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How to develop innovators? Innovation education for the gifted[1]

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Abstract
Many people correctly believe that a majority of innovators come from the population of gifted and talented children. If we want to develop innovative abilities of the gifted, then a special, new direction in gifted education is needed: innovation education. This article introduces innovation education, which refers to a wide range of educational interventions aimed at identifying, developing, and transforming child talent into adult innovation. Such educational interventions should include, but should not be limited to, the 10 interrelated components. This article describes each of them.

Keywords
Innovation education, giftedness, innovation, gifted and talented children, innovation science

The link between giftedness and innovation

The origins of innovation education

In 2009 the US National Science Board invited experts to discuss how to develop the next generation of innovators in STEM (science, technology, engineering, and math) disciplines (NSF, 2009). This event—with a subsequent report to Congress and President Obama—showed that the US government is interested in developing innovators.

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However, this is not a new trend on a global scale. The novelty consists in that many experts came from the field of giftedness. This is because the National Science Foundation correctly assumes that giftedness[2] is related to innovation.

There is a consensus today that innovation refers to the implementation of ideas into practice in the form of new products, processes, or services (Shavinina, 2003a). Creativity refers to the generation of novel, original, and appropriate ideas. Innovation is essentially about the *implementation* of ideas. Creators generate ideas; innovators implement them into practice. There is, however, a rare group of people who are able to both generate ideas and to implement them into practice (Shavinina, 2007). They are gifted individuals.

Societies are interested in gifted children because of potential talents which—in their adulthood—may significantly enrich the world (Kholodnaya, 2002; Simonton, 2009). The history of human civilization can be understood via its inventions and discoveries (Shavinina, 2003a). The progressive development of mankind is linked to the ever-growing scientific, technological, educational, political, and commercial achievements of the human mind. Simonton (2009) demonstrated that a large proportion of the contributions to any domain come from a small number of its most talented contributors. Therefore, the gifted are responsible for innovations worldwide. They move frontiers of innovation ahead. This implies that the degree of societal interest in talented children, as well as societal investment in gifted education, will be directly reflected in the level of innovations in society, and, as a consequence, in its economic prosperity. This is why innovation is highly linked to giftedness, and why giftedness is related to economy and public policy and should be among the top priorities on any government's agenda (Shavinina, 2009b). Many of today's gifted children will become tomorrow's innovators. The efforts of the gifted education community should thus be directed to preparing today's gifted to become tomorrow's innovators.

Researchers occasionally address the issue of how to develop innovators. From many chapters in the *International Handbook on Innovation* (Shavinina, 2003a), only a few of them discuss the development of innovators in science (Root-Bernstein, 2003; Root-Bernstein and Root-Bernstein, 2003; Shavinina, 2003b; Weisberg, 2003) or the development of innovative abilities via the stimulation of creativity (Clapham, 2003; Reis and Renzulli, 2003; Shavinina and Ponomarev, 2003). How to develop innovators is a new direction in innovation science. The US government is behind a recent push for research in this area. As noted above, the National Science Board led the efforts of the US administration (NSF, 2009). Experts invited for a hearing in 2009 emphasized policy issues related to the development of innovators (Subotnik et al., 2009), findings from high-ability studies (Benbow, 2009; Van Tassel-Baska and MacFarlane, 2009), and a need to change the practice of scientists' development (Root-Bernstein, 2008). Shavinina (2009g) underlined the need to study high achievers in STEM areas (e.g., Nobel laureates, great inventors, and innovators with long-standing records of breakthrough innovations), whose innovation achievements are undeniable, as well as a need to focus on innovation education for everyone. Experts agree that the existing research base is thin (Benbow, 2009), a comprehensive research plan is necessary, and there is a need for basic research (Marrett and Johnson, 2009).

The main thesis of this article is that if we want to actualize the innovative potential of the gifted and develop their unique innovative talents, then we have to concentrate on innovation education.[3] Innovation education is not about innovations in teaching mathematics, physics, biology, and other disciplines. These are the so-called domain-specific innovations (Shavinina, 2003a). Innovation education refers to a wide range of educational interventions aimed at developing and transforming child talent into adult innovation. It means those societal actions aimed at helping gifted children to become adult innovators. These educational interventions should include, but should not be limited to, the following:

- Gifted education programs (e.g., Renzulli Enrichment Program, Future Problem Solving, etc; Cramond, 2009; Renzulli and Reis, 2009; Van Tassel-Baska and MacFarlane, 2009).
- New programs for the development of entrepreneurial giftedness, which is closely linked to innovation.
- Programs to develop metacognitive abilities of the gifted or abilities to implement things: the so-called executive abilities. Innovation is about the implementation of ideas.
- New programs based on recent progress in the study of scientific talent of Nobel laureates.
- Programs incorporating research on polymaths.
- New programs for the development of applied wisdom.
- Programs aimed at the development of managerial talent of the gifted.
- Basics of deadline management.
- Foundations of innovation science: a general 'know-what' and 'know-how'.
- Courage-related issues. For innovators to succeed, courage is essential.

The structure of innovation education can therefore be presented as 10 overlapping elements;[4] each of which is discussed below.

The structure of innovation education

Gifted education programs. As successful programs for the gifted are well described in the literature (Colangelo and Davis, 2003; Heller et al., 2000; Shavinina, 2009a), the first element of innovation education will not be discussed in detail here. Gifted education programs are not sufficient for developing innovators. It would be a mistake to suppose that gifted education itself will 'produce' innovators. There are at least two reasons for this.

First, by definition, innovation is the implementation of ideas into practice. This is not about their generation (i.e., creativity). People—and especially the gifted—are far better at generating new ideas than implementing them into practice. The implementation requires many talents (e.g., executive abilities or the ability to meet deadlines), which are not taught in gifted education programs. Consequently, if we want to develop innovators, then innovation education should incorporate such elements, which may help the

gifted cultivate talents necessary for becoming innovators (e.g., to foster their intuition and wisdom).

Second, research on gifted entrepreneurs–innovators demonstrates that many of them could not be considered gifted according to prevailing definitions of giftedness and practice of gifted education (Shavinina, 2006, 2008). Entrepreneurial giftedness is a special type of high ability that deviates from existing types of giftedness. Its study is a relatively recent enterprise (Shavinina, 2009d). We cannot, therefore, expect that 100% of future innovators will come from today's gifted. To increase chances of the gifted becoming innovators, innovation education should thus include other elements, presented below.

Entrepreneurial giftedness

The most important element of innovation education is entrepreneurial giftedness.[5] This is because entrepreneurs put ideas into practice via the creation of new ventures, which, in turn, create employment and—in successful cases—lead to economic prosperity. The essence of entrepreneurship coincides with the nature of innovation, because innovation is about the implementation of ideas into practice. Successful entrepreneurs are therefore innovators. This is why the following findings regarding entrepreneurial giftedness must be at the corner of innovation education:

Early signs of entrepreneurial giftedness. From early childhood, gifted entrepreneurs demonstrate characteristics that help them to succeed in life (Shavinina, 2008). *Specific* characteristics refer to those actions, abilities, skills, or traits that are related to *entrepreneurial* giftedness (e.g., the creation of ventures with money-making potential). *General* manifestations refer to those that can also be useful in other types of giftedness (e.g., competitiveness is helpful in business and sports alike). The following interrelated yet different *specific* manifestations of entrepreneurial giftedness were identified:

Constantly generate ideas on how to make money.

Love to generate and implement real-life projects with at least a minimal financial reward.

Love doing real business plans with predicted financial outcomes.

Work passionately and hard on executing their plans.

Wish to do 'real' things that bring money and try to do whatever possible to cut unnecessary steps.

The *general* manifestations of entrepreneurial giftedness include the following interrelated characteristics.

Perseverance to succeed: If I put my mind to something, I can do almost everything. They do not give up after the first failed project(s). Failures do not stop them.

Optimism and 'change the world' attitude. Gifted entrepreneurs from early years believe in themselves and their ability to change the world by succeeding with projects. They have a positive vision of everything. Optimism helps them succeed.

Early exposure to challenges. Gifted entrepreneurs like challenges from early years and have had a lot of exposure to them, and the love of challenges becomes one of their distinguishing characteristics.

Competitiveness, excellence, and perfection. Young gifted entrepreneurs possess competitive personalities. When they compete, they always try to be the best and win.

Neglect of academic subjects. Gifted entrepreneurs live in their own world of 'real practical' projects; school subjects do not make much sense to them. Many do not do well at school (e.g., Richard Branson). There are some exceptions. Bill Gates is one of them. He was doing well in the elementary school. Nevertheless, it is not clear whether Bill's success in academic subjects was determined by his abilities or by his extraordinary competitiveness. Jeff Bezos, who was enrolled in an gifted education program, is another exception.

Independence in thoughts and actions and a rule-breaking attitude. From early years gifted entrepreneurs are very independent in their thoughts and actions: authorities do not exist for them. A rule-breaking attitude is another distinguishing characteristic. This is why talented entrepreneurs are innovators: they are able to break all the existing rules and introduce something new. This is how and why great innovations happen.

These signs, manifested in childhood, become strong characteristics of gifted entrepreneurs in their adulthood (Shavinina, 2006).

Creative abilities of great entrepreneurs: individual innovators. Talented entrepreneurs develop their own methods for producing creative ideas (Shavinina, 2009d). Traditional creativity training does not contain anything similar. I translated those methods into a series of practical techniques for my workshops on creativity for teachers of the gifted and managers alike.

I found that gifted entrepreneurs are able to both generate ideas with money-making potential and to implement them into practice. It is a rare ability. For the most part, people either produce ideas or implement them. This unique ability of talented entrepreneurs has allowed me to talk about the phenomenon of *individual innovation.* Usually, innovation is a 'team sport' in that it involves many individuals to implement ideas into practice. The case of individual innovators is the exception to this rule: they are able to put into action all the ingredients necessary for the implementation of their ideas (Shavinina, 2007) such as organizational (e.g., creating a research lab, as Thomas Edison did, or founding a company from scratch, as Anita Roddick or Mary Kay did); human (i.e., hiring the best talent); and 'environmental' (e.g., changing the dominant working culture, as Akio Morita did when he almost rejected the traditional Japanese way of doing business at Sony; Kay Ash, 1996; Morita, 1987; Roddick, 2000). This is what the phenomenon of individual innovation is all about.

Executive abilities of gifted entrepreneurs. As mentioned above, innovation is mainly about the *implementation* of creative ideas into practice. From early childhood gifted entrepreneurs tried to implement their ideas. Lessons learned from them will be of

interest to the gifted, which should use every opportunity to implement ideas into practice.

Motivation of gifted entrepreneurs: creativity and excellence in action. Many gifted entrepreneurs founded new companies not because they wanted to make money (Shavinina, 2009b). They started businesses for a variety of reasons, which were not related to financial rewards. For example, creativity has always been behind the entrepreneurial motivation of Richard Branson: 'I have never gone into any business purely to make money. . . A business has to exercise your creative instincts' (Branson, 2002: 57). In the case of Michael Dell it is excellence that is in the heart of his entrepreneurial motivation. When he was 18 years old, Michael almost left university and his father asked him what he was planning to do with his life. He replied: 'I want to compete with IBM!' (Dell, 1999: 10). High abilities—for example, creativity or excellence—and achievement-related issues are behind great entrepreneurs' wish to create new ventures.

Unique vision: unusual type of representations. Unique point of view is the essence of giftedness (Shavinina, 2009e). This is also the basis of entrepreneurial giftedness. Talented entrepreneurs see, understand, and interpret everything in an unusual way. For example, not many 18 year olds could say with all the certitude that they 'want to compete with IBM'.

Specific extracognitive abilities: practical intuition. Gifted entrepreneurs are characterized by specific feelings, intentions and beliefs, preferences and values, as well as intuition (discussed below). It is fascinating how many important business decisions were made based on intuition (Branson, 2002; Morita, 1987). This is especially appropriate for women entrepreneurs, who have more developed intuition in comparison with men (Kay Ash, 1996; Roddick, 2000).

Microsocial factors stimulating or inhibiting the development of entrepreneurial giftedness. Future innovators should be aware of the micro-social factors that can facilitate or hinder the development of their entrepreneurial giftedness (e.g., family, school, childhood friends).[6] Examples from gifted entrepreneurs will be useful for innovation education, especially how they turn negative micro-social influences into beneficial ones.

Therefore, entrepreneurial giftedness should be a major element in the structure of innovation education.

Metacognition in action: developing the gifted's abilities to implement things

The development of the gifted's abilities to implement things—or their executive abilities—is an important component of innovation education. This is a unique ability and not everyone is capable of developing it.

A few years ago one management book became a bestseller on Amazon. Its authors demonstrated that many executives never execute. This is why the issue of the *innovation gap* is an important one. It means that people have a lot of ideas, but they are not able

to implement them because of various barriers.[7] This explains in part why innovation is still a relatively rare thing and why innovators' executive abilities are unique ones.

Human abilities to implement things—or our executive abilities—are in fact our metacognitive abilities. Metacognition refers to one's own knowledge about one's own cognitive abilities, as well as guiding, monitoring, and executing of one's own mental processes (Brown, 1994; Flavell, 1979; Kholodnaya, 2002). Brown and Palincsar (1989) designed programs aimed at developing children's metacognitive abilities. Innovation education should incorporate the best from them (Barfurth et al., 2009).

Scientific talent: lessons learned from Nobel laureates

Future innovators will benefit from learning from Nobel laureates in science. Nobel laureates' discoveries are scientific innovations. The nature of innovation is cross-disciplinary: it begins from great ideas in any field (Shavinina, 2003b, 2004). Winning a Nobel Prize represents the pinnacle of accomplishment possible in science. It is associated with a high degree of intellectually creative achievement that testifies to the innovative minds of its recipients.

In childhood, Nobel laureates in science encompassed a wide range of human abilities including the gifted (e.g., Marie Curie or Gertrude B. Elion), the gifted underachievers (e.g., Albert Einstein), twice-exceptional children, and children without any special talents (e.g., Barbara McClintock). Different profiles of abilities and divergent trajectories of talent development led to the same outcome: great discoveries, which means that those who made them possess exceptional abilities. At the end, all the various trajectories of talent development led to the same result: astonishing scientific achievements. Among many factors that made it possible, Nobel laureates' extracognitive abilities and their objectivization of cognition played important roles (Shavinina, 1996a, b, 2004, 2009f). Extracognitive abilities refer to:

> specific intellectually creative feelings: feelings of direction, harmony, beauty, and style, including the sense of 'important problems', 'good' ideas, 'correct' theories, elegant solutions; and feelings of 'being right or being wrong';
>
> specific intellectually creative beliefs and intentions (e.g., belief in elevated standards of performance);
>
> specific preferences and intellectual values (e.g., the 'inevitable' choice of great mentors); and
>
> intuition (Marton et al., 1994).

For instance, Barbara McClintock noticed that 'feeling for organism' was behind her discoveries in genetics (Keller, 1984). It is useful for future innovators to know how extracognitive abilities helped Nobel laureates to be innovative.

Lessons from Nobel laureates' childhood and adolescence are another important facet of learning from them. I am currently working on a project, A Study of Early Childhood and Adolescent Education of Nobel Laureates and the Implications for Gifted and General Education: Developing Scientific Talent of Nobel Calibre. It starts with the first

laureate, who received his prize in 1901, and ends with the laureates of 2010 ($n = 611$). Its goal is to discover the unique aspects of the early childhood and adolescent education of Nobel laureates that contributed to their superior intellectual and creative development and led to their excellent achievements in science.

Another important and unexpected aspect of learning from Nobel laureates came from a talented 10-year-old boy, Alexander, who became interested in this project. When he started to read books about Nobel laureates written for children, he discovered many interesting things. Alexander heard many times that Nobel laureates were excellent students. However, he found that Guglielmo Marconi was not a good boy at school. Nonetheless, it was *he* who pioneered radio communication. Einstein was expelled from his school in Munich, but *he* had one of the greatest minds of the 20th century. Banting was not good at school either, but *he* discovered insulin and saved the lives of millions of diabetics worldwide. The father of McClintock told teachers not to give any homework to his children; he believed that eight hours at school was enough for learning.

Alexander, therefore, originally thought that the Nobel laureates in science were great students. However, he has since found out that they were not. To be more precise, many of them were not the best in school. This made their stories so much more interesting to the boy. As the principal investigator on the above-mentioned project, I was intrigued by Alexander's findings and suggested that other children and adults might also be fascinated. As a result, he is currently working on a book about young Nobel laureates' educational stories that will be of interest to children, their parents, and teachers. The stories of Nobel laureates are very encouraging and motivating for today's gifted (Ponomarev, 2012).

It is interesting to note that at a time when researchers think of how to stimulate children's interest in science, Alexander has found some useful ways to do this. In a presentation to the US National Science Board on how to develop innovators, with a subsequent report to Congress and President Obama in 2009, I discussed Alexander's case. Specifically, his first degree of interest was why not all Nobel laureates were good learners at school. Then this initial interest motivated him to learn more about their discoveries. This was Alexander's second degree of interest. As a result, he is becoming seriously interested in science, which can be considered the third degree of interest. A deep involvement in science might be a desired final outcome and this is the highest degree of interest. His book on how 'supposed' delinquent boys and girls in school still managed to make great discoveries and became Nobel laureates is a 'by-product' of Alexander's developing interest in science (Ponomarev, 2012).

Gifted educators should thus learn from today's talented children as to how they get interested in science and use those lessons.[8] The development of scientific talents is an important element of innovation education.

Polymathy or multiple giftedness

Polymathy is another element of innovation education. The concept of polymathy refers to the cases of multiple-talented individuals who made significant major contributions to multiple domains (Root-Bernstein, 2003, 2009; Root-Bernstein and Root-Bernstein, 1999). Researchers working in an area of expertise often state that specialization is a

requirement for adult success, that skills and knowledge do not transfer across domains, and that the domain dependence of creativity and giftedness makes general creativity and talent impossible (Ericsson et al., 2009). The absence of people who have made key contributions to multiple domains supposedly supports the specialization thesis. Root-Bernstein's (2009) research challenges all three legs of the specialization thesis. He identified individuals who have made important contributions to several domains, and thus demonstrated polymathy among creatively gifted adults. Today's gifted or future innovators will greatly benefit from the knowledge about the phenomenon of polymathy that must be included in innovation education programs. Parents and teachers should also encourage the gifted to develop their talents to the fullest extent in all possible areas of human endeavor.

Applied wisdom

It is important to develop wisdom[9] in the gifted that is a special type of high ability. Researchers emphasize it many times (Ferrari, 2009; Heng and Tam, 2009). In light of innovation education, I shall point out another aspect of it. The collapse of Enron, Worldcom, and other companies demonstrated that wisdom is a much-needed, yet relatively rare, human ability. 'Mistakes will be made', repeats the Auditor General of Canada, Sheila Fraser. The most powerful way to prevent future mistakes of any kind is to rely on human wisdom. (Auto)biographical accounts on great innovators show that they have highly developed wisdom-related skills (Branson, 2002; Dell, 1999; Grove, 1996; Lowenstein, 1996; Morita, 1987). Wisdom is behind the success of any human endeavor. Wisdom and innovation are thus highly related. Societies can progress today only by innovating; therefore, every effort should be made to develop wisdom in today's gifted children and adolescents—tomorrow's innovators.

Shavinina and Medvid (2009) analyzed the wisdom-based performance of Richard Branson, a famous innovator and entrepreneur. This and similar cases (e.g., the business philosophy of Mary Kay or the entrepreneurial approach of Anita Roddick), as well as practical techniques aimed at developing wisdom-related abilities of the gifted, should be included in innovation education.

Developing managerial talent[10] in today's gifted: lessons from great managers

As noted above, innovators are able to put into place all the organizational, human, and 'environmental' structures necessary for implementing their ideas into practice. The human aspect is important. As David Ogilvy, the legendary founder and chief executive officer of the advertising agency Ogilvy & Mather Worldwide repeated, 'people are the only thing that matters, and the only thing you should think about, because when that part is right, everything else works' (Wademan, 2005: 36). Innovators should therefore be good at managing people. This is why managerial talent is a critical ingredient of innovation talent. Many famous innovators are excellent in managing people. See, for example, Shavinina and Medvid (2009) for a case study of Richard Branson as a great manager. Lessons from such managers should be an important element of innovation

education. Knowledge of their unique approaches to managing people will be an asset for today's gifted—tomorrow's innovators.

The second part of learning from great managers should be based on the Gallup's study of 80,000 best managers (Buckingham and Coffman, 1990). The gifted will benefit from knowing how and why the great managers in the world break all the rules of conventional management wisdom. Practical cases with exercises will help develop the gifted's managerial abilities.

Deadline management

A new research direction has recently emerged within administrative sciences: deadline management. Projects—including innovative ones—have their beginning and end. The same is true for any innovation that often depends on timely efforts: time needed to develop it, to introduce it to the marketplace, and so forth. A shorter period of time is better for innovation. It means that with respect to innovation those individuals and organizations who are fast in the innovation process will win. This is why deadline management should be an essential part of innovation education and should include the understanding that deadlines bring out the best in people; there is a need to cultivate a positive attitude to deadlines, as well as to develop a culture conducive to deadlines (Amabile et al., 2002; Gersick, 1995).

The basics of innovation science

Innovation education will not be comprehensive without some general 'know what' and 'know how' about innovation, such as the individual differences principle of innovation (Shavinina, 2007); the tyranny of success—when winners often become losers—(i.e., when companies lose their innovative edge); conflicting organizational pressures (i.e., functioning efficiently today while innovating effectively for tomorrow); problems associated with partial views of innovation; multiple barriers to innovation; how innovation can help increase performance; why it is important to work on many types of innovation simultaneously, and others (Shavinina, 2003a). The gifted are able to understand these multi-dimensional issues.

Courage: much needed but untrained talent

Innovators are very courageous people (Shavinina, 2006, 2008). Courage is much needed for potential innovators. When they are about to implement great ideas into practice, and thus introduce breakthrough innovations that have not existed before and nobody can predict the response from markets, they should not be afraid to go ahead. Markets simply do not exist for revolutionary innovations. It is innovators who have to create them. They should thus be courageous enough to convince everyone around them that the market will exist. Akio Morita is a great example.

When he—a co-founder and then Chairman of Sony—decided to develop the Walkman, he faced resistance. Nobody liked his idea. The Walkman appeared despite strong marketing input to suggest there was no demand for this product. The marketing

department even resisted using the word 'Walkman', because it did not exist in the English language and sounded strange to English speakers. Morita's intuition made the Walkman possible. At the peak of strong resistance to the idea of the Walkman, he threatened to leave the chairman position if Sony did not sell 100,000 Walkman in the first six months. Sony sold much more, and Morita was later awarded by a Royal Academy (UK) for his contributions to the development of English by introducing the words *Sony* and *Walkman*. He emphasized later that creativity 'requires human thought, spontaneous intuition, and a lot of courage' (Morita, 1987: 83).

Nobody teaches today's gifted to be courageous in pursuing their unique interests and implementing ideas into practice. This element of innovation education will thus fill an apparent niche in gifted education.

The 'know how' part of innovation education: HICEMTs

The 10 elements of innovation education considered so far represent the *know what* part of innovation education. Its know how part is about how to present these elements in a better possible way to gifted learners. High intellectual and creative educational multimedia technologies (HICEMTs) can be a good carrier of the know-how part of innovation education. It would be great to design HICEMTs specifically for the development of innovative abilities of the gifted. With their general and specific sets of characteristics (which are described in detail in Shavinina, 2009g), HICEMTs seem to be a good way to deliver innovation education. This is a challenging task for the future.

Innovation education for today's adults: the case of INNOCREX

So far, innovation education for gifted children has been discussed. However, it should be accessible to all members of society. In this case the elements of innovation education should be slightly modified. INNOCREX (www.innocrex.com) is an example of such modification. Its mission is to develop adults' abilities via a series of one-day workshops on creativity, innovation, excellence, managerial talent, entrepreneurial giftedness, practical intuition, and applied wisdom. Teachers working with gifted children find these workshops useful for their professional development. They learn important practical tools (for example, intuition and wisdom), which help them to channel their talent, motivate their students to be more creative, solve everyday problems in innovative ways, and perform professional activities at the level of excellence.

Conclusions

This article introduces innovation education as a new direction in gifted education. Its structure consists of 10 elements discussed above. The article emphasizes that giftedness is highly related to innovation and the economy. If gifted educators are concerned about the future of the gifted and the future of our world, then they have to focus on innovation education. Policy makers have an important role to play in helping educators and parents to achieve this goal. Successful realization of this goal will mean the fulfillment of one of the most important missions of any government: economic prosperity for all.

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Notes

1. Everyone would benefit from innovation education: the gifted and those individuals who were not identified as gifted. Innovation can come from any person in society. The gifted education community is the primary readership of *Gifted Education International*, and this is why this article focuses on innovation education for the gifted.
2. Regardless of the differences existing between definitions of giftedness and related concepts (Colangelo & Devis, 2003; Heller et al., 2000; Shavinina, 2009a), in this article the terms "giftedness," "talent," and "high ability" are used interchangeably. They refer to individuals demonstrating extraordinary abilities and/or achievements in one or many areas of human endeavor.
3. Innovation education is not intended to replace gifted education. At the same time successful development of all talents of the gifted will eventually put them at the cutting edge in their areas of endeavors and, therefore, chances are pretty high that they will innovate. Similarly, if the ultimate goal of gifted education is to produce innovators, and the majority of students do not become innovators, then it probably means that programs were not quite successful.
4. These elements were selected based on the analysis of the field of innovation science (Shavinina, 2003a) and research on the phenomenon of individual innovation in the case of eminent innovators with a long-standing record of innovation (Shavinina, 2007). Jeff Bezos, Richard Branson, Steven Jobs, Mike Lazaridis, Akio Morita are such innovators.
5. *Entrepreneurial giftedness* refers to talented individuals who have succeeded in business by creating new ventures (*fulfilled* entrepreneurial giftedness) with at least a minimal financial reward or who demonstrated an exceptional potential ability to succeed (*prospective* entrepreneurial giftedness; Shavinina, 2009a).
6. Researchers differentiate between micro-social and macro-social factors (Shavinina, 2006). The macro-social factors refer to those societal, cultural, and historical contexts in which individuals live (i.e., the contemporary Zeitgeist). Definitely, macro-social factors often operate through micro-social factors.
7. Although a majority of people believe that innovation is a good thing, researchers found that obstacles are the norm, rather than the exception, on the way to innovation (Hadjimanolis, 2003). There exist human-related, technology-related, and policy-related barriers to innovation, just to mention the main, broad groups of barriers (Shavinina, 2003a). A wide range of obstacles make it difficult for potential innovators to implement their ideas into practice. The issue of the innovation gap should thus be kept in mind when we are discussing the executive abilities of the gifted.
8. In a time when world-renowned specialists from a variety of disciplines try to suggest ways to stimulate children's interest in science, Alexander discovered a great way to motivate kids to learn more about science. By using these lessons, parents and teachers will develop scientific talents of Nobel calibre in today's gifted, which will enrich the world by subsequent scientific innovations.
9. Wisdom refers to the application of intelligence, creativity, and experience as guided by values toward the achievement of a common good, through a balance among (a) intrapersonal, (b) interpersonal, and (c) extra-personal interests, over the (a) short and (b) long term, to achieve a

balance among (a) adaptation to existing environments, (b) shaping of existing environments, and (c) selection of new environments. Foolishness is an extreme failure of wisdom (Sternberg, 1998).

10. Traditionally, managerial talent is associated with an individual's exceptional ability to deal with people, mainly to motivate them to achieve high performance (Buckingham & Coffman, 1990). Recently, Shavinina & Medvid (2009) defined managerial talent as a combination of applied wisdom, practical intuition, excellence, entrepreneurial giftedness, creative abilities, and innovation.

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Biography

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