills of counterfactual thinking which can result in reorganisation and capitalisation on opportunities	Krueger (2009); Weaver et al. (2009); Macosko et al. (2009) Roper (1998)
Innovation	'[...] which the entrepreneur either creates new wealth producing resources or endows existing resources with enhanced potential for creating wealth'	Leko-Šimić et al. (2007); Shaver (2009)
Risk Taking	'Willingness to engage in business ventures in which the outcome may be highly uncertain'	Schmitt-Rodermund (2004)
Persistence	'The fact of continuing in an opinion or course of action in spite of difficulty or opposition'	
High Extraversion	'Extraversion is characterized by positive emotions, surgency, and the tendency to seek out stimulation and the company of others'	
Proactivity	'It relates to aggressive posturing relative to competitors, with emphasis on execution and follow-up of tasks in pursuit of the company's objectives.'	Leko-Šimić et al. (2007); Boojihawon et al. (2007)
Responsiveness to Local Environmental Conditions	Being aware of and responsive to local environmental conditions	
Global Vision	Having a universal point of view in the life and work	
Information Seeking Ability	Having the initiative and ability necessary to seek out information in response to current needs	Gholipor (2009)

Challenge Ability	Preference to select hard goals, recommend effective ways for solving difficulties, solving ambiguous and complex problems and dealing with scarce or rare organisational resources	Sadeghi and Steki (2010)
Visionary	'Catalysing new, big visionary ideas in the process of performing any action; big ideas that are uncommon and untouchable.'	Lans and Gulikers (2010); Liedtka (1998)
Strategic Thinking	'Strategic thinking extends both to the formulation and execution of strategies by business leaders and to the strategic performance of the total enterprise. It includes strategic analysis, strategic planning, organization and control and even strategic leadership. Therefore, strategic thinking basically covers all those attributes which can be labelled "strategic".'	
Stress and Failure Coping	The ability to cope well in response to stress and failure, which often involves problem-focused coping (i.e., acting on the problem which is the source of failure)	Haglund (2004)
Implementation Abilities	Putting a plan or system into operation	Green (2009)
Independence	The ability to live your life without being helped or influenced by other people	Badri et al. (2006)
Self-evaluation	The ability to reflect with honesty and openness on oneself and one's behaviour in context	Wong et al. (2005); Sapuan (2009)
Internal Locus of Control	The perceived control over the events of one's life	
Tolerance for Ambiguity	Refers to the extent to which one is comfortable and able to function in situations where there is a high degree of uncertainty and ambiguity as to the nature of the rules governing success or failure	Pearson and Chatterjee (2001); Amiri et al. (2009)
Desire to Have High Earning	The desire to have high earnings	Pistrui et al. (2001)

## *Innovation*

Innovation is one of the most cited entrepreneurial competencies and is often used to refer to the process of creative destruction. Specifically, wealth is often created when change occurs, either by the introduction of a new asset or a new production method, the opening of a new market, the conquest of a new source of provisioning or the creation of a new organisation. Studies have argued that innovation is a key factor in sustaining business (Wong, Cheung & Venuvinod, 2005) and that innovation is the specific function of entrepreneurship and the means by which the entrepreneur either creates new wealth producing resources or endows existing resources with enhanced potential for creating wealth (see also, Roper, 1998). In recent years, there has been considerable interest and debate about innovativeness and many scholars have identified innovativeness as one of the essential and enduring characteristics of entrepreneurs and the focal point of entrepreneurship (Tajeddini & Mueller, 2009).

## *Tolerance for Ambiguity*

Tolerance for ambiguity refers to the extent to which one is comfortable and able to function in a situation where there is a high degree of uncertainty and ambiguity as to the nature of the rules governing success or the nature of the problem one is faced with. There is some anecdotal evidence that entrepreneurs express greater ambiguity tolerance than either senior executives or general managers (Pearson & Chatterjee, 2001). Furthermore, Milton (1989) asserts that entrepreneurs do not only operate in an uncertain and poorly structured environment but they eagerly undertake the unknown and willingly seek out and manage uncertainty. Hence, entrepreneurs have higher tolerance for ambiguity than others (Sapuan, 2009). Entrialgo et al. (2000) argued that those people who best tolerate ambiguity are those who ultimately obtain greater success. Those individuals who aim to increase their market share face more uncertain settings than those seeking to maximise profitability in their existing market niche. The implementation of an expansionist strategy in conditions of uncertainty requires a greater tolerance of ambiguity.

### *Need for Achievement*

The construct of need for achievement was first defined in Murray's (1938) personality system. He defined it as the need to accomplish something difficult; to master, manipulate or organise physical objects, human beings or ideas; to do this as rapidly, and as independently as possible; to overcome obstacles and attain a high standard; to excel one's self; to rival and surpass others; to increase self-regard by the successful exercise of talent (Murray, 1938: 164). Several decades later, McClelland (Entrialgo et al., 2000) argued for the importance of the construct in the entrepreneurship literature by positing that a high need for achievement predisposes a young person to seek out an entrepreneurial position to attain more achievement satisfaction than could be derived from other types of positions. Consequently, need for achievement is one of the most cited entrepreneurial competencies and has been found to be related to many of other entrepreneurial characteristics (see Entrialgo et al., 2000).

### *Communication Skills*

Researchers have long recognised communication skills as critical to job performance, career advancement and organisational success. Many prior studies have examined the relationship between communication skills and job performance (Roebuck, Sigtler & Brush 1995). Also, Izquierdo and Deschoolmeester (2010) argue that communication is important for entrepreneurship as entrepreneurs have to be able to persuade people and communicate with various stakeholders, including customers, clients, suppliers, competitors and service providers. Furthermore, Baum, Locke and Kirkpatrick (2007) found that the ability to communicate a vision affected subsequent venture growth amongst entrepreneurs.

### *Decision Making*

The extant literature highlights the importance of decision-making competency as crucial for success as an entrepreneur. To be successful,

entrepreneurs are constantly required to make quick decisions due to the accelerated changes in demand, competition and technology (Izquierdo & Deschoolmeester, 2010). Decision-making ability is often related in complex ways to other entrepreneurial competencies. For instance, Busenitz (1999) examined the relationship between strategic decision making and entrepreneurial risk taking and concluded that entrepreneurs use representativeness heuristics more in their decision making and are more confident than managers in large organisations. As such, risk-taking ability and confidence may be interrelated and may be a function of the particular decision-making strategies that entrepreneurs adopt.

### *Opportunity Identification*

Opportunity identification is another often cited entrepreneurial competency. Byrne (2010) argues that a firm's entrepreneurial success is positively associated with its efforts to put key individuals in a position to detect opportunities, train them to be able to do so and reward them for doing so. Also, Weaver, D'Intino, Miller and Schoen (2009) found that successful entrepreneurs have the capability and willingness to distinguish and capitalise on opportunities. Ardichvili, Cardozo and Ray (2003) formulated a theory in relation to opportunity identification, highlighting in particular the relationship between opportunity identification and entrepreneurial alertness, social networks, prior knowledge of markets, prior knowledge of customer problems, prior knowledge of ways to serve markets and knowledge domains (special interest knowledge and industry knowledge).

### *Leadership and Management Ability*

The management school of thought describes entrepreneurs as people who organise, own, manage and assume the risk of an economic venture, while the leadership school of thought views entrepreneurs as leaders of people who have the ability to adapt their style to the needs of people (Sapuan, 2009). On the basis of his empirical work, Barkham (1994) found that only those entrepreneurs with some experience in the

management of people are likely to take on significant numbers of workers in the early years of the firm.

### *Self-confidence*

It has been shown in studies that entrepreneurs have a higher degree of self-confidence relative to non-entrepreneurs. Some scholars posit that the entrepreneurs must believe that they are able to achieve the goals that they set as entrepreneurs or business owners (Sapuan, 2009). Entrepreneurs have confidence in their own ability to both accomplish any goal they set for themselves, overcome the odds and succeed where others may fail (Tajeddini & Mueller, 2009). Examining self-confidence as an entrepreneurial competency was the subject of many prior studies. While many studies, including Jha (2008), Hynes, O'Dwyer and Birdthistle (2009), Kordnaei, Zali, Hooman and Shams (2007), Schmitt-Rodermund (2004) and Jahangiri (2008), found that self-confidence is an important entrepreneurial competency; some studies (Gürol & Atsan, 2006) have reported that self-confidence is not found to be higher in entrepreneurially inclined students, as compared to entrepreneurially non-inclined students.

### *Risk Perception and Risk-taking Propensity*

'Risk perception' is an individual's assessment of how controllable uncertainty is (Petraakis, 2010). 'Risk propensity' is defined as an individual's existing tendency to take or avoid risk, or a company's willingness to engage in business ventures in which the outcome may be highly uncertain (Leko-Šimić, Horvat & Forjan, 2007) who is one of the first authors to formally use the term 'entrepreneurship' indicated that the main factor that distinguishes entrepreneurs from employed workers was the uncertainty and risk taken on by the former (Entrialgo et al., 2000). Two hundred years later, McClelland (1958) observed that entrepreneurs exhibited moderate risk-taking propensity (Pearson & Chatterjee, 2001). Since then, as Tajeddini and Mueller (2009) believe, it can be claimed that perhaps the most widely cited description of entrepreneurs is the willingness to assume risk. Many scholars

(Lans & Gulikers, 2010, Petrakis, 2010; Rezaei & Rahsepar, 2009; Shaver, 2009) have noted the importance of risk taking as an entrepreneurial competency, while others argue that risk-taking propensity is not strongly linked to entrepreneurial effort and outcomes (Izquierdo & Deschoolmeester, 2010). The latter group of scholars believe that successful entrepreneurs are not gamblers; they are more inclined to take moderate than high risks and they tend to assess and calculate risks carefully (Izquierdo & Deschoolmeester, 2010).

## Method

### *Participants*

Seven Irish entrepreneurs were invited to participate in an IM session at the Enterprise Research Centre, University of Limerick. The backgrounds and businesses of these entrepreneurs were in areas, such as, Software, Electronic voting technologies, Pipe technologies, Marketing, Web-based businesses and Education. They had at least eight and maximum 16 years experience in their businesses. All participants were informed about study procedure and gave their consent at the beginning of the IM session.

### *Interactive Management (IM)*

IM is a facilitated group design process designed to enhance the collective problem solving ability of a group in response to a complex problem situation. IM utilises a carefully selected set of methodologies, matched to the phase of group interaction and the requirements of the situation. The most common methodologies are the Nominal Group Technique (NGT), Ideawriting, Interpretive Structural Modelling (ISM), and Field and Profile Representations. The first two methodologies are primarily employed for the purpose of generating ideas that are then structured using one or more of the latter three methodologies. The current study used both NGT and ISM to identify, clarify and model a set of entrepreneurial competencies that were selected as critical competencies.

Nominal Group Technique (Delbeq, Van De Ven & Gustafson, 1975) is a method that allows individual ideas to be pooled, and is best used in situations in which uncertainty and disagreements exist about the nature of possible ideas. NGT involves five steps: (a) presentation of a stimulus question to participants; (b) silent generation of ideas in writing by each participant working alone; (c) 'round-robin' presentation of ideas by participants, with recording on flipchart by the facilitator of these ideas and posting of the flipchart paper on walls surrounding the group; (d) serial discussion of the listed ideas by participants for sole purpose of clarifying their meaning (that is, no evaluation of ideas is allowed at this point); and (e) implementation of a closed voting process in which each participant is asked to select and rank five ideas from the list, with the results compiled and displayed for review by the group. A modified version of the standard NGT method was used in the current study, with participants initially working to identify entrepreneurial competencies from a list of competencies made available by the IM facilitation team. However, much like standard NGT, participants were also allowed to generate their own unique items and add to the list of competencies derived from the scientific literature.

Interpretive Structural Modelling (Warfield, 1994) is a computer-assisted methodology that helps a group to identify relationships among ideas and to impose structure on those ideas to help manage the complexity of the issue. Specifically, the ISM software utilises mathematical algorithms that minimise the number of queries necessary for exploring relationships among a set of ideas (see Warfield, 1976). ISM can be used to develop several types of structures depicting the relationships among a set of ideas, including influence structures (for example, 'supports' or 'aggravates'), priority structures (for example, 'is more important than' or 'should be learned before') and categorisations of ideas (for example, 'belongs in the same category with'). The five steps of ISM are: (a) identification and clarification of a list of ideas (for example, using NGT); (b) identification and clarification of a 'relational question' for exploring relationships among ideas (for example, 'Does idea A support idea B?', 'Is idea A of higher priority than B?' or 'Does idea A belong in the same category with idea B?'); (c) development of a structural map by using the relational question to explore connections between pairs of ideas; (d) display and discussion of the map by the group; and (e) amendment to the map by the group, if needed.

In the third step of developing a structural map, questions are generated by the ISM software and are projected onto a screen located in front of the group. The questions take the following form:

‘Does idea A relate in X manner to idea B?’

‘A’ and ‘B’ are pairs of ideas from the list developed by participants in the first step of ISM and the question of whether they ‘relate in X manner’ is the statement identified in the second step.

For example, if a group is developing an influence structure with problem statements, the question might read:

‘Does problem A significantly aggravate problem B?’

However, in the current study, given our interest in examining the interdependencies between competencies, we focused on enhancement relations, specifically, by asking the following question:

‘Does entrepreneurial competency A significantly enhance entrepreneurial competency B?’

Using the ISM methodology, the group engaged in discussion about each relational question and a vote was taken to determine the group’s judgement about the relationship. A ‘yes’ vote was entered in the ISM software by the computer operator if a majority of the participants judged that there was a significant relationship between the pair of ideas; otherwise, a ‘no’ vote was entered.

In the current study, a series of approximately 50 such decisions were made when mapping out the interdependencies between a consensus set of 12 highly ranked entrepreneurial competencies. The ISM software then generated information from which a structural map was constructed, showing the result of the group’s series of judgements about pairs of ideas. The length of time required to complete discussion of all necessary pairs of ideas was two hours.

The influence structuring work conducted with ISM can be considered as an activity in ‘mapping perceptions’ of the group members. Participants were given the opportunity to explore connections and links between ideas

in ways that probably would have gone undetected without such structuring work. ISM can, thus, provide participants with useful insights into the relationships between ideas and it generates a product, a structural map of those relationships, which can guide their thinking as they design potential solutions (for example, to the problem of how best to enhance specific entrepreneurial competencies). In the current study, many of the relations that appeared in the final structure (see Figure 1) were selected only after considerable discussion and participants were sometimes slow to arrive at a consensual view in relation to key structural interdependencies. Participants reported the IM session to be very challenging, but also rewarding as it afforded them significant insights into the core entrepreneurial competencies that sustain their productive activities on a daily basis.

## Findings

### *High Ranking Competencies—The Consensus Set*

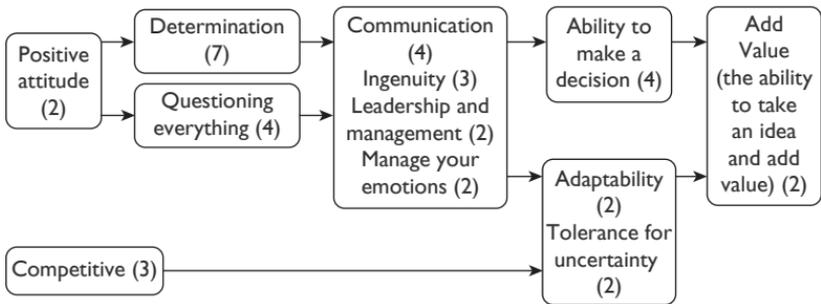
As the result of idea generation, clarification and voting, participants in the IM session identified a set of 12 entrepreneurial competencies to be included in the structuring phase of the IM session (see Table 2).

As can be seen in Table 2, some of the entrepreneurial competencies including ‘Questioning everything’ and ‘Manage your emotions’ appear as new ideas (that is, not appearing in Table 1) that were generated and ranked as important by more than one entrepreneur in the working group, while other competencies, such as, ‘ingenuity’, ‘positive attitude’

**Table 2.** Twelve Entrepreneurial Competencies Identified as Important by Entrepreneurs and the Corresponding Number of Votes Each Competency Received during the IM Session

Entrepreneurial Competency	Total Votes	Entrepreneurial Competency	Total Votes
Determination	7	Positive attitude	2
Ability to make decision	5	Leadership and management	2
Question everything	4	Adaptability	2
Communication	4	Tolerance for uncertainty	2
Ingenuity	3	Add value	2
Competitive	3	Manage your emotions	2

**Source:** Authors.



**Figure 1.** Enhancement Structure of Interrelationships amongst Ranked Entrepreneurial Competencies

**Source:** Authors.

and ‘add value’, are essentially similar to the entrepreneurial competencies listed in Table 1 (that is, ‘creativity’, ‘optimistic’ and ‘opportunity identification and grasping’). Finally, other identified competencies including ‘determination’ completely overlap in Tables 1 and 2.

### *Building an Enhancement Structure*

Using the ISM software, relations between the 12 entrepreneurial competencies were mapped (see Figure 1).

The structure is to be read from left to right and the arrows indicate ‘significant enhancement’. Values in parentheses reflect the number of votes the competency received. Items listed together in one box are reciprocally interrelated, with the significant enhancement relation working in both directions.

An initial examination of the enhancement structure suggests that ‘positivity’ and ‘competitiveness’ are critical drivers of other competencies of entrepreneurs. Determination is seen as both a highly valued characteristic (with seven votes) and a key driver of many other skills and dispositions. Both determination and a questioning attitude significantly enhanced a package of competencies that are reciprocally interrelated: communication skills, ingenuity, leadership and management, and the ability to manage your emotions. Adaptability and tolerance for ambiguity are placed in a cycle at stage 4 of the enhancement structure and thus, again, are viewed as interdependent competencies by the entrepreneurs in this study.

The ability to make a decision is a characteristic of the individual that is driven by a positive attitude, determination and inquisitiveness, and the cluster of interdependent competencies: communication, emotional regulation, ingenuity and leadership skills. The outcome of this enhancement structure is the ability to take an idea and add value.

## **Discussion**

This work represents the early stages of a larger project to explore the core competencies of entrepreneurship (and their interrelationships) and from this to propose a curriculum structure that is grounded in the professional experience of entrepreneurs and other stakeholders. Stebbins (2001) argues that the initial stages of exploratory research are most critical in that they identify the key categories, themes and focal points that guide further exploration.

The current study used IM with a group of seven successful entrepreneurs to identify, clarify, rank order and build a consensus model describing the interdependencies between 12 entrepreneurial competencies. Results indicated that a cluster of emotional, motivational, cognitive and interpersonal competencies are essential to the success of entrepreneurs. These included: determination, ability to make decision, questioning everything as ‘Cognitive Competencies’; ingenuity, positive attitude, managing your emotions and tolerance for uncertainty as ‘Emotional Competencies’; competitiveness and adding value as ‘Motivational Competencies’; and communication, leadership and management, and adaptability as ‘Interpersonal Competencies’.

Our current work is building on these results by conducting further IM sessions with new participants to include those teaching entrepreneurship and students. Future publications will report the results of these studies and compare findings to identify the core common competencies and their interrelationships. Stebbins (2001: 5) refers to this process as ‘concatenation’ which as such represents a move towards theoretical saturation and from tentative hypothesis (reported here) to theory that has confirmatory power stating that ‘early weaknesses in sampling, validity, and generalizability tend to get corrected over the course of several exploratory studies’. It is expected that this theory of entrepreneurial

competencies will have significant implications for curriculum design in the area, and here we take the opportunity to consider some of the implications of our current results, acknowledging that any suggestions are tentative as they represent the beginnings of the concatenation process with a limited data set.

The results of ISM revealed that positivity and competitiveness are fundamental drivers of all other competencies in the consensus model. At the same time, determination and inquisitiveness were the most highly ranked competencies and key drivers of many other skills and dispositions.

Figure 1 yielded some correlations amongst the ranked entrepreneurial competencies/dispositions that have been identified by previous empirical studies. Some of these have been confirmed by the results of this study while others have been determined to be inversely correlated. Table 3 compares prior studies to the present results using the following legend: + →: indicates that the first competency has a positive unilateral effect on the second competency; + - →: indicates that the first competency has both positive and negative unilateral effect on the second competency; + ↔: there is a positive bilateral relationship between the first and the second competency.

We found 'positivity' to be the key element of many of the other entrepreneurial competencies. Prior empirical studies supported the strong value and role of positive attitude in many ways. For example, as can be seen in Table 3, Carnevale and Isen (1986) pointed out that positive affect may facilitate successful negotiation as an impressive kind of communication either by accomplishing a reduction in eye contact, or by otherwise reducing the perception that the other is attempting to dominate. They also mentioned that these factors 'may also enhance integrative capacity, which may additionally facilitate successful negotiation' (Carnevale & Isen, 1986: 12). The effect of positive attitude on ingenuity was approved by Isen, Daubman and Nowicki's (1987) empirical findings that confirm positive affect can facilitate creative responding on tasks usually thought to reflect creativity. In another experimental study, Isen and Patrick (1983: 194) indicated that there is an interaction between level of risk/uncertainty and positive affect: 'subjects who had reason to be feeling elated bet more than control subjects on a low-risk bet, but wagered less than controls on a

**Table 3.** Extracted Evidence about Interrelationships amongst Ranked and Mapped Entrepreneurial Competencies

Origin Entrepreneurial Competency	Prior Studies' Found Correlation	Correlated Entrepreneurial Competency	Source(s)	Our Found Correlation
Communication	+ →	Leadership and management	Halawah (2005); Hawkins (1992); Flauto (1999)	+ / - →
Leadership and management	+ ↔ + →	Ingenuity	Zhang and Bartol (2010); Sosik et al. (1998); Chen (2007)	+ / - →
Manage your emotions	+ - → + → + →	Communication Positive attitude Decision making	Shaw (1955) Svensen et al. (2007) Lerner and Keltner (2000); Raghunathan and Tuan Pham (1999); Lerner and Tiedens (2006); Bodenhausen et al. (1994); Tuan Pham et al. (2001)	+ / - → + / - → + / - →
Competitive (need for achievement)	+ ↔ + → + →	Determination Ingenuity Tolerance for uncertainty	Riipinen (1994) Jaswal and Jerath (1991) McClelland (1958); Atkinson (1957); Meyer and Walker (1961); Atkinson et al. (1960)	+ / - → + / - → + / - →
Determination (internal locus of control)	+ ↔ + → - →	Leadership and management Leadership and management Leadership and management	Howell and Avolio (1993) Miller et al. (1982) Shivers-Blackwell (2006)	+ / - → + / - → + / - →

(Table 3 continued)

(Table 3 continued)

Origin	Prior Studies' Found Correlation	Correlated Entrepreneurial Competency	Source(s)	Our Found Correlation
Entrepreneurial Competency	+ ↔	Manage your emotions	Judge and Bono (2001); Vuger-Kovačić et al. (2007); Shepherd and Edelman (2009); Anderson (1977)	+ / - →
	+ →	Decision making	Lease (2004); Rodriguez and Blocher (1988)	+ / - →
	+ →	Ingenuity	Miller et al. (1982)	+ / - →
	+ →	Tolerance for uncertainty	Miller et al. (1982)	+ / - →
Positive attitude	+ →	Communication	Carnevale and Isen (1986)	+ / - →
	+ →	Ingenuity	Isen et al. (1987); Carnevale and Isen (1986)	+ / - →
	+ →	Decision making	Isen (2001)	+ / - →
	+ ↔	Tolerance for uncertainty	Isen and Patrick (1983)	+ / - →
Questioning everything	+ →	Decision making	Harvey et al. (2007)	+ / - →

high-risk bet'. Furthermore, the promoting effect of optimism on decision making was demonstrated by Isen (2001: 78) in three dimensions:

First, people in the positive-affect condition were significantly more likely to go beyond the assigned task and do more than was required; second, they showed significantly less confusion in their decision process; and third, they showed significantly more integration of information for decision making.

'Competitiveness' is another key entrepreneurial aspect that was identified through this study. Like this study, hierarchical multiple analyses and empirical evidence by McClelland (1958), Atkinson (1957), Meyer and Walker (1961) and Atkinson, Bastian, Earl and Litwin (1960) provided strong support for the contention that competitiveness plays an affecting role in enhancing tolerance for uncertainty. For instance, McClelland found that the tendency of school children to prefer risks on a ring toss game was meaningfully related to their need for achievement scores. This finding was approved by other studies (see Table 3).

'Determination' was identified as an entrepreneurial disposition that is both a highly valued characteristic and a key driver of many other skills and dispositions. Some of the effects of this characteristic on others were examined by prior studies. In the favour of findings of this study, the effect of internal locus of control on tolerance for uncertainty (Miller, Kets De Vries & Toulouse 1982), ingenuity (Jaswal & Jerath, 1991; Miller et al., 1982), ability to make decisions (Lease, 2004; Rodriguez & Blocher, 1988), manage your emotions (Anderson, 1977; Judge & Bono, 2001; Shepherd & Edelman, 2009; Vuger-Kovačić et al., 2007) and leadership/management (Miller et al., 1982; Shivers-Blackwell, 2006) was confirmed.

While our findings indicated that determination has a significant unilateral impact on leadership and management, Howell and Avolio (1993) reported that the relationship between these two aspects is a bilateral interaction and Shivers-Blackwell (2006) pointed out a negative effect of determined people on their management skills? They mentioned that Internals (people with internal lotus of control) appear to be less inclined to adjust their behaviours in compliance with role expectations and role pressures from role senders. This can result in a

resistance against any outside demands that attempt to influence their behaviour.

'Questioning everything' is another important entrepreneurial skill which affects many other skills. However, it seems that the importance of this ability was ignored by many of the prior studies. Reviewing the concept of global organisational knowledge, Harvey, Novicevic, Leonard and Payne (2007) suggested that the role of curiosity in ameliorating global managers' lack of knowledge should be of positive importance to the global managers' decision-making process.

Looking more closely at the interrelations amongst competencies in levels 3–5, there are other identified correlations, some already represented in the literature while others are not. For instance, as determined in this study, the significant effect of leadership and management on ingenuity (Chen, 2007; Sosik, Kahai & Avolio, 1998; Zhang & Bartol, 2010) and communication (Shaw, 1955) was approved. Also, Svensen, Neset and Eriksen (2007) found that team leadership is one of the important factors related to positive attitudes towards organisational change.

While some different correlations have been found by this study amongst communication, managing your emotions and some other entrepreneurial competencies, only a relationship between communication and leadership (Halawah, 2005; Hawkins, 1995; Flauto, 1999) and a significant correlation between managing your emotions and decision making (Bodenhausen et al., 1994; Lerner & Keltner, 2000; Lerner & Tiedens, 2006; Raghunathan & Tuan Pham, 1999; Tuan Pham & Raghunath, 2001) were confirmed.

As mentioned earlier this work marks the early exploration of a process designed to understand how key entrepreneurial competencies are interrelated, such that we might better understand the scope and sequence of training in the design of an entrepreneurship training programme. Some tentative considerations are briefly offered here on the curriculum scope and sequence and teaching methodologies.

As can be seen, while more than hundreds of studies over past decades were conducted to identify entrepreneurial competencies and dispositions, a few of them have been dedicated to explore the relationship amongst these competencies. Consequently, many of those relationships had remained unexamined. Furthermore, more than 60 per cent of those studies

**Table 4.** Unexamined Interrelationships amongst Ranked and Mapped Entrepreneurial Competencies (Levels 1 and 2)

Origin Entrepreneurial Competency	Correlated Entrepreneurial Competency
Positive attitude	Determination Questioning everything Leadership and management Adaptability Add value
Competitive	Adaptability Add value
Determination	Communication Adaptability Add value
Questioning everything	Communication Ingenuity Leadership and management Manage your emotions Adaptability Tolerance for uncertainty Add value

**Source:** Authors.

(for addressing entrepreneurial competencies' interrelationships) were conducted before 2000. So it can be concluded that the importance of these affiliations were neglected by prior scholars especially after 2000.

It can be accepted that for analysing the entrepreneurial competencies and finding some proper solutions to promote them, it is necessary to model their relationship and effects together. It seems that without this modelling, only their identification will not be efficient for their promotion and planning. Accordingly, one of the benefits of this study will be to throw some light on the dark and left-out sections of exploring the relationships between ranked entrepreneurial competencies. Table 4 shows a list of these priorities for levels 1 and 2 of entrepreneurial competencies for future attention and studies.

As it can be seen in Table 4, some of the interrelationships, such as, 'questioning everything' and 'positive attitude', were more unexamined than others. This, therefore, revealed more necessity for addressing these competencies than others in future research.

## Conclusion

It would be generally accepted that entrepreneurs can indeed be trained. There is, however, a lack of consensus about which entrepreneurial competency can be transferred to students through education. Furthermore, there is no general agreement about definition and a comprehensive list of those entrepreneurial competencies. While more than 65 validated and 12 ranked and mapped entrepreneurial characteristics were identified, it has been found that a few of their interrelations were examined by prior studies. While the application of these relationships is diverse in different research studies and works, the notion of these interrelationships is important.

More importantly, it has been shown that when ‘positive attitude’, ‘competitiveness’, ‘determination’, ‘questioning everything’, ‘communication’, ‘ingenuity’, ‘leadership and management’, ‘manage your emotions’, ‘ability to make a decision’, ‘adaptability’, ‘tolerance for uncertainty’ and ‘add value’ are key entrepreneurial competencies which have to be promoted in university students; the first four features are drivers of other identified competencies and dispositions. These findings are important for curriculum planners and developers in universities, because the scope of their instructional programmes is determined. Having these competencies, the next question for them is how these competencies have to be addressed and promoted in students? So, the next application of this study’s findings is clarified. The modelling amongst the identified characteristics can result in finding a proper sequence for offering courses related to those competencies to students. For example, drawing upon the logic of the enhancement structure developed by entrepreneurs in this study, it can be suggested that courses designed to promote some competencies including ‘positive attitude’, ‘determination’ and ‘questioning everything’ might be a pre-requirement for courses focusing on all other competencies in the system, excluding ‘competitiveness’. Also, courses focused on ‘competitiveness’ might be seen as a pre-requirement for the development of other competencies including ‘tolerance for uncertainty’, ‘adaptability’ and ‘add value’.

Looking more closely at the value (number of votes) and level of 12 ranked and modelled competencies, it can be seen that some of the competencies are more important than others, which suggests that they have to be considered more than others in curriculum development and

educational programmes/policies. This importance is the result of a mix of both their value and level. For instance, it seems while positive attitude, competitiveness, determination and questioning everything have more importance than others, communication and ingenuity are more important amongst the remaining competencies.

There are limitations associated with this work. It is possible that conducting this research in other contexts will result in different findings, as Tajeddini and Mueller (2009) indicated that prevalence of these characteristics in a population varies from country to country. This factor will be explored in future work as a significant part of the data collection is taking place in Iran. Another limitation of this study is related to the participants in the ISM session. It is possible that the same study and methods with other participants, such as, academics or students, might result in different findings. This will also be considered in further data collection. So this study suggests conducting the same studies with different related groups and also in different contexts to explore more worldwide acceptable entrepreneurial competencies for university students.

Our results identify the key drivers of entrepreneurial competency and suggest the sequence in which they should be cultivated in the learning experience of the students. It is suggested that the curriculum must be designed to facilitate the development of both content knowledge and the identified competencies simultaneously. This would argue for a strong focus on the explicit teaching and practice/experience of sub-skills that cultivate the larger competency coupled with effective feedback that encourages student self-efficacy and reflection (Hattie & Timperley, 2007). This would represent a process-focused rather than product-focused curriculum. Given how content-rich many modern curricula are, students can often find themselves overwhelmed by the volume of material encountered. This encourages a product focus at the expense of process considerations, a cognitive economy that is often supported by assessment procedures. The curriculum must provide time to enable this level of feedback and student reflection while maintaining student morale and motivation in what can be a very new and challenging experiential curriculum that demands high levels of self-efficacy.

Future publications will detail the design, enactment and evaluation of this curriculum. Finding the scope and sequence of preferred entrepreneurial competencies to be educated in universities has the potential to

enhance the coherence of related educational programmes in universities. This enhancement will occur based on the advantages of finding entrepreneurial competencies' scope and sequence on: curriculum order and content; modifying teaching–learning processes, such as, teaching methods, learning styles and assessment methods; and institutional policies, strategies and infrastructures. These issues will be further explored as part of the concatenation process in future publications.

### Acknowledgments

Authors would like to thank all of the Irish entrepreneurs who spent five hours of their time in the organised IM Session of this study and also colleagues in Enterprise Research Centre (ERC), University of Limerick for organising the event. We would also like to thank Iranian Ministry of Science, Research and Technology for supporting the study financially.

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