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Five Minds for the Entrepreneurial Future: Cognitive Skills as the Intellectual Foundation for Next Generation Entrepreneurship Curricula

THOMAS N. DUENING

This article proposes a new perspective on entrepreneurship curriculum design, one that is founded upon the emerging research into the cognitive skills that successful entrepreneurs possess and deploy. Specifically, this article utilises Gardner's 'minds' approach as a theoretical framework specific to the challenge of developing curriculum for teaching entrepreneurship. Following Gardner, each entrepreneurial mind developed in this article is a meta-category representation of a host of cognitive sub-skills that have been identified through research to be unique to successful entrepreneurs. The five minds for the entrepreneurial future are: (1) The Opportunity Recognising Mind, (2) The Designing Mind, (3) The Risk Managing Mind, (4) The Resilient Mind and (5) The Effectuating Mind. Taken as a whole, these five minds provide an intellectual foundation for entrepreneurship education and curriculum development. The articulation of the aggregated cognitive sub-skills in terms of entrepreneurial minds provides curriculum designers with a handy taxonomy, not unlike those used by general education curriculum designers. In addition, each of the entrepreneurial minds is based on a rich and growing literature that focuses on the cognitive skills that successful entrepreneurs possess.

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There is a strong movement afoot in the scholarly entrepreneurship literature, focusing on cognitive skills as a primary differentiator of successful entrepreneurs from novices and from non-entrepreneurs (Mitchell et al., 2007). Progress in this line of research is a welcome relief to the

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many academics who have taken up the challenge of teaching others how to become entrepreneurs. Previous efforts to identify entrepreneurial uniqueness with, respectively, personality characteristics or behavioural traits have, in the main, turned up empty. This result had left those charged with developing entrepreneurship curricula without a firm intellectual foundation (Adcroft et al., 2004). If we are not educating to create and/or enhance entrepreneurial personality characteristics, then what are we doing? If we are not educating to instil entrepreneurial behavioural traits, then what are we doing?

This article proposes a new perspective on entrepreneurship education and curriculum design, one that is founded upon the emerging and, so far, fruitful research into the cognitive skills that successful entrepreneurs seem uniquely to possess and deploy. As the research in this area is barely a decade old, much work undoubtedly remains to be conducted. Nonetheless, this article attempts to synthesise the extant findings in a manner that is useful to entrepreneurship curriculum design and development, and for defining educational outcomes and metrics.

Specifically, this article borrows from a new book written by Harvard psychologist, Howard Gardner. Gardner's book, *Five Minds for the Future*, purports to be, among other things, an intellectual foundation for general education and curriculum development (Gardner, 2007). In his book, Gardner develops detailed arguments for five specific 'minds' that individuals will need to be effective in the future. The minds he proposes are really synthesised meta-categories comprised of myriad cognitive sub-skills that can be defined, packaged for delivery and consumption at various levels of student maturity and readiness and ultimately, measured and assessed on an individual basis. The synthesised meta-categories provide educators with an intellectual foundation useful for developing curricular goals, objectives and metrics. Gardner's five minds, no doubt, can and will be debated, but they are useful targets for curriculum design and development (Sheffield, 2007). In devising synthetic meta-categories as an intellectual foundation for curriculum development, Gardner has followed in the footsteps of renowned educational theorists such as Jean Piaget, Benjamin Bloom, Albert Bandura and others.

This article utilises Gardner's 'minds' approach as a theoretical framework specific to the challenge of developing curriculum for teaching entrepreneurship. Just as Gardner synthesises reams of research to derive his five minds for general education, this article likewise derives five

essential minds for entrepreneurship education from a review of the extant literature into the cognitive skills evinced by successful entrepreneurs. Also following Gardner, each entrepreneurial mind developed in this article is a meta-category representation of a host of cognitive sub-skills that have been identified through research to be unique to successful entrepreneurs. This article develops the five minds for the entrepreneurial future and provides suggestions about their implications for entrepreneurship curriculum development and design.

Before we delve into the five minds for the entrepreneurial future, however, it is useful, first, to develop further my assertion that the ‘cognitive turn’ in entrepreneurship research has indeed come at a time of need in establishing a new intellectual foundation for entrepreneurship education.

A Brief History of Entrepreneurship Foundations Research

A brief history of the intellectual foundations of entrepreneurship education will help explain why the current article is necessary. The term ‘intellectual foundations’, in this context, is used to refer to the specific line of research that has attempted to discover those variables that are defining of, and unique to, entrepreneurs and entrepreneurship. The reason this research has been taken up are many, but most investigators in this space have two primary motivations. One motivation is an ineffable ‘gut feel’ that there are some things that are simply ‘different’ about successful entrepreneurs that distinguishes them from unsuccessful ones and from non-entrepreneurs. The other motivation stems from the desire for an intellectual foundation upon which to build credible and legitimate entrepreneurship curriculum (Kuratko, 2005). After all, it is quite plain that entrepreneurship will happen and has happened to great effect in America and around the world whether or not entrepreneurship researchers and educators exist. Thus, as reflective academics, it is imperative to find a *raison d’être* that provides justification for our curricular interventions. What value can educators bring that goes beyond the prevailing economic and policy conditions that promote entrepreneurs and entrepreneurship? It is the belief that there is something like entrepreneurial expertise that compels entrepreneurship researchers. Discovery of the foundations of this expertise will provide substantial guidance to the curriculum design

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activities of entrepreneurship educators (Ericsson et al., 1993). The search for the intellectual foundations of entrepreneurial expertise helps legitimise the interventions we create to effect that end.

Research into the foundations of management and entrepreneurship is just more than a century old. Most introductory management textbooks travel back to the era of Frederick Taylor and scientific management as the historical beginning of systematic effort to analyse and articulate techniques and strategies of effective management. We don't need to go back farther than that in this brief survey of the intellectual foundations of management thought. As most texts would agree, Taylor was followed, in turn, by a canon of innovative and insightful theorists and scholars that surely include Gilbreth, Weber, Barnard, Fayol, Drucker, Deming and others. These thinkers weren't just 'solution providers', as are most modern contributors to the bulging bookshelves in the business section of any library. These canonical thinkers pioneered entirely new ways of conceiving and acting within organisations. To steal an overworked phrase, they are recognised as founders of new management 'paradigms'.

In entrepreneurship research, the search for intellectual foundations is generally considered to have begun with investigations of the entrepreneurial personality as defining of entrepreneurial effectiveness. One can easily discern why early entrepreneurship researchers acted on the belief that successful entrepreneurs possess personality traits that distinguish them from non-entrepreneurs. My own experience also seems to indicate that there is at least something like an *essential* or *defining* personality characteristic common to entrepreneurs. As it turned out, years of painstaking research along this line has not borne significant fruit. It appears that there are simply not any personality characteristics that are either essential to, or defining of, entrepreneurs that differ systematically from non-entrepreneurs.

This insight has become increasingly accepted across the spectrum of investigators, and provides both opportunity and threat to those who aspire to teach entrepreneurship. The opportunity arises from the increased numbers of individuals who automatically become potential entrepreneurship students. Consider that, if it *had* turned out that there *were* personality characteristics common to entrepreneurs, some people would automatically be excluded because they either lacked the requisite characteristic or the ability and/or interest to develop it. The threat that arises from the acknowledgement that there are no essential personality

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characteristics is the removal of a candidate for a firm intellectual foundation. Note that if it *were* the case that entrepreneurs were exceptional in one or more specific personality characteristics, the goal of curriculum would be—among other things—to help students who possess such characteristics maximise their application in entrepreneurial ways.

Having run out of steam pursuing personality characteristics as the defining essence of successful entrepreneurs, scholars naturally were compelled to pursue other candidate variables. If the natural characteristics of an individual's personality were not the determining factor(s), perhaps, it was thought, entrepreneurs have learned to *behave* in ways that distinguish them from non-entrepreneurs. Again, investigators proposed a number of behavioural candidates as emblematic of entrepreneurs. Unfortunately, this line of research also resulted in a series of dead ends as examples of successful entrepreneurial behaviours had equal counterparts among samples of non-entrepreneurs. As with the personality characteristic school of thought before it, the behavioural trait school of thought became increasingly difficult to support. Those who taught entrepreneurship, once again, were faced with a lacuna in the intellectual foundations of curriculum design. The two pillars of that foundation, the personality characteristics and the behavioural traits schools of thought were eliminated before they could be fully exploited.

Fortunately, a new approach to understanding entrepreneurs and entrepreneurship has begun to bear serious scholarly fruit. The relatively new cognitive skills school of entrepreneurship research argues that the way entrepreneurs *think* differentiates them from non-entrepreneurs. Entrepreneurial cognitions are defined as: 'The knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation and venture creation and growth' (Mitchell et al., 2002). For example, in the last decade, significant progress has been made in identifying cognitive biases that are common to the way entrepreneurs think. Among these biases are the *Law of Small Numbers*, *Reasoning by Analogy* and *Overconfidence*. Scholars have also identified a number of mental habits or 'heuristics' that entrepreneurs are wont to deploy in contrast to non-entrepreneurs. These include cognitive rules that enable the management of risk and risk perception, the rapid vetting of rent-seeking opportunities and the ability to manage ambiguity and failure. Entrepreneurs have been shown to possess these and a wide range of other

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cognitive skills and habits to a greater degree than non-entrepreneurs. As such, this research provides new hope that an intellectual foundation can be laid for entrepreneurship curriculum development.

To date, the emerging research into the cognitive foundations of entrepreneurship has not been leveraged for curriculum design and development. It is likely that this has not occurred due to the relatively wide gap that exists between those researchers interested in discovering and cataloging cognitive elements of entrepreneurship and those whose primary interest is in developing robust curricula. Entrepreneurship research itself is currently struggling for legitimacy within the panoply of social sciences, without worrying additionally about the question of whether and how its findings should translate to curriculum design (Gregorie et al., 2006).

In order to utilise the language and findings of the cognitive skills research within the domain of curriculum design and development, a suitable translation is required. Educational theories that guide curriculum development are normally couched in terms that educational practitioners can understand. Several famous examples of this are Benjamin Bloom's taxonomy of educational objectives, Jean Piaget's stages of cognitive development and Albert Bandura's social learning theory (Schunk, 2007).

Each of these educational theories was based on subtle and often ingenious findings in cognitive, behavioural and developmental research. Often, the intent of the original research was not to devise a new educational paradigm. Rather, the intent was to examine and catalog the causes and variables associated with specific human behaviours. As the findings in the cognitive research were compiled, the theorists whose names are cited immediately above felt compelled to translate them into a less jargon-filled and more common meta-language—a language that could be used by education curriculum designers. The meta-language was intended to encapsulate the findings for use at another level and by those with expertise in a different domain.

Gardner has long been categorising human intelligence and creativity at levels that can be understood and used by people whose work is far removed from the cognitive scientific research that underlie the categories (Furnham, 2007). He began this level of theorising, famously, with his description of the 'multiple intelligences' that people seem to possess. This approach was intended to challenge the notion of a single intelligence as

measured and scored as a person's 'intelligence quotient' (IQ). Gardner's work on multiple intelligences has had far-reaching implications in education and curriculum development, as Gardner intended (Cuban, 2004). Gardner no less intends his five minds for the future to be useful in curriculum development. Let's turn next to Gardner's five minds for the future.

Gardner's Five Minds for the Future

The Harvard based psychologist, Howard Gardner, has written extensively on human intelligence, creativity and cognitions. Most recently, he has published on what he believes to be the essential 'minds' that are necessary for a person to be effective in the future (Gardner, 2007). He says, 'With these "minds", as I refer to them, a person will be well equipped to deal with what is expected, as well as what cannot be anticipated; without these minds, a person will be at the mercy of forces that he or she can't understand, let alone control' (Gardner, 2007: 2).

Gardner has identified five minds that he believes to be essential for a healthy adult person to function effectively in the future:

1. **The Disciplined Mind:** This mind is based on Gardner's observation that to be an effective adult in the modern world requires mastery of at least one discipline. The disciplined mind knows how to define and solve unique types of problems. It also knows how to distinguish useful contributions to a field of knowledge from errant or fraudulent ones. The disciplined mind builds on and extends its capability, constantly seeking to expand the range of problems that can be addressed. This capacity helps a person individuate and gain independence. As Gardner puts it, 'Without at least one discipline under his belt, the individual is destined to march to someone else's tune' (Gardner, 2007: 3).
2. **The Synthesising Mind:** This mind describes the capability to gather, organise and digest diverse facts and ideas, both from within the disciplinary perspective and from new perspectives. In the modern world, individuals are exposed to far more knowledge and information each day than they can adequately absorb and comprehend. To function in this world of information requires the ability to synthesise disparate data to develop opinions and reasoned

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actions. The synthesising mind ‘takes information from disparate sources, understands and evaluates that information objectively, and puts it together in ways that make sense to the synthesizer and also to other persons’ (Gardner, 2007: 3).

3. ***The Creating Mind:*** The creating mind is able to break new ground by combining information, ideas and artifacts in novel ways; by asking provocative and counter-intuitive questions; and by absorbing new ideas and creations into the stream of everyday life to enable new and unexpected outcomes. As the call for greater levels of innovation in our globally competitive economy grows louder, the creative mind is increasingly important. The ability to create is important not just within the creative disciplines (arts, literature) but across the spectrum of human endeavour.
4. ***The Respectful Mind:*** The respectful mind is critical to our ability to live together in a world that is growing increasingly interdependent. This mind prepares individuals to cope with cultural, attitudinal and behavioural variety. Gardner stresses that the respectful mind is not without conviction or values. That would be unsupportable. Rather, the respectful mind is able to tolerate differences among humans, seeks to resolve conflicts between varying perspectives through dialogue when possible and promotes tolerance and respectfulness among others.
5. ***The Ethical Mind:*** The ethical mind is also necessary in world that has become increasingly secular and choice laden. Individuals growing up in most parts of the world are less constrained by the value systems and strictures that formerly were endemic to family and religious life. As the influence of these shapers of ethical behaviour wanes, individuals must develop their own ethical systems and values. Unfortunately, the ‘values free’ education of the United States and much of the rest of the Western world does not provide students with the tools to create their own ethical and value systems. Gardner thinks that the ethical mind is an important goal for curriculum designers and must be a high priority in this complex world.

Gardner asserts that these five minds are more than theoretical constructs. They are essential capabilities for individuals to be effective in the future; and they are intellectual foundations for general education

and curriculum. As Gardner states, 'One cannot even begin to develop an educational system unless one has in mind the knowledge and skills that one values, and the kinds of individuals one hopes will emerge at the end' (Gardner, 2007: 14). As with the canon of educational theorists who preceded Gardner, educators will now attempt to apply his five minds taxonomy in the classroom. The ultimate test of his ideas will be the utility of the curricula that use his five minds as their intellectual foundation.

Gardner admittedly was aiming at general education with his five minds categories. Most readers who focus their educational practice and theorising within a particular field will probably conclude that Gardner's categories miss important elements of an effective education in their respective fields. This is certainly true for those of us who have accepted the challenge of teaching entrepreneurship. Gardner's categories say nothing about understanding economics, negotiating, networking, fund raising and many other things that are clearly essential to successful entrepreneurship.

Gardner's approach to creating taxonomy of 'minds' appropriate to general education is likely to be regarded as a useful contribution to general education. That assumption clears the way for theorists within specific educational disciplines to use the same approach to define desired 'minds' within their own fields. With the advances in entrepreneurship research into the cognitive skills of entrepreneurs, it is timely for a first attempt to identify a set of 'minds' derived from that research and appropriate for curriculum development. The next section is intended to be a first cut at a set of such minds.

Five Minds for the Entrepreneurial Future

As the new line of research into the differentiating cognitive skills of entrepreneurs continues to bear fruit, the question of how this research affects curriculum development and pedagogy must be asked. For example, it seems natural to assume that *if* entrepreneurs in fact possess certain cognitive skills and *if* these skills can in fact be learned and/or improved upon, then it seems only responsible for curriculum designers to focus their efforts on building these skills.

The literature on the cognitive skills of entrepreneurs is evolving rapidly, and there is much fruitful work that remains to be done in this area. Nevertheless, with nearly a decade of work behind us, it does not seem

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too early to begin to translate the detailed research into the higher level language of curriculum design. This level of analysis requires that we discuss the specific cognitive skills that are emerging as those possessed uniquely by entrepreneurs be re-defined in terms useful to curriculum builders. That means that we must aggregate the specific cognitive skills into categories that are translatable to language that practicing entrepreneurs might use to describe their own thoughts and actions. This is required to set curricula outcome goals that are understandable to, and inspirational for, students of entrepreneurship. For example, it would not be inspirational for a student of entrepreneurship to know that the goal of the curriculum and pedagogy was to develop a cognitive bias of 'over-confidence'. In contrast, a useful translation of this bias that would be, from a curricular perspective, teachable, inspirational and measurable might be to aggregate 'overconfidence' into a category of 'personal resilience'. Can the latter be taught? Arguably, yes. Can it be measured? Yes. Is it inspirational? You be the judge.

This article will not provide an overview of all of the relevant and highly specific research that has been published on the cognitive skills of entrepreneurs. There have been several very useful summaries of this research published in the past few years. Here, the concern is to translate the research into language that is useful to curriculum builders. I have borrowed the approach of Howard Gardner and describe the aggregated cognitive skills unique to entrepreneurs in terms of 'minds'.

- The Opportunity Recognising Mind
- The Designing Mind
- The Risk Managing Mind
- The Resilient Mind
- The Effectuating Mind

Each of these five minds for the entrepreneurial future is explored in greater detail next.

The Opportunity Recognising Mind

Research into the cognitive skills unique to entrepreneurs has reported observation of a distinct 'opportunity recognition' capability (Baron & Ensley, 2006). In fact, some scholars have asserted that opportunity

recognition capability is a fundamental concern of entrepreneurship research (Venkataraman, 1997). Opportunity recognition has been observed to be a form of pattern recognition that develops over time among seasoned entrepreneurs (Baron, 2006). Experience teaches entrepreneurs that certain patterns in consumer behaviour, economic conditions, resource availability and other factors are associated with new rent-seeking opportunities. Non-entrepreneurs, who have not learned to recognise these patterns either through experience or academic study, are less likely to recognise the higher level economic opportunity the patterns represent.

Entrepreneurship scholars have been examining the opportunity recognition mind and have identified several attributes that this mindset embodies. With more subtle definition through continued research, it seems feasible that a suitable curriculum can be developed to help foster the opportunity recognition mind. For example, rather than studying entrepreneurship cases at the level of strategy or operations, it may be worthwhile to develop and study cases of nascent entrepreneurship. Of course, this is a harder task for scholars as selecting a nascent entrepreneur who is likely to have a successful venture can be vanishingly difficult. Still, research can be designed that hedges its bets by including a cross section of nascent entrepreneurs, and examines their cogitations and emotions as they observe and weigh a variety of factors in their respective environments. Such research is likely to produce several case studies that reveal salient factors and patterns that occupy the thoughts of nascent entrepreneurs who create successful ventures. It is assumed that their cognitions differ to a measurable and effable degree from those whose ventures don't succeed, or they are simply lucky.

The Designing Mind

In the world of the entrepreneur, design plays a key role in a variety of ways. Entrepreneurs must either design a novel product and/or service to bring to a market, or they must be able to recognise such design novelty. Alternatively, they may design techniques for bringing existing products and services to underserved markets. In either case, the ability to design a 'solution' to a customer's problem is vital to entrepreneurship.

In addition to designing the product/service offering, the design of the entrepreneurial venture itself is a singularly important act that entrepreneurs carry out with intent and over time (Sarasvathy, 2004). The

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location of the venture, the reporting structure and job titles, the supply chain and other elements must be designed for maximum efficiency and effectiveness. Not least, most entrepreneurs are constantly in money raising mode and must be capable of designing a deal structure that is attractive to investors.

The concept of design thinking has received increasing attention beyond the realm of the entrepreneur. Design thinking is defined as ‘the way designer’s think: the mental processes they use to design objects, services, or systems’ (Dunne & Martin, 2006: 516). This is a distinct way of thinking focused on projects compared to traditional managers who think in terms of permanent assignments. Herbert Simon was an early advocate of design thinking. In his acclaimed book, *The Sciences of the Artificial*, he noted, ‘Engineering, medicine, business, architecture and painting are concerned not with the necessary but with the contingent—not with how things are but with how they might be—in short, with design’ (Simon, 1969: 46–47). Only recently have investigators begun to use the concept of design thinking in the context of entrepreneurship (Jacoby & Rodriguez, 2007). It is emphasised here as one of the five minds of the entrepreneurial future because it seems to offer a richness of reference that ‘organising’ or ‘operating’ lack.

The Risk Managing Mind

A common (mis) perception often expressed is that entrepreneurs are notorious risk takers. This perception has become commonplace because of the many exemplary entrepreneurs who, in fact, exceed the average tolerance of risk. Erroneously, the risk-taking propensity is identified as essential to their relative success. Of course, some entrepreneurs are risk takers to an extraordinary degree, but the frequency of risk taking among entrepreneurs is likely similar to that of the general population. What far more likely is the case is that entrepreneurs have become exceedingly adept risk minimisers. They are able to look at situations that, of course, include elements of risk and have learned techniques that enable them to bring the risk down to levels that are tolerable (Janney & Dess, 2006). By way of contrast, someone who has not developed this risk minimisation capacity will avoid the situation and its associated risks.

Entrepreneurship scholars have, in the last several years, begun to examine not only how entrepreneurs recognise economic opportunity but

also how they evaluate the risks associated with that opportunity (Keh et al., 2002). Managing risk involves internal and external components. Internally, the successful entrepreneur has learned to live with risk and to adapt to the ambiguity that it usually entails. Externally, the successful entrepreneur has learned to minimise risk through a multitude of actions. Raising capital from external investors, aggregating required resources, honing in on essential and advantage-providing knowledge and others are techniques the seasoned entrepreneur routinely employs.

The Resilient Mind

Resiliency is a term that has been used to refer to the ability to survive and even thrive under conditions of turbulence, change or trauma. In general, it refers to an ability to absorb defeat and/or bad news without losing one's focus on goals and objectives (Mangurian, 2007). This characteristic is especially useful for entrepreneurs since it has become common knowledge that entrepreneurship as a lifestyle will occasion failure (Timmons, 1986). The ability to rebound from entrepreneurial failure and continue the entrepreneurial lifestyle is a textbook example of what is referred to as resilience. The ability to continue in the wake of entrepreneurial failure includes confronting a range of obstacles. Among these are personal and internal obstacles, including emotional state, financial condition, family matters and others. Resiliency means being able to manage these various pressures in a manner that enables the continuance of the entrepreneurial lifestyle, whether or not a particular venture continues. Entrepreneurial failure also brings a number of external pressures to bear, including the entrepreneur's reputation among peers, investors and others with potential influence. This reputation may influence the entrepreneur's future ability to launch a new venture, raise necessary funds or acquire needed resources.

As a personality trait, resilience requires emotional intelligence as well as social awareness. Emotional intelligence includes the ability for one to recognise disappointment, frustration and even depression as legitimate emotions associated with loss. When the entrepreneur loses his or her business, it should be expected that some negative emotional state will arise. The ability to accept a negative emotion, deal with it effectively and move on to new challenges is a major component of resilience. So is the

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ability to move about in the social world during periods of challenge and difficulty. Withdrawing into some neutral corner or lashing out at forces beyond one's control as responses to entrepreneurial failure can damage the entrepreneur's social reputation. Resilience certainly also includes the ability to maintain one's equilibrium in social settings, which, in the case of publicly known entrepreneurial failure, generally leads to *enhanced* reputation.

The Effectuating Mind

Entrepreneurship certainly calls for an action orientation on the part of its practitioners. It is not possible to claim success as an entrepreneur without understanding, at least, how to *do* two things: (1) create or acquire something of value; and (2) deliver that value to a market willing to pay rents in excess of costs. Both of these essential ingredients of entrepreneurship require intentional actions, but neither is sufficient unto itself. The inventor in the garage who creates the next iPod, but lacks the action orientation to find a way to deliver the product to a market, will listen in isolation to whatever media his invention plays back. The salesperson who has a world class rolodex of willing buyers will dial the phone in despair unless he is able to lay claim to something those buyers value.

Entrepreneurship requires focused action. The effectuating mind is oriented towards understanding the gap between current and future reality, and towards traversing the pathway between them. Creativity may play a role in pioneering a path to be traversed, but that is not necessarily required. Many entrepreneurs are expert followers or 'second movers', following the pathways blazed by pioneers. What the effectuating mind requires is an orientation toward goal definition and goal achievement.

Research into the effectuating mind or 'action orientation' of the entrepreneur is replete with cognitive heuristics and biases, and emotional predilections. Effectuation theory, as it is now referred to in the literature, attempts to develop a theory of entrepreneurship expertise (Sarasvathy, 2001). Effectuation is decidedly an action orientation that is fundamentally at odds with several staple beliefs about entrepreneurship education. For example, many entrepreneur educators focus on market analysis and business planning as the core of their curriculum. Yet, effectuation research indicates that expert entrepreneurs don't rely on predictive or

causal knowledge, and are prone to rely on an action, feedback, new action approach to venture development (Read & Sarasvathy, 2005).

The Five Minds: Curricular and Pedagogical Implications

The five minds developed are intended to continue the analysis initiated by Gardner, and to extend it into the specific realm of entrepreneurship education. Likely, anyone who intends to succeed in entrepreneurship will also need to have a foundation of skills in the minds recommended by Gardner. It seems, without question, that entrepreneurs will need to be disciplined, creative, responsible and ethical, as Gardner insists. This is the realm of general education, and entrepreneurs should be exposed to the lessons and curriculum of this essential component of citizenship.

Nonetheless, Gardner's 'minds' can and probably should be extended and modified for designing a curriculum germane to specific professions and/or career orientations. Although Gardner's minds don't provide insight for specific professions, the overall approach to identifying essential minds and then building curriculum suitable for attaining them seems sound (Rossi, 2007). Gardner's analysis is more compelling in that it is derived from the extant body of cognitive skills research. It provides not only an intellectual foundation for curriculum development but also suggests specific metrics for educators to use in evaluating their effectiveness in achieving their professed aims.

The five minds of the entrepreneurial future are synthetic meta-categories of a range of underlying cognitive sub-skills that have been identified as unique to entrepreneurs. It is likely that entrepreneurship curriculum developers will be interested in designing programming that develops both the meta-category and sub-skills levels, and measuring outcomes in each. This concluding section examines outcome issues and suggests metrics that may be relevant in each of the five minds at the meta-category level only.

The Opportunity Recognition Mind

The recognition of opportunity is essential to entrepreneurship. It is a skill that develops over time in most entrepreneurs, suggesting that it is a skill that can be learned and refined. The research literature describes the

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process of opportunity recognition as akin to the pattern recognition that is developed in individuals who are deemed experts in a field. Successful entrepreneurs are experts in this manner. They are able to review and understand 'deals' more rapidly than novices. Successful entrepreneurs use heuristics that they have developed from their own experiences and from watching others. Curricular innovations that may help develop this mind include:

- Allow students to evaluate nascent entrepreneurial ventures, and encourage them to track those ventures over time.
- Review a set of mature and defunct entrepreneurial ventures whose outcomes are not revealed to the students. Ask them to use their evaluation skills to judge which of them were successful and which failed.
- Introduce students to seasoned venture capitalists (VC) via in-class sessions or via the many online video sources. Students should listen for and later discuss the criteria the VC uses to determine where and when to invest.

The Designing Mind

This mind defines the need to combine disparate ideas, people or physical objects in novel ways that appeal to others. Entrepreneurs must design their products and services, the structure of their ventures, the structure of their equity and debt offerings and other things. There are several curricular approaches that may help create the designing mind:

- Design thinking is inherently interdisciplinary and combinatory. Students should be challenged to work on projects that require multiple perspectives to achieve acceptable outcomes.
- Designing requires relentless prototyping. Students should be taught to review their ideas with trusted others for feedback that results in evolutionary and incremental improvements in their original concepts.
- The outcome of design is a narrative or story. Students should be encouraged to review an entrepreneurial venture and develop a compelling story about it to share with others.

The Risk Managing Mind

The ability to manage risk refers both to the ability, emotionally, to manage perceived risk and the ability to reduce actual risk through specific actions. Both of these elements of the risk management mind are amenable to curricular interventions and measurement. Some techniques that entrepreneurship educators might use to develop the risk management mind include:

- Helping students develop stress recognition and management skills. The young (20–26 years old) students that occupy much of the undergraduate entrepreneurship classrooms can be taught to recognise signs of stress as well as techniques for coping.
- Teaching students the wide variety of financial resources available to them. Successful entrepreneurs have learned to leverage multiple financial resources, including other people's money, banks, credit cards and others.
- Teaching students how to network and communicate with people who may be able to help them solve problems. Successful entrepreneurs are able to aggregate human resources to help them solve business problems that they could not solve on their own.

The Resilient Mind

This mind may be the most difficult to teach in the classroom, as successful entrepreneurs develop resilience only through multiple real-world failures. The goal in teaching the resilient mind to nascent entrepreneurs, then, would be to somehow accelerate the failure process. This is best done under conditions that produce the same type of emotions—although, likely not as intense—that entrepreneurs feel when experiencing venture failure. Experiencing the actual emotion with the lessons about failing and how to avoid it in the future not only helps cement those lessons in the mind but it is arguable that learning to cope with the emotions associated with failure is, in fact, the primary lesson. Often, nothing general can be learned from a failed venture that is useful as a heuristic in future ventures. Nonetheless, the emotional coping skills can be applied in multiple and unrelated settings. Several techniques may be useful in helping students develop resilient minds:

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- It may be useful to place students into overtly competitive situations in the classroom, where some win and some clearly lose. Class discussion would focus on the emotions the losers feel, and how they can develop internal dialogues to help them cope more effectively with any negative emotions.
- Classroom instruction should include conversations with entrepreneurs who have recently failed. Too often, instructors feature guest speakers who have had tremendous entrepreneurial success. These speakers usually recall their failures only vaguely. It is far better to bring in a recently failed entrepreneur to discuss how he/she is coping with the failure.
- Have volunteer students recall to the class an instance of what they consider to be a major failure in their lives. Students should provide sufficient detail to help conjure some level of emotion in them and also, in their classmates. Discussion should focus on how to think about the failure in new ways, especially in ways that maintain the emotional balance of the individual.

The Effectuating Mind

This mind is about taking action in a world of uncertain and often unpredictable outcomes. The effectuating mind has been the subject of scholarship in entrepreneurship for just shy of a decade (Sarasvathy, 1998). It is based on the assumption that there is something like entrepreneurial expertise, and that this expertise can be learned via a process of ‘deliberate practice’. Individuals who engage in deliberate practice acquire superior knowledge structures and from that derive superior expert performance. A curriculum designed to develop an effectuating mind would use the principles of deliberate practice as a basis. The principles and suggestions of how they relate to the deliberate practice of entrepreneurship include:

- **Motivation:** Individuals must be motivated to undertake deliberate practice and develop expertise. Nascent entrepreneurs should be taught to tap into whatever motivations are strongest for them, whether it is acquisition of wealth, solving a major social problem or the sheer enjoyment of starting up companies. Entrepreneurship educators should design curricula that tap into the diverse motivations that people will feel.

- **Understandability:** Some entrepreneurship educators make extensive use of practicing entrepreneurs in the classroom. While their stories of their entrepreneurial journeys can be enjoyable, they often lack a cohesive framework that enables students to glean lessons that apply in other situations and circumstances. Understandability means that the nascent entrepreneur learns an arsenal of skills, models and processes that can be applied across entrepreneurial domains and opportunities.
- **Feedback:** For deliberate practice to affect learning there must be immediate feedback on performance. This part of the learning process is critical as students try new behaviours and modify them in the face of negative feedback. This process of trial and feedback resembles that used by experts as they continuously upgrade their cognitive pattern recognition systems. Entrepreneurship curriculum should provide students opportunities to practice new behaviours and understandings, and receive immediate feedback on those performances.
- **Repetition:** Deliberate practice involves repeated performance of the same or similar tasks. The motivation required to repeatedly practice is one of the key distinctions between experts and people who merely have experience. Entrepreneurship curriculum should strive to convey the need for repetition as a means of developing entrepreneurial expertise. Too often, curricula highlight the 'one hit wonders' or those entrepreneurs who became successful on their first effort. Far more common is the entrepreneur who tries multiple times to become successful, learning valuable lessons along the way.
- **Fit:** This component of deliberate practice asserts that the tasks being practised must fit the individual and the contextual circumstances. For example, a person who aspires to be a concert pianist must not only have appropriate equipment but must also be fortunately endowed with talent. If either is lacking, there would be no fit between the practice and the goals. Nascent entrepreneurs must learn that success is a function of talent, expertise, environment and other factors. Sarasvathy (2001) recommends that a curriculum should help students appreciate questions such as what they know and whom they know, what types of economic and/or social artifacts they wish to have and should create.

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Taken as a whole, these five minds provide a provocative intellectual foundation for entrepreneurship education and curriculum development. The articulation of the aggregated cognitive sub-skills in terms of entrepreneurial minds provides curriculum designers with a handy taxonomy, not unlike those used by general education curriculum designers. In addition, each of the entrepreneurial minds is based on a rich and growing literature that focuses on the cognitive skills that successful entrepreneurs possess. Thus, there is ample opportunity for curriculum designers to develop skill-building exercises and activities that target the various sub-skills. Importantly, most of these cognitive sub-skills lend themselves to pre- and post-intervention measurement, and most have substantial normative data that enable broad comparative interpretation.

The five minds for the entrepreneurial future presented in this article represent a 'shot across the bow' of entrepreneurship educators. This article is not intended as a last word on this important topic, but it does insist on establishing intellectual foundations for our curricular interventions. Entrepreneurship has a long and inspiring legacy in the Western world. Entrepreneurs carved out mountains and built railroads, they lit our cities, they built our buildings and, in many cases, were the founders of our leading academic institutions. As humbling as it may be, entrepreneurship has and probably would continue to flourish with or without entrepreneurship educators. With a firm intellectual foundation for the entrepreneurship curricula we create and offer, we should at least be able to develop an explanation that indicates to students and interested onlookers that we know what we are doing. More importantly, this intellectual foundation will give *us* conviction that we know *why* we are doing what we are doing in the entrepreneurship classroom.

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