Lateral thinking is a unique problem-solving technique with a creative approach resulting in ideas that are not obtainable by using only vertical traditional thinking. The term was presented by Edward de Bono. Difference between lateral and vertical thinking can be divided into several areas, nevertheless they should not be completely separate, but complement each other in the problem-solving process. Lateral thinking is a process that requires time and work in order to progress. It can be described as one of the paths to creativity, as it is directed to develop new ideas. There are two main approaches in development of this skill, while tools used for development can be divided into several groups. This thinking technique has helped many people and companies in their search for better and more innovative solutions.

Key words: lateral thinking; vertical thinking; creativity; problem solving approach

1. Introduction

Lateral thinking can be defined as a process of solving problems using untraditional ideas that may not be immediately obvious. This way of thinking includes dealing with ideas that are not considered to be directly logical. The term was primarily mentioned and defined by de Bono [1] (Appendix A). He reported this way of thinking as opposite to vertical thinking, which is described as traditional or logical thinking. However, he did not write off vertical thinking as a non-effective, but noted that lateral thinking is complementary to vertical thinking, where each makes the other one more effective. This way of thinking proposes different ways for examining a problem, opposite to immediately taking the solution that seems to be straightforward. Furthermore, difference between lateral and vertical thinking can be declared in several areas [2]:

- alternatives (acquiring the solution of the problem based on ideas that are not logical on a first sight, spreading the views beyond the obvious),
2. Lateral thinking properties

De Bono has suggested quite a few ways to improve this skill [3]. It consists of considering some random problem appearing and finding the alternative solutions to the one that is logical. This can be achieved through generating options by lateral thinking and evaluating both logical and lateral solutions.

2.1 Misconceptions about lateral thinking

It is important to note that lateral thinking is not a talent. This is actually one of the most frequent misguides and one of the reasons why people do not try to be creative in thinking. Here I would like to emphasize that this is a process of development and requires time to progress. However, some people may be natural talents in lateral thinking; hence their ability will develop faster. De Bono compares these discrepancies with mathematics or other subjects, pointing out that people can improve by being taught this concept and making it into a permanent skill [1]. Some people will still be more creative than others, but that is the case with any other skill. If we do not develop the skill, we will depend only on the natural talent. Second misconception about lateral thinking is that creativity comes from rebels, as they always try to be different. This is actually true in the system where people do not understand creativity.

Today, however, things are changing. People nowadays understand the ‘game’ of creativity, and formal tools of lateral thinking are developed. Also, many of the approaches to creativity suggest that everyone is creative, but most of the people are inhibited. So the effort should be made in liberating people and making them creative. This approach suggests that nonsequentiality (bringing in the ideas from completely different area of research and adjusting them to a problem in hand), undoing selection processes (thinking outside the logical boundaries and conducting ideas that may seem inappropriate at the first glance, but could eventually develop into something useful), attention (shifting the direct focus of the problem area).
brainstorming is one of the tools to deliberate people's minds and make them creative, encouraging them to say whatever they want without the fear of being mocked.

2.2 Is lateral thinking synonym for creative thinking

When we talk about something 'creative', it is implied that it means creating or developing something that was not present before. Even though lateral thinking is often described as a creative thinking, this is not the same term.

However, lateral thinking is one of the processes that encourage to creativity, while ideas arising as a product of lateral thinking are creative by its nature. De Bono describes lateral thinking as a creative process directed towards emerging with new ideas [4]. Therefore, lateral thinking can be described as one of the paths to creativity, among the others, such as brainstorming etc.

3. Tools and techniques

It is not enough to develop lateral thinking just by encouraging yourself approach the problem with attitudes like 'freedom' and 'friskiness', i.e. stimulate yourself to be free-minded. There are certain tools that can help you build up the skill, so you can use your ability any time you want and not only when you feel inspired. There are two main approaches to lateral thinking development.

One of them is the motivate people to be creative and afterwards teach them the tools.

The second one, and rather often used, is to teach people the tools and when they meet with the problem they can use learned tools and become motivated to be creative. The hardest thing in this process is to start thinking creative ideas because the tools seem to be awkward to use. De Bono compares this with a riding the bicycle [1]. At first, riding bicycle feels very unnatural, but after a while, when you pick up the skills, it becomes superior to walking. Tools used for development of lateral thinking skills can be divided into several groups [3].

Focus tools are responsible for disciplined use of time, tools and purpose. It means that these tools will help you understand how to set key statements, decide which tools to use in solving the problem, and plan the timing.

Idea generating tools will help you to extract concepts and ideas, which will lead you to the new ideas. De Bono reported this as one of the most important tools, as it will alone significantly improve the idea output of your creative sessions. These tools are teaching you how to think 'outside the box'.
Idea sorting tools is designed to help in organizing idea output into a framework suitable to usage. This means that creative and useful ideas often have to be adjusted in some way in order to be compatible for implementation.

Idea building tools implies investigating only one idea at a time. These tools are useful because often ideas that seem to be promising can prove to be inadequate when explored in details.

4. Concluding remarks with reference to engineering

The skills of lateral thinking have helped many people around the world in different field of interests. In DuPont company lateral thinking tools helped employees to eliminate nine steps in manufacturing process, this improvement saved 30 million $ to company. Dan Weare from National Business Manager reported that his company doubled their business since the employees took the creative thinking sessions.

So, how could science researchers benefit from learning skills of lateral thinking? Mechanical engineering is a specific field, where often only one answer of the problem is the correct one. However, ability to reach this answer is greatly conditioned by the direction of research. In fact, invention of new technologies and application of science laws in solving various problems requires from engineer to think creative.

Lateral thinking abilities can definitely help a researcher to explore directions that are not obvious in process of finding the solution. Also, this ability will spread the field of view in finding interesting existing problems, where some questions are still left unanswered and some effort should be done in finding the appropriate answers.

However, engineer’s ideas have to be in compliance with general ethics principles. Ethics in engineering is a broad professional concern which should be completely fulfilled, as engineers have to take into account welfare and safety of the public. Therefore, engineer should not accept any idea, even if it is an ingenious one from some aspect, that could potentially generate a threatening situation, either to environment or human society.
REFERENCES

Appendix A Short curriculum of Edward de Bono

Edward de Bono is a Maltese physician, author, inventor and consultant. He was born on 19 May 1933. He gained a medical degree from the University of Malta. De Bono also studied at Rhodes Scholar at Christ Church, Oxford, where he earned Master of Arts degree in psychology and physiology. Furthermore, he gained a PhD degree in medicine from Trinity College, Cambridge. Doctor of Design degree from the Royal Melbourne Institute of Technology and Doctor of Law degree from the University of Dundee. He is a professor at Malta, Pretoria, Central England and Dublin City University. De Bono also holds the Da Vinci Professor of Thinking chair at University of Advancing Technology in Tempe, Arizona, USA. He is the author of 57 books, in which he originated the term of lateral thinking and invented the principle of Six Thinking Hats. He has taught his thinking methods to many world’s leading organization, and started to set up the World Center for New Thinking and Peace Studies based in Malta. In 1995, he created the futuristic documentary film, 2040: Possibilities by Edward de Bono. He is strong proponent of the teaching of thinking as a subject in schools. In 1988 he was awarded the first Capire prize in Madrid for a significant contribution to humankind. In 1995 the Malta Government awarded Edward de Bono the ‘Order of Merit’. This is the highest award available and is limited to only twenty living persons. In 2005 he was shortlisted for the Nobel prize in Economics. De Bono is one of the very few people in history who had major impact on the way we think today.

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