1 HOW TO USE THE DT4VET TOOLKIT

This part will introduce the fundamentals of using the DT4VET toolbox. This toolkit is one of the outputs of the project "Educating Designerly Thinkers for Vocational Education and Training: Design Thinking Tool for Educators," funded by the ERASMUS KA-202 program of the European Union.

The goal of the DT4VET toolset is to promote "designerly thinking" to educators and students at vocational and technical high schools. It is expected that assisting students in internalizing designerly ways of thinking will result in a long-lasting habit of problem solving and multidisciplinary thinking in their professional lives. Before proceeding into the details of how to use the toolkit, it is vital to have a fundamental understanding of the concept of "designerly thinking" and its underlying principles.

1.1 How do designers think?

Understanding "designing" and "designerly thinking" is necessary to provide an answer to this query.

First, designing entails *the planning and execution of a process to produce an object or system*. It involves determining advantageous and restrictive situations at the beginning, as well as functional, aesthetic, and economic features by communicating with the users and the environment. The design process can be quick, such as just sketching an idea, or it can be long-term, such as user research, modeling, prototyping, or re-design.

The design process has always been user-oriented. Interdisciplinary and integrated approaches have also become increasingly important with the development of new research and assessment methods. As design disciplines investigate new data collection methods, design and techniques are increasingly being applied to topics outside of the traditional design domain. Today, the design process is no longer limited to material objects but also pertains to immaterial things, like systems and organizations. *This gave "design" a more global and strategic role.*

Second, design is often directly associated with *creativity*. Existing research shows that design education can develop a creative and innovative thinking system, prone to problem-solving. In design education, tools, skills, methods, and processes are widely used along with theoretical knowledge. This, in turn, changes the way the candidates think, gives them the knowledge that will last, and lets them learn the design culture.

DT4VET aims to inspire the design thinking method for initial vocational education and training and to educate designerly thinkers who can define the problem creatively; are human-oriented; and have transversal skills. As Rittel and Webber said in 1973, the most effective tool for educators in vocational schools is the ability to "think creatively like a designer who works with wicked, open-ended, and ill-defined problems."

1.2   What is design thinking?

As a sister methodology, the origin of "Design Thinking" is often credited to Herbert Simon's "The Science of the Artificial," first published in 1969. However, it was Rowe who introduced the term 'Design Thinking' to the terminology in 1987. The connection between the designerly way of thinking and design thinking is mentioned by Johansson and Sköldberg in 2013.

They differentiate the two by implying contexts. "Design thinking" is an approach that is usually used by business and management; however, "designerly way of thinking" is basically a creative mindset that can be used in educational and academic settings also. Design Thinking is developed to increase creative thinking by bringing multidisciplinary people together and conducting collaborations with people who are not technically or academically trained designers. Today, many educational institutions are fostering the use of design thinking in their research, curriculum, and social services as a medium like other fields where practitioners encourage its use in other domains and applications, such as businesses, governmental institutions, or K–12 education.

Principles of Design Thinking

Design thinking can be used as a method and a process in a variety of situations. For example, it can be used as a tool to investigate and solve open and ill-defined problems or as a process to find out new possibilities and opportunities for innovation by deepening empathy with users.

Being sector-agnostic is one of the most significant qualities of design thinking. That means design thinking is a method or process that can be applied to any sector, from products and services to financial processes, education, and studies, and even one's own life.

Contemporary design thinking was popularized by IDEO and the Stanford School of Design. The approach adopted by IDEO and institutionalized in Stanford's d.school has generally been reduced to five 'modes': *Empathize, Define, Ideate, Prototype, and Test*. Based on this framework, other organizations have also presented their design thinking method as an extended or shrunken five-step process. Although they appear to have significant differences on the surface, their basic assumptions are similar, and the difference beneath the surface is slight.

(1)   empathy or exploration, where the goal is to understand the target audience you are designing for; empathizing means to develop an end-user experience for new users.

(2)   define or interpret that includes identifying the individual's perspective and needs; At the define phase, the data collected during the empathy phase are analyzed to define a problem framework.

(3)   idea generation, which involves brainstorming to generate as many creative solutions as possible; This phase is used to make scenarios, create personas, and find the best approach to solving the problem.

(4)   prototype or experiment where a potential solution is generated; At prototype phase ideas are represented and made tangible.

(5)   Testing or development involving sharing the prototype with target users for feedback. The prototype can be tested by the design team or a small group of people outside the design team.

2   DT4VET TOOLKIT

The activities in the DT4VET Toolkit are coherent with the projects' "designerly way of thinking" targets. Each phase has several activities that provide educators with diversity for their immediate needs.

The toolkit has four main categories, which include 19 different activities, and an additional usability testing phase with one activity. The toolkit has four categories: **student journey orientation, experience orientation, service orientation, SME and collaboration orientation**. The usability testing phase is a standalone and optional activity that can be used if desired.

The Toolkit is free-to-use for anybody who is interested in gaining "designerly way of thinking" insight.

- The student journey orientation phase provides tools to teacher to support students' learning and understanding different kinds of students. The tools can be used alone or together with other teachers and students.
- The experience orientation phase focuses on ideating, creating, testing, and experimenting skills that students will need in work life during their vocational careers, and therefore these tools can be used in class in learning projects. The tools of this phase can also be used for developing teaching and curricula.
- The service orientation phase aims to provide tools to prepare students for the service moment and aspects of their work life, hence developing skills holistically during studies. The tools of this phase can be used in class in learning projects, but also for developing teaching and curricula.
- SME and collaboration orientation provides tools to teacher to develop SME aspect of work life. The tools can be used alone or together with other teachers and students, but also in a work environment, for instance during a practical training.
- Usability testing is a method used in interaction design to evaluate a product by testing it on users. It gives direct input on how real users use the system.

Student Journey Orientation

- o   Opportunity–challenge mind map – a visual diagram of student's opportunities and challenges

- o   Persona – a fictional character of a typical student or a typical group of students

- o   6 questions – 6 questions to help find answers to students' situations, learning and development

- o   Empathy map - a visual map to deepen understanding of students

- o   Empathy interviews (as a research method tool)- interviews to deepen understanding of students or the topic

- o   Student journey map - a map detailing students' learning journey and what and who is involved in it

Experience Orientation

- o   Ideation: brainstorming – a free-thinking method to generate ideas

- o   Prototype: low fidelity prototypes – quick, cheap, and simple prototypes to understand and test the basic idea and functions

- o   Prototype: rapid experimentation – experiment with ideas and prototypes rapidly to get feedback and improvement

- o   Ideation: scamper - an ideation method that changes different aspects of a product, process, or issue

- o   Prototype: role playing - testing through roleplay and acting

Service Orientation

- o   Stakeholder map - define, understand, and manage the service stakeholders

- o   Interviews - a tool to understand and discover the 'deeper' service key fields and elements

- o   Co-creation workshop - an effective tool and process to understand and define the key service elements

- o   Expert workshop - a process and tool necessary to implement your service from the expert's point of view

SME and Collaboration Orientation

- o   Stakeholder map - a visual map of stakeholders and their roles

- o   Interviews - interviews to learn more about the company and its challenge

- o   Co – creation workshop - people of different backgrounds generating ideas together

- o   Expert workshop (evaluation matrix) - an expert workshop to select particular aspects

Usability Testing

User experience - testing the usability of a product, process, or service for improvements

Thus far, the terms "designerly method of thinking" and "design thinking" have been discussed. Download the DT4VET toolkit from the projects' website, the ERASMUS Project outcomes portal, or the METU Bilge-İş online module if you like to obtain practical experience with the designerly way of thinking exercises featured in the toolkit.

In each activity, you can find explanations about duration, materials, purpose, steps, and hints in detail. After reading everything, you are ready to put these activities to the test with your students or anyone else who is available.

Since the objectives of the activities within each phase are converging, at least one of these activities must be selected and carried out in a group to achieve a more comprehensive understanding. Before beginning any of these activities, it is strongly suggested to identify a topic or problem area. This topic should adhere to the principles of design thinking.

Be careful that particularly intricate, narrow-scope problems that demand technical competence, such as the dishwasher's opening mechanism, or conversely, very wide questions, such as what the purpose of life is, may not generate the desired outcomes.

Here are some examples that have been already worked previously,

- a more efficient cooler,
- a dishwasher that offers flexibility of use,
- increasing students' interest to the aviation industry,
- raising awareness for food recycling

may be the first topics that come to mind.

Note that the above examples are neither recommended scopes nor frameworks for your personal design thinking experience. They are simply examples from prior research.

To define your problem area, please use your creativity

It is now your turn.

- Get the toolkit
- Choose a problem area
- Arrange people to work with
- Select toolkit activities
- Conduct activities in groups

Please proceed to the DT4VET Online Learning Module offered at METU Bilge-İş if you wish to acquire a participation certificate by meeting the module's requirements. DT4VET wishes you a pleasant journey.