Supporting a New Generation of Innovators and Entrepreneurs

A Talk for the Westminster Higher Education Forum

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Abstract: What can modern education with its emphasis on conformance and measurement do in order to support innovation and entrepreneurs with their emphasis on diversity and performance? Tom de Havas attempts to highlight some of the problems from the perspective of an entrepreneur and suggest some changes to free up education to support innovation and entrepreneuring.

The Author: I built my first radio transmitter at 12 and much later a business from a back room to a turnover of £1,500,000. I have since involved myself with issues from defence policy to system theory. I founded Medway Makers and Science Faction Ltd as ways to re-engage everybody in, constructive social activities leading to new capabilities and achievements, but I cannot take the credit, people make it happen. We are uniting the three pillars of Science & Technology, Art & Design, and Innovation & Industry.

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1 Entrepreneuring

Entrepreneurs find ways to create value and sell it. This may or may not involve innovation but usually does in terms of either the product, service or the marketing of that product or service.

The web defines innovation as;

> *noun* - the action or process of innovating. "innovation is crucial to the continuing success of any organisation"

> *synonyms:* change, alteration, revolution, upheaval, transformation, metamorphosis, reorganisation, restructuring, rearrangement, recasting, remodelling, renovation, restyling, variation; new measures, new methods, new devices, novelty, newness, unconventionality, modernisation, modernism; a break with tradition, a shift of emphasis, a departure, a change of direction. "they favoured the traditional approach and resisted innovation"

1.1 Entrepreneurs Output Value

Entrepreneurs try to generate and deliver value where there previously was none.

The psychologist Abraham Maslow defined a hierarchy of human needs in his paper "A Theory of Human Motivation" published in 1943. These were roughly;

- Physical needs - The physical requirements for human survival, food water etc.

- Safety needs - The need for peace, stability and housing etc.

- Clan needs - Sense of belonging and acceptance among social groups.

- Esteem needs - Desire to be recognised and valued by others and self.

- Self-actualization - the desire to accomplish everything that one can, to become the most that one can be in ones chosen role.

Of course most of our basic needs and wants are met and today's entrepreneurs are left; to think of things we might value if we knew that they existed, or to tease out our desires and make products and services to satisfy them.

Innovation is; making things we value, and shaping life in ways we value as people.

1.2   Innovation

There are many new businesses that start each year that do not involve innovative products or services, the launch of a new brand of butter for example, but we would have far fewer businesses in the world delivering far less value it it were not for innovation. What ever innovation is lacking in the product or service will have to be made up for in the marketing.

The path of innovation is generally uncharted, most really profound innovation begins with an unthinkable step.

- Pneumatic tyres must have seemed ridiculous to people used to iron tyres.

- The idea that steam could be used in an engine, to allow a man shovelling coal into a fire, to haul 100 tons up an incline, would have seemed insane to the Romans.

- Who would have expected Loom Bands to sell in the quantities they have.

All these show that innovation is outside the obvious.

1.3 Credibility and Persistence

My experience has told me that the process of innovative entrepreneuring divides into two phases.

Phase 1: Why are you doing this?

When you first start out on a new business venture the majority of people around you believe that you are clearly losing your marbles and that you will eventually come to your senses and get a proper job.

You are subject to odd looks of pity and helpful advice.

More than 50% of the time they are right. However they only need to be wrong 20% of the time and for you try a sufficient number of times, in order to succeed and reach phase 2.

Phase 2: How did you do it?

In phase 2 you struggle to keep up with the ever growing number of customers.

Similar people to the afore mentioned are now asking you how you did it and what is the secret of your success.

What entrepreneurs have is persistence in the face of adversity. A tendency to solve problems rather then abandon them.

Given that the majority (more than 50%) of really innovative projects will fail, and that they are sufficiently "off the wall" or "outside the box" to appear unrealistic - How can we support the next generation of entrepreneurs?

2   Education

2.1   Conformity Versus Diversity

So how can modern education support innovation in a new generation of entrepreneurs?

- Currently education asks for conformity and measurable performance and most projects are expected to be completed in hours or at most days. Projects are driven by the need to tick a box.

- Innovation asks for diversity, which is difficult to measure fairly. Most projects are expected to be completed in weeks or months or even years. Projects are driven by the enthusiasm of the person doing them.

How can we resolve this crisis of values? How can we bring these things together?

Most innovation comes from a process of evolution and evolution depends on diversity. Conformity has a role to play but we shouldn't be obsessed with it. (I am not talking about diversity in terms of nationality, race or gender. I am talking about diversity of aptitudes and capabilities.)

There is little welcome for the processes of innovation and no place for the exceptional within the current education system at every level.

Currently, due to the obsession with measurement and the erroneous belief that it is the only way to gauge performance, pupils and teachers that deviate from conformed learning methods suffer penalties in terms of grades and often in terms of careers. This stresses and eventually drives away, innovative teaching staff to careers where they are more appreciated.

Homework is said to teach you to work independently but actually it stops you from making your own choices about how you spend your free time, it takes away the time left for innovative children to innovate. I am not suggesting that all children are innovative or want to be, but those that are are held back.

So how can education support the next generation of entrepreneurs?

2.2 Natural Aptitude & Nurtured Capability

The nature versus nurture argument usually involves extremists who are happy to attribute all are abilities to one or the other. Both positions clearly are not substantiated by what we see around us. Without question there is obviously a nature and a nurture element to who we are.

Define a "capability" to mean, being able to do some particular thing.

Define an "aptitude" to mean, an innate quality that supports the acquisition of capabilities.

There are arguments to the effect that exceptional capabilities are all learned and then this is usually followed by the idea that therefore anyone can do it.

There is no question that people with a talent for electrical engineering are not born knowing ohms law, and musicians are not born knowing how to play an instrument, but what they are born with is a predisposition to feeling fulfilled by the activities that will lead to their exceptional capabilities in a given area.

Irrespective of what may be nature and what may be nurture, the underlying dogma is that children arrive at school largely

equal and every attempt is made to ignore differences in aptitude and capabilities to the point of suppressing outliers who in there time may well become the entrepreneurs of tomorrow.

Nature

There may be research out there regarding the aptitudes in the early years but due to time constraints I shall provide only some of my own story which I do not believe to be extraordinary by any means:

> I suspect when my first word was "Light-on" my mother was somewhat disappointed.

> At four on a nice walk in a country lane I found an old TV Chassis in a ditch and because my mother wouldn't carry it home for me I carried the half mile home myself and from it I learned my first electronics.

I think this supports the notion that we are all born the same, is a total misnomer, we are far from the "blank slate" that early education seems to expect and sometimes demand.

> Everyday I was struggling to find out more about science but was told at school I needed to try harder in French and German.

> I simply did not have access to the knowledge I was seeking, anywhere.

> About 14 years old I fixed a TV and so spent Saturday and Sunday mornings watching the Open University and that was some of the best education I ever had.

> Also when I went to technical college at 16 there was a good technical library and a computer terminal that I wrote my first programs on, and that supported my future career.

> I did the minimum examinations necessary for university and that left me with time to build radios, fix TVs and blow

up buckets in the back garden, safely most of the time. I had a few electric shocks a boy shouldn't have and at one time had an exposed colour TV tube working on a table top in my bedroom, that's 25 Kv! My sisters seemed to know, not to touch anything.

All this education was outside school, it was not assessed it was immeasurable .

There was little doubt that I was the right kind, of not normal.

Nurture

The education system did very little formally to encourage or support my boundless quest for experience in the fields of my interest, preferring to demand conformity.

My father died when I was two and my mother had no special interest in the subjects which I seemed to have an aptitude for, despite the accusations of my nursery teacher.

There are three other indisputable cases of outliers in my own family and I believe that we are far from rare as families go. Why do they waste us?

Concluding

Let me say that when children arrive at school, it is largely irrelevant how much of their ability can be put down to nurture or nature, how much is aptitude and how much is capability.

The current education system ignores what activities a person may have aptitude for, preferring to nurture a fixed set of capabilities towards a uniform output. We constantly see the school system measured by only literacy, numeracy and general science, yet there is no consideration of capabilities in electronics, programming, gardening or cooking etc.

If there had been some decent physics texts in the classroom

when I was 6 I would have been motivated to read earlier. The most advanced physics available was "Tin tin goes to the moon"!

Inevitably the standards that can be achieved in any subject by people who are motivated by "if you don't do this you will fail in life" versus the standards that can be achieved by tapping into peoples natural passion, are simply worlds apart.

Admittedly with a class of 30 and endless marking and reports, no teacher has time to deal with diverse aptitudes, many simply don't have the capability and some actually despise these children or simply pretend they don't exist.

But it is only by tapping into enthusiasm that we will nurture the innovators of tomorrow. Currently natural motivations are essentially wasted.

2.3 Ability in Education

I want to consider two models of ability:

The Dumb-Smart Model

Now from education I got the impression that there were smart people and dumb people and a line in between and luckily I was nearer the smart end so I was OK.

It seemed that the focus of the system was, measuring people out on this dumb-smart line.

But from running a business I found out the dumb-smart line was a very limiting concept.

The Diverse Capabilities Model

There was a very diverse range of capabilities in the people out there, that couldn't always be measured against each other and some that were not even recognised.

The thoroughness and patience of serving a perfect coffee a hundred times a day is disregarded. Why? I know a woman who has just opened her second coffee shop because of her capability to do this. That is entrepreneuring and there is innovation in the creation of an environment where people want to sit and enjoy their drink. Would this ability ever be seen as important in today's educational environment?

Competition or Cooperation

In a fervour of talk about the benefits of competition and the competitive environment most people overlook the fact that many of the bodies that actively compete in the environment are formed of cooperating individuals working together to compete more effectively.

The whole reason that life ever evolved beyond single celled organisms was because cooperation can succeed in competitive environments.

Entrepreneurs have to master the art of getting people to cooperate.

Individual Capability v. Collective Capabilities

Most enterprise is formed of groups of cooperating individuals who have diverse capabilities but contribute to a common set of organisational objectives and directives. This is enterprise culture and it is much closer to the way humans naturally operate. I am not saying that there is no internal competition, but in successful organisations, it is carefully controlled and cooperation is the predominant paradigm.

Within the educational world we measure individual ability not collective ability. Even when students are encouraged to work together on projects in groups these groups are necessarily formed from those on the same course and cannot include or emulate the carefully engineered social groups of a modern enterprise.

The Damage of the Dumb-Smart Competitive Model

The "dumb-smart competitive" paradigm leads to attitudes which damage the "diverse capabilities cooperative" paradigm.

> You know its so hurtful when people imply that doing a job like serving coffee is dumb.

> Its also so hurtful when I build my latest wonder gadget and show it to somebody and they say "Oh I suppose you think your clever".

> Now that I am 54 I am old enough to understand this response comes from a deeply entrenched dumb-smart competitive attitude - I explain that actually I showed it to them because I wanted to share the joy of the thing with them and actually I was looking for a kind of parental approval and mutual pleasure, as well as offering to help them make one if they want.

So what I'm saying is that current education doesn't nurture or acknowledge a vast number of natural aptitudes that form the invaluable bedrock of innovation and thus enterprise, and that teachers who try to deviate from the "dumb-smart competitive" paradigm are penalised.

The ultimate manifestation of the dumb-smart model are qualifications like the Baccalaureate that extend over a broad range of subjects but can provide a general passport into higher education to study subjects in which the students weaknesses are hidden. The 11+ again attempts to assess on the dumb-smart line rather than appreciating children with specialised capabilities.

We must recognise that children are not blank slates and that education should nurture, natural aptitudes to the full, and develop capabilities to the full in the service of society.

2.4 Motivation in Education

The most natural motivation is enthusiasm. Why not use it rather than fight it.

Schools rely on discipline and as a means of pushing children to study subjects in which many have no interest rather then choosing subjects to match the individuals aptitudes, capabilities, and interest in a similar manner to higher education.

There is a serious lack of hands on education, use of tools, equipment and practical activities meaning that practical hands on people are disadvantages from the start.

Many children attend school to meet legal requirements and to free up time for their parents to work.

Even in higher education there are still difficulties dealing with diverse abilities because the focus is on qualification rather than education.

In this respect education does not nurture, natural aptitudes and often totally opposes exceptional natural aptitudes and capabilities. It is a shocking waste of talent.

2.5 Assessment in Education

The priority of qualification over education means;

- teaching with the objective of getting the the best test results out of the maximum number of students,

which is quite different from,

- teaching with the intention of supporting each student to maximise their capabilities.

Lowering the Bar

A directive to get the the best test results out of the maximum number of students, where the teacher is themselves assessed and possibly penalised if they do not do so, provides a substantial incentive for lowering the standards at every opportunity.

This incentive extends even as far as a government keen to make its self appear positive in terms of its achievements in education.

Focus

There is no incentive to teach a student that are unlikely to improve their scores and there is no incentive to teach material that isn't being tested.

There is a clear incentive for the educational abandonment of both low and high abilities in the given subject.

The educational focus is on a specific ability range in the given subject.

2.6 Segregation in Education

Age Segregation

Current educational segregation at school is primarily by age thus not supporting exceptional children of which there are many.

Even with streaming children are confined to the sets of their year. The assumption is that the variation is an anomaly and that no child can consistently go five times as fast as another in any given subject. Highly capable children are generally regarded as nuisances.

Dumb-Smart Segregation

Current educational segregation at school is secondarily topically into perhaps 3 bands of general ability i.e. that span all subjects!

This essentially assumes that the dumb-smart line is a reality and that someone who is good at English should be good at maths also and visa versa. This means that those that do not fit into the dumb-smart hypothesis can suffer in all subjects by being in classes that are both too advanced and other classes that are not advanced enough. This is a huge waste of student potential.

There are for sure very capable people and very incapable people but the majority do not have their capabilities distributed evenly across subjects. The pretence that they do is both wasteful and demoralising.

Subject and Ability Segregation

Although in higher education extensive segregation by subject and ability has taken place, the demand for measured outcomes still means that there is an incentive to lower the bar and focus on those likely to improve rather than assisting students to develop their aptitudes and capabilities to the full.

2.7 Conclusions

If the education system seriously wishes to encourage innovation and thus entrepreneurialism, then It is certainly time we left the Dumb-Smart model of education behind us and focussed on supporting individuals and groups to develop diverse capabilities to the full.

We must also dispense with the "blank-slate" model and assist all students to develop their aptitudes tapping into there enthusiasms and helping them make choices but with an understanding of the media's influence on the popularity of choices and through an understanding of the risks and rewards

linked to those choices and the amount of work involved.

The focus of education should be to develop evidence based portfolios for each individual that can be taken to potential employers who can then see for themselves what a person has achieved and can assess what they may be capable of in the future.

Assessment should be as much as possible by employers because employers are in a far better position to evaluate a portfolios application to their business than than the education system is.

How can these objectives be met? How can we encourage diversity and thus entrepreneurialism in the current education system?

I believe by supporting a workshop format of teaching rather than a chalk and talk style.

Maker spaces have been doing this for some time with some startling results.

3   Maker Spaces

Maker spaces are workshops where people come together to work on achieving sometimes personal or sometimes collective, practical objectives.

Maker spaces can support **diverse** interests and ability ranges. They encouraging people to be all they can be rather than holding them back.

Participants are of mixed **abilities**. When one individual lacks a capability they can learn it from another. If no one in the group has the capability then they look to outside sources of information such as the internet. They allow highly capable people to share their capabilities with others in the socially cooperative structures that mimic industry. This is best practice.

Because there is no formal **assessment** and grading there is no **motive** to learn just to attain grades and there is no formal ranking or segregation of ability.

Individuals choose to participate or not as the case may be. They **self select** and stream themselves into the best projects for them.

The group is there and supports each individual to develop their capabilities to the maximum irrespective of the level of any other individual.

And who directs, manages and runs these spaces:

- People with passion who have a proven portfolio of diverse achievements. They are hard to measure, hard to find but they are out there.

- It's not about prestige its about capability proven by a portfolio of products and services, these are the people

we need.

Can we afford to support this transition?

In the short term of course we can't.

In the long term - Can we afford not to?

3.1   Resources Required

At Medway Makers we have proved a Maker Space can be created in a home though resources can be limited. Myself and Michael McRoberts have more facilities than most people do at home and we have shared those facilities and our knowledge with others involved. But the kitchen table is now full, the sofa is not a good place to work, and the three computer workstations are in use every session.

This is too big for our homes. We need space. I have been talking one person from the local UTC about having a maker space there and also talking with someone at Greenwich University about hosting sessions there.

4   A Final Note

This document reflects largely what was presented in the talk I gave to for the Westminster Forum Project's Higher Education Forum. It was the result of about 30 hours work and is based largely on my own experiences of education, innovation and entrepreneuring, and the experiences I have heard about and read about.

I have little doubt that the "workshop" format for learning is the best format for innovators and entrepreneurs of all ages and of mixed aptitudes and capabilities. I cannot say whether people who lack all motivation would be best served by this teaching method.

I feel that as with all development we will not move forward because one person has a pie in the sky idea and then imposes the half baked pie on everyone else. An idea is really something to be shared not enforced and it is only by the engagement of those with years of experience in the teaching profession combined by those, like myself, with years of experience in innovation, that we can hope to come up with a genuine working system.

Any engineer knows that it takes a great deal of work to turn an idea on the drawing board into an idea in reality, and it can only be done with the support of all involved.

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