METHODOLOGY

Theory and Practice of Training in Talented and Innovative Thinking in Schools

Part 1.

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Content

Introduction

The concepts of innovation and innovative thinking today are amongst the key guiding concepts of education policies and practices in many countries and regions. Economic globalisation, increasing international competition and spreading of innovation-based strategies of competition in the business and public spheres as well as fast technological changes (e.g., advent of the 4th industrial revolution) are only a few of the factors that make education policy makers, social partners and stakeholders, but foremost educational institutions and teachers focus their attention on the innovations and innovative thinking in the learning and teaching practices.

Innovations and innovative thinking increasingly occupy the place of the core objects of education and training processes and become favourite objects in the education strategies and policy documents. However, in many countries we can see important gaps between recognition of the strategic importance of innovations and innovative thinking for the present and future education on the one hand, and implementation of real practices and measures of development of innovative thinking in general education on the other hand. It can be explained by different objective and subjective factors.

There are certain challenges in sustaining the needs of creative thinking in the period of implementation of innovations and innovative solutions that are usually based on standardisation approach that reduces the need for creative and original thinking. For example, creation of innovations in the ICT sector was followed by spread of the "digital taylorism", which significantly reduced the complexity of the work processes and lowered the demand for high skills and creativity.

However, looking at the existing practices of education, the core challenges in the development of innovative thinking in the schools are related to the lack of methodological and didactical know-how, which hampers developing innovative thinking skills in the educational didactic processes. Despite the growing supply of different methodological materials in this field in many countries, the problem of shortage of the know-how remains important. This work aims at suggesting a systemic theoretical and practical know-how in education of talents and development of innovative thinking in the schools of general education.

Preparation of this methodology involved reviewing scientific literature and research-based materials, as well as development of methodical and practical recommendations on different didactical, organisational and institutional issues of the education of innovative thinking in the general education.
The main target group of this methodology are teachers and educators working in the field of formal and non-formal education, managers of educational establishments and experts involved in working out the curriculum and elaborating the didactic materials.

Chapter I, "Are Talents Born or Created?", discusses the question of whether the process of becoming a talent is more influenced by nature or by nurture. It discusses the concepts of intelligence, creativity, giftedness and talent by disclosing the components of these concepts and their main influencing factors.

Chapter II, "Theories of Creativity and Creative Personality", presents the concept of creativity by referring to the context of education and reviewing the related theories of creativity. It also defines the main features of the creativity levels, provides the characteristics of a creative personality and discusses assumptions of creative education.
Chapter III, "Existing Model of Talented Thinking and its Relation to Innovative Processes", explains the concept of talent, thinking in general and creative thinking processes. It also provides a review of the existing models of creative and innovative thinking concepts and indicates the essential principles of development of the innovative thinking skills. The chapter concludes with practical methodological recommendations for development of innovative thinking skills.

Chapter IV, "Didactics of Talented Thinking", reviews the core didactic assumptions of development of the creative thinking skills. This review is followed by presentation of a conceptual model of thinking areas and discussion of suggestions on selection of didactic materials and teaching methods with provisions and explanations of some concrete examples and recommendations.

Chapter V, "Methods with Wide Practical Application", is a short description of the so-called methods of creative thinking activation and TRIZ methodology (Theory of Inventive Problem Solving). Methods of activation of creative thinking were the only methods with practical application in the first half of the 20th century. However, at the end of the century it was clear that those methods helped to solve only

comparatively simple problems, whereas TRIZ renders a possibility of solving very complicated problems in a stable and safe way and providing a higher level of creativity.

Chapter VI, "Some Elements of the Theory of Talented Thinking", despite the modesty of its title, provides a very systemic and comprehensive introduction to the theory of talented thinking and its application to the practice of teaching and learning. This is one of the essential methodological and methodical contributions of this book that may help educators and researchers into the educational approach to development of talented thinking.

Chapter VII, "Problems of Educating 7-10-Year-Old Children and Possibilities of Problem Solving", discusses the main typical problems of developing talented thinking in 7-10-year-old children and suggests appropriate methodical solutions to these problems.

Chapter VIII, "Good Examples and Stories from Teachers That May Help Develop Talented Thinking in Classrooms", overviews examples of testing exercises based on the above-mentioned TRIZ method (Theory of Inventive Problem Solving) in two Estonian primary schools and three Latvian schools.

Chapter I.
Are talents born or created?

Viire Sepp

This chapter discusses the question whether the process of becoming a talent is influenced more by nature or by nurture.

Concepts of intelligence, creativity, giftedness and talent

Usually, when we speak of giftedness or talent, everybody has their own idea of what these concepts mean, or which characteristics or people are referred to. Such an implicit definition, i.e. a definition that is based on the individual's (the deciding agent's) own general experience, intuition or opinion, affects our perception and attitudes more often than we can imagine. A stereotypical approach is therefore very common, and this in turn spreads in the form of established myths. In the context of school or the educational system in a wider sense, the most wide-spread yet also the most dangerous myths are as follows: giftedness is manifested in any case – just like cream forms on milk; a gifted student is gifted in every field/everything; a gifted student gets top grades; a gifted student is a geek who has no interests other than studying and who cannot manage in everyday life, etc. This approach involves the danger that a great number of students potentially capable of outstanding achievements remain unnoticed and their development is not supported enough. Hence, it is important to first agree on terminology and familiarize ourselves with theoretical concepts, which also have an empirical science-based background.

Unfortunately, it is nearly impossible to provide an all-encompassing definition of giftedness. One can find dozens of different definitions, the differences between variations depending on the concepts or criteria that were taken as the basis for, or the purpose of, definition. For example, Sternberg and Zhang (2004) have found that giftedness can be defined by the following criteria:

- excellence – the individual displays clearly better results in one or several fields compared to peers;
- rarity – compared to peers, the individual has distinctively high attributes;
- Productivity – ability to achieve exceptional results or perform exceptional activities;
- demonstrability – outstanding achievements in a field can be measured by valid metrics;
- value – the individual expresses extraordinary potential in a domain that in the corresponding environment or culture is held in high regard.

Therefore, the concept of giftedness can be approached from the aspects of presumptions, results as well as (social) value, depending on when and for what purpose the definition is provided.

Intelligence

When we speak of cognitive abilities, we cannot overlook the concept of intelligence. The most influential researchers of intelligence have agreed on the following definition: "**Intelligence** is a very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, and learn from experience. It is not merely book-learning, a narrow academic skill, or test-taking smarts. Rather, it reflects a broader and deeper capability for comprehending our surroundings, 'catching on', 'making sense' of things, or 'figuring out' what to do", (Gottfredson, 1997). Intelligence is measured by the intelligence quotient IQ. Just like many other psychological attributes, IQ values are divided in society based on normal distribution, which is also referred to as Gaussian distribution or the "bell curve". Intelligence tests are among the most common methods of defining giftedness based on the verification criterion. Usually, a standard group average is regarded as equal to 100 points and one standard deviation is 15 points. Those whose IQ differs from the standard group by 2 standard deviations (IQ $\geq$ 130) are regarded as highly intelligent. Approximately 98% of people receive a lower result. Tasks requiring mental effort or intelligence tests measure general mental ability, i.e. the *g*-factor, as well as specific ability attributable to a particular test type (such as verbal flow, mathematical skills, spatial imagination,

memory, etc.). It has been found that general ability affects the likelihood of solving all these specific tasks in a certain manner – a higher *g*-factor in a positive manner and a lower *g*-factor in a negative manner. In recent times, researchers have come to a common conclusion that the structure of intelligence is hierarchical: all activities requiring mental ability are based on general mental ability (*g),* which in turn has sub-facets that are mutually relatively independent. These sub-facets, however, do depend on the *g*-factor. Hierarchical models describe an individual's cognitive abilities using three decreasing levels: general intelligence (*g*); broad abilities; specific abilities. Specific abilities, which are located on the lowest level, can be related to a narrow skill or area of knowledge (such as a specific job or profession). Ability groups of a more general nature are located on the broad ability level. For example, in J. Carroll's model (1993), these were fluid intelligence, crystallized intelligence, general memory and learning, broad visual perception; broad auditory perception; broad retrieval ability; broad cognitive speediness; processing speed. Abilities located on different levels are interrelated, as they all have a common portion. This common portion is *g*.

Allik and Mõttus (2011) point to a relatively recently published explanation of *g*, according to which during an individual's development, abilities mutually influence each other (e.g., if attention capacity increases, then memory capacity also increases, and may in turn influence processing speed). It has also been found that as a group's average intelligence increases, the proportion of the *g*-factor decreases respectively. One explanation for this pattern is that as children develop, their abilities become more varied, new skills and abilities emerge and differentiate them from others; the children's giftedness is revealed more in one field and less in another (*ibid,* p. 81).

Although the changes occurring in the development of mental abilities are common to all individuals, the differences in people's mental abilities are rather constant, i.e. an individual who displays higher than average mental abilities at one point of their life, will likely also do so at later stages of life. **In childhood, intelligence depends heavily on environmental factors, which makes it the most favourable period in life for developing mental abilities. To generalise, it could be said that genetic factors contribute to only about 40% of differences between individuals' intelligence levels; the environment contributes to 60%.** The older people get, the more they are influenced by genetic factors, because their choice of environment increasingly depends on themselves and their genetic predispositions. Research shows

that active participation in a child's development is crucial. The tendency to prefer new stimuli and the time it takes to get adjusted to them correlates with cognitive, linguistic and general intelligence levels at later stages of life. Children's speech development levels and over two and a half year old children's intelligence test results predict their later performance at school rather well.

As we know, the correlation between the IQ test score and the average grade or educational level is usually around 0.50 or even above that; therefore, to a certain extent grades also reflect individuals' giftedness, albeit not in absolute terms. Judging mainly by grades, the **gifted underachievers** are left unnoticed. These are students who do not maximise their inherent gifts. According to research conducted in Estonia, there are two times more underachievers among intellectually gifted students compared to average students, and over 70% of them are male. Among the latter, the number of underachievers increases in time (Laidra, 2010). This data refers to the fact uncovered in the research that on the one hand, male students have more confidence in their giftedness and they overly rely on this, but on the other hand, the school system does not cater to the needs of gifted male students. Gifted female students tend to associate their success with effort rather than giftedness and are therefore willing to put in more effort.

Multiple intelligences

By contrast to the IQ-based definition of giftedness, there are approaches that place the focus on specific abilities and extraordinary achievements in different fields. Howard Gardner (2006), professor at Harvard University, who researches individuals with brain damage and gifted children, has postulated that nine relatively autonomous "intelligences" are exhibited in different domains of achievement. These specific "intelligences" are logical-mathematical, visual-spatial, verbal-linguistic, musical, bodily-kinaesthetic, naturalistic, interpersonal, intrapersonal, and existential intelligence.

- Logical-mathematical intelligence – the ability to form equations and create solutions, to calculate, to solve abstract problems;
- Verbal-linguistic intelligence – the ability to analyse linguistic information and create written or oral text, feeling for language;

- Visual-spatial intelligence – the ability to find one's way on surface and in a room, to comprehend graphically presented information;
- Musical intelligence – the ability to create a variety of sounds; sense of rhythm;
- Bodily-kinaesthetic intelligence – the ability to use one's body to create something and to solve problems;
- Naturalistic intelligence – the ability to identify and differentiate between living and non-living objects of nature;
- Interpersonal intelligence – the ability to sense and comprehend other people's moods, desires, motives, and intentions;
- Intrapersonal intelligence – the ability to analyse oneself and recognise the abovementioned aspects in oneself;
- Existential intelligence – high level of spirituality, the ability to ask and discuss "big" questions.

Gardner does not dispute the existence of *g*, but he treats it as a specific factor relevant chiefly to academic achievement, to situations that resemble those at school. The main issue that arises when analysing Gardner's theory is that it is not very clear, to which effect the intelligences presented by him are related to personal characteristics and motor skills, and to which extent they are related to mental ability. Furthermore, there is no clear proof that these intelligences are indeed mutually independent (and therefore also independent of *g*).

In any case, Gardner's theory of multiple intelligences is the closest to the approach that allows us to claim that every individual, even if not very gifted, is strong in some field. **Gardner's theory reminds us to pay greater attention to children's strengths, and motivates us to also adjust the environment accordingly.**

In addition to Gardner's multiple intelligences theory, there are a number of other theories that are different from the so-called mainstream approach to the structure of intelligence. Raymond Cattell divided mental abilities into **fluid intelligence**, i.e. intrinsic ability to learn, to 'connect the dots' and solve problems, and **crystallized intelligence**, i.e. experience and skills acquired in the course of life (Gleitman et al, 2014: 505-506). Fluid intelligence develops faster than crystallized intelligence, but after achieving its maximum level at around 25, unfortunately also starts to decrease

fast. Crystallized abilities, i.e. the skill to use acquired knowledge, however, improves in time and also decreases in a slower pace.

Robert Sternberg (2003) has also said that we should differentiate between several types of intelligence. He highlights **practical intelligence** as one of the subforms of mental intelligence alongside analytical and creative intelligence, and defines it as the ability to solve everyday problems. Practical intelligence is largely based on tacit knowledge, i.e. untutored knowledge acquired unknowingly in everyday situations. Such "street smartness" cannot be measured with ordinary IQ tests or learned from a book. At the same time, such knowledge is crucial for managing in a practical situation, making reasonable decisions in daily life or, for instance, surviving in grave environmental conditions.

One particular form of intelligence, which in daily life can often be even more useful than academic ability, is **emotional intelligence.** This is an ability to comprehend one's own and others' emotions and to control personal emotions. Emotional intelligence comprises of four parts: 1) ability to correctly perceive one's emotions; 2) ability to use emotions to facilitate thinking and reasoning, and the ability to trust one's "gut feeling"; 3) ability to understand emotions and describe them verbally; 4) ability to restrict one's emotions. Emotions play an important role in solving problems and making decisions; they participate in directing one's attention, and they also affect memory. Emotional intelligence can be learned and developed. This topic has been covered in works of popular science by Daniel Goleman, which have also been translated into Estonian.

Components of giftedness

Creativity

As we saw above, it is impossible to provide an unambiguous definition to giftedness even at the level of mental ability. Research into the biographies of outstanding creative individuals and others who have achieved extraordinary results has revealed a great deal of components, which influence the manifestation of giftedness. One such component is **creativity.** Renzulli's view, which is based on the "three ring model"

(Renzulli, 2005), regards intelligence and creativity together with motivation as different components of giftedness. Another, processual approach, emphasises overlapping skills – giftedness and creativity presume similar cognitive skills, such as defining a problem, selective coding, the ability to apply existing knowledge in new situations, or overcoming limitations (or constraints) (see Sepp, 2010 for a more detailed overview). In recent times, researchers have started to increasingly highlight different levels of creativity – the "Big C", which is a rare phenomenon and can be seen in famous creative personae like Mozart, Einstein or Picasso, as opposed to the "little c", i.e. conventional creativity that is expressed in daily life and can be seen in almost every individual. Kaufmann and Beghetto's (2009) Four-C creativity Model also adds professional creativity and **learning creativity** (*mini-c)*. Mini-c is defined as personally meaningful interpretation of experiences, actions and events. It is expressed in the process of learning, the creative process results in new mental constructions created during acquisition of new material, whereas the constructions have not (yet) been expressed in a tangible way. Creativity as a predisposition to create something new and original is related to divergent thinking, in which case there are many "right" end results. With children, an appropriate approach is also to concentrate on the creative process and the environment that supports creativity. M. Csikszentmihályi describes flow as a process of utmost motivation and concentration, where one loses the sense of time and space. The utmost compensation for this is the creative process itself (Gleitman et al, 2014. 733-734).

How to nurture children's creativity? (Sepp, 2010)

- Encourage children to learn and act independently
- Offer various opportunities to acquire new experiences, knowledge and skills
- Facilitate flexible thinking
- Refrain from criticising children's ideas and suggestions; be supportive
- Tolerate and accept 'reasonable' mistakes
- Facilitate self-assessment and help them cope with setbacks
- Take children's questions seriously
- Accept alternative solutions
- Regard courage as highly as the right answer

Deliberate practice

The importance of deliberate practice is emphasised particularly by theoreticians, who view giftedness as proficiency or an expert level at something. To illustrate, there are examples of experiments where short term memory test results improved drastically as a result of specific memory training. In one test, an ordinary college student's short term memory capacity (usually, a person remembers 7 decimal points) had increased to 80 decimal points after a few hundred hours of training (see Sepp, 2010). There is a widely recognized claim that it takes 10,000 hours of work to become an expert in any field. Even though the effect of systematic practice cannot be underestimated (this is most evident when comparing the volume of individual training sessions of high class athletes or virtuoso instrumentalists and the less successful representatives of these groups). These concepts are criticised mostly because they leave out creativity as an important component of giftedness, and environmental factors.

Motivation

Work and practice are directly related to the level of an individual's motivation. Intrinsic motivation or dedication is one of the most important components in most giftedness models. It has been found that intrinsic motivation is accompanied by an internal desire, stimulated by personal interest and curiosity, to acquire more integrated skills. Intrinsically motivated students are more immersed in learning, are better at making connections between facts and subjects, good at linking theory with practice, and their knowledge is durable. When parents and pedagogues support children's natural curiosity and intrinsic interest in learning, they help them perceive learning as a satisfactory activity, which in turn increases their motivation to engage in learning activities (or set motivating goals) in other forms. On the other hand, external compensation that vicariously controls students' learning behaviour sends them the signal that learning is not an activity that brings joy and satisfaction, and should only be engaged in to get compensation or avoid punishment. Research has revealed that if emphasis is placed on extrinsic motivators, intrinsic motivation as well as creativity and cognitive flexibility may decrease. It has been found that extrinsic compensation which is perceived as controlling activity has in fact a more profound negative effect on gifted children.

The feeling of self-efficacy is also closely connected to motivation. Self-efficacy is an individual's belief in their ability to solve a specific problem, complete a task or achieve a goal (Bandura, 1994). The feeling of self-efficacy determines whether a child is prepared to undertake a task and make efforts to complete it. The feeling of self-efficacy is affected by direct experiences of success or failure, opportunities of success perceived alongside other children, encouragement received from adults, and children's physical condition.

To improve the feeling of self-efficacy in children, teachers and parents should help them recognise success and development in specific areas of life. With gifted children, self-conception may also be affected by the understanding whether a gift or intelligence is a quality that can be little improved by oneself (fixed mindset), or they believe that giftedness can be improved through personal effort and work (growth mindset). Research proves that younger children's beliefs correlate more with the growth mindset, and as children get older, the fixed mindset starts to prevail. It is believed that gifted children reach this breaking point in older age. Dweck (2000) has found that in an intellectually unstimulating environment, the proportion of children with a fixed mindset is actually unfortunately larger among gifted children. Children with a fixed mindset always try to seem "smart", yet make as little effort as possible. They are primarily focused on short-term performance goals (a good grade or reward, approval from adults, etc.). They strive for something new only when they are certain that they will succeed. In case of criticism they express learned helplessness instead of going for another try. Children with a growth mindset are focused on challenges and they enthusiastically experiment with complex tasks. They are engrossed in learning and their goals are geared towards achieving mastery. These people are characterised by a sense of satisfaction from overcoming difficulties; they are focused on gaining more knowledge and using it rather than demonstrating their existing knowledge. They are also motivated primarily by intrinsic interest sparked by the activity itself, the key elements of such interest being curiosity, investigation and solving problems. Whether or not a child becomes oriented towards making an effort, depends greatly on the modelling behaviour of adults/teachers. If such children are only rewarded for being "smart" and not for the effort they made, their vulnerability and sensitivity increases, so that they become fearful of experiencing setbacks and failures. We often see that children are only praised for their innate gifts, which decreases their intrinsic

motivation. Praise should be directed towards the efforts that a child has made to acquire the skills. The effectiveness of this "positive attribution" technique has been proved by several scientific studies. It is also clear that the success experienced after solving complicated tasks increases the feeling of self-efficacy to a greater extent than that of simple tasks, and increases the child's willingness to make efforts.

Factors influencing the expression of giftedness

Cognitive disparities

Although gifted children usually stand out with the speed of solving a task, some disparities have also been found – the speed of task-solving may be affected by gifted children's tendency to pay attention to details and aim for perfection. It has been found that gifted children spend more time on a few specific elements of the cognitive process. One study of children aged 12-13 concluded that children with higher mental abilities solved tasks faster, but spent more time at the stage of analysing the task and planning the solution compared to their peers with average abilities. At the same time, gifted children are more flexible in replacing unsuccessful problem-solving strategies with alternative ones, they are able to spontaneously generate sequences of strategic steps towards a solution, and set priorities in defining a route towards the solution, they are more resourceful in defining a problem and can differentiate between important and unimportant matters (Barfurth, Ritchie, Irving and Shore, 2009).

Many psychologists believe that a key role in the development of giftedness is played by the fundamental level of knowledge (Shavinina, 1997). They have found that a common denominator among gifted children is a well-structured, well-functioning and advanced knowledge base, which enables easy access and activation at any moment. The question of the level of knowledge among gifted children, however, has not been researched much – it is not clear why some children acquire knowledge with less effort than others. As gifted children's cognitive capabilities are more similar to children who are older than them, their wider knowledge base enables them to perform well at a higher level compared to their peers. It has also been found that greater experience in a field plays a far larger role in the processes of learning and memory than, for instance, intelligence.

Gifted children's "thinking curriculum" should be based on the following principles:

- thinking and contents are learned simultaneously (to learn thinking, it is not necessary to wait until the child acquires extensive knowledge in a field);
- learning about thinking, while also learning how to think (learning "about thinking" teaches metacognitive skills; learning "how to think" teaches the organisation and practice of thinking);
- helping students become autonomous learners;
- paying attention to transfer (learning to use strategies in different contexts).

Personality factors

Personality factors play a crucial role in realising giftedness, and may often become the deciding factors in children's development. Contemporary personality research has defined five basic tendencies, how an individual reacts to the surrounding environment (see Gleitman et al, 2014), and the "Big Five" is as follows:

- *neuroticism* – a tendency to feel negative emotions (fear, sadness, anger, guilt, etc.), inclination towards depression or inability to control one's impulses in stressful and critical situations;
- *extraversion* – a tendency characterised by keywords such as warmth, sociability, activity, self-confidence, seeking excitement, experiencing mainly positive emotions;
- *openness to experience* – openness to new ideas and sensations, flexibility of thinking, fantasy, interest towards the surrounding world and one's inner processes;
- *agreeableness* – tendency to trust other people and help them, being selfless and compliant;
- *conscientiousness* – tendency to plan one's activities and to control one's desires and impulses, self-discipline and perseverance in implementing one's plans.

The tendencies are generally stable through time, but as people get older, there is a perceivable increase in sociability and fortitude and decrease in neuroticism, openness and extraversion. Although studies have shown that tendencies are independent of mental abilities, i.e. the interrelation of personality-related tendencies and mental

abilities is very weak or non-existent, some results have indicated that there are disparities in relation with mental ability. Based on research conducted so far, the most valid negative correlation is probably between fortitude and mental abilities: students who achieved higher scores in mental ability tests tended to regard themselves as incompetent, disorderly, directionless, thoughtless, or undisciplined.

In 2001, a study conducted among 2746 Estonian 6-12-grade students analysed their individual personality traits in connection with the results of their Raven's Progressive Matrices Test, a non-verbal 'culture fair' multiple choice IQ test (Laidra, 2008). Compared to ordinary students, gifted children achieved lower scores in neuroticism and higher scores in openness. No differences were detected in extraversion, sociability or fortitude.

Several studies have found that gifted children achieve higher results in openness and introversion compared to average children (Sepp, 2008, Saul, 2006).

Although openness is sometimes described as a certain predisposition, which allows an individual to increase capabilities during life and is intuitively also relatable to creativity, there have been no research findings proving that there is a permanent connection between abilities and openness (Allik, 2003).

Such contradictory results refer to the fact that conclusions about the interconnection of mental abilities and personality-related tendencies are not yet very trustworthy.

Practical recommendations

Comprehension of the multifaceted nature of giftedness triggers us to integrate new approaches into the teaching practice – constantly gathering information about students' strengths and interests, understanding how teachers can support their motivation and creativity. The efficiency of the process can be improved by the following steps:

- providing different options for learning the essence of a subject or task (Hattie, 2011)
- providing an opportunity to demonstrate one's knowledge and skills in a variety of ways, thus enhancing the level of involvement and depth of the learning process (Darling-Hammond, 2010)

- the learning process should follow the students' strengths, needs and developmental goals as much as possible (Tomlinson, 2014)

Alongside best practices and theories, the teacher's own intuition and creativity will also remain important, as will do the teacher's partnership with the student as a personality.

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Chapter II.
Theories of Creativity and Creative Personality

Odeta Norkutė

Concept of Creativity

Creativity is one of the elements of human existence. A human being invented a thing and made it. To be creative means to have ideas. Nowadays, creativity is becoming more and more related to the future of the mankind. Our future depends on how many creative people capable of generating ideas and finding alternatives there are in the world (Daujotytė, 2010). As indicated by Daujotytė (2010), creativity includes mathematicians, physicists, economists, lawyers and librarians. Even more – it doesn‘t reject people involved in manual labour. Nature, agricultural work encourages creativity: nature is creative, it manages sophisticated sound scores, colour combinations, creates landscapes. We know that it is also remorseless: it both creates and destroys. Human being‘s creative powers can be not only constructive but destructive as well.

Creativity is a complicated concept and has a lot of definitions; the most widely used definitions are related to an individual, a product or a process, and some of the used definitions are privileged due to the social context. Referring to creativity as a feature of an individual, they speak about his or her cognitive features (intellect) or personal features (motivation). Researches into personality often regard internal motivation as one of the essential features of a creative individual since creative individuals tend to be guided by their internal interests (Černevičiūtė, Strazdas, 2014).

The performance is typical of the concept of creativity: a person who performs creatively finds unexpected solutions, spots the ways out, turns in unexpected directions and notices the things that have not been noticed or perceived by others yet. In the opinion of Runco (2002), Jovaiša, (2007), Girdzijauskienė (2005), Grakauskaitė-Karkockienė (2006), creativity is a whole complex of abilities, intellectual and personal characteristics including the person’s approach to life. It has been noted that creativity is mostly determined by individual personal characteristics:

originality, flexibility, fluency, curiosity, sensitivity, energy and independence, ability to solve problems and accept challenges. (Numgaudienė, Ramanauskaitė, 2014).

Summarizing the variety of creativity concepts, Černevičiūtė and Strazdas (2014) classify them into four categories based on two dimensions:

***Dimension I*:** creativity can be classified as "creating something new" (Majaro 1988).

Creating new is creating new elements or new combinations of the already existing elements with the only aim to create a new element, without knowing where it can lead to. The creator can have an idea of the message but not be sure whether it will be understood by the receivers: a similar thing happens when a painter starts painting in different styles (for example, new art styles – impressionism, "pop art", conceptual art).

Dimension II: *"problem solving"* is when the direction is already selected but there are some obstacles to overcome. For this, new ways and new means should be used, though the aim remains the same. Such a situation may occur in a scientific laboratory when a method of creating a new medication already exists. If the experiment with a new combination of the same chemicals is not successful, one chemical should be replaced by something new. Researchers emphasize *problem solving* as the most important aspect of creativity and consider originality to be only a part of creativity (Runco 2004).

Another side of creativity is that it can be an individual (very common belief in art) or a collective phenomenon (example 1). Psychological researches show that creativity is formed in the collective environment.

	INDIVIDUAL	**COLLECTIVE**
CREATING THE NEW	Artistic process	Work in a laboratory
PROBLEM SOLVING	Daily work challenges	Development projects

Example 1. ***Classification of Creativity Conceptions*** (Černevičiūtė, Strazdas, 2014)

Creativity Levels

Though all adults and children are able to be engaged in creative thinking and activities, their levels of creativity can be different. Taking A.Taylor's theory as the

basis, Wilson (2005) adapted it to the environment and separated out 5 levels of creativity.

Wilson (2005) states that the first three levels are available for everyone having motivation, and the last two levels can be achieved only by very talented people:

1. **Intuitive expressive level.** This creator's self-expression is primitive, intuitive and straightforward, led only by the intrinsic joy to create.
2. **Academic and technical level.** This creator is learning certain methods and skills, so his creative expression becomes more powerful because he has mastered academic and technical skills related to creative work.
3. **Invention level.** An inventor who has acquired academic and technical skills is not limited by them and launches a challenge against restrictions thus aiming at experiments beyond the limits of conventions.
4. **Innovation level.** The distinguishing marks of this level are originality and unusual products and ideas.
5. **Genius`s level.** The ideas and achievements of these creators are unique and valuable. This is a creative production level which is most difficult to analyze and explain.

People who do not disclose their all creative abilities often stay on the first level of creativity expression and avoid acquiring academic and technical skills worrying that such skills will be in conflict with their personal creativity, which is spontaneous and unique in their understanding. It is not an easy task to persuade such people that they can be taught to reach a higher creativity level. They usually tend to think that intuitive spontaneity will be sufficient for going up as high as the fourth level.

Csikszentmihalyi (1996) cut these five levels to two:

- "***big C***" – creative people who are famous in their professional area and
- "***small c***" – creative people whose creativity is revealed in their daily lives.

It can also be noted that there exists such a level as "*average c*", and the majority of creative people who make small contributions in their professional areas belong to it, though they never become famous.

Some other authors ((Non)-education of Creativity at School, 2009) believe that each person is creative; therefore, taking into consideration this statement, two levels of creativity can be recognized: exclusive creativity and ordinary creativity, or the elite and democratic concepts of creativity:

- exclusive creativity;
- ordinary creativity or the elite and democratic concepts of creativity.

Exclusive creativity is an ability of an individual to create original ideas, insights, knowledge, rearrangements, inventions, art works or other novelties which are considered to be valuable by others and change fundamentally the activity area and even all the human world. People who are able to do this are called talented or geniuses.

Ordinary creativity is a feature intrinsic in each individual: a wish to create something new through imagination, improvisation, problem solution and critical thinking. These works may be not very valuable and original – some other people are able to create similar or the same things – but they are new for their authors.

Characteristics of a Creative Personality

Wishing to find out where the secret of creativity is, the scientists are interested in creative and famous personalities. Though it is said that creative people "*have a bit different receptors for the information coming from other minds and a bit different mechanism of information processing",* the researches performed during a few decades make us recognize not only the role of inherent talents, but also the role of the creator`s personality.

As stated in the pedagogical researches ((Non)-education of Creativity at School, 2009), teachers distinguish the following characteristics typical of creative people (table 1):

Table 1

Characteristics of Creative People as per Pedagogical Researches

((Non)education of Creativity at School, 2009**)**

Characteristics of Creative People	**The Description of Manifestation of the Creativity Characteristics**
Curious and observant	Thoroughly and fully interested in different things; Able to see problems, shortages, oddities as well as the ideas relevant to their work.
Tolerant to indeterminacy	Not afraid of disorder, a lack of facts and rules, contradictions, incompatibilities because these situations provide numerous possibilities for creating a new order.
Flexible	Adapting to changes and striving for them, open to new ideas and experience, requirements and risks.
Thinking originally	Able to see ordinary things differently, break away from traditions and conventions, generate alternative ideas; able to visualize problems in their imagination and thinking in metaphors.
Independent	Possessing strong self-consciousness, thinking independently, believing in their ideas and significance of their activity, resistant to disapproval, misunderstanding, opposition; neglecting other people`s opinion and preferring to work independently; not seeking quick reward.
Persistent	Setting the goals of their activity and striving to reach them; therefore highly motivated, enthusiastic, energetic, devoted to the selected activity, able to work long hours, hard and concentrated.

Many other characteristics of creative people have been noticed. For example, their social maturity is often late – they take the duties of the adults later, and all their lives remain childish and playful. The stereotypes of gender roles are not very typical of them: creative girls like to dominate more than other girls, and creative boys are more sensitive than others and not as aggressive as other boys of the same age; in their teens, they often feel isolated and lonely.

The thinking style of creative people is versatile – they are able to combine analytical and intuitive, convergent and divergent thinking strategies.

Creative people can also be characterized as very confident, independent, taking risks, enthusiastic, brave, and curious; they are also playful, having sense of humour, idealistic and thoughtful. They are usually interested in artistic and aesthetic issues, they get involved in the things which are sophisticated and mysterious, and they also need privacy and time to be alone. They are usually more perceptive and have more intuition than others. An important feature characterizing these people is that they are ready to tolerate confusion usually inherent in the solution of creative problems. Most of these features were first disclosed by Barron (1969, 1988) and MacKinnon (2005) in their classical studies carried out at Barkley University: they studied and described the personalities of creative architects, writers and mathematicians. These characteristics were observed in all the three areas these people belonged to.

Piirto (2005) (table 2) summarized the following four main attitudes of especially creative people in Table 7, which can be applied to all creativity areas:

Table 2

The Attitudes of Creative People

(according to Piirto, 2005**)**

Naivety	**Self-discipline**	**Taking Risks**	**Confidence in Group**
Openness with which creative people observe what is obvious from a different angle.	Focused namely on the problem in the creative area selected by the creator; to disappointment of the teachers, self-discipline not necessarily means that the plans of other people will be taken into consideration.	Creativity related risk taking doesn‘t mean that the person will climb up mountains or do bungee jumping from a bridge. Instead, the person who tends to take risks needs the courage to stumble, to experience a failure and to recover without being upset if somebody repudiates him.	An obligatory provision for confidence in the group, especially in the case of creativity based on cooperation, could be applied to stage acting or dancing, preparation for launching a satellite to Mars or establishment of a new advertising company.

The characteristics listed above should help the teacher to identify creative children and teenagers in his class. Besides, this list can help to be more patient with students

demonstrating too many negative features. Maybe a huge amount of energy, exaggerated assertiveness, originality, curiosity and opposition to the adults, stubbornness and other features should be redirected. Attention should be paid to the fact that a number of students whose results are average or below the average can also possess great creativity abilities manifested, for example, in art, dancing, IT or any other field of specific knowledge where such a student feels confident and competitive.

Is it possible to identify a creative talent?

(According to Davis, Rimm, Siegle, 2011)

Knowing the features typical of creative people, we will be able to identify creative students, though most probably unerring indentification of a creative talent will not be possible.
➢ Albert Einstein learnt to speak when he was four, to write - when he was seven, he was bad at almost all the subjects at school. ➢ Thomas Edison`s teachers used to say that he was too stupid to learn something. ➢ Werner von Braun failed his mathematics exam in the ninth grade at school. ➢ Winston Churchill's learning results were the worst in his class, and twice he failed to go to the higher class. ➢ Pablo Picasso almost couldn't read or write until he was 10. His father hired a tutor, who after some time refused to teach him. ➢ Louis Paster's chemistry skills were evaluated as average by the Royal College. ➢ Charles Darwin learnt poorly at primary school, and he was not able to finish a course of medicine at university. ➢ F.W.Woolworth, at the age of 21, worked in a fabrics store, but his employer didn't allow him to serve the customers as he "lacked common sense". ➢ Walt Disney was fired from a position in a newspaper because he did not manage to come up with anything good. ➢ Caruso`s music teacher told him: "You can't sing, you do not have any voice at all!" ➢ Louisa May Alcott was told by one of the editors that she would never write anything popular. ➢ Charles Dickins, Claude Monet, Isadora Duncan and Mark Twain didn't finish primary school.

- George Gershwin, Will Rogers, brothers Wright and the announcer Peter Jennings quit secondary school;
- Harrison Ford (Indiana Jones) and Lev Tolstoj were expelled from university because of poor progress.
- A letter found in 1991 and written in 1938 said that the western's star Gene Autry "had to improve his acting", that the course of acting "was evidently useless"and that "he needed a darker make-up to give him more manhood". 83 years old Autry's reaction to this was: "Major part of it is true".
- Katie Couric was fired from her first position in CNN, and the producer told her that she would never be able to work on television.
- Bill Gates, the founder of "Microsoft", quit Harvard University (but we should remind the students that later he achieved enough to get into the university).

As noted by Davis, Rim, Siegle (2011), we can find facts in the biographies of creative people that do not appear surprising; for example, that they were interested in creative activityies and had a lot of hobbies. We can find more than one performance in the theatre which is a very clear indicator of creativity because, in order to perform in the theatre, one should possess some important features, for example, a sense of humour, aesthetic interests, self-confidence and willingness to take risks, etc. However, there might appear some more delicate characteristics in the biographies of creative people: such people might prefer communicating with older or younger friends, and they may have had an imaginary friend in their childhood.

It is obvious that not all the mentioned characteristics are typical of creative students, and some of the characteristics are related to specific areas. For example, Piirto (2005) notes that a young poet gets his inspiration from the language, meanwhile scientists, musicians or artists striving for great careers get their inspiration from such things as the telescope, the piano or the artist`s brush.

Development of Creativity

Can creativity be acquired or is it inherent? The answer to both these questions is "yes" (Davis et al. 2004). Some people have an inherent combination of creative talents and intellect which is being activated by a strong motivation and sense of

destiny, and which makes such people create their dreams and implement their creations due to which the world becomes better.

The teaching of creativity should have its structure, the assumptions of which are made by the main goals and tasks of such teaching. These goals and tasks were defined by Davis in his works from 1987 to 2004:

1. To improve the perception of creativity, to teach creative attitudes and to enhance creative personal features;
2. To improve the way how the students understand creativity;
3. To enhance creative abilities, using different exercises in order to achieve this;
4. To teach the methods of creative thinking;
5. To involve students into creative activity;
6. To foster academic creativity.

Didactic Recommendation for Creativity Development Based on the Consistency of Goals

Creative Perception, Creative Attitudes and Creative Individual Features

Enhancing creative perception and developing creative attitudes is the most important part of the teaching aiming at development of creativity. Creative attitudes are taught in all courses or programmes of creative thinking, and there are good reasons for this. In order to think creatively, a person has to understand what creativity is. He has to evaluate creative thinking, be open to new-fashioned and unreal notions, impartial and receptive to funny ideas generated by other people and inclined to take creative risks, make mistakes and even fail. Sternberg (2003) tried to prove that high creativity emerged out of deliberate decisions, for example, a decision to analyze the problem once again, overcome obstacles, do what one likes to do and believe in one`s potentialities.

Creative accomplishments can be made by the majority of students. However, they don’t think about creativity as an impetus for progress and don’t value its importance for their personal development – for development of their talents and their potential,

for the ability to deal successfully with the surrounding world and use the opportunity to get more out of their life. Besides, students should understand the importance of creative novelties in the history of civilizations and in solving the existing and the future problems of the society (Davis, et all, 2004).

Improving Creative Individual Features

Personal features of a creative personality are closely related to creative attitudes and perceptions. It is not usually emphasized that there is always the need "*for development of individual features*". However, the teachers can reward and stimulate the required individual features and behaviour related to creative thinking, i.e. self-confidence, independence, enthusiasm, courage, wish to take risks, curiosity, playfulness, sense of humour, ability to devote some time to being alone and thinking, interest in complicated things, perceptivity, interest in art and aesthetic things (Davis, et all, 2004).

Cropley and Urban (2000) listed important attitudes and individual features which could be enhanced in the class: independence, ego strength, positive personal concepts, inclination to fulfill complicated tasks, tolerance to obscurity and acceptance of all (even contradictory) individual aspects.

Long ago, talking about "contradictory" individual aspects, Barron (1969, 1988) noted that creative people assimilate the features which are usually typical of the opposite sex. Cropley and Urban (2000) described the following "integration of the opposites": such stereotypically male features as independence, self-confidence and hardness overlap with stereotypically female features, such as sensitivity, intuition and responsibility. However, even possessing a high and diverse inherent potential, a biker will hardly dream of becoming a ballet dancer.

The teachers may foster creativity by encouraging the students to learn autonomously, not assessing strictly their ideas, tolerating "clever" mistakes, encouraging to think flexibly, encouraging self-assessment, usage of their fantasy and imagination, helping to overcome disappointment and failures, accepting the students as they are; they may help the students resist the pressure to be like everyone, reward them for the courage and correct answers, and always remember that the child's creativity could be expressed through the "troublesome" behaviour (Cropley and Urban, 2000.; Fleith,

2000; Rejskind, 2000). Besides, the teachers can also choose a direct method: to help the students understand each creative method, approach and feature, and why these things are important when striving for creativity.

Forming Creative Atmosphere

Creative attitudes and consciousness are closely related to the concept of creative atmosphere, i.e. the environment where creativity is encouraged and rewarded. Rogers (1959) named it *psychological safety*, a prerequisite for development of creative thinking.

Speaking about generating ideas, as noted by Davis et all (2004), the environment is called a *postponed decision*, which means a receptive environment where there is no criticism, assessment and where new, even crazy ideas can be suggested. When the teacher calls the "different" child a creative thinker, the students will most probably not call him an oddity and he will be most probably acknowledged and not repudiated. The phenomenon when rewarded behaviouror or habit gets consolidated and becomes a feature of character, but the behaviour the student is punished for or the behaviour which is not paid attention to vanishes is an old and respected principal of psychology. Creative atmosphere rewards for creative thinking and helps it become a habit.

Creative consciousness and creative attitudes are also developed in the course of performing the majority of the exercises and activities which aim at development of creativity during the lessons. The main things which distinguish the people *possessing* creative abilities from the people *using* their creative potential are the attitudes, consciousness and relevant creative individual features due to which people tend to think and behave creatively. Sternberg (2003) listed some suggestions that can help encourage the students to develop and use creative habits and features (table 3):

Table 3

Exercises Enhancing Creativity

(according to Sternberg, 2003)

Be aware of when it is appropriate to be creative and when you have to follow the norms.	Be creative when implementing artistic and scientific research projects. Don't be creative when taking exams in case you have to choose the answer from a few optional variants. Don`t be creative when your creativity contradicts common school rules.
Find out what subjects you are best at.	Experiment and investigate, take risks and challenges. You might succeed in finding new talents.
Take motivation from your inside and not the outside.	Try to satisfy yourself and do what you like. Look for satisfaction while performing the work well.
Don't let personal problems prevent you from thinking and work.	Acknowledge that sometimes everybody has problems and try to treat them properly. Work can help you not to think of the problems.
Don't undertake more (or less) than you can do.	Find the balance providing you with an opportunity to perform your work well and at the same time doing not less than you are able to do.
Be persistent.	Don't allow disappointment, boredom, fear or failure to hinder your creative work. Finish what you have started, but keep in mind when you have to finish in case you are in the deadlock.
Make your environment more creative.	Do your parents, teachers and friends support your creative efforts? Does your room inspire you to think creatively? Can you change your environment to make it more creative?

Improvement of Creativity Perception

All the ways of teaching creativity will prove to be more efficient and the effect of teaching will last longer if the students get support in understanding what creativity is and what its typical features are. For this purpose a lot of the existing information and materials can be used. Cropley and Urban, 2000; Davis, 2011; Treffinger, Sortore and Cross, 1993 present a variety of subjects which can be used to prepare for the lessons "about creativity":

- importance of creativity for the individual and the society;
- characteristics of creative people;

- the nature of creative ideas as modifications, combinations and analogous relations;
- the nature of creative activity – its stages, changed perception, modifications, connections, analogous thinking;
- creative abilities;
- theories and definitions of creativity;
- creativity tests and their logical substantiation;
- the ways of creative thinking;
- other aspects of creativity.

As it has been mentioned, famous creative people`s biographies are a valuable material and a good example for teaching attitudes, habits and ways of life. Besides, the students can get acquainted with the following principles of creative thinking:

- creativity makes your life more interesting, successful and pleasant;
- creative people are not conservative; they see the same things at different angles;
- creative people feel heartsick when they follow the common norms – it is against their nature to be like everybody;
- it is not true that creative people continually violate the common norms;
- to think creatively means to take risks and make mistakes; the more creative the idea is, the greater the risk of error and the more failures occur;
- creative people play with ideas considering a lot of options, using methods, thinking analogically, estimating their ideas and transferring them into actions;
- creative people use their talents, not waste them.

Enhancing of Creative Abilities

Enhancing of creative abilities should be based on the same logics of the teaching strategies as enhancing of all other skills in the learning process, for example, reading, mathematics, solving chemistry tasks, throwing the ball into the basket, etc.

However, it should be noted that when enhancing creative abilities, many kinds of activities should not only be tied to creativity, but they should be also aimed at improving the perception of creativity and directing the attitudes of an individual in the creative direction.

Development of the Abilities of Fluency, Flexibility, Originality, Detailed Exposition

The abilities listed above are ascribed to the traditional and well-known ones, and their development will be of use in the process of solving problems and looking for proper answers to different questions.

Students can do such exercises together with all their classmates, may be guided by the rules of generating ideas, or they may do the tasks individually. One of the most helpful ways involving the students into work is dividing them into teams for solving problems. All the teams try to solve the same problem and then present all their ideas or only the best ones to the class. The students are often surprised when they learn about different ways of interpreting the problem, about the methods and ideas for solving it from their classmates. Such surprising differences encourage them to take risks and present their own creative ideas (Davis et all, 2004).

Davis et all, (2011) give some didactic advice on how the fluency can be encouraged during the lessons.

1. Doing the exercises requiring the answer to the questions which start with "What would happen if...?" the students list the consequences of incredible events. Such events might be imaginary or close to reality.

What would happen,...

…if people had an eye in the back of the head?

…if there were no books?

…if the only instruments were drums?

…if there was no gravity in this room?

…if fair haired people were not allowed into hotels and restaurants and did not have a

…right to vote?

…if the earth leant and your town moved to the North Pole?

…if Edison was a plumber and we did not have light bulbs?

…if nobody ever smiled?
…if all people littered in public places?
…if there were no bricks or wood from which we could build houses?
…if there were no cars, television, video games, peanut butter, bikes, football?

2. Thinking of how ***the products could be improved*** is another type of the questions, and the answers to which cannot be only "yes" or "no". The students might be asked to think of the ways how to improve the product or the type of activity – pencils, school desks, classes, boards, soft drinks, sinks, school (or public) bus system, popcorn, baths, computers, bikes, running shoes, etc.

3. Maybe the oldest task of the development of creativity is to think of ***unusual ways to use*** ordinary things; besides, this is a good exercise as well. *How could the old tires be used? A clothes hanger? Empty plastic bottles? Plastic bags? A wooden cane? A piece of paper? Food leftovers in the canteen?*

4. Creation ***problems and paradoxes*** is an interesting and complicated activity. It might be necessary to solve a problem or to explain logically the situation that is difficult to understand.

The problem might be both realistic and unrealistic. For example: how all the thefts of bikes could be prevented? How could the lunch menu be improved? What 20-Eur-worth Christmas present could be bought for our parents? How could the school (family) electricity bill be reduced? How could our health be improved? How could we help Mr. Smith, a 55-year- old former night watch, unemployed, without special skills? How could a stubborn elephant be moved out of the living room? How could three bears prevent the robberies?

Some examples of the problems requiring explanation:

- The school principal all of a sudden cancels the breaks. Why?
- The grass growing behind the advertising stands is usually lush. Why?

– It was noticed that ten paintings had disappeared from the art gallery without any burglary signs. How could they disappear?

5. While solving ***designing problems*** the students can design an ideal school, the plane for transportation of timid kangaroos, an improved grass mower, more functional clothes, safer ways to travel, more efficient way to supply food in the canteen, new sandwiches or other delicacies for ”McDonald’s“, a better mousetrap, etc.

6. When developing the ***fluency ability,*** the students might be asked to name the things which are, for example, round, square, sweet, salty, blue, white, made of metal, made of wood, long and thin, short and thick, which smell nicely, which are not tasty or have sharp edges.

7. When developing the ***flexibility,*** the students are asked to look at things from a different angle:

– What would this room look like to a tidy housewife? To a hungry little mouse? To an alien?
– What does the highway look like to a tire? To a crow? To a lost pilot?

8. When developing the ***detailed exposition,*** the students are asked to start from a simple idea and to develop it, for example:

– To create a device for walking a dog or caressing a cat (describing dimensions, material and price of such a device);
– To embellish and improve a short story, drawing, invention, class excursion.

Teaching the Methods of Creative Thinking

Individual Methods of Creative Thinking

Individual creative thinking methods are the ways which are deliberately and not deliberately created and used by each creative person irrespective of the objects or context used in his or her works. This topic is the basis of such important questions

as “Where do ideas come from?” and “What is the nature of the inner creative activity?” (Davis, 2011).

The majority of individual methods are *analogical* by their nature. This means that the innovator took the idea for his work from the event he had heard about in the news, from a historical event, the book he had read before, the film he had seen, the melody he had heard, from the art or an architectural style, an invention, a scientific discovery, a business idea, some novelty which had been created before, or some natural phenomenon. In fact, when we hear the phrase “he was inspired by...”, or “it was based on...”, we can be sure that the innovator deliberately or by chance used the method based on analogy.

Hereafter are some examples of the individual methods of creative thinking (according to Davis et all, 2011):

1) Einstein used to make, as he called them, “mental experiments”. One of the most memorable examples of such experiments was the one where he imagined himself being a small creature which could fly in the space on a ray of light. This helped him to formulate his general relativity theory.

2) Speaking about art, we see repetitive objects and styles typical of each famous painter and reflecting his individual methods of creative thinking. For example, Picasso was famous for his African, Joker, Blue or Rose periods during which his paintings were inspired by a certain topic. Besides, he used to deliberately destroy faces and other parts of the human body and to put them together again in an original way. Paul Gauguin used to paint the natives of the Pacific Ocean region in his unique way. Edgar Degas was famous for his graceful ballerinas. Renoir’s brand is light pastel colours, women and landscapes depicted in the paintings.

3) Andrew Lloyd Weber‘s musical “Cats” was based on T.S. Eliot’s collection of poems “Old Possum‘s Book of Practical Cats”.

4) The legend holds it that even Leonardo da Vinci would wander along the streets in Italy carrying a sketch book and looking for interesting faces for his picture “The Last Supper”.

5) All Franz Liszt‘s “Hungarian Rhapsodies” were based on the Hungarian Gypsies’ folk songs. Tchaikovsky also used to turn folk songs into

symphonies. Aaron Copland's suite "*Appalachian Spring*" was based on a folk song "Simple Gifts". Even a popular song "*Star Spangled Banner"* was created on the basis of an English drinking song.

6) Cartoonists keep using a deliberate analogical thinking to generate ideas. For example, after the First Gulf War Saddam Hussein was shown as a helpless Wizard of Oz hiding behind the curtain: "I am Saddam, great and powerful!"

7) Holinshed's historical book "Chronicles" was published at the end of the XVI century. William Shakespeare took a number of ideas from it and used them in his plays "Macbeth", "Henry IV", "Henry V", "Henry VI", "Richard II", etc.. Writing "Antony and Cleopatra" and the tragedy "Coriolanus", he used the Plutarch's "Biographies". The play "Troilus and Cressida" was based on different Troy story narrations.

8) Modern novelists and scriptwriters continue to take ideas from the well-known sources. For example, Japanese attack against Pearl Harbor during the World War II inspired creators of the films "*From Here to Eternity"*, "Tora, Tora, Tora!" and "Pearl Harbour". In one of the interviews the scriptwriter of "*High Noon"* admitted that the inspiration to write a scernario for this awarded and full of suspense western was born from the fear Hollywood writers and actors lived in during the sixth decade of the last century because of the notorious criminal gangs acting at that time.

9) The popular series "Star Wars" was created partially on the basis of George Lucas's individual creative thinking method. While writing his script for "Star Wars", Lucas was reading books on mythology. In his interview to the "Times" Lucas said: "I wanted my "Star Wars" to be epical, so I turned to the epic heroes". As a result, in the film we meet a young man who has to prove his manliness to his father and who saves a princess in trouble, who has an older and a wiser tutor (in fact, two tutors – Ben Kenobi and Yoda), and who is fighting with the villain Darth Vaver.

There are several ways to encourage students to develop their individual creative thinking methods. First of all, students should understand that even very creative people "look for" their own ideas. This demystifies creativity and helps persuade students that they have the right to use the existing ideas without feeling "not

creative". After all, if William Shakespeare, Franz Liszt, George Lucas and Art Buchwald borrowed stories, melodies and ideas, the students can also do it (based on Davis et all, 2004).

Students can also be taught several repetitive individual methods of critical thinking. These methods consist of the following strategies (Davis et all, 2004):

1. To use deliberately analogical and metaphorical thinking. For example, creating aesthetic products, students can come across new ideas by revising what has been created by others and tracking the origins of these ideas. The students can learn to ask the following questions: What else does it remind? What pleased the others? Which aspects of similar problems or situations could I use? Do history, the Bible and other literary works offer any ideas? What would the professionals do? (Davis, 2004).
2. To modify, combine and improve the existing ideas.
3. To start inversely, from the goal – maybe, an ideal or perfect decision to a problem: for example, to take it that the problem has been solved – and to work in reverse trying to identify what is necessary to reach the goal.
4. To ask oneself how such a problem could be solved after 50, 100 or 200 years.

Incorporating Students into Creative Activity

When developing creativity, it is essential to involve students into the activity requiring creative thinking and problem solving. Only then we can be sure that creative attitudes, abilities and skills will be enhanced.

The teacher striving for children's creativity has to look for opportunities for developing their thinking abilities using solutions of different problems related to the existing knowledge and teaching materials. (Rimm, 2004).

Using the existing knowledge base.

It should be taken into consideration that it is possible to think creatively in an "abstract" way. It is not necessary to have a big "fund" of specialized knowledge in order to generate new ideas, for example, how to improve traffic conditions in your

area, how to make your parents`evening more interesting or make guinea pig Vanda a bit happier.

In order to involve the students into an active creative process, the basis of the ideas should be related to daily life; besides, new ideas and their generation occur when there is a creative task which suggests finding a variety of solutions.

Looking for new solutions, a certain amount of knowledge is required when it is necessary to find ideas or solutions in some specific areas, or when the solution is intended to motivate one's choices and the desire to implement one's ideas.

Though a number of researches have been performed proving the efficiency of teaching creative thinking strategies or a higher level of divergent thinking, Hunsaker (2005) reminds that an important detail is that the researches of creative thinking don't explain how to transfer students' skills into their world outside the school if they are not involved into real activity.

Development of Academic Creativity

Involvement of students into creative activities and development of their creative thinking at school should be related to improvement of their academic achievements; that is why real work or the generated ideas should be related to the school subjects: sciences, languages, social sciences, etc. An example offered by Torrance and Goff (1990) illustrates the way it could be done at school: the students can be asked to remember the date when Columbus discovered America, or to tell how the history could have changed if Columbus had stepped off in California. Which question is more interesting? Which question would help remember the date better?

Shallcross (1981) created a system of exercises which can be used in certain subjects:

1. make a sculpture using leaves, stones, clay and paper bags (arts);
2. name the ways to make teeth cleaning a pleasant activity for children (sciences, studies of human life and nature (health));
3. invent a simple and quickly prepared meal (technologies (housework));
4. plan a series, a mystery or a soap opera using the method of morphological synthesis (language and literature);

5. think of new ways to measure time, water, air and height (mathematics);
6. ask somebody to play three notes on the piano. On the basis of these three notes create a melody (music);
7. invent muscles stretching exercises for runners (PE);
8. think of the ways to save vanishing species of animals (sciences) generating and applying new ideas;
9. think of the ways for different nations to come to know each other better (social sciences) generating and applying new ideas.

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Chapter III.
Existing Model of Talented Thinking and its Relation to Innovative Processes.

Odeta Norkutė

Models of the Concepts of Talent

In his Act of Programme for Skilful and Talented Children presented to the USA Congress in 1988, Javits indicates that talented children are those who give evidence of high achievement capability in the areas such as intellectual, creative, artistic;who posssess leadership capacity, or who are talented in specific academic fields, and who need the services and activities which are not ordinarily provided by school in order to fully develop those capabilities.

Barbe and Renzulli (1981), Roedell, Jackson and Robinson (1980), Rabinowitz and Glasser (1985) state that children's talents are disclosed through showing high level complicated abstractions, formulating questions and answers which reflect extraordinary perception, sensitivity to relations and unusual knowledge structure. Such children are also especially able to identify the essence of the problem, to choose a strategy for solving the problem and to distinguish important information from unimportant. Clark (2002) makes it even more specific and states that a talented person is able to achieve self-realization only through integration of perception, thinking and emotions.

Marland (1972) indicated that children's talents are revealed through demonstration of high results in all or some of the following fields:

- general intellect,
- specific academic achievements,
- creative or productive thinking,
- leadership, artistic activity,
- psychomotor abilities.

Taking into account the fact that talent is expressed in different fields at the same time, Marland (1972) suggests creating programmes involving specific methods of development of such children`s skills thus allowing them to use and demonstrate their talents in the best way.

According to the concepts of the talent and aptitudes, there are a few universally recognized models of talent. The main structural element in these models is general intellect and its manifestation in various fields because application of intellectual talents is directly related not only to the external indicators, such as level of learning achievements or quality of practical activity, but also to the amount of income, social meaning of creative achievements, etc. (Czeschlik and Rost, 1988; Jensen, 1996; Feldhusen and Jarwan, 2000). Besides manifestation of general intellect, talent can be defined by the following structural elements: motivation, working capacity, persistence, and self-appraisal.

Assumptions of Educating Thinking Abilities

How should the teacher work so that the students' creativity and innovative thinking skills were improved and, finally, new or innovative products were developed? Beresnevičius (2010) reviews the theories criticizing the very idea of teaching creative (talented) thinking. Some authors believe that both creativity and thinking abilities of an individual are inherent features; consequently, the education process doesn't affect them much. Cattell (1963) and Horn (1967) indicate that it is not possible to educate creativity. Gage, Berliner (1994) point out that creativity, like intellect, is a rather invariable attribute. Csikszentmihalyi (1976, 1996) believes that children's creativity can't be educated, and creative productivity can be improved only by the right combination of personal characteristics and creation of the environment enhancing creative work.

Another group of authors (Torrance, 1986; Lukas, 1983; Clapham, 1997; McFadzean, 2000; Tanner, 2001) hold it that the results of both creativity and thinking can be significantly modified if favourable conditions are created and special methods and education technologies are used. Malzman (1960) found out that after children had been taught certain creative actions, their originality test results improved.

It has been discovered that the variety of means determine the changes in the person's abilities, thinking, creative behaviour and creative potential. Practitioners who promote creativity use different methods, from motivation and setting the goals to teaching special techniques. (Nickerson, 1999). These methods are based on creative thinking, perception, processing of the memorized information, and other theories. (Beresnevičius, 2010).

The researchers working in the field of teaching creative thinking (Clapham, 1997; Scott, Leritz & Mumford, 2004; Tanner, 2001) describe the techniques of creative thinking which can be learnt by the majority of people and which help generating more innovative ideas. Of course, people who have better associative abilities and are able to relate distant ideas will generate more original ideas. However, the practice shows that creative thinking techniques can be mastered, and the majority of those who have mastered them have significantly improved the parameters of their creative activity.

Costa (2003) formulated four components of thinking skills programme (Table 4) and made the list of 16 "thinking types":

Table 4

The Components of Thinking Skills Program

(Costa, 2003)

No.	**Name of the part of the program**	**Purpose**
1.	Teaching material	The essential things associated with thinking skills to be learnt and applied. The materials determine selection of thinking skills, e.g. solution of a scientific problem will require the skills related to logic and scientific control, meanwhile social and aesthetic materials require the skills related to ethical and artistic solutions. Besides, interesting materials increase students' motivation: "*Teaching materials activate and awaken a curious mind*"
2.	Teaching of thinking skills	Essential means of efficient thinking which need help to be understood by the direct teaching method.

3.	Solving of the problems requiring masterful thinking skills.	Systematization of thinking skills according to the strategies: creativity, problem solving and decision making. Students have to solve the given ambiguities, abnormalities, contradictions, dilemmas, secrets, obstacles and paradoxes.
4.	Thinking types	Attitudes or inclinations to use thinking skills under appropriate circumstances. Students have to assess the thinking skill and to know when it can be used; to be able to employ and improve a certain thinking skill.

Though the number of thinking types is huge, Costa (2003) named the following 16 rather complicated and, in his opinion, especially important thinking skills:

- to be persistent when the solution is not evident;
- to resist impulsiveness;
- to listen to other people with understanding and empathy;
- to think flexibly;
- to think of one's own thinking (meta-cognition);
- to aim for accuracy and precision;
- to ask questions and raise problems;
- to apply previously acquired knowledge in new situations;
- to think and communicate clearly and with precision;
- to collect data using all senses for this purpose;
- to create, imagine, implement novelties;
- to react with surprise and respect;
- to take reasonable risks;
- to understand humour;
- to think autonomously;
- to be constantly open to continuous learning.

A big and significant part in the education of thinking skills is teaching of "attitudes" and "characteristics". As it was indicated by Davis (2004), de Bono (2000), some important thinking skills are closely related to personal attitudes, for example, creative pause (respect to evidences; desire to look for the reasons and alternatives; desire to refrain from assessment or even to change it on the basis of the facts; tolerating

ambiguities; sensitivity to others' viewpoints (Alvino, 1990, Lipman, 1991), and of course, understanding of creativity (Davis, 2004).

Davis, Rimm, Siegle (2010) distinguish several ways or technologies of educating thinking which might be used in regard with the dominating models of a child's/children's talents or creative thinking. The authors indicate three strategies of the development of thinking skills, according to which, the didactic recommendations for the implementation of these strategies are provided:

- indirect teaching,
- direct teaching,
- meta-cognition.

Indirect Teaching of Thinking Skills

As stated by Davis, Rim, Siegle (2010), thinking skills can be taught in a rather subtle way, *indirectly*, practicing them and doing exercises separately from the subject material or together with it. For example, during the teaching process the teacher can enhance the skills of classification by presenting classification tasks (including multiple and secondary classification) and giving practical work to solve them.

Costa (1985), Costa and Lowery (1989), Swartz (2001), Perkins (1990) recommend the teachers to add varibility to the teaching material by raising problems and asking questions, for example,the questions: "*Why?", "What if?" and "How?", but not only "What?"*

Teachers can ask their students to investigate paradoxes, dilemmas and discrepancies. Besides, they may ask the students to compare, classify, evaluate; find similarities and differences, analogical relations using induction to think of the principles, etc.

"The box of problems" gives the students an opportunity to suggest problems which could be solved by all the group. In the "place for thinking" arranged in the class the students can go deep into the topics they are interested in or work on implementation of the projects.

Besides, the teachers can project appropriate thinking skills during the "thinking aloud" analysis, assessment, consideration or creative work.

Direct Teaching of Thinking Skills

The majority of complicated thinking skills can be taught *directly* and offered to the students as deliberate ways of considering and solving problems (Beyer, 1991; Costa, 2003; Costa and Lowery, 1989; Reis, Burns, Renzulli, 1992). Teaching of creative or innovative thinking can be based on the fact that the students have maximum opportunities to evaluate the tendencies of the phenomena through observation, and after that they have every possibility to present their assessments or opinions about these phenomena, draw conclusions and make generalizations. Thus teaching creative thinking becomes direct because it allows generating ideas and applying different individual thinking methods (Davis, 2004).

CoRT (Cognitive Reasearch Trust) *Thinking Programme* prepared by de Bono (1976, 2015) can serve as an example of direct teaching of creative thinking. This programme was designed to teach such skills as evaluation, ability to see things at a different angle, planning, identifying priorities. These skills are considered to be the strategies of deliberate and conscious thinking. The students get support in understanding each skill and *why, when and how* it should be used.

De Bono (2015) formulated the following thinking skills which could be delivered during the teaching process:

1. thinking about good aspects (“pluses”), bad aspects (“minuses”) and interesting aspects of the ideas and suggestions;
2. considering all the factors when choosing something or making decisions;
3. thinking about consequences of the actions (short term, average term and long term);
4. thinking about goals and tasks, seeing the tasks of other people;
5. planning taking into account all the factors and indicating the goals and tasks;
6. skills of making the lists;
7. identifying priorities (for example, speaking about important factors, tasks and consequences);

8. thinking of different alternatives, possibilities and options(for example, when explaining the reasons or discussing alternative actions);
9. decision making: to do that, it is necessary to discuss all the relevant factors, tasks, consequences and possible alternatives;
10. seeing other people's attitudes; understanding that others can take into consideration different factors, imagine different consequences or have other tasks or priorities;
11. choosing the things in accordance with what has to be done and in line with the requirements (*what is the most suitable?*);
12. defining the action which should be performed and which is being performed, and what should be done after that (*systematization and analysis*) – for this purpose all the factors should be discussed and the alternatives should be thought of;
13. attention to different situation aspects, i.e. knowing when the analysis is being done, the factors that are being discussed, the consequences that are being considered, etc.;
14. project implementation related to thinking may be achieved through formulating the ideas, finding answers to the questions or problem solutions, or admitting the failure to resolve the problem;
15. recognition that opinions and facts are two kinds of evidence;
16. recognition of weak, strong or essential evidence;
17. recognition of the things which are agreed or not agreed about and recognition of insignificant things;
18. rightfulness in accordance with the facts, authorities, etc.;
19. justification of an argument with valuable words, such as "fair", "proper", "honest" or "sincere" instead of such words as "ridiculous", "dishonest", "cunning" or "stupid";
20. choice of position in the dispute about exaggerated things, mistakes (e.g. when providing facts) or about tendentious (fixed) ideas;

21. doubting the existing work methods as means of stimulating generation of new ideas;
22. improvement of different things, identifying shortcomings and thinking of the ways to eliminate them;
23. solution of problems, thinking about the requirements to the problem solution;
24. understanding what is *provided information* and *not provided but necessary information;*
25. understanding what is *contradictory information* which might lead to drawing wrong conclusions;
26. identifying which guesses are based on good information ("small guesses", e.g. tomorrow the sun will rise), and which guesses are based on bad information ("big guesses", e.g. the final result of the future football match);
27. ability to distinguish usual emotions (e.g. anger, love, fair, sadness) from the emotions related to the personal opinion about one`s self (personal emotions, e.g. pride, the feeling of power or insecurity);
28. understanding which values determine thinking, decisions, options and actions.

Though analogiacl thinking can be taught indirectly by using the problems based on simple analogies, it can also be taught by delivering it as a deliberate skill. For example, the students might be asked to write an essay named "*What I did last summer*" sticking to the vocabulary which is normally used when talking about a rocket launch or a football match; or "to borrow" some ideas from the fairy tale about Cinderella and draw a cartoon about some actual recent event in the way the painter would do it; or to create a school security system on the basis of animals' natural security system.

Meta-cognition in Development of Thinking Skills

Meta-cognition is thinking about the way we think. The basis of meta-cognition activity is self-observation and personal reflection. These are two of the main characteristics not only of the experts but also of the people thinking creatively. Of

course, students should understand how they think and how their thinking differs from that of other people (Sheppard and Kanevsky, 1999). Hong (1999) noticed that some kinds of activities of a higher thinking level are closely related to meta-cognition, for example, planning, forecasting, setting tasks, asking questions, evaluation, rehearsing, choosing actions and strategies, usage of the existing knowledge for generation of new ideas and selective linking of new information to the existing knowledge.

In order to stimulate personal reflection and, accordingly, meta-cognition, during the learning process of this type of thinking, the students can write diaries, summaries, put down expectations and do self-estimation, arrange the final lessons. For example, the students can look for the answers to the following questions: *"What have I learnt?", "How have I learnt this?", "What do I still want to know?", "Which way of learning is the easiest for me? Why?", "What are my strong sides*?".

> In order to help the students to think about how they are thinking Sheppard and Kanevsky (1999) recommend the analogy of "mind – machine". When solving some problems the students had to draw and describe a machine which reflected the work of their mind. For example: one girl said that her mind is similar to steam iron which irons wrinkled pieces of information. Another student made the analogy with video camera, "When I know how to use it, then it works. But when I don't know that, then it becomes difficult to understand".

The students agreed that after such lessons they started understanding better how their mind was functioning (Sheppard, Kanevsky 1999).

The students taught and encouraged by such simple methods and means begin to understand why one or another method should be used, when it should be used and see the stages of the usage of this method.

> Meta-cognition is an aid to the students to understand the sources of their own ideas, attitudes and values and the origin of the ideas and values of other people. Barell (1991) recommended the students not to reason their own point of view, but try to defend the positions of the others, for example: what do students think about the suggestion to build a new swimming pool? What do tax payers think about this? Supervisors? Teachers? Besides, the teacher (or

the students) can ask a question why have they thought of a certain question and what does it mean to them.

Besides, the teaching about the differences between the research and the learning methods selected by different students could be attributed to meta-cognition as well. Some of the students prefer visual methods, meanwhile others like audio or sensory methods more. Some prefer lectures, autonomous investigations, team work, games, intensive activity, etc.

The personal abilities and the activity of meta-cognition determine, control and stimulate adaptation of thinking skills.

Models of Teaching and Development of Thinking Skills

Application of De Bono's CoRT Thinking Programme

In 1973 – 1999, Edward de Bono created consistent materials for teaching direct thinking skills, which later were named CoRT Thinking Programme (CoRT Thinking Programme - *Cognitive Reasearch Trust Thinking Programme*).

The advantage of this programme is that its implementation doesn't require any or only very little special preparation on the part of the teacher.

The basis of the programme is the so-called PMI strategy:

P – pluses;
M – minuses;
I – interesting.

Students have an opportunity to estimate new ideas, suggestions, phenomena and activities on the basis of these three provisions: pluses (positive things), minuses (negative things) and the aspects which are neither positive nor negative but just interesting to them.

Application of this strategy allows the students to learn argumentation and acquire the ability to look at things at different angles: for example, some ideas which at first seemed not very good will not be rejected at once. On the other hand, there will be no

hurry in assessing the idea which sounds good, but has serious drawbacks which have been missed. Some ideas are neither good nor bad, they are just interesting and important; furthermore, they might stimulate generation of other ideas.

In case PMI strategy is not used, unnecessary emotions can hinder making sound decisions. When PMI strategy is used, the decisions about the idea are made after it is investigated, but not before.

Davis (2010) recommends different sets of lessons with the following sequence and structural parts (table 5):

Table 5

Structural Parts of the Lesson, Implementing de Bono's CoRT Thinking Programme

Part of the lesson	Purpose	Example of implementation
1. ***Introduction***	Defining and explaining the skill	While learning the skill of ***all factors consideration,*** the students find out that there always exist many factors which should be taken into consideration when making a decision or choice. If one or more factors are ignored, the option chosen might be wrong. Besides, the students can try and see the factors which were ignored by the others in the group.
2. ***Example***	An example of a problem (or statement) is given and the skill is applied.	In London, there is a law according to which all new buildings must have underground parking lots. It was not taken into account that due to the underground parking lots people will prefer going to work in their personal vehicles, and thus the traffic in the city will become worse.
3. ***Practice***	Four or five trial problems give the students an opportunity to gain personal experience using a respective skill.	What factors do you take into consideration when choosing a hairdo? What should be taken into consideration during an interview with a person applying for a teacher's position?

4. *Activity*	Distinguishing and discussing the main factors	During class work or group discussions the students may discuss, for example, whether it is easy or not to consider separate important factors when it is important to take a look at all of them; what happens when the others don't consider important factors; whether it is necessary to consider all the existing factors or only the important ones, etc.
5. *Principles*	Generalization	There are usually five reasonable principles proved by the arguments in favour of usage of the skill and by the advantages of usage of the skill. Everything should be reasonable.
6. *Project*	Solution of an extra teaching problem	A specific topic is selected and its implementation project is prepared.

Thinking skills taught according to CoRT thinking programme are not related to any specific subject area. Thinking is presented as a separate issue, a deliberate skill of meta-cognition.

Feuerstein's Instrumental Enrichment Programme for Teaching Skills

As a teenager, Reuven Feuerstein spent a few years in Nazi concentration camps. Later, he studied at the universities of Geneva and Sorbonne and helped children and adults to migrate to Israel.

In Israel he was investigating the education needs of the immigrants the majority of whom would be assessed as mentally retarded in the intellect tests. He developed a programme which was meant to change the cognition structure of the mentally retarded people and turn them into autonomous thinkers able to generate and explain ideas (Makler, 1980).

Feuerstein's (1980) Instrumental Enrichment Programme was meant to solve the questions related to such issues as impulsiveness; egocentric thinking and behaviour; recognition, definition and solution of the problems; consideration of one or two sources simultaneously; analysis, comparison, sorting; planning, trial; perception of the need of logical evidence; proper usage of time and space dimensions.

Feuerstein's (1980) instrumental enrichment is a 3-year programme created for the children of nine and older prepared for the formal operational thinking activity described by Piaget.

Cognitive functions taught in accordance with the Iinstrumental Enrichment Programme are divided into three categories:

- *input* (e.g., systematization of information);
- *detail explanation* (e.g., estimation of information relevance);
- *output* (e.g., presentation of problem solutions).

During implementation of the Instrumental Enrichment Programme, comparison exercises help enhance classification abilities and the ability to notice differences and similarities of the objects, events and ideas. Verbal and non-verbal syllogisms enhance formal logics including the ability to use sets, subsets and repetitive sets. Students make conclusions with regards to the validity of the things, find relations, principles, choose and process the data.

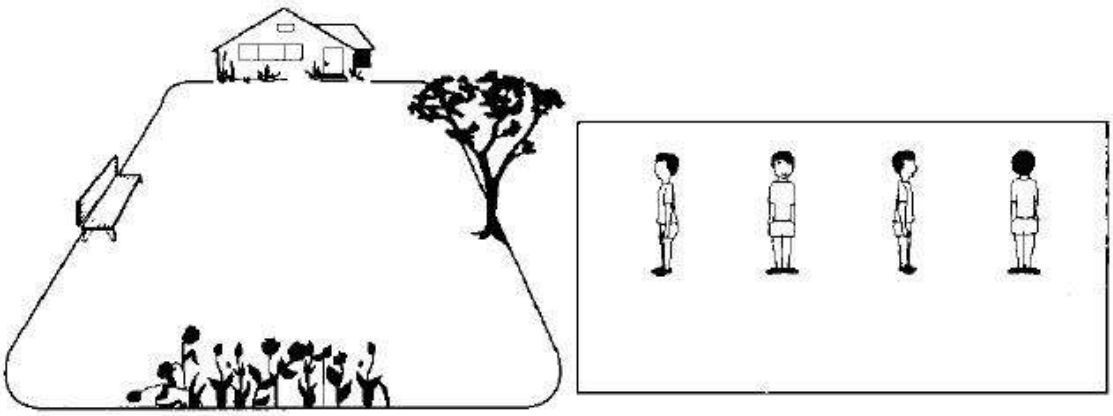
There are 13 types of exercises, and each of them helps develop certain essential abilities. The teacher should have a special preparation to be able to implement the programme and has to prepare his or her own teaching materials and means in advance; however, some exercises or tasks can be used as everyday teaching materials within the usual teaching programmes.

Examples of exercises:

TO CONNECT THE DOTS. The students are given a set of shapeless dots of different complexity. Their task is to identify and, by connecting the dots, draw geometric figures, for example, squares, rhombuses and stars.

This exercise enhances projection of visual relations, the ability to distinguish forms and sizes, to maintain consistency of forms and sizes when orientation is changing, to use important information, to find strategies, to see perspectives, to control impulsiveness, to mark corresponding things, to fulfil the work with precision and accuracy, to make plans, to define the starting point, to perform a systematic search and comparison according to the example; it also increases motivation. (Feuerstein, 1980).

ORIENTATION IN SPACE. Here below is a picture of a house, a bench, a garden and a tree (picture 1). There are boys on the right side looking to the left, to the right, forward and back. Imagine a picture with a boy in the middle of the garden.



Picture 1.

When filling in the table, the student describes the location of every object displayed in the picture from the point of view of each direction the boy is looking in.

This exercise helps the children:

1) to use concepts and stable (specific, abstract or interpersonal) systems of standards in order to orientate in space,
2) to see how the problem should be defined,
3) to use several information sources simultaneously,
4) to work systematically,
5) to think of the basis of hypotheses and conclusions by making logical conclusions,
6) to understand how the data in the table should be summarized,
7) to present the information precisely and exactly,
8) to subdue the egocentricity.

Socratic Method of Asking Questions in Education of Thinking Skills

The purpose of asking questions in the process of learning is to give an impulse to the students' active thinking. Asking questions is described as support in learning, identifying and solving problems, mastering the materials and concepts. Asking questions helps the children to identify their experience.

According to Bonz (1999), the questions have to be related to higher cognitive levels to develop students' intellectual abilities and also to enhance the skills of autonomous activity. If the teacher's questions are oriented at a lower intellectual level, then recollection of factual knowledge is requested (Gayle, Preiss, Allen, 2006). If the teacher wants to achieve a higher level of intellectual cognition, he is striving for the assumptions and reflections which create a positive effect of learning achievements (Gall, Artero-Boname, 1995).

Asking questions is attributed to the interactive form of learning as it is feasible only when at least two players are involved: the student ready for the learning activity and the teacher prepared for the expedient activity. The teacher's task during implementation of this method is to ask the students questions related to the problem, experiment or text which is being analysed, and to get their answers. Therefore a proper preparation is required on the part of the teacher, which manifests itself not only in preparation and implementation of the teaching plan, but also in versatility (when the teacher is prepared for unexpected situations or students' statements and questions). The results of the researches show that sometimes teachers ask from one to four questions a minute. Unfortunately, the majority of the questions are usually related to the lowest (according to Bloom's taxonomy) level of knowledge or memory (80 %), and only the rest 20 % are related to the other five levels (understanding, application, analysis, synthesis, assessment).

The model of four questioning levels can be defined on the basis of the system of cognitive levels (Bonz, 1999):

- *cognitive memory* questions related to the recalling and listing of specific facts (numbers, dates, propositions, definitions, etc.), for example, "What parts does a bike consist of?", "Can you explain why do the trees grow?"
- *convergent questions* when the asked questions cause reflection, considerations (for example, "What would happen if a bike lost one wheel?", "What would happen if there were no trees?").
- *divergent questions* when a creative discovery of the connections is encouraged (for example, "How should I learn to ride a single wheel bike?", "Does the growth of the trees with leaves differ from the growth of the trees with thorns?").

- *estimating questions*, encouraging the formulation of estimation and substantiation (for example, "What benefit do people get of a bike?", "Why should the trees be preserved?").

According to Kerry (1982), the following levels of questioning can be indicated:

Formation of the Concepts:

- listing *(What have you noticed, read...?)*
- systematization *(What is attributed? In what order...?)*
- classification *(What are the related concepts? How can we define...?)*

Interpretation and generalization:

- information collection *(What did clear up...?)*
- explanation and substantiation *(How are you going to come back? How could this be explained...?)*
- presentation and transformation of conclusions *(What influence does it have…? What conclusions can be made on the basis of...?)*

Making and checking the hypothesis:

- explanation of the phenomenon and prediction *(What would happen if...?)*
- substantiation of the hypothesis *(How can you explain that...? How can you explain the assumption that...?)*
- checking the assumptions *(What will we discover if...? How can this proposition be proved...?)*

Kerry (1982) indicates the following types of questions that encourage the development of thinking:

- hypothetical prediction: *"What would happen if...?"*
- listing the reasons: *"Why...?"*
- estimation: *"What can be the evidence that...?"*
- problem solution: *"How...?"*

In the process of learning, it is important to teach in order to understand, not to know. According to Kerry (1982), "in order to know, it is enough to remember; in order to understand, it is necessary to think". So during the questioning the students have to think themselves, and it is one of the main advantages of the questioning method. For the students, the questioning is more interesting than the teacher's monologue because

they are actively involved, and the questions stimulate their curiosity (*Why is something happening*?). Besides, the students have to think; logical links are shown, and the students are encouraged to follow them (What should be the temperature of the water to make it possible to breed fish?).

The method of questions awakens perception, not only helps accumulate knowledge. When the teacher gives a verbal presentation, the students are told what they have to know. In this way perception is not encouraged, and it is unlikely that the memory will be active.

Questioning has a direct link to motivation of learning as nothing can motivate better than the feeling of satisfaction which comes to the student when he answers the question correctly or gets a compliment from the teacher (reference to psychology: the stimulus –response learning method encourages motivation).

The advantages of the questioning method:

- shows the logics of the subject that will be further followed and encourages perception rather than superficial memorizing;
- ensures that new knowledge is based on the previous knowledge;
- allows to transfer knowledge into another situation;
- gives an immediate response to the teacher and the students revealing students' understanding;
- ensures acceptable for the students pace of lessons;
- students find it an active and interesting activity;
- students have an opportunity to use in practice the concepts and vocabulary they have just acquired;
- shows wrong thoughts and attitudes (checking and corrections are being done);
- motivate students as they get an opportunity to see how they succeed in learning;
- if the questioning is individual the teacher finds out the difficulties the students are facing;
- allows the teacher to make assessment of learning;

Teaching and encouragement of thinking through asking questions sometimes is called "Socratic questioning" (Paul, Elder, 2005). It encourages students:

- to explain,
- to analyze assumptions,
- to investigate arguments and evidence,
- to analyze attitudes and perspectives,
- to analyze implications and consequences,
- to ask questions.

Paul and Elder`s (2005) thinking model through questioning helps both teachers and students to apply the main concepts of Socratic critical thinking to any subject taught or learnt. Davis, Rimm, Siegle (2010) present a questioning taxonomy allowing to observe the evolution of the students' thinking level – from the elementary to the sophisticated one:

Explanatory questions:

What do you mean by saying ___?
What is the point of your proposition?
Could you give an example?
Could you expand on this?
How ___ is related to ___?
Could you explain that in other words?
In your opinion, what is the main problem here?
How is it related to our discussion (problem, question)?
Jane, could you make a summary of what Richard said? Richard, did you mean that?

Questions for the analysis of assumptions:

What are your (their) assumptions?
What assumptions could be done instead?
All your argumentation is based on the idea that ___. Why do you base your arguments on ___, and not on ___?
It seems you are making an assumption that ___. How can you justify your opinion?
Is that always like this? Why do you think that this assumption is valid in this case?

Questions for the analysis of reasons and evidence:

Where do you know this from?

Are such reasons adequate?

Do you have (good) evidence to justify that?

Are there any reasons to doubt such evidence?

How could we make sure that it is true?

What other information should we be aware of?

Questions about attitudes and perspectives:

Why have you chosen this perspective and not the other?

Can anyone see the same thing differently? Why?

What would a person disagreeing with you tell?

How would you react to the objection from ___ side?

What is the alternative?

What do Roxanne's and Ken's ideas have in common?

Questions for the analysis of implications and consequences:

What do you imply by this?

When you say ___, do you imply that ___?

If this happens, what else could happen because of that? Why?

Would it happen for sure or maybe?

If this is the truth what else can be true?

Questions about the question:

How can we know that?

How anyone could solve this question?

Is this the same question as ___?

What assumption is hiding under this question?

Why is this question important?

Does this question ask us to estimate anything?

Do we all agree that this question is exactly like this?

What questions should be answered first in order this question could be answered?

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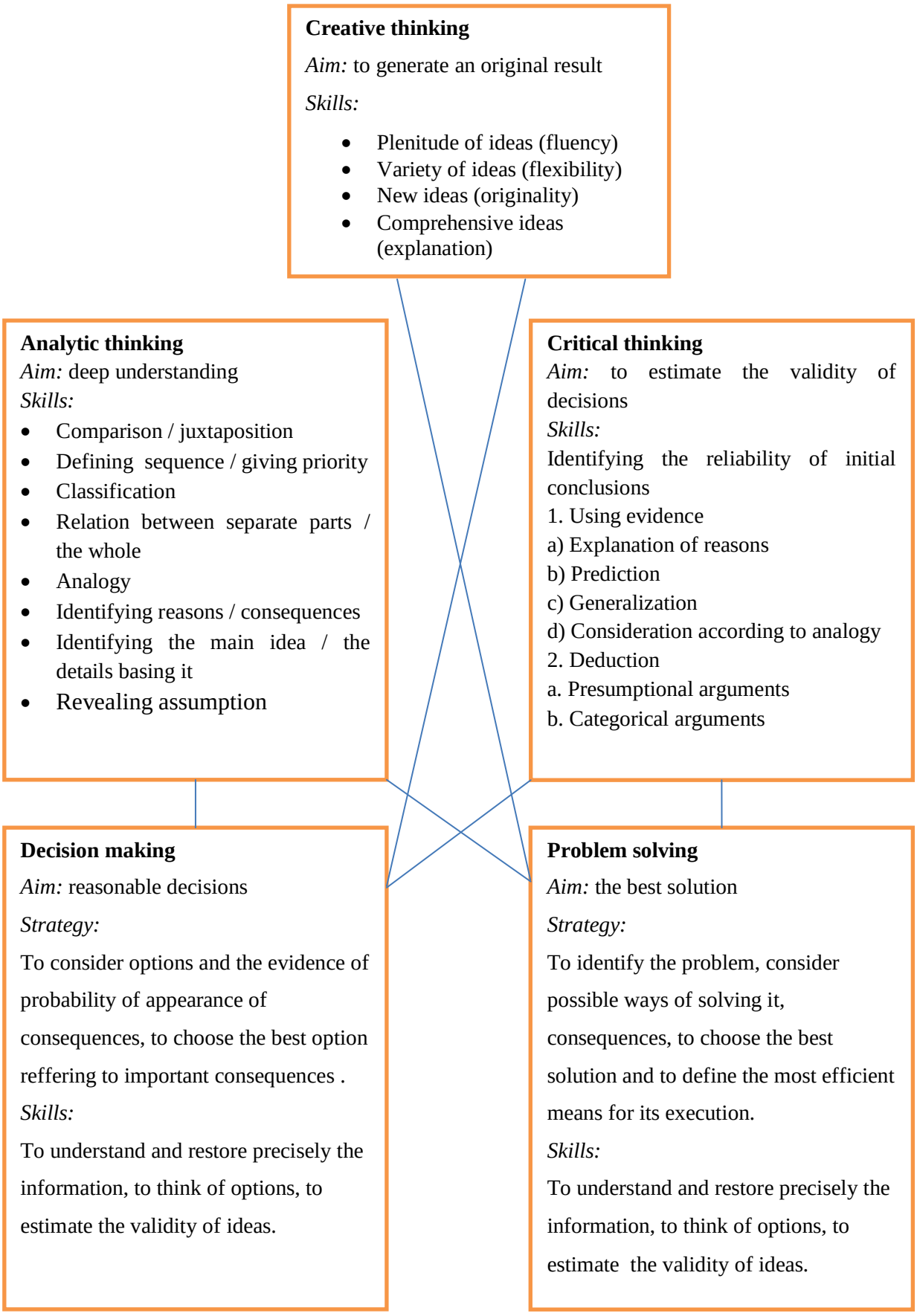
Chapter IV.
Didactics of Talented Thinking.

Odeta Norkutė

"Thinking is a skill; therefore, like all skills, it can be developed and improved" – stated the famous researcher of thinking de Bono. It has been proved by the researches that children and adults who have been taught purposeful thinking think much more efficiently.

Development of thinking activity allows to develop versatile cognition of different areas of life, improves perception of these areas and general mentality. Due to all these factors the talent can be revealed and success and satisfaction can be achieved after performing the attractive task or creating a product. Properly formed thinking processes help students handle the received information better and more quickly and to use it properly and purposefully in the performance of academic tasks. In the learning process such students are efficiently employing creative and critical thinking abilities by using versatile thinking skills, especially when they need to perform complicated tasks.

Speaking about didactic recommendations or teaching materials for development of thinking processes with reference to Parks and Black (2012), it can be indicated that teachers emphasize necessity of critical and creative thinking development, but the training materials haven't been properly prepared yet as there is lack of tasks or materials for logical consideration and principles in the textbooks. This causes difficulties to the teachers who want to educate and improve students' techniques of abstract thinking, technical logical perception, etc. Finally, the teachers have not been provided with clear definitions of what constitutes thinking processes, i.e. what is the model of thinking processes and what the training should be started with. Swartz and Perkins (1990) formulated a clear and not complicated model of thinking processes where they not only named the elements of thinking but also indicated the skills which help identify these elements (Picture 2).



Picture 2. The Map of Thinking Areas According to Swartz and Perkins (1990)

Teaching to Use Knowledge

It is not enough to remember the knowledge, it is important to learn to apply it and to know when and how to use it. Students are often not able to use the newly acquired knowledge in the real life conditions. One of the reasons for this is not fully understood material, missing relations between the constructs created by the student. Students should get used to learning more efficiently; they should practise in applying the things they are learning. They should develop the need for thinking about the relations between their created constructs, finding links between them and finding out what relations exist between the concepts and the procedures. Practical tasks not only help learning to apply the knowledge, but they also motivate students to learn. Why should a student wish to go to school if he doesn‘t learn anything that could be used in practice?

People of any age reach the best results in learning when they participate in the activities which seem to them meaningful in real life and important from the cultural point of view. The concept of culture here should be understood widely, it can be children and youth culture or the culture of different ethnical groups. A lot of activities at schools, according to children, are not significant as they don‘t understand why they are doing them and what their benefit is. The teacher can make learning more meaningful by relating it to the authentic context. For example, he can choose the activities characterizing the students’ daily life.

Didactic Recommendations

Linking the Existing Knowledge to the New Knowledge:

1) When learning fractions, a lot of children make mistakes because they apply the same rules for fractions as for natural numbers.
2) When learning a second language (foreign or state), children incorrectly apply some patterns of their mother tongue to the second language and do not understand that.

The teacher should foresee such learning difficulties and undertake suitable actions: draw the students’ attention to the possibility of wrong understanding; create situations where wrong applications can be exposed and mistakes can be understood;

give the students some examples of wrong perception; give the students enough time to restructure their previous perception and knowledge.

Strategies for Acquisition of Knowledge:

On their way to the shop, as early as in the first form some children, on their own initiative, repeat aloud the list of goods they need to buy. These children have already found the benefit of the strategy of repeating words aloud for memorizing them.

This shows that people learn more successfully when they apply efficient and flexible memorizing skills, thinking and problem solving strategies. Children start developing individual learning strategies already in primary school. Researches show that good results are achieved when teachers teach their students proper learning strategies systematically.

The strategies can be taught directly and indirectly. When the teacher raises the problem and suggests the steps for its analysis or asks significant questions which help the students find the final answer, they speak about problem solution strategies taught indirectly.

Learning as a Social Activity – Cooperation:

It is often beneficial for the students to learn in pairs and small groups, especially when they perform special tasks or activities dedicated to learning through cooperation. Properly organized work in small groups helps train the students to speak, listen and handle the information related to the task, encourages thinking and generating ideas. Learning through cooperation improves the climate in the class, increases learning motivation of the students and educates their social competencies.

Knowledge Construction:

The student constructs his own knowing. The knowing of each student is individual.

- Learning is impossible without active participation and thinking of the student.
- The student, when starting to learn new material, has to activate the knowledge he already has.
- The most efficient learning takes place in the student's closest surroundings.

- One of the most important roles of the teacher is to provide the support that the student needs in explanation, training, learning planning, evaluation, learning to think and other.

Recommendation on how to prepare a programme for thinking skills teaching (Costa, 2003)

Arthur Costa (2003) described four components of a well prepared programme for teaching children"skilful thinking habits" or "thinking types".

Imagine four concentric circles similar to a dart table.

Reasonably selected material placed in the centre is the subject in relation to which thinking skill will be taught, and then such skills will be applied. Selection of the thinking skills depends on the teaching material. For example, solution of a scientific problem will require skills related to logic and to scientific control, meanwhile social and aesthetic material will require skills related to ethics and to artistic solutions. Moreover, interesting materials increase students` motivation: "*Teaching material activates and exites a curious mind*" (Costa, 2003, 326).

The second circle is ***teaching of thinking skills:*** essential means of efficient thinking understanding of which requires some help rendered my means of direct teaching.

The third circle is called "***solution of problems requiring masterful thinking skills****"*. Students encounter ambiguities, abnormalities, contradictions, dilemmas, secrets, obstacles or paradoxes which have to be solved.

Thinking skills are systematized through creating strategies called *creativity, problem solving and decision making*.

The external circle is ***thinking types –*** suppositions or inclinations to use thinking skills in favourable circumstances. Students must be able to properly assess the thinking skill, know when to apply it, be ready to use it and understand the necessity to improve a certain thinking skill.

Although the number of thinking types is infinite, Costa (2003) listed the following 16 rather complicated and, in his opinion, particularly important thinking skills:

- to be persistent when the solution is not clear;
- resist impulsiveness;

- listen to other people with understanding and empathy;
- think flexibly;
- think about one's own thinking (meta-cognition);
- strive for accuracy and precision;
- ask questions and raise problems;
- apply the earlier acquired knowledge in new situations;
- think and communicate clearly and precisely;
- collect data using all the human senses;
- create, imagine, implement novelties;
- react with surprise and respect;
- take reasonable risks;
- understand humour;
- think autonomously;
- be constantly open to continuous learning.

Development of Meta-cognition

1) **Variety of the activities:** diaries, summaries, writing down expectations, self evaluation, preparation and presentation of the reports, answering such questions *"What have I learnt?", "How have I learn it?", "What else do I wish to know?", "Which way of learning is the easiest for me? Why?", "What are my strong sides?"* **(**Leader, 1995).
2) **Do not reason on your own point of view; try to defend positions of the others (Barell, 1991), for example:** *What do students think about the suggestion to build a new swimming pool? What do tax payers think about this? Supervisors? Teachers?* Besides, the teacher (or the students) can ask a question why have they thought of a certain question and what does it mean to them.

Lesson on Development of Thinking Skills

The structure of each lesson usually consists of the following six parts:

1. ***Introduction.*** In the introduction the skill is defined and explained. For example, while learning the skill of problem solving, students find out that when a decision is made or something is to be selected, there are always a lot of factors which should be taken into consideration. When one or more factors are ignored, the selected variant might prove to be wrong. Besides, students can try to find the factors which were not considered by the others in the process of thinking and discussion.
2. ***Example.*** An example of a problem (or a statement) is presented and the skill is applied. For example, there was a law in London according to which all new buildings had to have an underground parking. The fact that the nearby underground parking would encourage people to drive to work in their own cars was not taken into consideration; as a result, traffic congestion in the city became worse.
3. ***Practice.*** Four or five trial problems give the students an opportunity to gain personal experience through using a corresponding skill. For example, what factors are taken into consideration while choosing a hairdo?
4. ***Activity.*** Working in a class or in discussion groups, students usually speak on different subjects: for example, how easy it is not to take into consideration important factors, when it is important to discuss all the factors, what happens when these factors are ignored, and whether it is necessary to consider all the factors or only the most important ones.
5. ***Principles.*** Five reasonable principles are usually presented, and they can be compared to the arguments in favour of application of the skill and to the advantages it brings.
6. ***Project.*** These are additional teaching problems.

Development of Thinking Skills and Assumptions (based on Lipman, 1988; Lipman, Sharp and Scanyan, 1980; Sharp and Reed, 1992 "Philosophy for Children").

- ***Relation of the reason and the consequence.*** Determine whether the following statement means relation between the reason and the consequence: "He threw a stone and broke the window".
- ***Recognition of consistent and contradictory statements or ideas.*** For example: can you be a true animal lover and still eat meat?
- ***Identification of not clearly expressed assumptions.*** What supposition is hiding behind the following statement: "I love your hairdo. In which beauty salon were you?"
- ***Finding out the relations between separate parts and the whole complex, the whole complex and separate parts.*** The students might be asked to evaluate whether, for example, the statement "If the features of Mike's face are nice so Mike's face is nice" is correct.
- ***Making generalizations.*** The students make generalizations on the basis of series of facts such as "Raspberries make me sick; strawberries make me sick; blueberries make me sick."
- ***Analogical thinking.*** The students practise to think in analogies when solving such problems as "*Bacteria for the disease* is the same as *candle for (a) wax, (b) wick, (c) whiteness, (d) light"*.
- ***Invertible and non-invertible statements.*** The statements that include the words "any" / "none" are invertible, for example, "none of the submarines are kangaroos; meaning none of the kangaroos are submarines". However, the statements including the word "all" usually cannot be inverted: "All plain models are toys, but not all toys are plain models".
- ***Independent thinking.*** Should we always have to follow the majority?
- ***Ability to look at things from a different angle.*** Can you look at this question from a different perspective?
- ***Taking care.*** Taking care of other people's well-being.

Teaching Methods for Teaching of Thinking

Frayer's Model for Development of Vocabulary – Formation of Concepts by Creating Definitions

A variant of concept formation through analysis of the features of the objects and presentation of the definition of the concept is the Model of Vocabulary Development by Frayer (1969), further *Frayer`s model.* Application of this model in the teaching process helps develop thinking by expanding perception and formation of concepts.

The graphical structure presented below was created using Frayer`s model (Frayer, Frederick & Klausmeier, 1969); it is supposed to help the students to find the meanings of words and concepts and describe them. This process helps the students enhance understanding of words. The students are asked to consider important features (characteristics) of the word (concept), to provide appropriate examples and not appropriate non-examples, to formulate definitions (example in the table 6):

Table 6

Filled in Graphical Scheme of the Model of Frayer

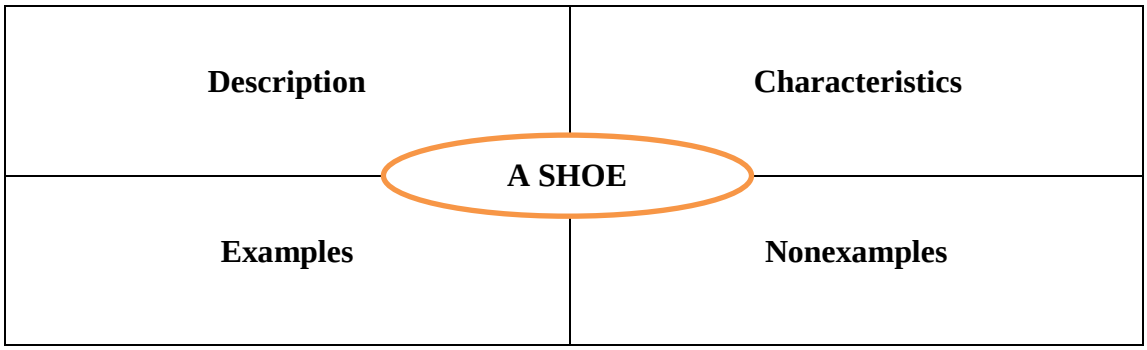
Description	**Characteristics**
"a person who explores nature and physical world by performing tests, experiments and measures"	It is typical for the scientist: – to raise questions; – to observe; – to foresee results and/or formulate hypotheses; – to collect, classify and analyse data; – to prepare (plan) an experiment; – to draw conclusions; – to present (communicate) the results to others.
A SCIENTIST	
Examples	**Nonexamples**
– Astronomers – explore the universe (planets, stars, etc.) – Biologists – explore nature (plants and animals) – Geologists – explore the earth structure (rocks and soils) – Physicists – explore materials and energy.	– An entertainer – A poet – A banker

Practical Application of the Model of Formation and Perception of Concepts by Frayer in the Lesson

1) Prepare a table. On a large sheet of paper draw a table and write down the statements which students will have to work on.
2) Discuss the nature of the future activity in order the students could understand how to work: what should they do autonomously, which sources should they use, in what way should they present the information, etc.

3) In order the work principle was clear to the students you could start from the analysis together in the class of a well known word, for example, a stone, a shoe, an umbrella, etc.

The Scheme of the Model of Frayer



4) First, ask students to describe the word in their own words. Write down a definition corresponding to their knowledge.
5) Then ask students to give typical features (characteristics) of a word (concept) or the facts which they know about this word (concept).
6) Finally, ask students to give the examples and nonexamples which are appropriate for the concept and finish filling the table.

After students have mastered the principle of the nature of activity the model of Frayer can be used in other ways as well:

1) At the beginning the examples and nonexamples are given and students are asked to discuss what word or concept it might be.
2) Similar exercises might be given when some parts of the scheme are filled in and students are asked to fill in the rest of the scheme.

When the students are exchanging ideas, it is recommended to pay attention to the level of understanding of the group and of each student separately in order not to diverge from the main goals or the topic which is being analysed.

Usage of Systematized Tables

With the help of the tables, the teachers and the students can see, organize and show the complicated information which is used for estimating questions, solving problems

or making decisions. Systematized tables can be also used for monitoring thinking, project planning and assessment of the students' achievements.

Systematized tables contain names, titles or questions which have to be answered or statements which have to be clearly presented; therefore in this case the purposefulness of thinking is very important as it is necessary:

- to estimate reliability of the information sources;
- to analyse the reasons for the conclusions made;
- to think using analogy;
- to estimate explanations of the reasons;
- to make reasonable predictions;
- to estimate general laws or to form them;
- to be guided by conditional or categorical thinking.

Systematized tables can be used for several purposes:

- to provide and systematize the information needed for research and assessment;
- to show interrelations;
- to stimulate and handle the thinking process.

Use of Systematized Tables

The table contains information which is used to estimate what sources of energy and in what way can be used and developed (Swartz, Parks, 1994). The examples given in the table of the variants of energy sources can help the students collect the requested miscellaneous information and make observations (table 7).

Table 7

The Example of the Systematized Table

Relevant consequences				
Variants	**Is it simple to produce**	**Environmental protection**	**Costs**	**Accessibility**
Solar power Active Passive Photovoltaic				
Nuclear energy				
Energy from the chemical products of petroleum				
Energy from coal				

An important aspect which should be taken into account when usage of the table is related to development of thinking abilities is that the table has not only to be filled with relevant information, but all the information has to be analysed from the point of view of the consequences for the environment, humans, etc. (the line at the top). This means that while collecting the information, the students have to consider the anticipatory solutions; for example, when indicating employment possibilities a certain energy source provides, it is necessary to estimate the accessibility, costs or impact of this source.

Students can fill in the table in groups or individually; however, later the collected information is systematized and moved into one table. This process is very intensive because of meta-cognition: every student or group has to reason on her/his/its choices or decisions and substantiate them.

As it is shown in the table which contains an example of systematized information, the students have not only reasoned, but they have also found out the meaning of each statement; for example, the group of students which had to collect information about solar power prepared their generalized statement in which they had synthesized important information about solar power which they had received during investigation (table 8).

Table 8

The Example of the Systematized Table (filled in),

(Swartz. Parks, 1994)

Relevant consequences				
Variants	**Is it simple to produce**	**Environmental protection**	**Costs**	**Accessibility**
Solar power Active Passive Photovoltaic	- Simple if the place, latitude and weather conditions are favourable. - Requires not much maintenance. - Doesn't require much repair. - Photovoltaic systems are not economical, the existing technologies should be improved.	- Doesn't cause undesirable air or water pollution. Plain equipment or circular mirror fields - Trees are being cut. The environment is effected by the materials and equipment used in the production and the removal of the elements.	- Solar power plants are expensive (the price could get down if mass production is started). - Doesn't require much maintenance or repair. - Minimal maintenance expenses. - Expensive researches and development.	- Limited by place, latitude and weather. - In some places dependent on the season. - Limited possibilities to spread and save received electric energy. - A renewing source.
Nuclear power	- Complicated, requiring sophisticated equipment, specialized techniques and unusual safety measures. - Waste removal is risky, requiring long term storages.	- Danger of radiation. - Uranium mining causes erosion and long term toxic pollution. - During waste storage the radiation can get into the environment. - Huge plant constructions.	- Expensive safety measures, maintenance and the establishment of power plants. - Expensive licenses, certificates and testing. - Maintenance costs.	- Uranium is a rear raw material. - The reactors are contradictory and not widely spread.

Energy from the chemical products of petroleum.	- Complicated but widely used.	- Risk of petroleum spill. - The stock of petroleum is being wasted. - Hydrocarbon is polluting the air, damaging ozone layer, causing acid rains. - Refining petroleum the air is polluted.	- High costs of research, tests, distribution and cleaning. - Expensive import; dependence on the price in international markets. - Used not only for getting energy.	- Limited, dependent on the region stock. - Not renewing source.
Energy from the coal	- Complicated but widely used.	- Open mines destroy the landscape. - When the coal is used the surface is covered by a grey layer. - The parts' emission is polluting air. - Acid rains pollute air and water.	- The researches of the usage and spreading of soft coal are very expensive. - Expensive manpower, transport and storage.	- Declining stock. - The soft coal is not widely enough used.

After filling of the table is finished, information in each column is generalized and the common principle is identified, which helps the students answer another important question: what consequences are more important. This generalizing statement specifies the factors that have more weight in making the decision concerning the energy sources. When reasoning about the generalizing statements for the lines and columns of the table, the students can prepare recommendations on suitability of this or that energy source for their country.

Verbal Communication in Development of Thinking Skills

Through verbal communication students acquire, perceive new information and incorporate it into the already existing stock of knowledge. When students talk, they show their ability to solve problems. The language is only a thinking medium; however, it is also an important means of teaching thinking.

Karnes, Bean (2014), referring to Tchudi and Mitchell (1999), defined the five-stage process during which communication is used as a teaching tool and formulated the teacher`s tasks:

1. ***To involve and interest.*** Teachers involve the students through the presentation of new material. Students are generating ideas or discussing what they know about one or another subject. The goal is to give every student an opportunity to be listened to and to help them "to be convinced" by this subject.
2. ***To explore.*** Working in a small group, students start to understand information through asking each other questions about a specific subject and discussing the areas they are interested in.
3. ***To transform.*** Students start to concentrate their thinking and to make decisions in order to acquire new understanding of a specific subject.
4. ***To present.*** Students prepare formal presentations for a bigger group. The aim is not only to provide information, but also to give the group an opportunity to react to their thoughts. During this period the formal presentation skills become very important.
5. ***To reflect.*** Students are again divided into smaller groups and discuss what they have learnt and how their learning process has been affected by communication with other people and present the impact on their thinking.

Most often, four verbal communication areas are distinguished, which have two participating parties - the speaker and the listener, and interaction of these parties is called communication:

- speaking (e.g., a lecture),
- group discussions,
- interviews,
- debates.

Examples of Teaching Verbal Communication

Interview

For the students, it is important to know how to speak to people and listen to them in order to get the desired first-hand information and record it. Sebranek, Meyer and Kemper (1990) gave a few useful pieces of advice on how to arrange a good interview. They set the milestones which the students should be guided by during preparation for the interview, during the interview and after the interview.

Before the interview
– Choose carefully a person who has some specialized knowledge of the investigated area.
– Write down all the questions you are going to ask.
– Make an appointment for the interview with the person at convenient time and place.
– Inform the person about the nature of your project in advance.
– Study your subject in advance so that the amount of new information won't astonish you and you will appear to be a well-informed listener.
– Practice working with a microphone in order to know how to use it and how the cartridge and elements can be replaced quickly.
– Rehearse asking questions and writing down the answers.
During the interview
– Start with introducing yourself, say thanks for the interview and ask whether you can make notes or use a voice recorder.
– Ask a good first question and listen carefully.
– Keep an eye contact with the informant, pay attention to the expression of his face and his gestures.
– By active listening show that you are actively involved in the subject you are discussing and that you are interested in it.
– Don't interrupt the informant without a serious reason.
– Before finishing the interview, look through the notes – is there anything which should be cleared? or are there any extra questions which should be asked?
After the interview
– Say thanks to the informant for the interview and ask whether he would like to get a copy of the final product.
– Write down everything you can remember as soon as you can. Later write down the transcript of the interview from the voice recorder.
– Prior to including the information acquired into the final product, ask the informant or any other authoritative person about all the doubtful facts once again.
– Make sure that the informant gets a copy of the final product if he wishes to have it.

Students can prepare the interview about one subject but choose different ways:

- a TV interview;
- a radio interview;
- a newspaper interview;
- a scientific research interview.

Several groups can perform the interview using the same method and on the same subject, for example, in case of a scientific research interview; or do research into a specific subject, but together and with different participants of the research asking different questions about the selected subject, in which case collection of information will be complex and detailed.

Debates

This kind of communication gives an opportunity to investigate, define and defend both sides of any argument or question. It is important to teach the students acceptable formal terminology and order. Students should be able to perform investigation, distinguish essential information from non-essential, substantiate the statements by firm evidence and arguments, work together with other students and express thoughts clearly and efficiently (Summers, Whan and Rousse, 1963). In many cases debates can be one of the pithiest ways of development leadership skills.

It is said that the stage of preparation for formal debates is as important as formal debates themselves, and even more important. For beginners, it is especially important to use the defined format of the debates. As a result of following the clear and concise method of arranging debates, important skills of participating in debates become accessible for every talented student. Debates encourage students` interest in hot news, help developing the abilities of critical thinking; improve communication skills and ability to investigate the problem demonstrating at the same time how deliberate, positive and well- organized changes can be made in a democratic society (Karnes, Bean, 2014).

Recommendations for Arranging Debates
I. Preparation for debates A. Analyse a statement. B. Choose a position. 1. Positive position 2. Negative position C. Allocate the duties for the team members. D. Prepare arguments. E. Substantiate arguments. 1. Find evidence 2. Use logical argumentation F. Create strategies. 1. Positive strategies 2. Negative strategies
II. Participating in Debates A. Choose a format. 1. Standard format 2. Cross-examination format 3. Lincoln – Douglas format B. Say speeches. 1. Constructive speeches 2. Cross-examination 3. Denials C. Estimate the efficiency.

Questioning in the Development of Thinking Abilities

The teacher who asks questions constantly receives feedback from his or her students on how they have understood the subject.

The Purpose of Questioning is Acquisition of New Knowledge

– The essential thing which should be aimed at during questioning is that students should acquire as much new knowledge as possible during the lesson.

- Each question must raise interest, only then the knowledge is acquired easier.

The Basics of Questioning Techniques

Nobody can tell which type of questioning is the best. Everybody can make their conclusions based on the situation. However, it is worth knowing some rules of the questioning:

- the question must be formulated correctly in the sense of language and content, avoiding any ambiguities: *Where is the coal mined? I have in mind not the mining company but the location.*
- the question should have only didactic propositions, double questions or asking the same question twice should be avoided: *What are the perspectives of an urbane photographer? Why?*
- from the point of view of the language the question cannot be reverse (opposite), the questions with explanation should be avoided: *Are they only the citizens of a pension age?*
- the question cannot contain too much information: *What is the capital of Italy? Does it start with a letter "R"?*
- mysterious, vague questions should be avoided.
- after asking a question, the teacher should give the students some time for thinking and giving an answer. This time cannot be interrupted. It is recommended to wait for at least 3 seconds (try to count!). Most often not more than one second is given for the answer.
- the teacher cannot spend too much time for presenting the question (it will ruin the curiosity).
- the student has to tell everything, and he has to get a reaction and comments to his answer.
- "the teacher's echo" must be avoided. It is not necessary to repeat each student's word unless the student is answering fragmentally, then some additions or modifications could be suggested.
- the teacher cannot be responsible for the student if he gives wrong answers, it is better to give extra questions that could lead to the right answer.
- the question can be given to the whole group.

– it should be observed that not too many questions have been asked – one question each half a minute (unless chain questions have been asked).

The Examples of Using Questioning Techniques

<table>
<tr><td>  </td><td>What do you see? (it is recommended to choose real things representing the topic of the lesson)
– Why are candles made only of wax (paraffin)?
– What can be done with a candle?
What could be the topic of the lesson?
• It can be formulated by all together
• Children can guess
• The formulation can be prepared by the teacher</td></tr>
<tr><td>  </td><td>What do you see?
– What materials is this thing made of?
– Why is it used in darkness?
– What would happen if we did not have this thing?</td></tr>
<tr><td colspan="2">Further activity when the topic of the lesson has been formulated
What aspect do you imagine further?
– I am interested in...
– Now we are going to discuss...
– Could you now name...
– Name what comes into your mind...
How did you understand it?
– Substantiate your statements
– Explain why do you think so
– What reasons allow doing such generalizations?
What did you like the best in this situation?
– I would like to know what you liked the most in this story;
– Say your first impression;
– What main aspects can be distinguished in this situation?
– I was thinking much about this situation, why?</td></tr>
</table>

What did you not understand?

- Is there anything we have not talked about?
- Why have we not talked about these things?

How can it be described?

- Can you give any suggestions?
- What are other options?
- How can it be described?
- Can it be somehow recorded?

These questions can be further developed in detail or only a part of them can be chosen – it depends on the intended goal.

Assessment of Thinking Skills

It is difficult to evaluate how the students` thinking has changed; however, the students are waiting for their work and efforts to be assessed and noticed. Assessment of the results of the work is the most significant way of assessment of the changes in the thinking level.

One of the most difficult questions in assessment of the changes in the students' thinking and their success in acquiring the material is related to the planning of the assessment tasks, the assessment of the work results included, and the assessment of the students' works by giving grades. The teachers always face difficulties in giving grades, especially if critical and creative thinking is emphasized during the lessons and in the tasks.

As a higher thinking level reveals itself best when students demonstrate their ability of skilled thinking and understanding of the material, and it requires a lot of time to prepare, Karnes and Bean (2014) recommend ranking of such assessment procedures by importance as indicated in the table below:

- assessment tasks related to critical or creative thinking require to develop time consuming products therefore they are the most valuable;
- tasks of analysis can be assessed by filling in the forms, which is less time and effort consuming;

– tasks related to the knowledge, perception and application might be assessed by performing the tests that are less time and effort consuming, therefore such tasks are valued the least.

There is an example of assessment distribution after the tasks on the theme "The Civil War" have been performed (table 9).

Table 9

Assessment Tasks

(according to Karnes and Bean, 2014)

Importance	**Assessment of learning**	**Assessment procedures**	**Material (The Civil War)**	**Example**
50%	What main concepts which should be additionally analysed and estimated have I learnt during this lesson?	Results of the activity (speeches, projects, work in laboratory, detailed written answers.	Reasons and results, argumentation of each side, differences of resources.	What influence did the government reform have on the outcome of the Civil War?
20%	What concepts are related to consistent or rational thinking?	Results of the activity (projects, diagrams of concepts, drawings), detailed written answers, classification, options	Events or leaders and battles. Resources of Southerners and Northerners. Life in slavery	Classify the presented events and retell them by heart. Write down the events in their sequential order. Prepare the diagram of the concepts of the leaders and the battles. Compare the resources of Southerners and Northerners.
20%	What important definitions were not mentioned in the previous paragraphs?	Concise written answers. Detailed written answers (descriptive essays). Options.	Abolitionism Sea blockade Isolation	Did Abraham Linkoln stand up for abolitionism? Why? Tell about the sea blockade as about the war strategy. What is isolation?

10%	What facts are necessary for increasing literacy or avoiding confusion?	Concise written answers. Coordinating options. Options.	Decision of Dred Scott Isolation Compromise of Missouri. Skills of map reading.	Which of these things encouraged the opposition to slavery in the North before the war: fight anthem of the Republic, "Uncle Tom's Cabin", Dixieland?

The efficiency of analytical and critical teaching is revealed in the quality of the students' written works. They reflect the students' thinking. If the student's thoughts are vague, not concentrated and unfinished, his written works will show it. The improved quality of written works is the best and direct evidence of efficient teaching of critical and analytical thinking.

The table shows relations between thinking processes and different tools aiding the students in writing. Though the questions in the thinking strategy column can be treated as standards for creating headings, students' thinking is often implicit and not evident. If teachers don't revise their students' notes, they might not find out whether the students have analysed the main questions related to various thinking strategies when they were doing their written works (Table 10).

Table 10

The Relations of the Types of Written Works and Thinking Strategies

(according to Parks, 1999)

Types of written works	**Thinking strategy**
Narrative Create a story about the following situation: _____.	Decision making
Explanatory Compare and juxtapose _____ and _____. Describe the events which caused _____. What caused _____. What would happen if _____.	Comparison and juxtaposition Making up a sequence Explaining the reasons Prediction

Persuasive Why should _____ do _____? Why did _____ do _____? Prepare an argument for _____. How should we behave with _____?	Reasons / Conclusions Explaining the reasons Reasons / Conclusions and disclosing the assumptions Decision making
Creative Write a poem or a story about _____.	To create a metaphor To create opportunities
Descriptive Describe _____. Describe how _____.	Parts of the whole or classification Making up a sequence

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