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SOI: [1.1/TAS](#) DOI: [10.15863/TAS](#)

## International Scientific Journal Theoretical & Applied Science

p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online)

Year: 2019 Issue: 01 Volume: 69

Published: 23.01.2019 <http://T-Science.org>

QR – Issue



QR – Article



### SECTION 21. Pedagogy. Psychology. Innovations in the field of education.

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## DOES DESIGN THINKING SERVE AS AN EFFECTIVE STRATEGY FOR INNOVATION?

**Abstract:** The paper deals with the concept of design thinking and its ability to improve innovative skills. The goal of the study is to attempt to overview recent trends in design thinking concept and provide the arguments that engineers-to-be claim. It explains in details the origin, key features of design thinking which promote the development of an individual's personality and serve modern society demands as well; the main stages in teaching design thinking and addresses its advantages and disadvantages as a strategy for innovation. The paper presents the results of the Olympiad held for students of Moscow Polytechnic University. It proved that the majority of participants having been introduced to the concept of design thinking support its strategies in project work and problem-solving.

**Key words:** design thinking, innovation, problem solving, teaching methods, project.

**Language:** English

**Citation:** Metelitsa, N., & Diagileva, N. (2019). Does design thinking serve as an effective strategy for innovation? *ISJ Theoretical & Applied Science*, 01 (69), 176-180.

**Soi:** <http://s-o-i.org/1.1/TAS-01-69-22> **Doi:**  <https://dx.doi.org/10.15863/TAS.2019.01.69.22>

### Introduction

Over the last centuries the idea of changing the world and improving our lifestyle has occupied people's minds. New technologies, new approaches, new processes appear and are rapidly implemented in everyday life of ordinary people. Innovation matters to everyone, including big or small business, start-up entrepreneurs, educational establishments, government, workforce. Both organizations and individuals use imagination, creativity, knowledge and design thinking skills to identify and choose ideas to enable innovation. Creative-problem solving skills are developed and enhanced through a range of real-world activities. Overcoming these activities confers experience and skills to solve complicated problems and to generate better ideas. Some of the world's leading companies such as Google, Apple, Samsung, Sony, Proctor & Gamble employ the design thinking approach and this induced to start new teaching process. It is currently known that some leading universities and private tutors provide educative courses of design thinking. They promise

to teach how to make use of practical design thinking methods in every stage of a problem, how to employ various analytical methods, how to reduce risks in inventing a prototype and accelerate organizational learning [1].

However, what a design thinking is and does it really serve as an effective strategy in innovation? Why do people have this term in their minds but do not clearly understand its application and significance? Our goal in this paper is to attempt to overview recent trends in design thinking concept and provide the arguments that engineers-to-be claim.

### The concept of design thinking

The idea of Design Thinking appeared around the early 2000s describing a leadership between David Kelley and Tim Brown, who created a firm to reflect the evolution of the concept by focusing not only on product development. They have expanded their experience and practice to involve the design of services, strategies and even educational and other

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social systems [2; p.4]. The term of design thinking arose as an effective innovative approach and within the next few years, it became essential for managers striving to renew their business, and leading universities and business schools desiring to better educate their students for an increasingly complicated and changing surrounding. The concept of design thinking suggests that an organization not only learns to think and work more like designers but also learns how to cooperate, distribute problems differently, to come up with breakthrough ideas, balance exploration and exploitation better. Transforming its business by being more innovative will be a key to a success [3; p.3]. This idea was generally recognized by increasing number of firms that implement design thinking. Many industrial companies try to apply designer's problem-solving methods to corporate invention process. Why are these techniques so demanded?

Creative thinking for designers is almost the same as inventing for a scientist, designers tend to be more interested in "what" and "how" it is done in comparison with scientists' "why". Design creativity supplements scientific creativity. Reasoning from above, designers also focus on other issues such as:

- human-centered concern - means that an inventor should always keep in mind the question whether the final product will satisfy customer's needs;
- environment- centered approach - nowadays environmental interests are at a level with human interests. Human and environment value should be taken into account in any project.
- Ability to visualize- undoubtedly scientists are less creative people than designers who use much their imagination in work.
- Using language as a Tool- communication sometimes is the only way to explain the intricacy, and to simplify the process; forcing invention can be complicated without verbal language. Visual Language is described as a combination of words and images within defined shapes and structures. It is usually used to simplify difficult concepts, illustrate deeper meaning or assist in collaborative thinking.
- Affinity for teamwork- usually designers work for clients, so it is natural for them to obtain good interpersonal skills. Moreover, multi-discipline teams of designers are highly valuable nowadays, because of their abilities to generalize, communicate, visualize concepts and work as a team to achieve one goal.
- Capability to work regularly with qualitative information- means that a tool-kit of methods for a complete range of planning tasks to search information, to organize ideas, visualize and to communicate a plan to the team, they are usable by anyone working in a project [4; p.5].

There are some other characteristics of design thinking suggested by different universities, but the most significant fact is that designer's problem-solving techniques are never taught explicitly, they can be effectively applied only in conjunction with other kinds of thinking brought from the sciences, arts, engineering, business, etc. Creating a good multi-discipline team is, unfortunately, not a key to a successful innovation. Innovation may be presented to a company, but it will challenge a team trained in design thinking.

### Entrepreneurship education and design thinking

The design process is what puts Design Thinking into action. Some leading universities and schools suggest the following structure in educating students.

*Define and observe – ideate – visualize- create a prototype –test and refine* (HPI School of Design Thinking, The Global Citizen in International Business Education, HGSE Teaching and Learning Lab, Austin Center for Design, Hasso Plattner Institute, Stanford University). In this structure there is no exact consequence, some actions may be followed or foretaken by others, it depends on the case. The mentioned structure of a Design Challenge teaches students to explore problems within a situation.

The first step is to Define and Observe the problem means that a student should have between 3 and 6 potential problems, because it is common during the educating process for students to discover unanticipated problems. The goal of this step is to come up with at least one actionable problem statement, to determine a unique human centered problem from a big variety of unorganized information. Then ideation follows, it is the process of idea generation. Ideation provides the fuel for building prototypes and driving innovative solutions. At this step students may listen and compare other's ideas using brainstorming rules such as be visual and defer judgement on an idea. Before creating a prototype, students with creative thinking should visualize the final solution. As it was mentioned above, designers usually have this ability. Prototyping is the iterative development of objects intended to elicit qualitative or quantitative feedback. The act of prototyping involves creating, testing and iterating it. At this step, students realize the value of building to think and the significance of rapid prototyping. The final stage is testing and refining where students try to apply the prototyped idea in the appropriate context of the user's life. This helps us to realize we were right at prototyping stage, the testing is the chance to refine solutions and make them better. Obtaining feedback is important at this stage, it reveals the value of having a clear prototype in testing an idea [5; p.9]. This structure of educating

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students is too general, but certainly it is possible to apply it to any educational process.

Design thinking experts Kelley and Littman (2001), Brown (2009) and Liedtka (2013) emphasize that design thinking can be applied in any discipline: product, service, business or social model, entertainment, career and development, book and other. Moreover, methods, techniques and approaches can be used by any company, organization, department to achieve any goals [2: 1; 6: p.228-236]. Applying design thinking certainly may cause various problems and this fact leads to increasing number of opponents in this effective strategy in innovation.

### Pros and cons of design thinking

It is a known fact that the most important in solving any problem is to define the challenge correctly. The way we define challenge will determine our future attempts to solve it to achieve the most appropriate result.

Generating several completely different ideas to solve the challenge gives a bigger opportunity to choose the most appropriate solution. Brainstorming and mind mapping are used which are two great problem solving methods. Brainstorming is a way of expanding thinking on any topic. Mind-mapping then helps to organize all ideas and consider the relationship between them. There are two main stages in a searching solution process: a free thinking stage and an organizing stage. It is essential not to complete them together. Collecting different creative ideas, a problem solving technique can be used to decide which one is the best solution, then it should be evaluated and compared to others. Design thinking methodology includes such major elements as fast iterations, early and frequent interaction with customers, agile process design with less hierarchy and learning-by-doing approach that involves building prototypes and creating mock-ups of any kind in the process [7].

Design thinking projects are always supposed to be accomplished in teams, evolving various skills and knowledge, experience and cooperation of all members. Kelley and Littman determined that cooperation in a team provides driving power and energy to the design project due to common ownership and responsibility about the idea [8; p.87]. Participants are gathered from different fields of knowledge to build an interdisciplinary team. Such people are eager to work collaboratively, able to communicate verbally, physically and visually [2; p.2] applying their experience, skills, expertise and strengths. Moreover, such alliance obtains serendipity and cross-pollination [8; p.154]. Serendipity is the luck some people have in finding or creating interesting or valuable things by chance. Cross-pollination means sharing or interchange of knowledge, ideas, etc., as for mutual enrichment, in

other words it is an ability to use knowledge from one field in a different one.

According to Kelley and Littman advice, teams are usually created by these main principles: all members have to be dedicated to the final result and usually have a ridiculous deadline; they should not have hierarchy between each other, be respectful, well rounded and diverse; they should be placed in appropriate environment with eclectic convenient space for communication, brainstorming and good partnership. Such tips help big companies to assemble the best possible teams. Key elements of such teams are respect, trust, morale and passion. This allows striving for crazy deadlines and seemingly unachievable aims being in passion about their project. High team morale is reached, when people realize themselves as valued, unique, trusted, united and free having breaks, pranks. Needless to say such environment and feeling stimulates creative work and collaboration, helps to maintain self-confidence and to overcome any obstacles.

According to the mentioned above, this concept seems beneficial and in force as that is how design thinking should unfold in a corporate setting. An experienced, skilled, encouraged team is involved in a clearly defined innovation challenge. Collaborating participants conduct research to identify the problem and find the best solution; visualizing they suggest a variety of solutions, create prototypes, test it and pilot a profitable business model.

That is how the concept of design thinking is supposed to work, but in real practice it hardly ever does. During the last seven years while design thinking is thought to be an effective strategy in innovation, companies that pursue and support this idea have realized that seemingly effective strategy rarely proceeds according to the given model. Companies often face unexpected difficulties, conflicts in different ways with inventing processes, structures and corporate cultures. Innovation is an intrinsically complicated process and sometimes abstract vision makes it more complicated. In practice participants often attempt to dodge design thinking projects, shunning habits and mindsets the concept required [7]. That is how the first obstacle appears.

The second obstacle comes with an organization of the teams themselves. The design thinking concept appeals to equal, self-confidence and self-organized teams, but the most organizations don't have the experience to work last that. In most companies senior managers are supposed only to supervise design thinking team and to supply them with a good working environment, but in practice senior managers interact with participants giving them additional tasks and this leads to accepting responsibilities for project outcome. That is not the worst issue, it often happens that such senior managers prefer to supervise from 12 to 15 design

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thinking projects at the same time, that reduces the efficiency of the whole process due to slow progress.

The main concern is that, teaching designers to be involved in a team, doesn't take into consideration that many companies have their own corporate culture. Due to it they tend to aggravate some structural limitations, such as specialization, focus on financial outcome and failure phobia.

Certain specialization usually required certain tasks and the territory of certain departments, and it effects on design thinking by difficulties in communication because of very specific viewpoints and different level of creative skills. A financial outcome is more important for organization workers in comparison with creative workers. So, focusing too early on monetary results, sometimes at the first stage of the innovative process can discourage creativity, cause instead of inspiration participants preoccupied with profit. Furthermore, many organizations punish or fine workers for any minor failure. This discourages the risk-taking, which is a must for design thinking. Concluding these limitations, reducing freedom, understanding and supporting each other, and decreasing personal risk of failure leads to reducing the collective chance of success. Consequently, design thinking cannot be an effective strategy of innovation in such organizations.

### What engineers-to-be know about design thinking

It is obvious that design thinking approach has its followers and opponents all over the world. The popularity of this concept steadily grows over the last 7 years. The leading organizations successful apply all advantages of design thinking to make their innovations relevant, essential within minimum time spent. If somebody wants to create, improve something design thinking helps to achieve this. It helps to reduce the risks by engaging with external and internal people searching for an innovative solution. The successful process starts with creating series of prototypes to learn from, then to test and refine concepts avoiding imperfection. But each success comes from a proper start.

Previously we mentioned that design thinking was created by the designers at the university in Stanford as a methodology. It was supposed to use intuition, imagination, logic and system reasoning to solve complex problems in the society and to simplify the innovative process. But life and technology revolution challenge us all the time, and it requires people, future inventors to think differently, to improve continuously to meet customers' needs. All around the world design thinking is profoundly experienced working with students from different majors like biology, biomedical engineering along with students of mechanical, design, IT specializations. Such collisions create surprisingly innovative

brainstorming ideas. There is no need to be afraid of working with people from different fields, occupations, only ambitious student who is not afraid of risk-taking can become a valuable member of a Team to invent something indeed beneficial applying design thinking.

Teachers, tutors, educational establishments in general may give required knowledge, skills, sometimes even experience. Nevertheless do students indeed have a clear idea what a design thinking is and what is it a beneficial ability?

Moscow Polytechnic university chair "Foreign Languages" in spring 2018 conducted the Olympiad for engineering students to check their common knowledge in English and design thinking understanding. The main issue of competition was to get students' answers to the following question whether Design Thinking is an effective strategy for innovation. At the preliminary stage, the participants shared their knowledge answering the question what they knew about design thinking in an application form. Handling their answers, the teacher found out that the majority obtained lack of information on the given topic, but they all were willing to participate and learn more on that issue. That's how an educative purpose was realized. The most students wrote that design thinking was a kind of strategy for innovation with a help of creative thinking, only a few of them could consider that above all it was a team collaboration.

The first period was devoted to listening practical experience and advice of participants from all over the world. The speaker was a part of an international students collision working on the project with the multi-national and inter-disciplined team. She shared her personal vision on how design thinking works and gave advice not to be afraid of anything. According to her words, the key to success was always to think about the customer's needs and this helps to improve continuously. She asked to avoid thoughts of quitting the project even if something went wrong and more than 1000 ways didn't work until you find the right one. The speaker strongly recommended to push yourself to find a solution that the society truly needs to know to be sustainable. The second period of the competition was to examine a recent article taken from a magazine "Issue Opinion and Analysis" published in September 2017 and complete the given tasks. The article "Why design thinking in a business needs a rethink" analyzed the current difficulties engineers usually face with completing the project. And outline the possible solutions such as to recognize and appreciate the diversity of experience and skills and integrate design thinking into a product development process [7].

It was obvious that design thinking not only exposes the designer's mental ability, but it can be advanced and practiced by everybody who aims to

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solve problems in a creative way, who desires to conceive new realities and realize innovative ideas [9; p.18].

Completing these two periods the participants had a clear idea about what design thinking is, how it works, what advantages and disadvantages it has. Afterwards, they were eagerly put their thoughts into paper concerning the topic whether design thinking was an effective strategy for innovation or not. The outcome was unexpected. Teachers didn't realize that interest in such a relevant topic would exceed expectation. All members of the Olympiad produced their essays; they simultaneously explained the concept of the issue and introduced arguments pros and cons design thinking. According to this written survey, we found out that the majority of participants, engineers-to-be support the idea of design thinking. Teamwork is a valuable activity for problem-solving and inventing something new. Innovation is an inherently social process that involves not just creating but also convincing people to do something in a new way. Working in a team

collaborating with various people will help to achieve the desired results.

### Conclusion

Results of theoretical and practical observe described in this paper demonstrate that design thinking is a relevant and effective strategy for innovation if it is controlled and follow some minor rules. Additionally, the survey that was conducted by teachers of English at Moscow Polytech University shows that future engineers are eager to be involved in design thinking project work, it excites curiosity and desire to experience something innovative and challenging. This means that initial purpose of the Olympiad was achieved. The received outcome was not tested by other teachers or tutors at any other universities. All the survey materials, tasks and the students' essays are kept by the authors and may be proposed to other participants or person concerned by additional request.

### References:

1. (2016). *Design Thinking Course: The Beginner's Guide*. Retrieved June 19, 2018, from <https://www.interaction-design.org/courses/design-thinking-the-beginner-s-guide?ad-set=design-thinking-course&gclid=CjwKCAjw9qfZBRA5EiwAiq0AbfRj-rWWt79dXXuLbkEOhDnDkrtTC4e85kOqAxdWr86UFdzDm-RiWhoCSqAQAvDBwE>
2. Liedtka, J. (2013). Design Thinking: What is it and Why it Works Design at Daren Working paper series.
3. Carlgren, L. (2013). Design Thinking as an Enabler of Innovation: Exploring the concept and its relation to building innovation capabilities.
4. Owen, C. (2006). Design Thinking: driving Innovation.
5. (n.d.). *An Educator's Guide to Design Thinking. The k12 Lab Wiki*. Retrieved November 19, 2018, from <https://dschool-old.stanford.edu/groups/k12/search/resources?n=modifiedDate&howMany=10&sortDirection=reverse&tag=resources>
6. Brown, T. (2009). *Change by Design: How Design thinking Transforms Organizations and Inspires Innovation 1st edition*. New York: Harper Business
7. Kupp, M., Anderson, J., & Reckhenrich, J. (2017). Why Design Thinking in Business Needs a Rethink Magazine: Fall 2017 Issue Opinion & Analysis September 12, 2017. Retrieved November 20, 2018, from <https://sloanreview.mit.edu/article/why-design-thinking-in-business-needs-a-rethink/#article-authors>
8. Kelly, T., & Littman, J. (2001). *The Art of Innovation: Lessons in Creativity from IDEO; America's Leading Design Firm*. United Kingdom: Harper- Collins Business
9. Tschimmel, K. (2012). *Design Thinking as an effective Toolkit for Innovation*. Proceedings of the XXIII ISPIM Conference: Action for Innovation: Innovating from Experience. Barcelona.