

DESCI



Developing and Evaluating Skills for Creativity and Innovation

LIST OF METHODOLOGIES



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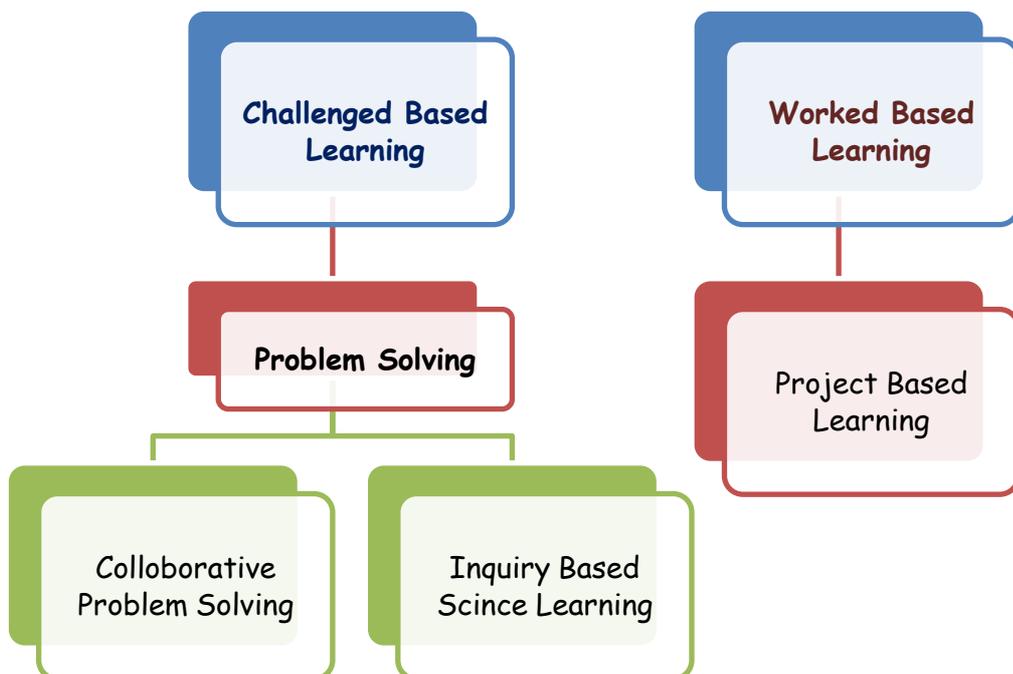
List of Methodologies

In DESCI approach to Alternating Training (AT), the LL is the central learning environment by which students, guided by teachers, tutors, researchers and entrepreneurs develop innovative ideas that are socially, ecologically and economically sustainable.

In this document are listed the methodologies used by the school in the framework of the LL activities, during the DESCI testing phase, AT paths under the DESCI approach.

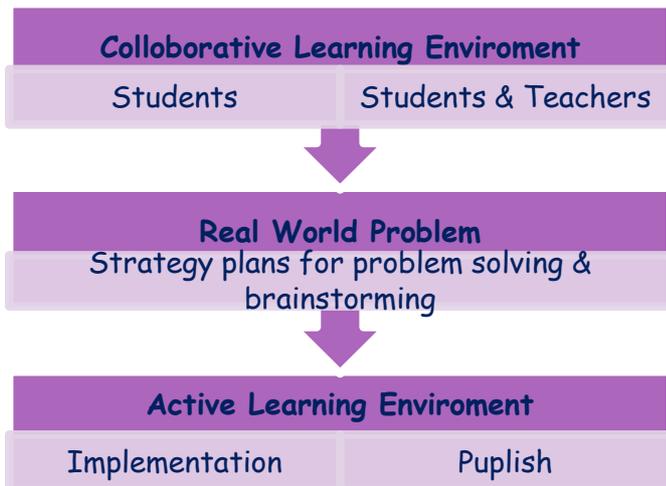
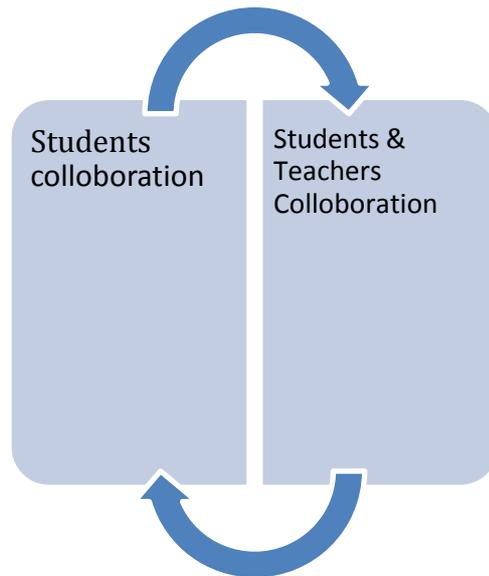
This is not intended as a thorough list. It is a dynamic document that could be continuously improved by the schools that will adopt the DESCI approach to the AT.

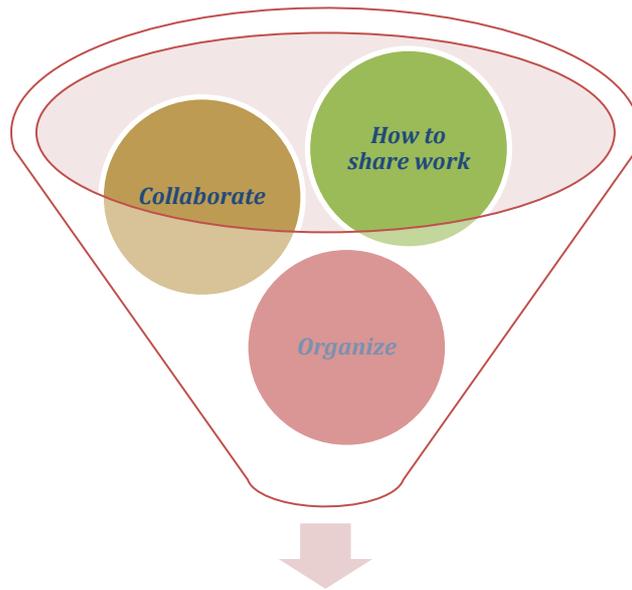
CATEGORIES



Challenge Based Learning (CBL)

Provides an efficient and effective framework for learning while solving real-world challenges. The framework fuels collaboration between students, teachers, families, and community members to identify big ideas, ask thoughtful questions, and identify, investigate and solve challenges. This approach helps students gain deep subject area knowledge and develop the skills necessary to thrive in an ever-changing world.

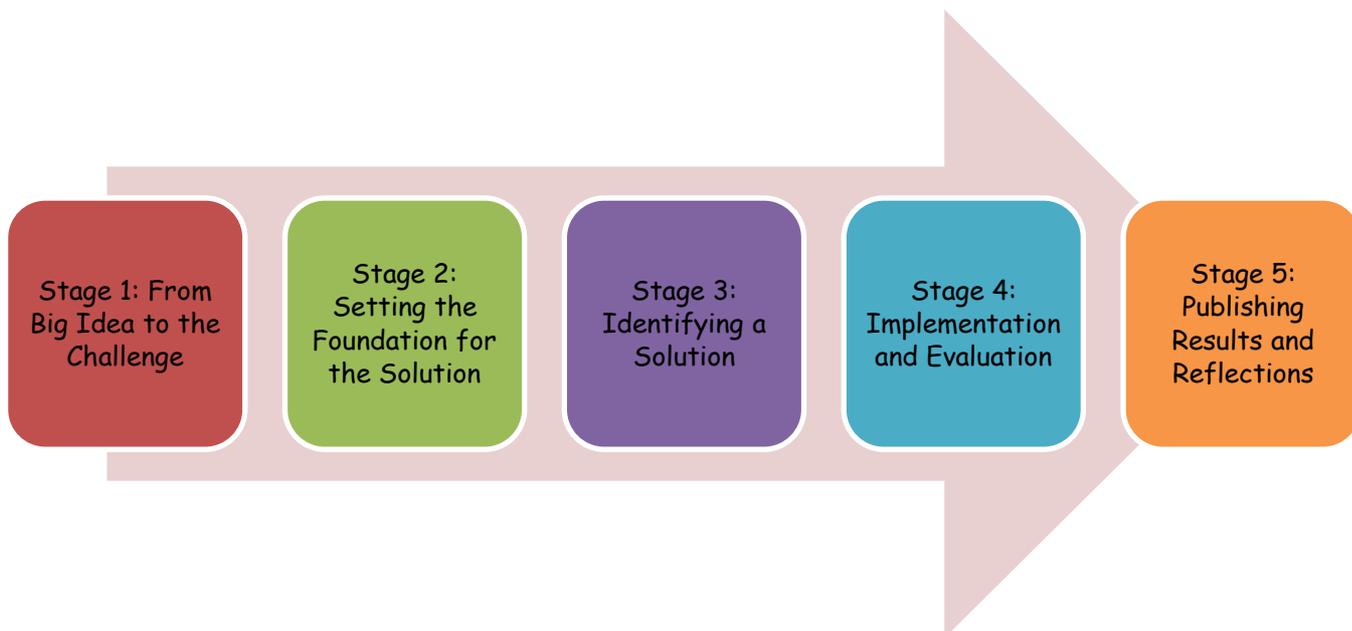




Students express themselves more effectively and gain meaningful skills through the projects

WORKING PHASES





1. Collaborative problem solving

Problem-solving: is an essential component of the skills required to perform interpersonal and non-routine analytic tasks successfully. In both kinds of tasks, people need to think about how to engage with the situation, monitor the effect of their actions systematically, and adjust to feedback. While schools are not the only environment in which problem-solving competence is nurtured, high-quality education, in a wide range of subjects, certainly helps to develop these skills. **Progressive teaching methods, like problem-based learning, inquiry-based learning, and individual and group project work,** used to foster deep understanding and prepare students to apply their knowledge in novel situations. Good teaching promotes self-regulated learning and met cognition – particularly knowledge about when and how to use certain strategies for learning or for problem solving – and develops cognitive dispositions that underpin problem solving. It prepares students to reason effectively in unfamiliar situations, and to fill gaps in their knowledge by observing, exploring and interacting with unknown systems.¹

The teacher gives the students a problem to solve. The learning process goes through overcoming obstacles and arriving at satisfactory solutions. For solving the problem, indeed, students have to seek information, generate new knowledge, make decisions. *Problem-solving* presupposes that students can take on some of the responsibility for their own learning and can take personal action to solve problems, resolve conflicts, discuss alternatives, and focus on thinking as a vital element of the curriculum. It provides students with opportunities to use their newly acquired

¹ *Assessing Problem-Solving Skills in PISA 2012; Creative Problem Solving: Students' skills in tackling real-life problems - Volume V, OECD 2014 p.29)*

knowledge in meaningful, real-life activities and assists them in working at higher levels of thinking².

Collaborative learning - refers to students who work together to achieve a common goal in one (Underwood & Underwood, 1999, O'Neil et al., 2003). It is a peer to peer learning environment, in which students learn cooperating each other attempting a common task, generally in small groups. The students share the localized knowledges, capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas, monitoring one another's work, etc.).

In collaborative problem-solving, however, the common goal becomes a problem that the team must work together to solve. A major difference between collaborative learning and cooperative problem solving is the nature of the activity. Much of the support for the importance of work cooperatively comes from social constructivists like Vygotsky (1978) who suggested that social interaction facilitates learning. Therefore, in general, the nature of collaboration, learning provides students with clearly defined activities that are explicitly informed about the goal and given a mandate to cooperate on the condition that they improve their learning and understanding development. While introducing some models of collaborative learning cognitive elements in the process, such as decision-making, the focus of collaboration.

Table 1 Matrix of Collaborative Problem Solving skills for PISA 2015

	(1) Establishing and maintaining shared understanding	(2) Taking appropriate action to solve the problem	(3) Establishing and maintaining team organisation
(A) Exploring and Understanding	(A1) Discovering perspectives and abilities of team members	(A2) Discovering the type of collaborative interaction to solve the problem, along with goals	(A3) Understanding roles to solve problem
(B) Representing and Formulating	(B1) Building a shared representation and negotiating the meaning of the problem (common ground)	(B2) Identifying and describing tasks to be completed	(B3) Describe roles and team organisation (communication protocol/rules of engagement)
(C) Planning and Executing	(C1) Communicating with team members about the actions to be/ being performed	(C2) Enacting plans	(C3) Following rules of engagement, (e.g., prompting other team members to perform their tasks.)
(D) Monitoring and Reflecting	(D1) Monitoring and repairing the shared understanding	(D2) Monitoring results of actions and evaluating success in solving the problem	(D3) Monitoring, providing feedback and adapting the team organisation and roles

(Pisa 2015 - Collaborative problem- solving framework)

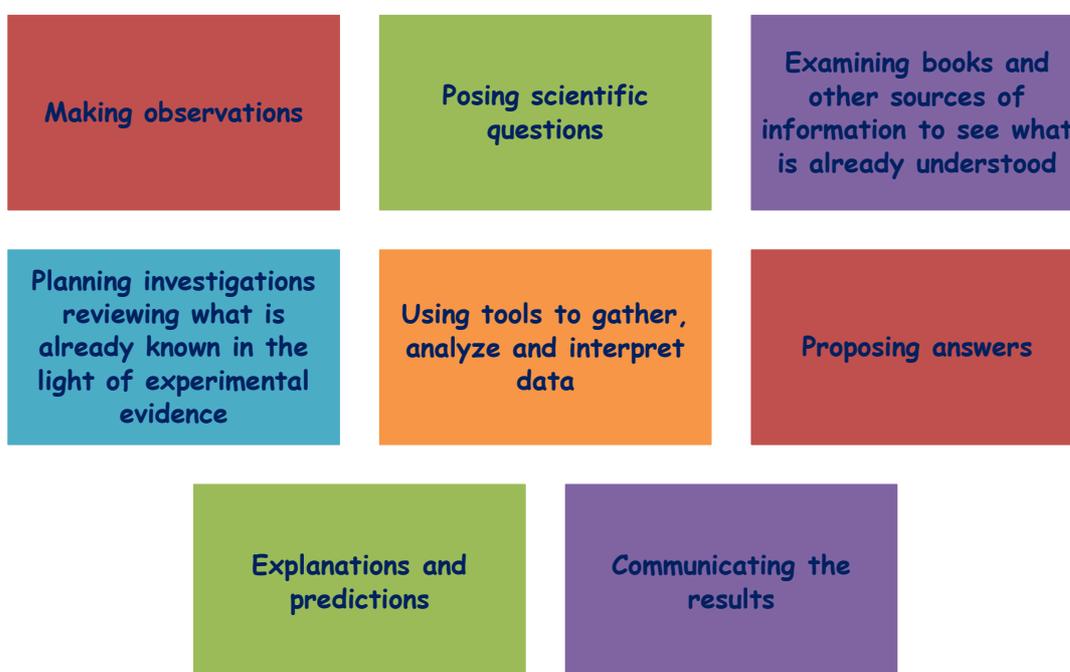
² <https://www.teachervision.com/problem-solving/problem-solving>

2. Inquiry-based

The learning process goes through an inquiry process, by posing questions, investigating them, generating hypotheses, testing them, collecting data, discussing them, finding conclusions. A facilitator often assists this process.

Inquiry Based Science Learning (IBSL)

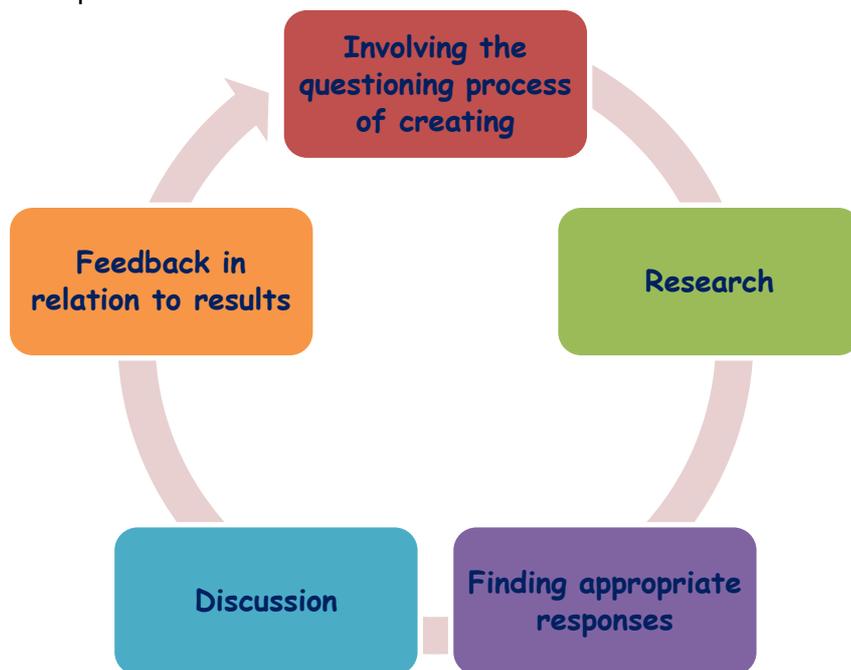
- Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations by finding answers to questions.
- The educational process through the exploration of the natural or manufactured (simulated) social environment leads pupils to questions and discoveries during which they are searching for new knowledge.



(Elster ; 2012 cited in Linn, Davis & Bell, 2004, p.9).

IBSL is promoted in many countries as a pedagogy which improves education. After the publication of the report entitled “Science Education Now: A Renewed Pedagogy for the Future of Europe”, IBSL is officially promoted as a highly commended educational objective in all European Program studies (Stylianidou; Koulouris & Sotiriou, 2011 cited in Bybee, Powell & Trowbridge, 2008; Hounsell & McCune, 2003; Minner, Levy & Century, 2010; Rocard et al., 2007). Educational and empirical research offers a wide range of approaches to inquiry-based learning.) IBSL is a pedagogical strategy where the student possesses a dominant role in the learning process.

IBSL is often likened as a circle or a spiral Educational activities are organized in a circular manner, regardless the topic



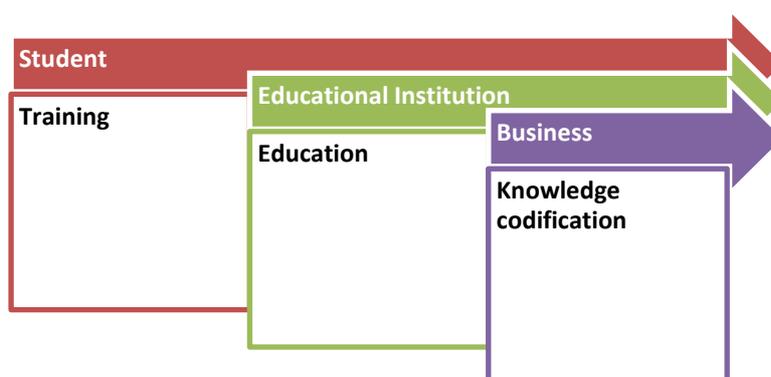
(Bishop et al., 2004)

Each question leads to the thinking of a new idea and new questions. The educational process through the exploration of the natural or manufactured (simulated) social environment leads pupils to questions and discoveries during which they are searching for new knowledge. With this pedagogical strategy, children learn about science, while they apply those (Aubé & David, 2003).

Work-based learning

It is an educational strategy that offers students the opportunity to enhance and deepen their classroom learning, explore future career areas and demonstrate their skills in an authentic environment. This series defines work-based learning as a continuous experience that helps students prepare for post-secondary education and careers. High-quality job-based learning should begin in the first ranks with activities that help to raise pupils' awareness of possible careers.

Worked based Model



Work-based learning is a subset of experience-based learning. However within the somewhat narrower confines of vocational education and training, work-based learning refers to learning that occurs through undertaking real work, through the production of real goods and services, whether this work is paid or unpaid. It should be clearly distinguished from learning that takes place in enterprise-based training workshops and training classrooms. The latter, which can be referred to as enterprise-based training, is not work-based learning, but simply classroom-based learning that takes place in an enterprise rather than in an educational institution.

The case for work-based learning is commonly made in terms of the benefits that it can provide for vocational education and training. However before this paper looks at the link between vocational education and training and work-based learning, four other arguments for it are discussed: its contribution to enterprise productivity and innovation; its value as a form of learning, regardless of its links to vocational education and training; its value in improving youth transitions; and its importance in career development. The evidence for these arguments is not only interesting in its own right, but highly relevant to questions about the relationship between work-based learning and vocational education and training (UNESCO-UNEVOC | Revisiting global trends in TVET, Work-based learning: Why? How?, p.165)

Worked Based Learning Strategies

Apprenticeship, internship, or counseling: includes the student who works for an employer where it is taught and supervised by an experienced employee of the selected organization. The student is periodically evaluated for progress according to the skills and knowledge gained, and may pay the wages accordingly. At the end of the course, the student receives a certificate of service. The student learns in a realistic environment and has the opportunity to apply his knowledge to real-world scenarios.

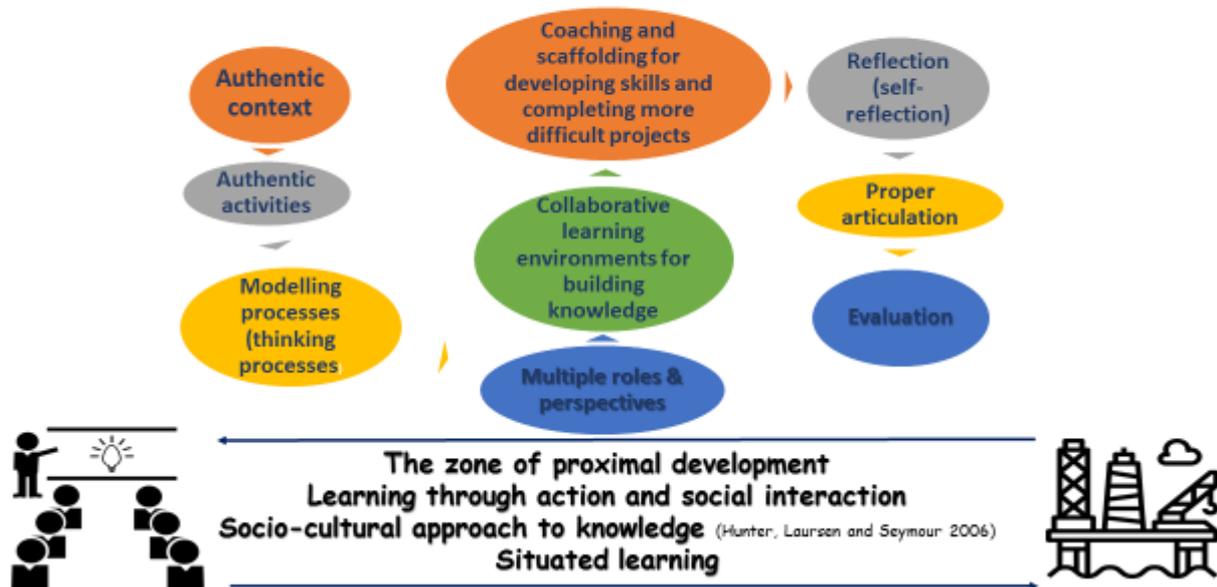
Shadow work: Shadowing is a short-term opportunity that introduces a student to a particular job or career by combining the student with a workplace employee. By following or shading the employee, the student becomes familiar with the duties and responsibilities associated with this job.

Business / Industrial Journey: Traveling on site offers students insight into the latest technical developments and business strategies of a business. Students also learn about the various career opportunities available and understand the driving forces of the community economy.

Business experience: Involves the establishment of specific businesses, from planning, organizing and managing the stage to risk control and risk management aspects of a business.

Educational learning: This strategy combines social service with career, where students provide voluntary service to public and non-profit organizations, political and government offices,

**The workplace is an active learning environment
for the transfer and exploitation of the "social nature" of existing knowledge**
(Collins, Brown, & Holum, 1991, Collins, Brown, & Newman, 1989, Harrington & Oliver, 2000)



Project-based learning (PBL) is a student-centred methodology. It is based on the idea that students acquire a deeper knowledge when they need it. In PBL the students have the task to develop a project. To reach the objective of developing such a project the student needs to collect knowledges and learn about subjects, investigating and responding to questions, challenges, or problems in a complex environment. PBL's success depends on the project that the teacher proposes to develop: it should be engaging for the students, near to their wishes, not too simple, nor too complex.³ Example: Junior Science Café project.

³ https://en.wikipedia.org/wiki/Problem-based_learning

DESCI EXPERIENCES

Here below are listed the methodologies used by DESCI partner schools during the testing phase that can provide examples. Any methodologies can be refer to one or more category presented above.

a. Metaplan - A meta-plan is a discursive technique in which all people in the group write down their own ideas or opinions on a topic, one idea on one card. Its main aim is to give a chance to reasonable amount of people to connect and express their own views (about 100 people). During the initial individual phase it is important that ideas are not judged. Then all cards are collected and fixed on a pin board. Only now the ideas are processed. The cards are organized according to categories and ranked. The clusters of ideas may yield insights or reveal connections people were not aware of.

Metaplan technologies can be used in active learning for discussing problems or topics, for converge to a shared decisions. It has been used during the students living lab in design phases.

b. Open Space Technology - It is directed to a considerable number of people and is a useful tool to expose students to a number of potentially competing project they need to take into account. These are its criteria:

- Whoever comes, is the right people: the right people is who shows up at the OST sessions
- Whenever it starts, is the right time: solutions require creativity and that does not run on the clock
- Wherever it is, is the right place: space is opening everywhere all the time
- Whatever happens is the only thing that could have, be prepared to be surprised! Once something has happened, it's done. And we have to move on. The second part is a reminder that such situation is completely fine.
- When it is over, it's over: when the topic of the session is accomplished move on.

The Law of two feet: when you are not productive search for another session and another group where you can be productive.

<http://www.openspaceworld.org/files/tmnfiles/OSTResearch2000.htm>

http://www.openspaceworld.com/users_guide.htm

d. Word Cafe A World Café is a conversational process for knowledge sharing in which groups of people discuss a topic at several tables, with individuals switching tables periodically and getting introduced to the previous discussion at their new table by a "table host". As well as speaking and listening, individuals may be encouraged to write or doodle on the tablecloth so that when people change tables, they can see what previous members have written as well as hearing the table host's view of what has been happening.

<http://www.gurteen.com/gurteen/gurteen.nsf/id/kcafe-run>

<http://knowledge.cafe/knowledge-cafe-concept/>

- e. **Roundtable** - Roundtable are discussions in which participants are in agreement on a specific topic that successively discuss and debate. Each person is given equal right to participate. <https://www.eventmanagerblog.com/organising-successful-roundtables>
- f. **Brainstorming** – is a technique conceived to increase creativity for groups. With Brainstorming, a group seeks a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members. Two crucial features are: gatherers don't judge the ideas somebody else proposes; quantity of ideas fuels quality of ideas. <https://www.contriber.com/innovation-will-woodward/>Scott, Isaksen (1988). *"A review of Brainstorming Research: Six Critical Issues for Inquiry"* (PDF). *Creative Problem Solving Group Buffalo. Creative Problem Solving Group Buffalo. Retrieved 02 February 2018.*
- g. **Ethazi** is not just a methodology. It represents a learning environment that covers all the phases of the learning process and in which a variety of methodologies could be adopted. It is based on turning problems into challenges and then solving such challenges. It is articulated in 11 steps listed below and is characterised by a strong collaborative component:
1. Approaching the problem
 2. From a problem to a CHALLENGE
 3. To establish parameters
 4. To get and organise information
 5. Elaboration of alternatives
 6. Presentation of proposals and alternatives
 7. Selecting of proposals
 8. Planning actions
 9. Executing the actions
 10. Present the results
 11. Evaluate
- h. **Interviews to users** – These are model interviews in which students are asked to conceive a set of questions that will be put to their users (for instance, elderlies of the local healthcare centres) in order to acquire details about their needs or the fruition they are enjoying of certain services/products.
- i. **E-Forms in Moodle** – In particular, students used the electronic class of the school and in particular forum activities to collaborate and to produce deliverables. <http://www.1gympeirath.gr/moodle>
- j. **Role Playing** - is a way of working through a situation, a scenario, or a problem by assuming roles and practicing what to say and to do in a safe setting. This kind of learning experience has several benefits and advantages when implemented skilfully with a good trainer or teacher. Instructors can supplement their teaching methods with role-playing in any context where it seems relevant.

<https://blogs.shu.ac.uk/shutel/2014/07/04/role-play-an-approach-to-teaching-and-learning/>