METHODOLOGICAL PRESCRIPTIONS
FOR IMPLEMENTING THE DESIGN THINKING LEARNING METHOD

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Abstract. Good educational practices show that constructivist pedagogical approaches, which involve the learner in the self-learning process, represent effective solutions for achieving academic performance. Active learning methods, being constructivist, can offer a number of advantages to the instructional process if they are implemented and managed correctly. This article presents the *Design Thinking Learning* method, its characteristics and methodological prescriptions for its integration.

Keywords: Design Thinking Learning, active learning methods, education, self-learning.

REPERE METODOLOGICE PENTRU IMPLEMENTAREA
METODEI DE INSTRUIRE ÎN BAZA GÂNDIRII PROIECTIVE

Rezumat. Bunele practici educaționale arată că abordările pedagogice constructiviste, care implică cursantul în procesul de autoinstruire, reprezintă soluții eficiente pentru atingerea performanțelor academice. Metodele active de învățare, fiind constructiviste, pot oferi o serie de avantaje procesului de instruire dacă sunt implementate și gestionate corect. Acest articol prezintă metoda de Instruire în baza Gândirii Proiective, caracteristicile acesteia și prescripțiile metodologice pentru integrare ei.

Cuvinte cheie: metoda de Instruire în baza Gândirii Proiective, metode active de învățare, educație, autoînvățare.

Introduction

Design Thinking Learning (DThL) is an active method in which students identify challenges, gather information, generate potential solutions, refine ideas and test solutions. The purpose of this method is to unlock creativity and innovation, to conceive new ideas, to offer more feasible and viable solutions.

DThL has the following characteristics:

- ✓ *It is focused on the learner*. It starts with a deep empathy and goes to the understanding of the needs and motivations of students.
- ✓ *It is collaborative.* It stimulates cooperation, as solving of a challenge is much easier when it is done in cooperation with others than alone.
- ✓ *It is optimistic*. Regardless of the students' constraints, DThL is a fun process that can create change.
- ✓ *It's experimental*. DThL is based on hands-on learning.

DThL comes from Stanford school, which involves five stages, performed in a specific order, called: Empathize, Define, Ideate, Prototype and Teste (fig. 1).
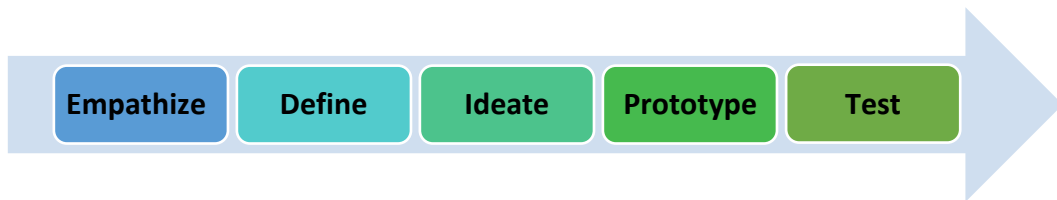
Figure 1. Stages of DThL

Stage 1. Empathize. The idea of this stage is to get an empathic understanding of the problem which should be solved. *This involves the experts' consulting to learn more about the researched issue by observing, engaging and empathizing with people, understanding their experiences and motivations, exploring their social and cultural environment so that can be gained a deeper understanding of the researched problem.* Empathy is more than an analysis of the public. Its purpose is to discover significant aspects about users such as their behavior, their feelings in various contexts. It is the stage focused on empathic exploratory methods such as interviews, field research, observations.

Empathy, as researchers have demonstrated, is not a fixed skill that students possess or not. Even better, it is a skill that can be trained, and research shows that empathy-oriented training programs work effectively. Scientists have shown that children who have been treated with more empathy have a greater ability to learn, and those who have educated through negative experiences at home, tend to be more stressed, which negatively affects their school life. Other words: children learn best when adults and their caretakers are kind and understanding.

But first, let's see what empathy looks like in a classroom. Empathy can be defined as a welcoming and warm environment, in which students demonstrate prosocial behaviors and help each other to learn. In a classroom, empathy is the environment in which students have a sense of belonging to when they enter in it. Cultivating empathy also strengthens self-esteem and helps children to be more confident in their academic abilities.

Stage 2. Define. The purpose of this stage in the research process is *to synthesize the research results and to clarify some recently collected information*. The obtained data are *presented to the team for analyzing and identifying the basic problems and the causes of their occurrence.*

This stage helps the team to gather great ideas for establishing features, functions and any other elements that will allow members to solve problems with less difficulty.

Stage 3. Ideate. In the third part of the DThL process, designers try *to develop ideas to expound the researched problem and find different possibilities to solve the problem*. All ideas are considered and there are no constraints or restrictions.

There are different techniques to ideate, such as: Brainstorming, Brainwrite, Worst Possible Idea, SCAMPER. Brainstorming and Worst Possible Idea activities are usually used to encourage free thinking and develop the space of the problem.

Generating ideas is very difficult for an impressive number of students, because some of them believe that only certain children can think creatively. Regular practice of brainstorming techniques combats this stereotype and can improve this ability.

Stage 4. Prototype. This is the face intended for experimentation and its purpose is to determine the best possible solution for every identified problem in the previous stages. The best solutions are carried out through the prototypes and then, they are examined, approved, developed and reconstructed. At the end of this step the team will have a higher quality idea of the inherent constraints of the product and will have a clearer vision about how real users will react when they would use the final product. Creating a new product highlights enough details to be able to decide if the concept will go to the next step.

If we want students to fully embrace the process of design thinking, they should not be afraid of making mistakes. The classroom culture needs to support this on a regular basis - not just in the designing process. We should teach students that mistakes are not the end of the world by giving our positive examples of learning from those mistakes.

Stage 5. Test. At this stage, the team *thoroughly checks the entire product using the best solutions identified in the previous phase.*

It is important for the teacher to provide useful feedback while the students are working. By encouraging them to make changes throughout the process, students are able to conceive of this as an essential habit in order to do better.

It is also a good idea for the teacher to regularly ask for students' feedback and suggest them to modify the product using their suggestions.

Methodology

As a training method, Design Thinking can be implemented as a workshop form. The duration of a workshop can vary from a few days to a few weeks, depending on the complexity of the problem and its goal. Both, planning and customizing activities, are managed by an instructor called a facilitator. A Design Thinking workshop must have a final goal. The workshop will pass all the steps of the process: Empathize, Define, Ideate, Prototype and Teste.

Examples of workshops could be:

1. *Invent an application that monitors the use of electricity in the house;*
2. *Help your loved persons to monitor your home health with an invention.*
3. *How the use of renewable energy protects the environment.*
4. *Invent an application that monitors time spent on social media.*

The process of designing a workshop begins with the intentional definition of a challenge. A challenge should be approachable, easy to understand and clearly defined. Asking the right question to make the challenge essential. The question should be wide enough to allow for unexpected possibilities, but also narrow enough to allow for

concentration. The challenge must not include the answer to the question. Here are some examples to come up with a challenge for the workshops mentioned:

1. *How can lead new inventions to a stronger economy?*
2. *How can new inventions help supervisors to look after the patient's health without making essential changes to the patient's daily routine?*
3. *How do renewable energy inventions contribute to environmental protection?*
4. *How does mood affect social networks?*

DThL is based on teamwork. Each team should:

✓ be made up of two to five persons;
✓ contain different people in order to generate various ideas;
✓ have the own role and responsibility of all members;
✓ have a coordinator.

***Stage* 1. *Empathize*.** Empathy means opening of new opportunities, inspiration to create new ideas. With a good preparation, this can be a great way to provide a deeper understanding of the challenge.

Here are some implementation ideas:

✓ Outline a calendar that all students can see! Write down tasks, meetings, and end dates. Form agreements with teams, define what time you can collaborate best. Put this data in everyone's calendars.

✓ Create a visible reminder! Post the challenge so that all teams can see it. Keep the calendar in a visible space so that all team members can see it. Inspiration is the fuel for new ideas Experts are often the most valuable source of inspiration.

✓ Plan activities in which teams can collaborate from different perspectives and explore unfamiliar contexts! The meeting with the experts will help the students to understand the problem from several perspectives. Inside the teams, brainstorm the topics you want to learn from students' conversations with research participants.

✓ Ask questions that explore these topics! Use open-ended questions such as: "Tell me about an experience ...", "What are the best / worst parts about ...? "," Can you help me understand more about…? " Experts can provide in-depth information on a topic and can be especially useful when you need to learn a large amount of information in a short period of time.

There are various ways to obtain information from experts such as: individual interviews; learning from people's self-documentation; group interviews; learning from colleagues etc.

Plan the documentation activities! Decide what you would like to document from experts: feelings, activities, behaviors. Choose the best way to collect this information: photos, journals, voice recordings, videos.

An example of accomplishing this stage for the workshop: "*How can new inventions help supervisors to look after the patient's health without making essential changes to the patient's daily routine?*"

The teacher divides the students into pairs and asks them to write down the answer to the next questions and share them with their classmate:

- ✓ "Where does the food from the grocery store comes from? (If students don't know the answer of the question, they can interview the staff of a market, supplier or farmer)".
- ✓ "How are the foods sold produced? Where does the food come from?"
- ✓ "How does the food get from the farm to the grocery store? How does it get to you?"
- ✓ "What are the biggest challenges in terms of costs / impact for farmers, suppliers, supermarkets?"
- ✓ "How can technology help improve product quality?"

Students work in pairs. They collect and write down ideas for the proposed challenge.

Stage **2. *Define***. Define is nothing else as the interpretation phase of the observations collected in the previous stage.

When completing an observation, the teacher should set aside time immediately after the session to reflect on the immediate impressions after the observations made. He gives students time to: share their impressions with the team; highlight the things they found most interesting; listen to other members' impressions of the observation; compare experiences and impressions. Reflection on what was observed can be achieved by:

- ✓ *Storrytelling* - a story in which students describe the people they met and the places they visited. Suggest students to print out photos and use them to illustrate the stories.
- ✓ *Diagrams, tables, images, infographics* - Synthesized information, grouped by categories. The synthesis of this information can be done by answering questions such as: What did several people mention? Are there any behaviors you have seen repeatedly? What problems were obvious? Can you group more related topics into larger categories? What contradictions did you find? What does it feel surprising and why? Are there topics on which you have different opinions? Why are you most excited? Gather information and add new versions of discoveries. For example, the ideas "there is a lack of space for students to collaborate" and "the reading room does not encourage collaboration" could be grouped, and then we can develop the idea that "students need flexible space to collaborate."
- ✓ *Venn diagrams, concept maps, tables* are effective tools for distributing observations.

    For the workshop: "*How can new inventions help supervisors to look after the patient's health without making essential changes to the patient's daily routine?*" the following activities can be associated with this stage:

The teacher can suggests students to make a mind map which represents the track of haw the food comes from the farm to grocery stores across the country.

Then, students can be informed that the ways in which food is grown and how they get to the local supermarket involve thousands of inventions, as from plows and sprinkler systems that help produce food to the trucks that bring them to the destination city.

Students brainstorm with the inventions involved in moving food from the farm to the table. The teacher asks the students to complete the inventions on the map as the students declare their answers.

***Stage* 3. *Ideate*.** Ideate means the generation of new ideas. Brainstorming encourages students to think expansively and without constraints. Effective brainstorming can produce hundreds of innovative ideas.

The brainstorming question could be: "How can we create a space for students to relax between classes?". This extends the possible solutions beyond the idea of having a room with sofas. Start each statement with "How can we ...?" or "What if…?" as an invitation for contributions, suggestions and exploration. Generate more questions. Write them in a simple, concise language.

Immediately, after the brainstorming session, form several groups of two to five people and choose the idea to sketch more details. Extend this idea. Give students the opportunity to present their ideas to each other. Ask opposing groups about their favorite parts, as well as what they think there could be improved.

Once an idea has started to evolve, collect your thoughts in a more structured format. Create a description of the concept. Summarize the main idea.

For the workshop: "*How can new inventions help supervisors to look after the patient's health without making essential changes to the patient's daily routine?"* can be proposed an activity of inventive students. Its purpose is to analyze the problem more broadly, from the perspective of the community in which the students live. Students should associate the researched problem with problems similar to the society in which they live and find ideas for solving them. To learn more about the problems facing local society we can ask students to consult local experts, newspapers or local websites.

***Stage* 4. *Prototype*.** Experimentation gives life to new ideas. Building prototypes means making ideas tangible, learning while building them and sharing them with other people. The prototype can be in the form of:

- ✓ Storyboard - is represented by a series of images, sketches, cartoons or even blocks of text.
- ✓ Diagram - structured map, network, etc.
- ✓ Story - description, letter, story, etc.
- ✓ Advertising - advertising that promotes the best parts of the idea.

- ✓ Layout - prototype that can be created with digital tools, websites, simple sketch on paper, a digital model.
- ✓ Model - Three-dimensional representation of the idea. Paper, cardboard, textile or 3D printer can be used.
- ✓ Scene - Role play with the people who are part of the team.

Feedback is one of the most valuable tools in developing an idea. Prototype sharing helps us see what really matters to people and what needs to be improved.

In the prototyping stage of the workshop: "*How can new inventions help supervisors to look after the patient's health without making essential changes to the patient's daily routine?"* using their research, students will create an invention designed to help others monitor their home health. To do this, students will be informed by the teacher that the invention will consist of the following components:

- ▪ **The sketch, model** or **prototype** of the invention that students will present to interested parties, such as: members of the municipal council, state parliamentarians, the local newspaper and law firms (actually colleagues and teachers);

  The sketch, model or prototype must answer the following questions:
  - ✓ What is the problem?
  - ✓ Who is affected by the problem?
  - ✓ How can help an invention to solve a problem from a community?
  - ✓ How can we make an invention a reality?
  - ✓ Who would I need to materialize the invention?

- ▪ **A diagram of the operation** of their invention. It may be a diagram, presentation or video explaining how the invention works;

- ▪ **A functional product**. It can be a computer application, an application for mobile device, a web page, an installation, a film, etc.

Stage **5.** *Test*. At this stage it is evaluated the evolution of the idea. As the concept evolves, so does it have the impact on community members. The teacher defines a set of criteria that would help guide and evaluate the development of the student prototype. He makes observations and notes on the impact over time, periodically reformulating these criteria. He reflects on the changes he has noticed and compares the impressions with the initial circumstances.

After these observations, he associates all tasks with a chronology. He obtains agreements from the students about the calendar of activities and record the commitments made by the students. Schedule regular meetings with students helps him to share their thoughts, ideas, and concerns.

In the final stage of the workshop: "*How can new inventions help supervisors to look after the patient's health without making essential changes to the patient's daily routine?"*

the groups must present their projects, argue the invention and answer the questions of their colleagues.

Example of implementing DThL

Optional discipline: Graphic Design

Module: *Developing a Moodboard*

Allocated time: 10 *weeks*

The teacher announces the theme of the workshop: "What would a Future Library look like?". Students will be divided into 4 groups. Each group will design its own Future Library. Students are advised that:

✓ No idea is a bad idea - sometimes small ideas open the way to big dreams!

✓ Students need to focus only on what they want to achieve. Some amazing ideas are born from dreams!

For this workshop there are formed groups of five people. Each group invents its own Future Library.

*STAGE 1: Empathize. The teacher proposes the next activities to the groups:

Activity 1. How do you think? What are the reading preferences of readers of different ages?

List the ideas in this table:

A grandfather	*A parent*
Possible answer: A comfortable armchair	*Possible answer: A large window*
Possible answer: A cup of coffee	*Possible answer: An isolated area*
A teacher	*A primary school student*
Possible answer: A large space	*Possible answer: A playing area*
Possible answer: An airy space	
A student from a gymnasium	*A high school student*
A college student	*An university student*

Activity 2. Complete the table above by realizing interviews with them.

*STAGE 2: Define.

Activity 1. What is a public library? Express your opinion in this table.

Group 1	*Group* 2
Group 3	*Group* 4

Activity 2. What are the characteristics of a public library? Write the answer in the table below.

Possible answer: serve the public interest	*Possible answer: they are open to all members of the community*
Possible answer: they are voluntary - no one is obliged to use the services offered;	*Possible answer: offers basic services free of charge.*

Activity 3. What are the advantages of a public library? Write the answer.

Possible answer: ✓ *Library staff is available to provide immediate, toll-free services.* ✓ *Most libraries offer quiet for reading and reflection, as well as meeting places for small or large groups.*	*Possible answer:* ✓ *All public libraries offer free services to their customers.* ✓ *Freedom of access to a wide range of information.*
✓ *Confidentiality of customer information.* ✓ *Most public libraries are the source and subject of community pride.*	✓ *Combines all information, education and entertainment features in one package.*

Activity 4. What are the challenges to which public libraries are subjected in the age of digital transformation? Write your opinion.

Group 1. Possible answer: continuous development in the field of technology	*Group 2. Possible answer: Financial constraints*
Group 3. Possible answer: Increased competition	*Group 4. Possible answer: Demographic changes*

Activity 5. Describe the factors that led to these challenges?

Possible answer: *Virtual publishing* - the transition from paper to digital information is a major change. There is much more information available directly to users through a variety of services, such as Google Scholar and or e-books. This is growing and developing very fast and most future publications will be in digital format. E-books are developing rapidly, including graphics, audio, video, interactivity and many other features. Much of the media information is available in digital format and the near future will only be in this form.	Possible answer: *Instant information* - The Internet serves as a reference source, anytime, anywhere. People can compare and select information and services with a single click.
Possible answer: *Free information* - A lot of information is free; however, it is difficult to verify its reliability.	Possible answer: *New facilities* - new technologies continue to appear with a lot of new facilities that are transforming our society and the way we deal with information. The diversity

	of devices continues to expand, becoming even more mobile. In the future, storage will be faster, physically smaller, cheaper and have more capacity. Communication will reach unimaginable speeds, communications systems, cloud services will continue to spread, as well as social networks, new search and organization tools.

*STAGE 3: Ideate.

Activity 1. Describe the model of a future library.

Example: A model for a future library should meet the following future objectives: experience, involvement, empowerment and innovation. Indoor spaces should be seen as possibilities that can be fulfilled both in the physical library and in cyberspace.

Activity 2. What spaces should a future library include? What would be the destination of these spaces?

Learning space	Meeting space	Inspiration space	Performance space
The space where children, young people and adults can discover and explore the world.	*Rest areas with newspapers.*	*Space with different thematic arrangements.*	*Space where users can be inspired to create new inventions.*
Free and unlimited access to information and knowledge.	*Cafe facilities.*		*Access to media, materials, tools, scenes for organizing events.*
Bright space.	*Meetings where topics and problems can be analyzed and discussed.*		

*STAGE 4: Prototype.

Activity 1. Now it's time to start thinking about fun things - what the dream library looks like. Take a new piece of paper and fold it in half twice so that you have four rectangular spaces.

Activity 2. Use the suggestions below to create four different models of dream library spaces. Good designers are not limited to just one idea - they try many different things and are sometimes surprised by what they find when they experiment.

Space 1	Space 2
Separate learning speakers	*Bookcases, newspapers, etc.*
Computer room	*Cafe area*
Book shelves	
Electronic book lending machine	

Space 3	Space 4
Couches	*History area*
Bookcases	*Astronaut area*

*STAGE 5: Test - Create the Future Library

Activity 1. Think about all the things you considered in steps 1, 2, 3 and 4:

✓ What are the people's preferences?

✓ What spaces should they include?

✓ What should each space contain?

✓ What would be the impact of these spaces in the development of society?

Create sketches for each library space designed to bring together your favorite ideas. Draw a star next to your favorite space.

Activity 2. You will now create a moodboard that will describe the final dream library. Remember:

✓ No idea is a bad idea - sometimes small ideas open the way to big dreams!

✓ Don't worry about the impossible; focus only on what you want to see.

✓ You need to create the dream library as a team.

✓ Create a moodboard that reflects the dream library following the rules of graphic composition.

Activity 3. Describe in 3-5 sentences the characteristics of your library and why did you make these choices.

ICT tools for organizing training through *Design Thinking*

The BookWidgets widget library (https://www.bookwidgets.com/) can be used to carry out project-based training activities. The widget library contains over 40 interactive exercises divided into 6 different themes:

✓ Test & Review;

✓ Games;

✓ Pictures and videos;

✓ Mathematics;

✓ Incorporation of external resources;

✓ Various.

*STAGE I: Empathize

To perform the exercises in Stage I can be used the next interactive exercises:

Activity 1. Answer the next questions using Spreadsheet Widget. "How do you think? What would be the reading preferences of readers of different ages?"

To describe ideas of students can be used Spreadsheet Widget. Will be created a two-column table in which students will respond interactively to the questions mentioned in this activity.

<u>Activity 2.</u> Complete the table above by conducting interviews with them.

The Widget Worksheet or Split Worksheet could be used for interview purposes. The Worksheet widget is similar to the quiz widget, but slightly different. It contains 30 types of questions and the automatic grading option. In a Worksheet the questions are placed one below the other on the same page instead of the next "page". This makes it more like a worksheet than a test. To ask a single question, the worksheet widget is better than the test widget.
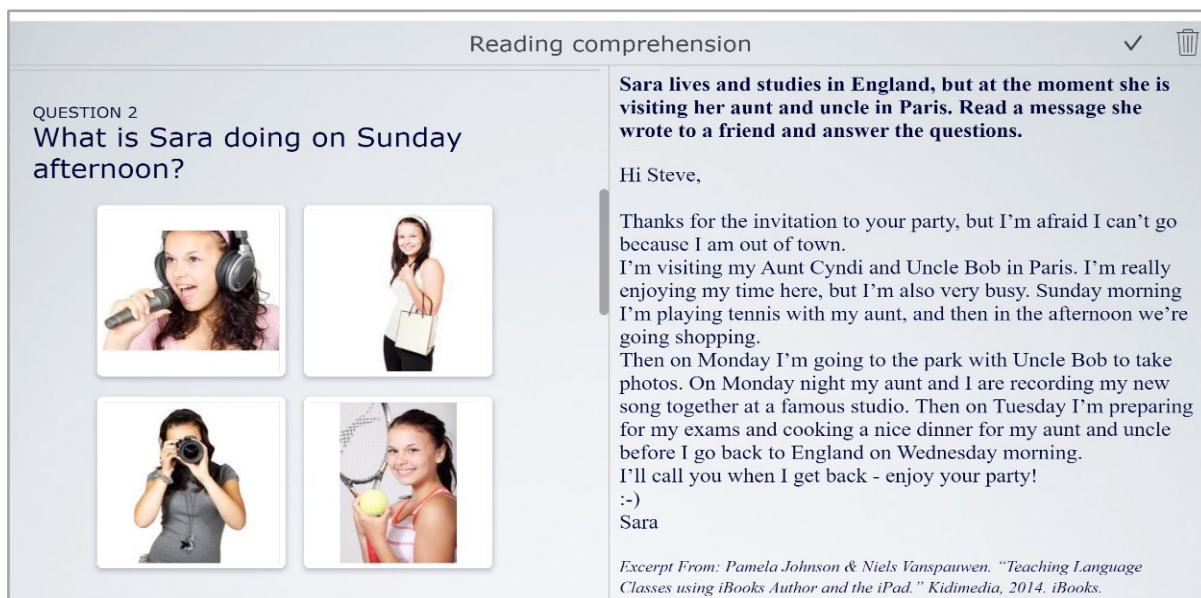
Figure 2. Split Worksheet model

The Split Worksheet (a simple individualized worksheet) works similar to a simple worksheet but with the difference that can be added: text, audio / video files, image, or a pdf file. This widget is used more often to test reading / listening skills and to test students' understanding of new concepts.
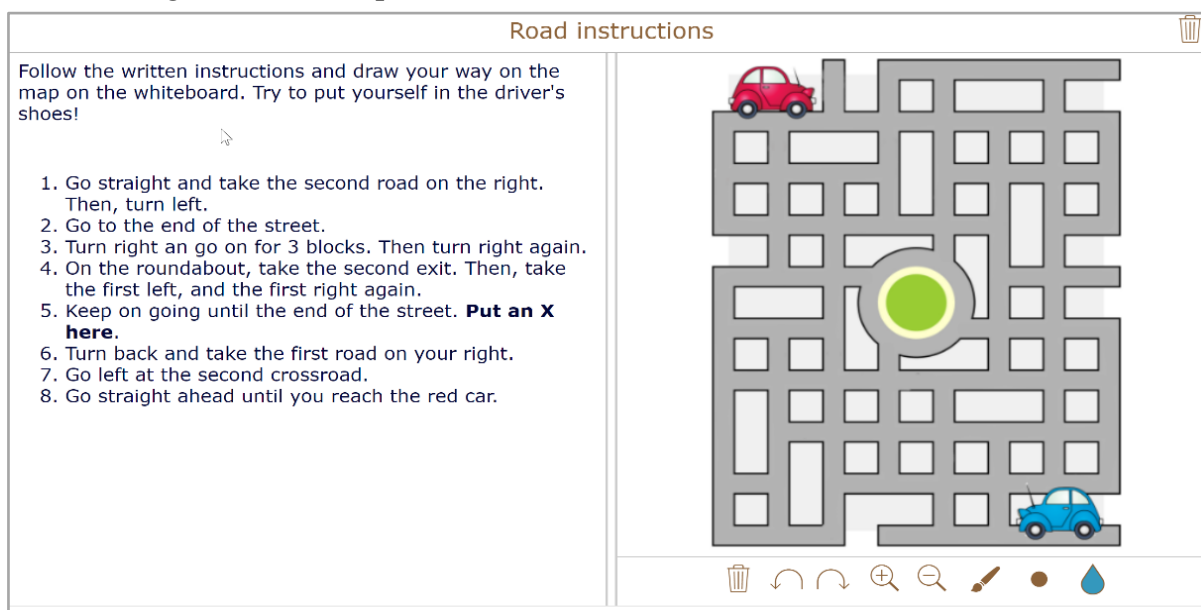
Figure 3. Split Whiteboard model

*STAGE II: Define

For the stage II (Define) can be used the following interactive exercises:

<u>Activity 1.</u> Answer the question "What is a public library?" using a Split Whiteboard Widgets. Express your opinion.

A Split Whiteboard Widgets work like a regular interactive whiteboard in which images, texts, audio and video files can be incorporated. Students can answer questions, associate answers, perform calculations, draw or comment.

For the <u>Activity 2</u> would be appropriate the Mind Map Widget. It could contain the question: "What are the characteristics of a public library?". With this widget can be drawn a mind map. To do this, add text boxes, figures, colors and connect them by drawing lines and arrows. The mind map widget can also be used for: brainstorming on a topic; structuring a concept; summarizing a topic / a subject; mapping ideas; asking questions about a topic; introducing yourself.

In order to identify the benefits of a public library in <u>Activity 3</u> or for the proposed activity of examining the challenges facing public libraries in the age of digital transformation can be used *a simple* or *split Spreadsheet Widget* or *Whiteboard Widge*t.

In order to carry out the activity with the description of the factors that led to the challenges to which the public libraries are subjected in the era of digital transformation <u>Activity 5</u> we can use the TipTiles Widget (Image boards) where images, audio and video files can be incorporated to describe the factors that led to the challenges facing public libraries in the age of digital transformation.

This widget can also be used: to explain some concepts; to learn the pronunciation of words; to describe monuments or historical places; to describe events, processes, etc.

*STAGE III: Ideate

For the activities from the third stage we could use a Randomness widget through which students can describe the learning spaces, meeting, inspiration and performance spaces, thus creating an imaginary model of a future library.

The Randomness widget allows us to add images, numbers, words or emoticons. It contains a wheel in which the names of the students are added. By rotating it, a student is randomly chosen to answer a question.

*STAGE IV: Prototype

This step can be implemented through the Whiteboard and Split Whiteboard widgets.

Suggestions for creating the four various models of dream library spaces will be implemented through the split Whiteboard widget, and the integrated prototype through the Whiteboard widget.

*STAGE V. Test

To reflect on the prototype created in the previous stage we can use the Quiz widget. This Widget is not just a multiple-choice test. This type of test contains over 30 types of answers

from which students can choose. With it we can build an interactive test in which we can add texts, images, video and audio files. The answers are various, such as: multiple choice, single answer, paragraph and others. The Quiz widget allows students to submit answers. After sending the answers, they are automatically noted. The teacher only needs to view the answers, provide feedback and send the students' results.

Figure 4. Widget Split Whiteboard model

Conclusions and recommendations

Active learning methods are innovative pedagogical technologies, which stimulate constructivist learning especially when they are supported by ICT. They are based on intensifying the learners' activities both in the classroom and when they work individually, without the supervision of the teacher or tutor.

The Design Thinking Learning method improves the development of practical skills, communication and collaboration skills. It develops creative thinking, empathy, the spirit of innovation and self-confidence.

Implementation of DThL method requires resources (prototypes, suitable workspaces, software and technological equipment), experience, organizational time, the teacher's courage and perseverance.

DThL encourages experimentation and claims from the teacher to be resilient to failure. It is natural to appear failures in the process of developing of new solutions by this method.

We should remarque that evaluating and measuring the performance achieved through the Design Thinking Learning method can be much difficult than in the case of traditional learning process.

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