

# Mapping the motivations and intentions of technology orientated entrepreneurs

Elizabeth Chell and Kurt Allman

The Manchester Science Enterprise Centre, Main Building, UMIST, PO BOX 88, Manchester.  
elizabeth.chell@umist.ac.uk; K.Allman@crispeurope.org

The role of entrepreneurs in stimulating growth in the small business economy has received significant interest in the last three decades. This growing interest is prompted, in part, by the government's assumption that the establishment and expansion of existing small firms could be greatly enhanced by the promotion of entrepreneurial education programmes in colleges and universities. Whilst there has been significant interest in the role, type and effect of entrepreneurs in the economy, few studies have examined the effect of entrepreneurial programmes on the progression of an idea through to commercialisation. This is because such research, whilst seemingly desirable, is problematic. Evidence can be gleaned through the development of suitable conceptual frameworks and methods, to assess the role and impact of entrepreneurial programmes on the commercialisation of products or processes, and the enhancement of entrepreneurial capabilities. To address this problem, the research will examine different approaches and frameworks that have been developed and applied hitherto. The objective of this will be to highlight the difficulties in assessing the motivations, cognitive and behavioural changes of entrepreneurs. Also, the research will demonstrate the need to undertake adequate controls, which illustrate possible improvement in entrepreneurial capabilities, networks, and credibility in comparison to students that embarked on courses without entrepreneurial elements. The process will confine itself to business development within the higher education (HEI) context.

The MSEC has as its remit to provide opportunity, education, awareness and training to foster entrepreneurship within science and engineering departments across four universities in Greater Manchester. This setting will provide a unique situation in which to investigate the development of germinal technology businesses from the inception of an idea to the point of incubation, prototype development and investment. There is a requirement to understand the needs of the *virgin* entrepreneur, possible obstacles to commercialisation and the process of new venture creation.

The methodology to be adopted has been identified, and forges new ground on combining positivist and phenomenological paradigms. The multi-paradigm approach supports the use of critical incident technique to reveal greater insights in to the personal and cognitive development of *virginal* entrepreneurs, the suitability of enterprise programmes to act as catalysts for venture creation, and their role in supporting technology transfer. The research will not only confine itself to examining undergraduate and postgraduate projects within MSEC's business creation unit, but will also continue to assess the experience of entrepreneurs' when they leave the programme. The research also documents the economic

**contribution of the programme, in terms of generation of new technology-based firms and the impact of entrepreneurs joining established small firms. Ultimately the aim is to build a long-term picture of the role of enterprise programmes in HEIs that will inform policy and practice.**

## 1. Context

A crucial part of governmental industrial and innovation policy is to support entrepreneurship and the creation of new business through various programmes. The White Paper (2001) on enterprise, skills & innovation set out the government's objectives for how it should work with individuals, communities and business to help them create opportunity through change. This builds upon previous policy, which in 1993 identified the importance of utilising the UK's science and research base (Realising Our Potential, Cm 2250) and utilising knowledge to produce higher value added goods and services (Our Competitive Future: Building the Knowledge Driven Economy, Cm 4176). Whilst the 1998 White Paper [Cm 4176] has been borne out in the last three years, the UK's economy still lags behind that of its major European counterparts (HM Treasury, 2000). As a result, the challenge is now to address barriers to growth at several levels. At one level the government is keen to address what it considers to be a lack of enterprise culture within the education and training system, and at another level, what it sees as a lack of technology transfer from universities to industry. To this end, significant investment is being targeted to an incubator fund, to ensure support is available to small business formation. There is also increased funding for the exploitation of technologies (identified by the Foresight exercise) by high technology based firms. A number of studies, however, have shown that whilst there is the potential in the UK's small firms to grow, there is often a perceived mismatch in supply and demand of suitably talented individuals to assist business growth (Storey, 1994). Consequently, much of the Government's policies have focussed on business support agencies. These have also been supported by private initiatives driven by industry intermediaries. However, studies have revealed that such support infrastructure may not always be beneficial, especially where there is a shortage of resources within the SME, a bewildering number of schemes, and a distrust of the trainers when

dealing with commercially sensitive products (Allman, 1996; Amos, 1998). Possible alternatives to such policies are in the training of graduate and postgraduate scientists and engineers with suitable and appropriate skills that can be used immediately by the SME.

Within the UK the development of scientists and engineers skilled in enterprise and business skills is being tackled by the creation of twelve science enterprise centres. The centres are established in cultures of academic excellence in science and engineering and supported initially by a pump-priming grant from the Office of Science & Technology (OST). Their remit is to work with businesses, foster and promote the commercialisation of science and technology through enterprise and entrepreneurship, utilising the university research base. Whilst regionally focussed, the science enterprise centre, in partnership with the university is able to educate engineers and scientists to become entrepreneurially focused individuals interested in commercialising; their own ideas, university research, or technologies, product and services that organisations cannot commercialise themselves. These programmes depart from the traditional content of management courses where the student remains at arm's length from the reality of product development. Instead, the enterprise courses are delivered in concert with real life patent issues, IP, manufacturing and product evaluation difficulties.

Over the last two decades there has been an increase in the number of courses and programmes aimed at entrepreneurship and enterprise, primarily within the USA. Within the UK a limited number of programmes do exist such as undergraduate enterprise modules and hybrid MBAs incorporating entrepreneurship elements. It is realised that these programmes are insufficient to address the problem of the need for a cultural shift from an education system that is theoretical and analytical rather than practical and applied. A balance needs to be struck in which students are given a framework of understanding that is extended to the development of capability at individual and team levels.

The difficulty lies in determining the effectiveness of an entrepreneurial education programme in creating new ventures, producing students with the appropriate skills to start a new venture, or assist in the growth of existing enterprises. Other questions also remain, such as what type of learning process or experience is required to truly equip the student with the skills necessary to make a significant contribution to venture creation. Such perspectives require analysis of the start up process, which have certainly been under-researched (Aldrich, 1999). Consequently several different levels of analysis are required to provide a more holistic view on the impact of entrepreneurial education programmes. At a *macro* level, this study will review extant literature to assess the impact of entrepreneurial education on venture creation. This will try to identify what programmes and models have been particularly successful, and whether there is any best practice in this activity. At a *meta* level, there is a need to understand whether such programmes assist in enabling greater commercial focus of university research, with positive outcomes of higher incubation rates and revenue generation from such activity. There is also the need to understand if such programmes provide sufficient reward to enable more successful and sustainable relationships between university research departments and firms. At the *micro* level, there is the need to understand what skills are needed to develop entrepreneurial capability and awareness. Here, there is also a need to contribute to theory on learning, such as what learning periods or episodes (sometimes traumatic and stressful) are required to produce higher learning in enterprise related activities.

Consequently, the approach will not confine itself to detached observation but seek explanation from the subjects perspective – that of the *virgin* entrepreneur.

It is first necessary to review a significant number of studies that have tried to identify factors that have contributed to venture creation from HEIs.

## 2. Review of existing programmes

With the growth of entrepreneurial education programmes there has been significant interest in their effectiveness. For some time there has been

intense debate in the field of entrepreneurship as to whether students can be taught to become entrepreneurs (Sexton and Upton, 1987; Heebøll, 1997; van der Sijde *et al.*, 1998). Whilst most of the empirical studies conducted state that entrepreneurship can be taught, and that such education can enhance entrepreneurial activity, evaluating the impact or performance of an educational programme is far from easy. A review of the literature reveals that many studies have focussed on: course content and its appropriateness, efficacy of different pedagogical approaches, the number of students starting their own business or working for an existing organisation, and the effectiveness of Higher Education Institutions (HEI) in promoting regional growth (Amos, 1998; Cosh *et al.*, 1998; Syeda-Masooda *et al.*, 1999; Westhead, 1998). Interestingly, what some of these studies have been *unable* to demonstrate is the efficacy of training on small firm performance (Amos, 1998; Cosh *et al.*, 1998).

A review of pedagogical approaches is provided by Fiet (2000a), which examined the implication of teaching students theory, and agreed with Kuhn (1970) in identifying the importance of teaching theory to students. However, examining a number of syllabi, Fiet (2000a) concluded that in order to assist students to become skilled in theory based competencies, there is a need to develop new approaches to practise theory-based skills. Fiet (2000a) concluded that the practice of theory-based activities requires new approaches targeted at improving potential entrepreneurs' chances of success in the market place. Such approaches should attempt to address the problem of anecdotal teaching, which is limited because the type of situation an entrepreneur is likely to encounter will probably not fit the type described in the classroom, nor will studying entrepreneurial profiles from case studies inspire potential entrepreneurs' unless they fit the same profile (Fiet 2000b). Fiet (2000b) identified that more cumulative theory building is required which can be corrected in the light of contradictory, biased, or inaccurate evidence.

Vesper and Gartner (1997) attempted to measure and evaluate entrepreneur programmes offered by a number of business schools and universities in the USA, Canada and Europe. The courses were evaluated using the Malcom

Baldrige National Quality Award criteria, which assesses 20 requirements under seven themes; leadership across the institution, information analysis, strategic planning, human resource development and management, educational and business process management, student focus, and school performance results. Their study, whilst an attempt to depart from traditional ratings criteria, to more robust evaluation, focussed on the management structure that supports the programme's delivery. The assessment produced a significant difference in how universities ranked their own programme, and was generally sceptical of existing ranking schemes. Furthermore, Vesper and Gartner (1997) highlighted weaknesses in current programme evaluation techniques, especially with regard to quality of the programme, and highlighted a real need for the growing number of entrepreneurial programmes to critically evaluate performance, rather than satisfying superficial criteria (Vesper and Gartner, 1997).

McMullan and Gillin (1998) assessed an entrepreneurship programme at Swinburne University in Australia. At Swinburne the Master of Enterprise in Innovation comprises course material that includes case studies, case research and is combined with an entrepreneurial project. As the course progresses it incorporates more venturing focused elements. The McMullan and Gillin study of 109 graduates found that just after two years, 87% of students enrolled on the Master of Enterprise & Innovation programme had started a micro-business. This compared much more favourably with outcomes from a traditional MBA and even a hybrid MBA entrepreneurship programme. The study also found that

people can be educated to start new businesses with growth potential... even students who were not initially intending to develop a new business could join entrepreneurial teams (p.283).

The research also found that entrepreneurship education may be one of the few under exploited, cost effective, micro-economic tools governments have for intelligently developing local economies (McMullan and Gillin, 1998).

A study by Reitan (1997) found that in Norway programmes offering scholarships significantly

helped new technology based firm (NTBF) creation. The programme rate start up was 89%, the success rate was 73.3%, and commercialisation was 82.8%. However, this could be considered to have been a rather narrow view of 'success' especially as the study revealed another side to the story. It was found that the programme did not contribute significantly to employment, and, after tax, most of the firms were unprofitable. Reitan (1997) acknowledged that the long-term picture may be somewhat different, and the difficulty of profitability and growth may be more likely linked to the absence of seed funding and poor infrastructure.

Chrisman *et al.* (1995) reviewed the effectiveness of entrepreneurial activity at the University of Calgary. The study demonstrated that research and technology development enabled the creation of 180 ventures and 723 jobs. The focus of the study was not to elicit the quality, profitability, or employment potential of the business, but rather to understand mediating factors that may prevent spinout companies forming. Their study found that widely fluctuating budgets from government, and poor inter-department connections especially between engineering, science, medical and management faculties could seriously hamper a university's economic development.

Mian's (1995, 1996) study attempted to address the value added contribution of university technology business incubators to entrepreneurs and new high technology based firms (NHTBFs). Through evaluating typical incubator services with university related inputs, the study found that many of the perceived value added contributions were mundane services, such as photocopier and conference suite provision, rather than education and training, technology transfer and business support services. Moreover, NHTBFs stated that university image and laboratory equipment was a significant value added service, however, few firms participated with the university, utilised laboratory equipment or research expertise. Mian (1996) acknowledged that whilst incubation provides an important infrastructure for nurturing small firms, important challenges remain for the incubation process if it is to contribute significantly to sustained economic development. Mian (1996) states that further research is needed to explore and understand why the majority of incubating firms do not participate in, or utilise, university

R&D activities, education and training and technology transfer. It may be that by associating with the university there are intangible benefits such as the kudos that reflects on the incubating firm.

Syeda-Masooda *et al.* (1999) study explored the utilisation of HEI training and research expertise by the UK's SME community. The research attempted to elicit ways of facilitating and strengthening links between graduates and the SME sector. Acquiring data from several universities' students, obtained through a self-completed questionnaire, it was possible to identify a natural bias of graduates in favour of large firms when making career choices. The study found that the uptake of graduates by the SME community would be greatly enhanced where there was significant interaction, either through work experience or research projects that engaged SMEs as part of their undergraduate studies. The study had significant implication for policy, were the skills gap of SMEs is to be 'plugged' by recent graduates. The study found prejudice against SMEs that tended to have no foundation in fact, and was often perpetuated by the assistance provided by the university career advice service. Syeda-Masooda *et al.* (1999) study recommended that undergraduates have a greater exposure to the SME. This study also highlights the need for a significant culture change within institutions of higher education particularly in respect of the career options that are available to students. Not only is employment in an SME a career option but so too is self-employment. Certainly it is an objective of the UK's science enterprise challenge initiative that such culture changes be addressed.

Cosh *et al.* (1998) study of training interest of staff within a variety of small and medium sized firms, utilising a univariate analysis, found that training could improve the survivability of firms. However, multivariate techniques found that training was positively but not significantly related to survival except in the 10–20 employee size. Similarly, a study by Amos (1998) found that education, training and development did not significantly differentiate leading and lagging organisations. The result did indicate that leading organisations were more likely to have formal appraisal systems and have a higher delegation of responsibility to staff. This phe-

nomena was also observed by Marsick and Watkins (1990), but they recognised that learning may represent a cognitive change which is difficult to observe or quantify because it is the 'potential to change' that characterises this process (see Gibb, 1994).

Significant reviews of the literature, conducted by Dainow (1986) and Gorman *et al.* (1997), assessed the literature over 10 years (1974–1984 and 1985–1994 respectively), and identified that there was a requirement for a more systematic collection and analysis of data, and more varied methodologies to build a stronger empirical base. In other words, a preponderance of studies was quantitative in method adopted and functionalist in approach. These studies typically have not considered the impact of the programme on the student from say a cognitive, developmental perspective and they have tended to assume that business creation is an event rather than a process. More sophisticated methods of analysis are needed if a richer and deeper seam of understanding is to be revealed. Such data would in any event be valuable for programme development. This is not to say that some quantification is not valuable, on the contrary where robustly developed such a design can identify significant causal relationships. For example, where the researcher is intimate with the field, intuitive assumptions about the case in hand are often accurately reflected in the nature of the derived causal relationships. However, in more complex scenarios such causal relationships may be the result of mistaken inferences or prejudices. This is often the criticism of functionalist-positive studies by interpretivist researchers.

In considering this and other studies described above, there are important policy questions that concern the criteria for evaluation. If such criteria focus on the identification and quantification of inputs and outcomes then many programmes would be considered to be successful. In the short term, for example, within twelve months of completion of a programme, a not insignificant number of newly founded micro-businesses can be identified. However, if new businesses are to have any enduring impact on an economy they must be innovative (that is, not substitutes for extant businesses), and they must demonstrate growth potential that ultimately is shown to be realisable.

### 2.1. *The interpretative approach to entrepreneurial behaviour*

An interpretative approach allows the researcher to examine issues from the subject's perspective. This facilitates the development of understanding of personal perspectives on issues, nuances of meaning and the multiplicity of possible ways of dealing with situations, especially under conditions of uncertainty. Thus a focus is maintained on understanding how the entrepreneur deals with dynamic processes of decision making, that are largely confused, chaotic, unstructured and non-linear (Hill and McGowan, 1999). Understanding this sense-making behaviour is essential because the enterprise emanates from the vision and machinations of the entrepreneur and associated others. Chell has taken this further by stating that an entrepreneur is an active agent who shapes and creates their own reality, and as such is simultaneously the driver of the entrepreneurial process operating within a reality which sets limits and choices of action possibilities (Bouchikhi, 1993; Chell, 2000). Through interpretivism, it is possible to consider human actions in context and thus understand entrepreneurial behaviour, and consequently by labelling behaviour, make reference to the nature of entrepreneurial behaviour and personalities (Berger and Luckmann, 1966; Chell and Pittaway, 1998; Chell, 2000).

Such a perspective enables a closer understanding of how entrepreneurs develop capabilities and practices. This approach moves away from finding fixed characteristics and traits, and moves towards how people actually learn and work in entrepreneurial ways through 'getting in close' to build deeper understanding of involvement (Hill and McGowan, 1999). Several researchers have used interpretative research to conduct enquiry into entrepreneurial activities (Rae, 2000; Deakins, 1996; Cope and Watts, 2000; Chell and Burrows, 1991, Chell and Rhodes, 1999; Chell and Pittaway, 1998; Chell, 2000). Rae's (2000) approach utilised social constructionism to elicit entrepreneurial practices in cultural context, through the use of language, narrative, and discourse. This approach is recognised as a valid approach to understand and interpret such phenomena (Atkinson, 1998). The research examined 13 successful entrepreneurs over a period of time, which prevented a solely

retrospective analysis. The narratives were categorised into five broad life stages from which a number of themes emerged. From those themes it was possible to produce a more integrated perspective of the learning process from the many dynamic interrelationships that entrepreneurs experience, rather than focus on any single trait such as memory (Young and Sexton, 1997) or achievement (McClelland, 1961).

A study by Cope and Watts (2000) examined individual learning and business lifecycles, utilising a critical incident technique to examine entrepreneurial learning. The study examined prolonged and traumatic periods or *episodes* the entrepreneur experienced, and aimed at uncovering the effect this had on higher learning through these periods. Through examining a small sample of six entrepreneurs, chosen to represent polar extremes, it was considered possible to understand how individuals had changed, and what effects this had upon their view of the future. The Marsick and Watkins (1990) and Megginson (1996) studies also considered learning, and observed that the process of learning creates gradual or tacit change in an individual's orientation through sometimes unconscious or informal processes, developed through individual reflection. Their methodology, utilising a limited number of individuals was chosen not to be representative, as this would be infeasible, but to learn the most about complex aspects of entrepreneurship and learning. Exploration of the worst and best times the subject had experienced was achieved by asking 'how did that happen?' 'how did you feel?' and issuing prompts, such as 'why?' and 'then?', from which it was possible to explore an array of complex and dramatic moments. The research was able to explore difficult, painful periods, which on reflection often led to valuable learning experiences. Capturing the diverse and individual nature of these critical episodes, it was possible to uncover the variability and complexity of such experiences, which if not observed at the phenomenological level would have probably been trivialised by functionalist studies (Cope and Watts, 2000).

Reviewing extant literature (see Table 1 for an overview), it is possible to come to the same conclusion as Falkäng and Alberti (2000), that to date little attention has been given to how the overall effectiveness of entrepreneurial education programmes can be measured in relation to both

Table 1. Examples of the literature on entrepreneurship and HEIs.

Authors	Objectives	Measure/method	Paradigm	Benefits and limitations
Gartner and Shane, 1995	To measure entrepreneurship over time.	Three measures used: differences between firms and individuals; rates and stock measures; effects of timeframes on future performance.	Functionalist	Technique limited and should be combined with other measures.
Louis <i>et al.</i> , 1989	Entrepreneurs in academe: an exploration of behaviours among life scientist.	Questionnaire mailed to faculty staff.	Functionalist	Arms length investigation – searched out taxonomy of academic entrepreneurs.
Scott and Twomey, 1988	The long term supply of entrepreneurs: students career aspirations in relation to entrepreneurship.	UK, USA and Ireland: sample of 436 questionnaires. Study found predisposing factors act in concert with situational events producing inspiration on which entrepreneurs act.	Functionalist	Limited number and dis-aggregation of variables.
Sanchez and Perez, 1998	Entrepreneurship networks in Aragon Spain.	Measured family background, education, work experience, motivation and personality; development of high tech company, entrepreneurship network in Aragon.	Functionalist	Would benefit from depth analysis using interpretivist methods.
Klofsen and Jones-Evans, 1996	University-industry co-operation – formation of NTBFs.	Understand needs, focus, credibility and relationships within networks.	Functionalist	A case study; findings limited by sample size and research design.
McMullan and Gillan, 1998	Track activities and measure performance of graduate.	Number of jobs, amount of sales revenues, number of independent start-ups.	Functionalist	A case study; lacks predictive validity; limited by need for additional data over the long term; need to partial out relative impacts of independent variables.
Johannisson, Landstrom and Rosenberg, 1998	University training for entrepreneurship.	Individual action rationality model. Identification and classification of entrepreneurial types.	Interpretivist	Problem of establishing entrepreneurial action capability across differing learning contexts.

Table 1. Continued.

Authors	Objectives	Measure/method	Paradigm	Benefits and limitations
Rae, 2000	Understanding the effect of critical incidents on entrepreneurial learning.	Narrative of critical incidents of entrepreneurial events.	Interpretivist	Limited to successful entrepreneurs.
Cope and Watts, 2000	Exploration of individual learning and business life-cycles.	Narrative technique utilising critical incidents to understand how this affected higher level learning.	Interpretivist	Has the benefit of focusing on higher-level learning and the need for mentor support to reinforce learning.
Chell 1998	The development of a method for understanding how domestic and business issues impact entrepreneurial behaviour, business performance and family.	Critical Incident Technique is a qualitative interview procedure that facilitates the investigation of significant occurrences identified by the respondent, the way they are managed and their perceived effects.	Interpretivist	May be applied in entrepreneurial contexts requiring in depth analysis/ and understanding.
Lowe 1995	Understanding the social process of innovation.	Soft, dynamic measure of innovation.	Interpretivist	Accommodate complex views of innovative organisational networking.

the individual and society. This has meant many studies have overlooked an important process at the interface of the individual and society, which is the process of creation and innovation (Gorman *et al.*, 1997). This is because positivist/quantitative methodologies have adopted large scale surveys at arms length. Also, many of these studies have also been conducted post education and assessed product commercialisation when products are almost fully developed. On the other hand, interpretivist studies have been criticised for identifying individual cases as unique from which it is impossible to generalise. There is a need to build a bridge from the particular case in order to identify patterns and glean insights into phenomena (Chell and Rhodes, 1999). Language used for codifying phenomena is the mechanisms whereby this takes place (Berger and Luckmann, 1966).

There is an obvious need to capture those complex dynamics that reflect the individual and unique characteristics of the entrepreneur, and

the role of their environment. To investigate these issues it is necessary to move away from single perspectives offered by the functionalist-positivist or interpretivist paradigm. Traditionally, such methodologies have been held in tension, as differing paradigmatic approaches were considered incommensurable (Kuhn, 1970).

Such incommensurability stems from the belief that the research process makes different assumptions through differing theoretical positions (Burrell and Morgan, 1979). This is perpetuated by purists who maintain that interpretivist and positivist studies cannot be combined (Jackson and Carter, 1991, 1993; Parker and McHugh, 1991). More recently however, emerging research has suggested a need to move away from single to multiple perspectives, this is due to the complex cumulative effects of drastic changes in technology, workforce diversity, competition and globalisation (Lewis and Grimes, 1999; Morgeson and Hofmann, 1999; Deazin *et al.*, 1999). This, argue Lewis and Grimes (1999), requires the use of



alternate lenses and the increasing need for understandings that accommodate, rather than oversimplify or over-rationalise organisational tensions. To this end it is hoped that utilising a multi-paradigm approach would provide necessary insight into the needs of the *virgin* entrepreneur, the appropriate support infrastructure, obstacles to commercialisation, etc. As multiple perspectives provide clearer insights into phenomena, it becomes a powerful approach to assist policy development, because whilst a single approach within the interpretivist domain can produce detailed examination of processes in individual cases, it cannot determine how particular variables interact (Chih Lin, 1998). In combination with a functionalist study it may be possible to identify the widespread existence of similar cases, or where the results of such analysis may be applicable – a crucial issue for policy development.

### 3. Multi-paradigmatic approaches

Viewing the interpretivist literature, it appears that it has enabled researchers to get in close, to view behaviour and personality attributes of individuals manifested in situations observed in the research process. The functionalist perspective in contrast explains the mechanisms of a particular causal relationship. In order to understand the process of entrepreneurial education, product development, and the combined effect of this on behaviour, personality, learning and performance, it is apparent that none of the research methodologies used in previous entrepreneurial studies will provide a sufficiently comprehensive perspective on entrepreneurial development. Therefore, there is a need to move towards multi-paradigm research.

The move to a multi-paradigm enquiry is not without its problems (Pondy and Boje, 1981), but several authors (Lewis and Grimes, 1999; Schultz and Hatch, 1996) identify three differing approaches within multi-paradigm enquiry, these include: multi-paradigm reviews or incommensurability; multi-paradigm research or paradigm integration; and, metaparadigm theory building or paradigm crossing.

Multi-paradigm reviews seek to reveal the impact of theorists' underlying, and often taken-for-granted assumptions on the chosen phenom-

ena. It argues for the separate development and application of each paradigm. Lewis and Grimes (1999) identifies two approaches to *multi-paradigm reviews*, which are bracketing and bridging. Bracketing can be used to isolate differing perspectives to sensitise theorists to certain conceptualisations of phenomena. Bridging attempts to identify transition zones or fuzzy boundaries between paradigms, essentially uncovering unidirectional representations that emphasise paradigm similarities.

The second strategy is *multi paradigm research*. Lewis and Grimes (1999) state it moves beyond a review of existing literature to apply divergent paradigm lenses empirically. There are two kinds of multi-paradigm research, the first is *parallel*: termed parallel, because different paradigms are applied on equal terms rather than sequentially. This type of research preserves theoretical conflicts by depicting the organisational voices, images and interests magnified by opposing lenses. This may, by example, enable stream-of-consciousness interviews from organisational members, as in the case of Graham-Hill's (1996) research, from which it was possible to depict the intricacy and contradictions of small firm strategy (Lewis and Grimes, 1999). This strategy, Schultz and Hatch (1996) claim, allows researchers to compare paradigms but encourages a 'hands off' policy by emphasising differences and conflicts between paradigms rather than similarities. The second type of multi-paradigm research is *sequential*, and Lewis and Grimes (1999) identify these as cultivating diverse representations to purposely inform each other, as the outputs of one study provide inputs for a subsequent study – seeking to grasp disparate yet complementary focal points.

A third strategy moves beyond leaving the boundaries of each paradigm intact, paradigm bridging or theory building aims to address the permeability of the differing approaches. The focus of this approach appears to reconcile the tensions of *incommensurability* with integration. This aims to produce a new way of investigating multiple paradigm approaches, which seeks to investigate the similarities and differences between paradigms. This essentially allows the researcher to move back and forth between both paradigms so that multiple views are held in tension, enabling the researcher to accommodate opposing views within a metaparadigm perspec-

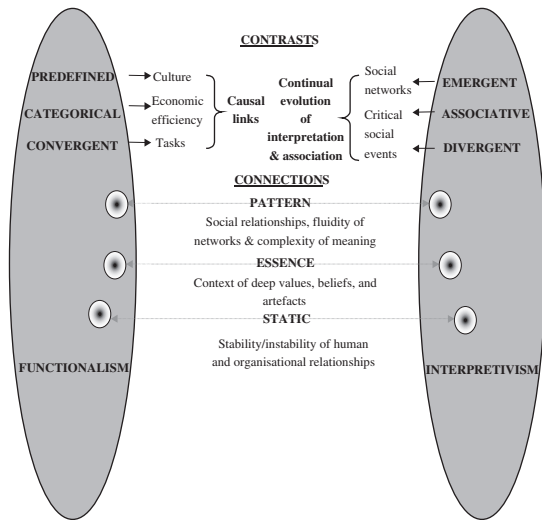


Figure 1. Illustrating concepts of *interplay* between functionalism and interpretivism in the domain of organisational culture studies (adapted from Schultz and Hatch, 1996).

tive – a higher level of abstraction. This Lewis and Grimes (1999) believe, assists researchers in producing a more rich, holistic and contextualised purview. This approach is highlighted

diagrammatically by Schultz and Hatch (1996) (see Figure 1).

Utilising any one of these approaches it may be possible to explore alternative perspectives and conflicting images of entrepreneurial education, which moves from an unrefined approach to build a metaparadigm theory that might contrast, link, and extend existing understanding.

Focusing their paper on culture studies, and identifying examples of functionalism and interpretivism, Schultz and Hatch (1996) identified how they should be approached analytically. The functionalist approach they argue requires a predefined and universal framework, in that similar levels and functions of culture are documented in all organisations. In the analysis, elements of culture are identified and the causal relationships between them are uncovered. The analytical process uses a convergent lens, which condenses and brings elements of cultural analysis together. Alternatively, the interpretivist approach uses a framework that identifies the creation of unique cultural constructs. Analysis takes the form of exploring the meanings and associations between organisational members. The analytical process uses a divergent lens,

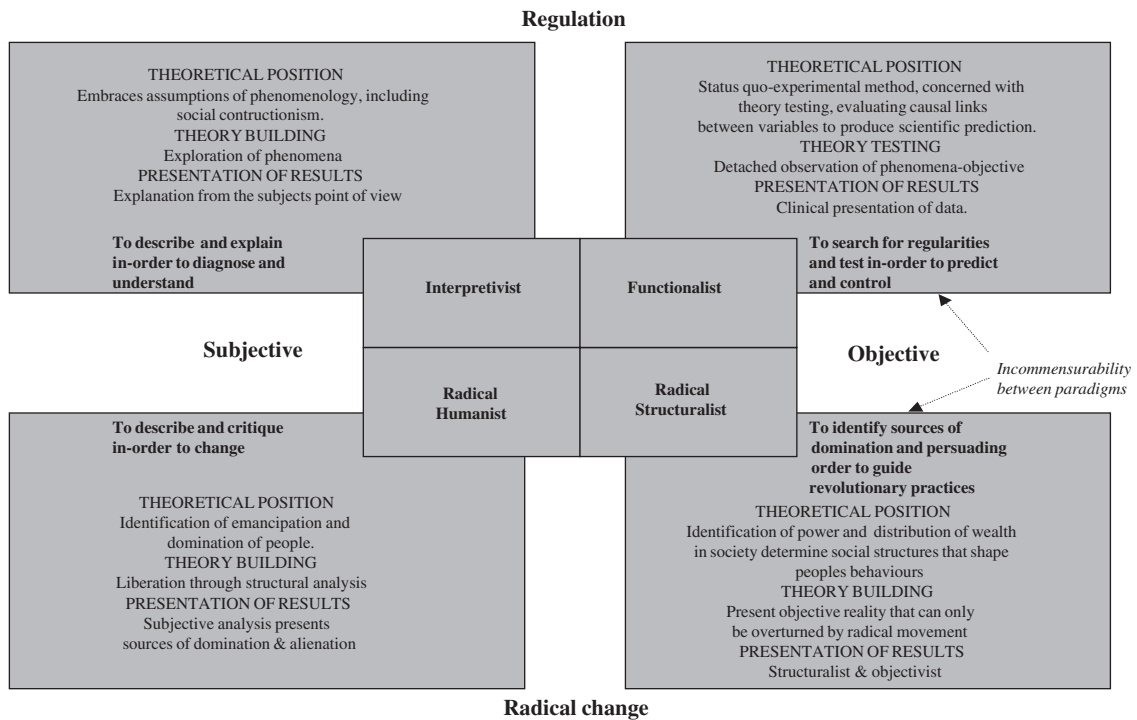


Figure 2. Illustrating the incommensurability of paradigms as proposed by Burrell and Morgan (1979).

which expands and enriches cultural analysis through constantly seeking more interpretations and making new associations.

Using these two approaches, Schultz and Hatch (1996) argue that it is possible to study the simultaneous occurrence of culture as generality, inherent in a predefined and universal framework, and culture as contextually emergent suggested by the construction of meaning. Schultz and Hatch (1996) suggest that using the technique of *interplay*, culture is neither defined in terms of generality or contextually emergent; instead researchers must understand culture in both of these ways. However, can the researcher ever truly venture from their home paradigm, and where does the theorist stand when viewing paradigm representations simultaneously? In short, Lewis and Grimes (1999) state that the act of critical self-reflection is crucial in bridging the gap between the image of the phenomenon and the phenomenon itself.

### 3.1. Multi-paradigm constituents

Undertaking entrepreneurship research, functionalism and interpretivism differ in the extent to which they define an analytical framework prior to studying the phenomena. Functionalism, as stated previously, advocates the use of frameworks illustrating causal patterns between variables (such as, does culture explain economic performance?). Hence the functionalist approach would enable the development of a predictive model.

In contrast to the functionalist approach, the interpretivist analysis would explore how entrepreneurs engage with others from which cultural themes, images and metaphors emanate (Lackoff and Johnson, 1980). In terms of analysing the data, functionalism and interpretivism also differ. Functionalist paradigms use reductionist methods to bring elements of an analysis together—moving from what appears to be unstructured elements to a more simplified representation. In contrast interpretivist studies are divergent through seeking more interpretations and new associations. When viewed through post-modern lenses desirable connections and contrasts can be seen. These connections have been labelled – ‘*pattern*’, ‘*essence*’ and ‘*static*’ (Schultz and Hatch, 1996), and are now explored.

*3.1.1. Pattern.* When investigating entrepreneurship, both functionalist and interpretivist scholars identify patterns *and* order so that they might examine social relations (Berger and Luckmann, 1966; Chell and Rhodes, 1999). Interpretivists look for preferences, associations and actions that are not easily described numerically and are manifestations specific to each case study, whereas, functionalists seek to test propositions that can be identified in other cases. Each seeks a pattern, positivists do so by identifying a general pattern and interpretivists by showing how the general pattern looks in practice (Chih Lin, 1998).

Within the functionalist paradigm, organisational studies such as Lowe’s (1995) approach attempt to map out social patterns in the process of entrepreneurship and illustrate the fluid nature of networks. Schultz (1995) also observed that a cultural pattern does not necessarily imply consistent and harmonious relationships. This is as a result of cultural behaviour and values, and identifying consistencies/inconsistencies and harmonious/inharmonious relationships, which is one of the major features functionalist research attempts to uncover. It is this core that must be discovered in order to explain causal relationships between culture, tasks and economic efficiency (Schultz and Hatch, 1996; Dennison, 1990). By contrast to the functionalist perspective, patterns of meaning are brought together to produce a distinctive way of observing and thinking about experience and interaction. These perspectives are collected in such a way that a singular, overpowering symbol may be adopted to represent the complexity of meaning, for example as in the case of a metaphor.

*3.1.2. Essence, meaning and language.* Essence between paradigms is an attempt at observing manifestations of observable phenomena, such as a culture that is generated by basic shared values, norms and rules (Schein, 1992). Whilst functionalists attempt to identify (and measure) key determining variables, interpretivists seek an infinite variety of meanings that are based on language and ascribed to the interpretation of perceived behaviours. Nevertheless, both seek underlying assumptions of meaning believed to order human experience. Seeking such assumptions makes it possible to decipher the context of values and artefacts (functionalism) or to understand which cultural meanings are ascribed to

cultural expressions (interpretivism) (Schultz and Hatch, 1996). As such, both paradigms attempt to uncover surface manifestations of culture, behaviour and norms through unlocking deeper assumptions, values and beliefs.

*3.1.3. Static.* Schultz and Hatch (1996) identified that in order to understand culture static representations should be used – this being the least complex. This is contrary to post-modern perspectives that fixed meaning is now replaced by a network of floating signifiers, which offer snapshots rather than a comprehensive ability to understand the structural characteristics of human institutions (Poster, 1988). Such perspectives attempt to capture the flux and discontinuity that constitute the affairs of organisations and individuals. One theoretical approach within functionalism has attempted to overcome the deficiencies of stasis by taking an evolutionary approach (Nelson and Winter, 1982; Hannan and Freeman, 1984; Burgelman and Rosenbloom, 1997). Thus it is assumed that organisational behaviour is not static but evolving and that the research design – albeit functionalist – should take this into account.

Identifying contrasts and connections between each of the paradigms requires an element of detachment. This post-modern perspective allows the phenomena to become fluid, with no fixed pattern – evolving spatially, temporally and with the people involved (Schultz and Hatch, 1996). Holding connections and contrast, between functionalism and interpretivism and creating intellectual tensions produces paradox. From such a position researchers can seek harmony or clarification between the two approaches, or like Barley and Kunda (1992), Schultz and Hatch (1996), Lewis and Grimes (1999) suggest that it would be better to stress and preserve the differences. This is a goal of *interplay*.

### *3.2. Generality and contextuality: interplay function 1*

Schultz and Hatch (1996) identify three interplay approaches and these need to be explored in the domain of entrepreneurship. Studying entrepreneurship from functionalist and interpretivist paradigms it is possible to identify entrepreneurship as generality, and entrepreneurship as

contextuality through the evolving construction of meaning, as Schultz and Hatch (1996) identified for culture studies. Examples of entrepreneurship from both paradigms illustrate this (see Pittaway, 2000). Studies (for example, McClelland, 1987) have found that between communities, entrepreneurs have shared values or behavioural tendencies that allow comparison across different settings. In contrast, interpretivist researchers assume that situations are unique; and, moreover, that each person has a unique history and experience through which they have developed a set of labels for describing their reality (Chell, 2000). Utilising *interplay* both approaches can co-exist. Such a technique may be used to highlight the different relationships that entrepreneurs hold with individuals and how their behaviour may differ for example, in the classroom or enterprise laboratory to more informal settings such as the venture centre, coffee bar or pub. This will assist in understanding the development of the entrepreneur in spontaneous versus ritualised settings and their choice of those settings where they perform most effectively in the course of the programme.

### *3.3. Clarity and ambiguity: interplay function 2*

Schultz and Hatch (1996) state that both functionalists and interpretivist paradigms observe surface manifestations that represent deeper cultural essence regardless of whether this essence is discovered by a categorical or an associative route. Clarity and ambiguity tend to be identified through longitudinal analysis. Allman (1996) found that many entrepreneurs who managed newly formed businesses sought help from business services and industry intermediaries, and clearly saw them as providing solutions to their problems. Revisiting the same entrepreneurs revealed that the numerous agencies and schemes required significant evaluation, and on many occasions the rewards were not worth the necessary investment in time. Such longitudinal analysis, which can hold clarity and ambiguity, can identify the instability between the entrepreneur's problem and the outcome of their solution (Hatch and Ehlich, 1993). No doubt if the same entrepreneurs were revisited it would be apparent that some had mastered the maze of support

services and again would see the role of support services as solutions to their problems. Utilising *interplay*, the research would aim to assess how the entrepreneur saw their development within the programme. There is no doubt that initially entrepreneurs will see the Master of Enterprise programme as a solution to their needs and aspiration. Once enrolled, an entrepreneur may become frustrated through an inability to progress a technology's development, or alternatively, the entrepreneur may not be able to raise sufficient capital to take the technology past prototype. How this is resolved, and the lasting experience upon the entrepreneur, will have a profound effect on the individual entrepreneur and will be valuable in relation to development of the understanding of the entrepreneurial process for these young entrepreneurs.

### 3.4. *Stability and instability: interplay function 3*

The functionalist approach was identified as conveying relationships of phenomena, articulating stable representations of entrepreneurial traits, values and norms. The interpretivist perspective in contrast seeks and explores new constructions of experiences, a process, which makes previous perspectives unstable (Schultz and Hatch, 1996). Consequently, functionalists produce stable representations of entrepreneurship and interpretivists illustrate instability.

The functionalist literature may be illustrated by the work of Hofstede (1980, 1991) where he identifies, labels and measures five dimensions of national culture in order to demonstrate particular, lasting differences between nations. In the field of entrepreneurship attempts to develop typologies of entrepreneurs that were enduring is illustrated by the work of Smith (1967). Entrepreneurs were labelled 'craftsmen' or 'opportunists', the former emanating from a blue-collar background and the latter from a white-collar background. In addition there were a set of behavioural characteristics associated with each type. A more recent variant of this approach is that of Hornaday (1990). In contrast to this, Chell and her colleagues developed a more fluid system of classification that assumed 'fuzzy boundaries' between categories and the ability

of the incumbent to develop over time and in effect shift between categories (Chell *et al.*, 1991).

Knights and Willmott (1995) provided an insight into stability and instability within organisational culture studies. The study examined the cultivation of professional teams from a traditional strategic management style of organisational hierarchy. The research highlighted the continued use of organisational routines (e.g. mission statements and hierarchical evaluation procedures) illustrating the stability of the paternalistic past. At the same time the study also showed the shifting dynamics of higher and middle management, as the formation of professional teams allowed power asymmetries to develop as middle managers resisted higher management's efforts. Rather than replace the paternalistic traditions of the past, the study illustrated that the new organisational structure had redefined these power asymmetries. In a similar way, Allman's (2001) study of a UK water company illustrated the stability and instability of organisational relationships when encountering differing forms of regulation. On the one hand, the study found stability in the way executives imposed planning systems onto middle and lower managers that aimed at more collective organisational decision making. But on the other hand, the study found that significant regulatory interaction prevented such planning styles, and that the new organisational hierarchy was able to perpetuate autonomous behaviour. Examining stability and instability, it was possible to explore management's fluctuating rhetoric that highlights the interplay within organisations that the technique *interplay* attempts to reveal.

Hence, in understanding how the MSEC programmes have affected the virgin entrepreneur, it will be necessary to accommodate different perspectives over time such as opposing views between student and mentor – exploring differences in vision, experience, etc. Further, the research assumes that metamorphosis, that is change and development within the student and the business venture, will occur and that methods need to be developed to capture those phenomena. The adoption of the critical incident method is one such approach. This enables the researcher to investigate both the predictable and the unpredictable aspects of growth and development (Chell, 1998). As Cope and Watts, 2000 point out:

What seems to be overlooked, though, is the complex personal learning that results from such experiences, and just how traumatic and painful these 'metamorphoses' can be for the entrepreneur to manage ... [A]lthough these transitions may be necessary for the sustained growth of the business, on a personal level they are difficult to manage and resolve, and this is an important part of the reason why certain critical events tend to be both prolonged and complicated (Cope and Watts, 2000, p 115).

#### 4. Developing and applying interplay within the research method

In applying the *interplay* strategy to a functionalist and interpretivist agenda it is possible to identify contrasts and connections, illustrate interdependence and tensions, which Schultz and Hatch (1996) state as allowing the argument to flow between the two paradigms. As such it will prove invaluable in investigating the diversity of experiences that young entrepreneurs will encounter, their changing motivations, and development from their *virginal* and naive state to having knowledge and relevant experience of venture creation.

A possible approach to uncover *interplay* is the utilisation of case studies, which make it possible to combine elements of positivist and interpretivist research. The case study approach allows the researcher to examine the phenomena of interest within its context, to tease out, trace, and recreate mechanisms that connect events and relationships. Also, exploring several case studies within the MSEC setting forces the researcher to be more rigorous about defining specific relationships. This provides the researcher with a ready-made collection of alternative explanations, and keeps definitions of terms from being too situation-specific, so that parallels to other situations are not lost (Chih Lin, 1998). The nature of comparative case studies does not guarantee interpretivist and positivist perspectives.

From existing literature two approaches appear most desirable to develop the interpretivist research agenda. The Rae and Carswell (2000) life story approach appears to offer a richer and thicker insight into how individuals learn to act entrepreneurially, and enables a more dynamic

and integrated perspective on the nature of the learning process, rather than focusing on any single perspective. Through focussing on recent life activities, it is intended that the interviewee can reflect about aspects of the course, its delivery, and usefulness to product development and commercialisation. An alternative approach is the critical incident technique as utilised by Chell (1998) and Cope and Watts (2000), and is most suited to this study as it facilitates the revelation of issues that are of particular importance to the interviewee. This enables phenomena to be recorded and captured to highlight actual practices and real life issues that shape behaviour. This would be particularly useful in exploring complex personal learning that results from difficult, sometimes traumatic and painful periods, but ultimately assists in the metamorphosis of student to entrepreneur. When combining such approaches with more traditional perspectives offered by functionalist entrepreneurial studies, it will be possible to close the gap between those factors assumed to be measurable and the less tangible aspects of the sense making behaviour of the virgin entrepreneur.

With these approaches to capturing the complexity of entrepreneurial behaviour and process, the research presents considerable challenges to the researcher. They stretch the capability of the researcher. This is because the approach is extremely time intensive and also requires complex interpersonal skills. Working with, selecting, and building trust, with enterprising people who are prepared to tell their story is a slow process requiring sensitive handling. Furthermore another issue that stretches the capability of the researcher is being able to examine the networks of the entrepreneur whose role and story may also be significant. Within the MSEC study such investigation will require views from; advisors, business mentors, enterprise academics, venture capitalists, and programme peers. This it is hoped will uncover the value and credibility of networks through establishing how they are viewed. As such, each case study will generate significant narratives over the process of the 12 months programme, and subsequent periods when the entrepreneur develops or joins a business outside the domain of MSEC. This is intended to address the types of assistance or incubation needs required after completion of the MSEC programme.

The research design also needs the crafting of suitable control experiments and comparators, to understand how MSEC's programme differs, or improves the successful development of entrepreneurs and successful ventures, in comparison to existing venture programmes and against the Northwest's student population generally.

## 5. Conclusion

The pace at which entrepreneurship programmes are developing has quickened over recent years due to the intervention of national governments and cultural shifts that have presented business venturing as an attractive and indeed lucrative livelihood. Studies that have attempted to evaluate the effectiveness of such programmes have, on the whole, been limited by the assumptions of functionalism – limited to identifying measuring inputs and outcomes. This paper has argued therefore that a more sophisticated research design is needed in order to capture both the tangible and intangible aspects of the educational, individual learning and personal development processes throughout the duration of the programme. This may then be viewed in relation to pedagogy, demography and other specifiable inputs on the one hand, and performance outcomes on the other.

Hence, a progressive theme of the paper has been the need to produce a multidimensional view of the development of the *virgin* entrepreneur, product development/prototyping, knowledge and technology transfer processes. A perspective that captures the immense diversity and complexity of this process is developed. Multi-paradigm, multi-level approaches are required. Moreover, two key techniques identified are those of *interplay* and *critical incident analysis* which enable the exploration of personal traumas, episodes, product development crises in relation to the *metamorphosis* and change in the subject, their learning and personal development.

The proposed research approach addresses and extends current understanding of the impact of entrepreneurship programmes at several distinct levels, enabled through the multi-paradigm research approach. At one level it addresses the short-term and immediate measures of student interests, and the efficacy of different pedagogical techniques. Extending the study at this level it is

important that changed attitudes, beliefs and objectives be measured (e.g. future career aspirations and development of student to young entrepreneur). This will require an assessment of skills and attitudes at the outset and periodically thereafter to identify changes and development. Also, the research approach will carefully document the economic contribution of the programme, in terms of generation of new technology-based firms and the impact of entrepreneurs joining established small firms.

Taking a multi-paradigm approach, utilising functionalism and interpretivism, it is possible to implement the *interplay* strategy. Schultz and Hatch (1999) argued that these paradigms focus on pattern, essence, and also represent static views of the phenomena. Utilising connections and contrast, it will be possible to identify generality/contextually, clarity/ambiguity, and stability/instability. This will facilitate theory building that is essential if we are to understand the diversity of activities that face the virgin entrepreneur. A detailed account of the development of the methodology is presented in the paper falling short of an explication of the operational methods – interview techniques, topic guides, profiling and data collection schedules.

The paper implies a number of policy implications that it is useful to highlight although it is beyond the scope of this particular paper to explore them in depth. The question 'can one teach entrepreneurship?' is largely assumed to be possible in this paper just as it is possible to teach any professionals (for example, medics) their craft. There are however, questions about what constitutes the curriculum of a high quality, effective programme and how best might it be delivered? This question leads to a further fundamental policy issue viz 'how should such programmes be evaluated?' clearly a purpose of this paper has been to highlight such design considerations. Furthermore, there are also value-for-money considerations where public funding is concerned. Hence it is important that science enterprise initiatives are evaluated from a public policy perspective.

However, the paper has drawn attention to the less tangible aspects of the learning and personal development process within an enterprise/technology transfer context – processes that by their very essence are difficult to measure. It has been argued that these aspects are the crux of

knowledge transfer for enterprise development. They include the whole person and their development: cognitive, behavioural and emotional dimensions. To this extent the process is not predictable; it is dependent on complex and unique cases. Learning needs to be carefully managed and individuals nurtured to assure metamorphosis consonant with entrepreneurial aims and objectives. Hence, the quality of the mentoring support and the monitoring of network relationships and their effects are critical to assure successful experiential learning.

## References

- Aldrich, H.E. (1999) *Organizations Evolving*. London: Sage.
- Allman, K. (1996) The applicability of foresight to SMEs. Innovation & Technology Assessment Centre, Cranfield University, 1996, unpublished MPhil. Thesis.
- Allman, K. (2001) The contribution of technology to the business of a utility. Policy Research Engineering Science & Technology, Manchester University, unpublished Doctoral Thesis.
- Amos, E. (1998) Training & development in the middle market: can it pay? Foundation for Manufacturing and Industry, Assessing the Impact of Training on the Performance of SMEs, ESRC & Warwick Business School Training Initiative, March.
- Atkinson, R. (1998) *The Life Story Interview*. CA: Sage.
- Barley, S.R. and Kunda, G. (1992) Design and devotion: surges of rational and normative ideologies of control in managerial discourse. *Administrative Science Quarterly*, **28**, 393–413.
- Berger, P.L. and Luckmann, T. (1966) *The Social Construction of Reality*. London: Penguin.
- Bouchikhi, H. (1993) A constructivist framework for understanding entrepreneurial performance. *Organizational Studies*, **14**, 4, 551–569.
- Burgelman, R.A. and Rosenbloom, R.S. (1997) Technology strategy: an evolutionary process perspective. In Tushman, M.L. and Anderson, P.L., *Managing Strategic Innovation & Change*. Oxford.
- Burrell, G. and Morgan, G. (1979) *Sociological Paradigms and Organizational Analysis*. Heinemann: London.
- Chell, E. (1998) The critical incident technique. In Cassell C. and Syman G. (eds) *Qualitative Research in Organisations*. London: Sage.
- Chell E. (2000) Towards researching the 'opportunistic entrepreneur': a social constructionist approach & research agenda. *European Journal of Work & Organisational Psychology*, **1**, 63–80.
- Chell, E. and Baines, S. (1998) Does gender affect business 'performance'? A study of micro businesses in business services in the UK. *Entrepreneurship & Regional Development*, **10**, 117–135.
- Chell, E. and Burrows, R. (1991) The small business owner manager. In Stanworth, J. and Gray, C. (eds) *Bolton 20 Years On: the Small Firm in the 1990s*. London: Paul Chapman, ch.7, pp. 151–177.
- Chell, E., Haworth, J.M. and Brearley, S. (1991) *The Entrepreneurial Personality: Concepts, Cases and Categories*. Routledge: London.
- Chell, E. and Pittaway, L. (1998) The social construction of entrepreneurship. Unpublished paper presented at the ISBA Conference, Durham University, UK.
- Chell, E. and Rhodes, H. (1999) The development of a methodology for researching vertical relations in small and medium sized enterprises. *Manchester: British Academy of Management Proceedings*, 170–186.
- Chih Lin, A. (1998) Bridging positivist and interpretivist approaches to qualitative methods. *Policy Studies Journal*, **26**, 1, 162 (19).
- Chrisman, J.J., Hynes, T. and Fraser, S. (1995) Faculty entrepreneurship and economic development: the case of the University of Calgary. *Journal of Business Venturing*, **10**, 267–281.
- Cm 2250 (1993) *Realising our Potential: a Strategy for Science, Engineering and Technology*. London: HMSO (Cm; 2250).- 0101225024.
- Cm 4176 *Our Competitive Future: Building the Knowledge Driven Economy*. London: HMSO.
- Cope, J. and Watts, G. (2000) Learning by doing – an exploration of critical incidents and reflection in entrepreneurial learning. *International Journal of Entrepreneurial Behaviour & Research*, **6**, 3, 104–124.
- Cosh, A., Duncan, J. and Hughes, A. (1998) The impact of training on business performance: an empirical analysis of UK SMEs 1987–95. Assessing the Impact of Training on the Performance of SMEs, ESRC & Warwick Business School Training Initiative, March.
- Dainow, R. (1986) Training and education of entrepreneurs: the current state of the literature. *Journal of Small Business Management*, **3**, 4, 10–23.
- Deakins, D. (1996) *Entrepreneurship and Small Firms*. London: McGraw-Hill.
- Deazin, R., Glynn, M.A. and Kazanjian, R.K. (1999) Multilevel theorizing about creativity in organisations: a sense making perspective. *Academy of Management Review*, **24**, 2, 286 (21).
- Dennison, D. (1990) *Corporate Culture and Organizational Effectiveness*. Wiley: New York.



- Falkäng, J. and Alberti, F. (2000) The assessment of entrepreneurship education. *Industry & Higher Education*, April.
- Fiet, J.O. (2000a) The pedagogical side of entrepreneurship theory. *Journal of Business Venturing*, **16**, 101–117.
- Fiet, J.O. (2000b) The theoretical side of teaching entrepreneurship. *Journal of Business Venturing*, **16**, 11–14.
- Garavan, T.N. and O'Conneide, B. (1994) Entrepreneurship education and training programme: a review & evaluation Part 1. *Journal of European Industrial Training*, **18**, 8, 3–12.
- Gartner, W.B. and Shane, S.A. (1995) Measuring entrepreneurship over time. *Journal of Business Venturing*, **10**, 283–301.
- Gibb, A.A. (1994) Do we really teach (approach) small business in the way we should. *Journal of Small Business & Entrepreneurship*, **11**, 4, 696–706.
- Gorman, G., Hanlon, D. and King, W. (1997) Some research perspectives on entrepreneurship education, enterprise education and education for small business management: a ten year literature review. *International Small Business Journal*, **15**, 3, 56(22).
- Graham-Hill, S. (1996) Small business strategy: a multi-paradigm perspective quoted in Lewis and Grimes (1999), from an unpublished Doctoral Thesis, University of Kentucky, Lexington.
- Hannan, H.T. and Freeman, J.H. (1984) Structural inertia and organisational change. *American Sociological Review*, **43**, 149–164.
- Hatch, M.J. and Ehlich, S. (1993) Spontaneous humour as an indicator of paradox and ambiguity. *Organisational Studies*, **14**, 505–527.
- Heebøll, J. (1997) Can entrepreneurship be taught – a Danish case study. *Industry & Higher Education*, June.
- Hill, J. and McGowan, P. (1999) Small business and enterprise development: questions about research methodology. *International Journal of Entrepreneurial Behaviour & Research*, **5**, 1.
- HM Treasury, (2000) *Forecast for the UK Economy, 2000*. see [http://www.hm-treasury.gov.uk/e\\_info/forc/comp/index.html](http://www.hm-treasury.gov.uk/e_info/forc/comp/index.html)
- Hofstede, G. (1980) *Culture's Consequences: International Differences in Work Related Values*. Newbury Park, CA: Sage.
- Hofstede, G. (1991) *Cultures and Organisations – Software of the Mind*. Maidenhead: McGraw-Hill, p 4.
- Hornaday, R.W. (1990) Dropping the E-word from small business research: an alternative typology. *Journal of Small Business Management*, **28**, 24, 22–33.
- Jackson, N. and Carter, P. (1991) In defence of paradigm incommensurability. *Organisation Studies*, **12**, 5, 109–127.
- Jackson, N. and Carter, P. (1993) Paradigm wars: a response to Hugh Willmott. *Organisation Studies*, **14**, 5, 109–127
- Johannisson, B., Landstrom, H. and Rosenberg, J. (1998) University training for entrepreneurship – an action frame of reference. *European Journal of Engineering Education*, **23**, 4.
- Klofsen, M. and Jones-Evans, D. (1996) Stimulation of technology-based small firms – a case study of university-industry cooperation. *Technovation*, **16**, 4, 187–193.
- Knights, D. and Willmott, H. (1995) Culture and control in a life insurance company. *Studies in Culture, Organisation, and Societies*, **1**, 29–47
- Kuhn, T.S. (1970) *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.
- Lackoff, G. and Johnson, M. (1980) *Metaphors We Live By*. Chicago: University of Chicago Press.
- Lewis, M. and Grimes, A.J. (1999) Metatriangulation: building theory from multiple paradigms. *Academy of Management Review*, **24**, 4, 672–690.
- Louis, K.S., Blumenthal, D., Gluck, M.E. and Soto, M.A. (1989) Entrepreneurs in academe: an exploration of behaviour among life scientists. *Administrative Science Quarterly* **34**, 1, 110 (22).
- Lowe, A. (1995) The basic social processes of entrepreneurial innovation. *International Journal of Entrepreneurial Behaviour & Research*, **1**, 2.
- Marsick, V. and Watkins, K. (1990) *Informal and Incidental Learning in the Workplace*. London: Routledge.
- McClelland, D.C. (1961) *The Achieving Society*. New York: Van Nostrand.
- McClelland, D.C. (1987) Characteristics of successful entrepreneurs. *Journal of Creative Behaviour*, **21**, 3, 219–233.
- McMullan, M.E. and Gillin, L.M. (1998) Industrial viewpoint – entrepreneurship education. *Technovation*, **18**, 4, 275–286.
- Meggison, D. (1996) Planned and emergent learning – consequences for development. *Management Learning*, **27**, 4, 411–28.
- Mian, S. (1995) Assessing and managing the university technology business incubator: an integrative framework. *Journal of Small Business Venturing*, **12**, 251–285.
- Mian, S. (1996) Assessing value added contribution of university technology business incubators to tenant firms. *Research Policy*, **25**, 325–335.
- Morgeson, F.P. and Hofmann, D.A. (1999) The structure and function of collective constructs: implications for multilevel research and theory

- development. *Academy of Management Review*, **24**, 2, 249 (14).
- Nelson, R. and Winter, S.G. (1982) *An Evolutionary Theory of Economic Change*, Belknap & Harvard.
- Parker, M. and McHugh, G. (1991) Five texts in search of an author: a response to John Hassard's 'multiple paradigms and organisation analysis'. *Organisation Studies*, **12**, 3, 451–456.
- Pittaway, L. (2000) Investigation of entrepreneurial behaviour. School of Management, Newcastle University, unpublished Doctoral Thesis.
- Pondy, L. and Boje, D.M. (1981) Bringing the Mind Back In. In Evan, W. (ed.) *Frontiers in Organisation and Management*. New York: Praeger, pp. 83–101.
- Poster M. (1988) *Introduction in Baudrillard: Selected Writings: 1–9*. Stanford CA: Stanford University Press.
- Rae, D. (2000) Understanding entrepreneurial learning: a question of how? *International Journal of Entrepreneurial Behaviour & Research*, **6**, 3.
- Rae, D. and Carswell, M. (2000) Using a life-story approach in researching entrepreneurial learning: the development of a conceptual model and its implications in the design of learning experiences. *Education & Training*, **42**, 4/5.
- Reitan, B. (1997) Fostering technical entrepreneurship in research communities: granting scholarships to would-be entrepreneurs. *Technovation*, **17**, 6, 287–296.
- Sanchez, A.M. and Perez, O.U. (1998) Entrepreneurship network and high technology firms: the case of Aragon. *Technovation*, **18**, 5, 335–345.
- Schein, E.H. (1992) *Organisational Culture & Leadership*, 2<sup>nd</sup> ed. San Francisco CA: Jossey Bass, **12**, 489–506.
- Schultz, M. and Hatch, M.J. (1996) Living with multiple paradigms: the case of paradigm interplay in organizational culture studies. *Academy of Management Review*, **21**, 2, 529–557.
- Schultz, M. (1995) *On Studying Organisational Cultures: Diagnosis and Understanding*. Berlin: Walter de Gruyter.
- Scott, M.G. and Twomey, D.F. (1988) The long-term supply of entrepreneurs: students' career aspirations in relation to entrepreneurship. *Journal of Small Business Management*, **26**, 4.
- Sexton, D.L. and Upton, N.B. (1987) Evaluation of an innovative approach to teaching entrepreneurship. *Journal of Small Business Management*, **25**, 35(9).
- Smith, N.R. (1967) *The Entrepreneur and His Firm: The Relationship Between Type of Man and Type of Company*. Michigan State University Press, East Lansing, Michigan.
- Storey, D. (1994) *Understanding the Small Business*, London: Routledge.
- Syeda-Masooda, M., Oakey, R. and Kippling M. (1999) Utilisation of science & technology graduates by the small & medium sized enterprise sector. *Education & Training*, **41**, 9, 425–436.
- Van der Sijde, P.C. and van Tillburg, J.J. (1998) Creating a climate for university spin-offs. *Industry & Higher Education*, **12**, 4, 297–302.
- Vesper, K.H. and Gartner, W.B. (1997) Measuring progress in entrepreneurship education. *Journal of Business Venturing*, **12**, 403–421.
- Westhead, P. (1998) Assessing the contribution of the Shell Technology Enterprise Programme (STEP) to SMEs in the United Kingdom. Assessing the Impact of Training on the Performance of SMEs, ESRC & Warwick Business School Training Initiative, March.
- White Paper (2001) Enterprise, Skills & Innovation, February 2000, see [www.dti.gov.uk/opportunityforall/pages/](http://www.dti.gov.uk/opportunityforall/pages/)
- Young, J. and Sexton, D. (1997) Entrepreneurial learning: a conceptual framework. *Journal of Entrepreneurship Culture*, **5**, 3, 223–48.