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The Teacher Toolkit on Teaching Methodology

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More about the CHAIN project:

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1. Team Management and JIGSAW Method

1.1. Team Management – introduction

Team management is the management of a designated group of people. This group has a task that involves achieving a previously planned goal. Team management is the ability to administer and coordinate a group of people to perform a designated task. The basic activities in team management are: teamwork, communication, goal setting and performance evaluation. A team usually consists of a certain number of members and a manager (leader). The manager's tasks include: getting to know the potential of the people included in his team, integrating the team members and directing them towards joint, effective work and implementation of designated projects. Such tasks often require a lot of work, which is caused by the diversity of employees in terms of their views, characters, experience, skills or motivation to work.

The leader's integration of the team aims to build a diverse team, where each member should be characterized by a different way of thinking. This helps to create a greater number of diverse ideas and solutions to problems that appear in the implemented projects. This approach allows for analyzing the problem from different perspectives and finding solutions that one person (or many people, but thinking in the same way) would not be able to propose or discover. The tasks of a good leader include motivating employees, which will allow them to extract their best features, ideas and demonstrate their expert knowledge. Proper team management should enable each team member to contribute to the development of this team and effective work based on the potential of this person. The point is for each person to feel needed in the team and work effectively for common success.

1.2. Stages and the role of a manager on a team building process

Skillful team building and active creation of its work increase the chance of success and achieving success. A team is able to achieve specific effects if all members are integrated and really cooperate with each other. However, it is necessary to realize that team building is a process consisting of different stages. The leader and crew should appropriately adjust the construction of their team depending on the development phase of this team. Professional team management begins at the stage of initiating joint work and should then be continued

depending on the development phase of the team[1]. The frequently used division into stages of team building was proposed by B. Tuckman and developed by J. Jenson.[2].

5 stages of team building (the model of group development by Tuckman and Jenson)[3],[4]:

1st stage – FORMING. This is the phase of team formation. It involves people meeting and forming a team. At this stage, the people who make up the team get to know each other and define the purpose of the group's activity. Characteristic features of the first stage are: caution in interpersonal contacts, low commitment, low interaction. The leader's role at this stage is to provide information about the purpose of the team's cooperation, the type and conditions of the tasks being performed. The manager's instructions must be short, clear and spoken directly. The leader should be firm and behave in a directive manner.

2nd stage – STORMING. This is the phase of "getting along" of individual employees. It involves establishing the position of members within the team. Conflict can arise at this stage, especially when team members compete for their positions and roles. The future structure of the team is established here. The leader's authority may be undermined in the second phase. The leader is exposed to criticism. The entire team or individuals may sharply criticize the leader and their professional skills and competencies. This stage often results in a decrease in motivation, arousal, or distrust among team members. The manager's role is to help explain emerging problems and relationships between employees. The leader should also model constructive behavior and reveal and acknowledge differences of opinion among team members.

3rd stage – NORMING. At this stage, a consensus is reached on formal and informal roles, tasks, priorities, and rules of behavior and mutual communication. This is where the real work of the team begins, and muscle memory, skills, and team expertise develop through practice. In the third phase, it is possible to increase efficiency. The differences of opinion revealed in the previous phase allow for a rational exchange of opinions. Using constructive feedback creates an atmosphere of security and trust. Members find their place in the team. The leader's task is to support, reward appropriate attitudes and provide positive feedback.

[1] Całek A., Jaśniok M., Kasperek K., Piłat M., ks. Polok G. (2011): Zarządzanie zespołem: motywacja i działanie. Published by Wydawnictwo Uniwersytetu Ekonomicznego, Katowice, Poland, page 38.
[2] Tuckman B. W., Jensen, M. A. C. (1977): Stages of Small-Group Development Revisited. Group & Organization Studies, 2(4), 419-427. https://doi.org/10.1177/105960117700200404
[3] Ibidem
[4] Całek A., Jaśniok M., Kasperek K., Piłat M., ks. Polok G. (2011): Zarządzanie zespołem: motywacja i działanie. Published by Wydawnictwo Uniwersytetu Ekonomicznego, Katowice, Poland, page 39.

4th stage –PERFORMING. The team, after optimizing processes and building a feedback loop, begins experimenting with different approaches. Different ideas are proposed to solve existing problems or to complete a specific project. In addition to suggesting ideas, team members identify areas for improvement, may ask for help, admit to previous mistakes, and seek new solutions. The fourth phase is characterized by the greatest employee satisfaction and maximization of the effectiveness of their actions. Motivation and concentration on the goal increase, the team reaches full maturity and a high level of self-control. The leader becomes an observer (may take on the role of an advisor) and strives for gradual withdrawal.

5th stage – ADJOURNING. This stage consists of evaluating and celebrating the team's success. In addition, everything that may be needed for the work of subsequent teams dealing with similar tasks in the future is documented and recorded.

Skipping any of these stages or moving too quickly between development phases can have negative consequences for the team's work. These stages are logically linked, so skipping them or unjustifiably accelerating them can disrupt the team's development process and disturb the internal harmony. Each phase of team development is important because it gives employees the opportunity to gain different experiences and skills needed for mutual cooperation[5].

1.3. JIGSAW method in Team Management

An important element of team management is the ability to build cooperation and mutual responsibility for the final success, which is the achievement of a given goal. In this context, one of the interesting techniques is the JIGSAW method.

The JIGSAW method involves mastering a single piece of knowledge/task (which is part of a larger task) by a given person (employee, student, participant, etc.) and then passing it on to other people (knowledge sharing). Thanks to this, partial knowledge is combined into a whole task, and each person has the opportunity to learn about the entire thematic range. As a result, thanks to the internal communication, discussion and transfer of the information, a whole team is familiar with the strategy of problem solution. **This approach is based on three key foundations**, important in team management, among others:

1) **team bonding**: collaborative learning fosters prosocial behaviour, leading to greater appreciation between participants. Each person is part of the whole and together the participants master the task or topic,

[5] Ibidem, page 39.

2) **communication skills**: learning by teaching increases the sustainability of learning, as explaining what we have learned has a particularly lasting effect.

3) **accountability**: social cohesion or group cohesion is strengthened when an individual's identification and responsibility with and for the group increases. Cascading interdependence, which can arise, for example, through common goals or complementary parts of tasks, is important for cohesion.

The JIGSAW method consists of the following steps (Figure 1):

- the participants (students, co-workers, team of people) create together so-called working (basic) groups, the number of people in the working group should correspond to the number of topics/tasks to be solved/developed (Step 1),
- then each working group will be divided so that its participants can create new groups, the so-called expert groups (in each expert group there will be a representative of each working group). The task of the expert group (Step 2) is to work on a given issue (which is part of a larger task). As a result, each member of a given basic group takes responsibility for the assigned scope of work/topic/task, which is an element/part of the whole (goal),
- after a set period of time, the representatives of the working groups return to their original teams (Step 3), where they pass on or present the developed solution in the expert group. The result is learning from each other, passing on the knowledge gained during work in expert groups and achieving a higher level of skills together (the knowledge is disseminated throughout the organization).

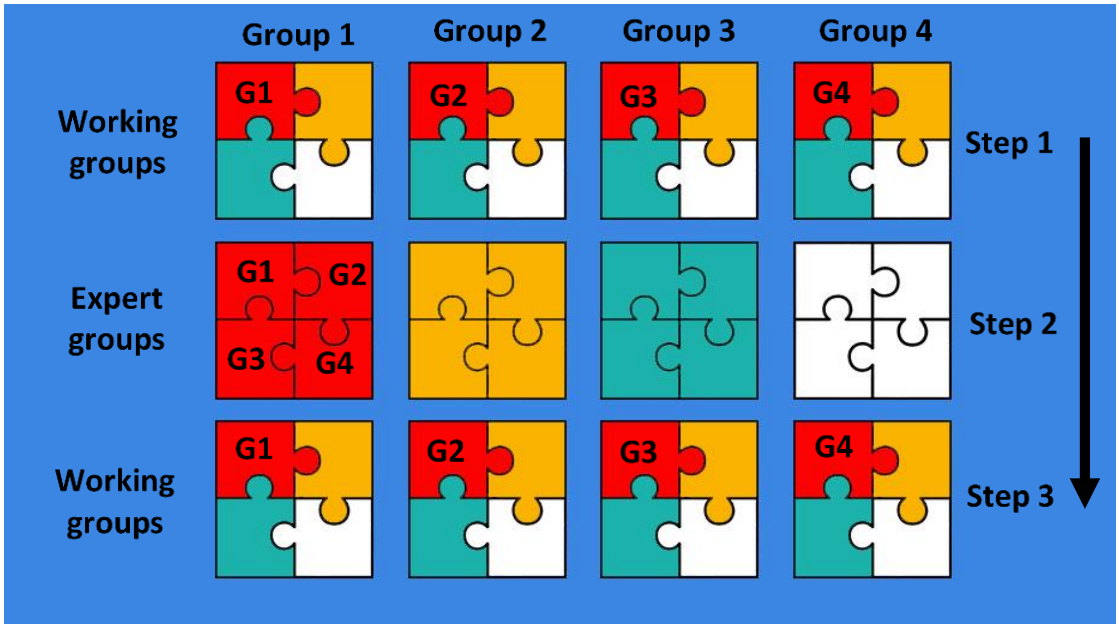


Figure 1. JIGSAW method process

Some of the main advantages of the JIGSAW method that support team management and individual skills are, as follow:

- participants can explore and teach different aspects of a topic, leading to a deeper understanding of the issue,
- it encourages participants to work together and promotes cooperation rather than competition,
- it compensates the disadvantage of traditional group work: the possibility for individual participant to hide in the group and thus reduce their own activity. Here, the participants take responsibility for a content-related part and pass it on to the other persons in the respective core group,
- the active involvement of the participants in the process may lead to a higher level of commitment and motivation, and contribute to changing the atmosphere within the groups from competitive (a negative orientation) to cooperative (a positive orientation),
- the method promotes respect, empathy and appreciation by bringing together people with different backgrounds, values, experiences and attitudes,
- develops the ability to work in a group (everyone is activated),
- increases communication skills,
- allows for effective acquisition of knowledge,
- develops creativity (each participant has the opportunity to share ideas),
- motivates to explore knowledge,
- improves the process of planning and organizing learning,
- it teaches responsibility for one's own work as everyone is responsible for the success of the team.

1.4. Team Management - supplementary materials and knowledge extension

More information about team management and its tools can be found here:

- Madalina Roman (2023): Simple Guide to Team Management. TIMEULAR, 19 December 2023. Access online: https://timeular.com/blog/team-management/?utm_source=google&utm_medium=cpc&utm_campaign=europe_pmax&gad_source=2&gclid=EAIaIQobChMI-qPF7aTniwMVEqODBx0vrCctEAEYAiAAEgLom_D_BwE
- Chartered Management Institute (2015: Steps in successful team building. Management House, Cottingham Rd, Corby, Northants. Access online: https://www.managers.org.uk/wp-content/uploads/2020/04/CHK-088-Steps-in-successful-team-building.pdf
- Brendon Burchard: How to Manage a Team. Video material. Access online: https://www.youtube.com/watch?v=VTKdLMGOZSE
- WCU: Tuckman's Stages of Group Development. West Chester University. Access online: https://www.wcupa.edu/coral/tuckmanStagesGroupDelvelopment.aspx
- Vani Raju G., Raju K.V.S., Jagannadha Swamy T.: Team Skills. Gokaraju Rangaraju, Institute of Engineering and Technology. India. Access online: https://www.griet.ac.in/cls/Team%20Management%20Skills-1.pdf
- EFAP (2015): Improving Time Management Skills. Vitality, Vol. 5, Number 4. EFAP Newsletter for Human Resource and Occupational Health Professionals, Program Administrators, Supervisors, and Key Personnel. Access online: https://www.queensu.ca/gazette/sites/default/files/assets/Vitality-Oct_EN-GENERIC_1015.pdf
- Katherine Brown (2024): 7 Key Team Management Skills for Success You Can Learn Today. The official website of Honkong Superace Software Technology Co. Article published on 25.12.2024. Access online: https://updf.com/skills/team-management/

2. Coaching

2.1. Introduction

Coaching is the process of supporting an individual or group in achieving goals, developing potential and improving skills. It is a partnership between the coach and the coachee, based on trust, interaction and openness.

The main goal of coaching in a professional environment is to bring out the full potential of the coachee by asking questions, reflecting, motivating and developing awareness. A coach helps to define goals, develop a strategy of action and overcome possible obstacles. Coaching focuses on the future and action.

The coaching process is based on regular sessions during which the coach asks questions, listens carefully and supports the coachee in identifying his own beliefs and limitations. Importantly, the coach does not impose solutions, but supports in the search for answers. It engages the employee in responsibility for their own development and encourages them to take action, experiment and learn from their own experiences.

Coaching can cover various areas of professional life, such as the development of soft skills, coping with challenges, conflicts in interpersonal relationships or achieving work-life balance. It can be used for different purposes and at different levels of coachee development. The goal may be to improve efficiency, develop leadership skills, team building ability, increase self-confidence, etc.

Coaching is not the same as other forms of work with another person (or group of people), such as mentoring, consulting, psychotherapy, motivational speeches, or giving feedback. A coach does not give advices, does not give solutions, does not share his opinions or his own experiences, does not point out mistakes and does not reprimand, nor does he focus on the past.

Coaching is accompanying the coachee in a creative process that makes you think and inspires you to maximize your professional and personal potential. It manifests itself in careful listening and observation of the coachee following what and how he says (and what he does not say), and sharing observations and asking questions that are to serve the coachee in his own discovery, expanding consciousness, development and reflection. As a result, the client strives to answer his own questions and achieve the goals he has set. The coach has a number of tools and techniques that can be used during this process.

2.1. The rules of coaching

There are a number of principles defining coaching work that are important for achieving the final success, including:

- partnership between the coach and the coachee: if this principle is disturbed, the coach or coachee will dominate the relationship over the other party, or both parties will feel bad. The coach and the coachee must feel good about each other and trust each other, especially since the topics discussed can often go beyond the so-called comfort zone,
- empathy – openness and sharing often sensitive topics or important information requires empathy on the part of the coach,
- confidentiality - the coach is obliged to maintain confidentiality and not to take information outside,
- responsibility - the coachee is mainly responsible for the effects of coaching work, because he or she is the one who brings in the information and topics. Moreover, he comes to his own conclusions, makes (or not) decisions and actions on this basis. The coach is only responsible for the implementation of the process in accordance with the principles of professional coaching,
- work with a goal - coaching is generally work on a goal/goals defined by the coachee. The goal may evolve during the process, but the decision will always be up to the coachee,
- faith in the coachee's resources – partnership cooperation is based on the assumption that the coachee has all the resources (i.e. skills, knowledge, experience, support of other people or material resources) to achieve the goal(s) right away, or in the formula of small steps. The question is really to make the coachee aware of this,
- present and future – the coaching process does not look back, but focuses on the present (feelings, emotions, or thoughts) and on working towards achieving the goal in a defined future,
- curiosity – the coach must be curious about the coachee in order to stimulate him to reflect and discover himself,
- courage - the coach must not be afraid to ask sometimes uncomfortable (difficult) questions and meet with strong emotions from the coachee (provided that good intentions and faith in the usefulness of these questions).

It is also worth noting that the coach does not have to be an expert in the topics with which he or she comes to the coachee session. This is due to the fact that the coach does not advise, teach, or share his experience (the coach himself can learn a lot from the coachee) – it is work on the coachee's own resources. The coach listens carefully and observes the client, sharing observations and asking questions. In this way, it helps them expand their awareness and see opportunities for development. Each coaching session is a work on achieving previously set goals, for example, on developing a useful skill or learning how to communicate correctly.

2.2. Types of coaching

Coaching is a very broad concept that includes many ways and areas in which it can be conducted. The most common types of coaching are:

- scientific/academic: aimed at building the image of a strong research university recognized in the international arena, developing the scientific profile of the university/employee or acquiring additional competences by the scientist/researcher in key skills such as team building, effective decision-making, conflict management and professional communication,
- student: this is support for students who may need to bring some order to their lives or solve temporary problems during their studies. It can also be related to writing a bachelor's, master's or doctoral thesis[6],
- business: addressed primarily to companies and organizations. It is a method supporting the development of employees, focused on discovering and shaping their abilities, skills and stimulating creativity. The main goal of coaching is to improve employees and support the organization in the implementation of the planned strategy,
- careers: focused on supporting the career planning and development of the coachee,
- life: focused on the personal development of the coachees,
- motivating: created for people who want to think more deeply about the answers, get to know themselves better and find motivation to keep going. It is a process that allows the coachee to think about what is important to them, what their strengths are and what they want to achieve. Motivational coaching sessions help you assess your own abilities and strengths, as well as identify solutions that can stimulate energy to achieve your goals.

[6] Coaching dla Uczelni: Uniwersytet XXI wieku. Access online: https://coachingdlauczelni.edu.pl/

The type of coaching may also depend on the number of people being trained. Therefore, it stands out:

- individual,
- couple,
- group,
- team.

Be careful, because coaching can be confused with counseling or mentoring. However, there is a fundamental difference between them. The coach uses the client's potential and only helps to achieve goals. Mentoring, on the other hand, is also a 1:1 job, the difference is that the mentor must be an experienced specialist in a given field. The mentor must have extensive experience to show the client many paths and opportunities, from which they will recommend one, suitable for the client and consistent with their vision of development.

2.3. The examples of the most important coaching tools

Although the knowledge and experience of a coach are essential, building a new quality cannot be done without tools. Each of them can be used at a slightly different stage, from the initial definition of the coachee's resources to the planning of his further development steps.

2.3.1. Model SMART

This model can help in elaborating the goal or objective. It focuses on defining a measurable, specific and realistic goal. According to SMART model the goal must be: Specific-Measurable-Achievable-Relevant-Time-bound (Figure 2).

Specific: objectives should not be easily confused with each other, or baffle you about what you really want, so you will need to be specific. When a goal is specific rather than broad, it removes any uncertainty while you or your team work through it. By answering some questions (what do I want to accomplish?, what steps do I need to take to get there?, who is responsible for completing each step of the goal?), you can get to the point of what you want to achieve and make a targeted goal.[7]

[7] Breeze Blog: How to write effective SMART goals. Access online: https://www.breeze.pm/blog/how-to-write-effective-smart-goals

Measurable: tying in closely with how specific it is, you need to be able to measure your goals too. Quantify your aims with objective markers like a number, deadline date, or percentage change. It will then be clearer when you've completed it. Moreover, you can make sure the progress you make along the way is not lost in the weeds. Some questions (how should you objectively measure what you want to achieve?, how will you track your progress toward completing the goal?, what would a person adopting your goal have to see in order for it to be considered achieved?) can help in defining this goal.

Figure 2. Model SMART

Achievable: if you set a goal that's too easy, you won't feel the same satisfaction achieving it. On the flipside, an objective that is too difficult can feel pointless to you or your team. Ultimately you're far more likely to accomplish your goals if you can find the middle ground between challenging and impossible.

Relevant: if you want to focus on this goal above other targets, it should completely align with the wider direction you want to head in. When an objective is relevant, you're more likely to stay interested and feel inspired to complete it. Here are some questions to consider: why are you setting this objective?, how does this goal fit in with your wider aspirations?, what would it mean to you to meet this goal? that should be helpful.

Time-bound: no one likes an objective that drags on, never getting fully finished. Goals that do not have an final date can be susceptible to scope creep and unclear success metrics, too. Therefore, when defining your objective, it is important to accompany it with a time limit. And if there are sub-tasks, on the way to the defined main goal, each one will need its own deadline within a clearly estimated timeline. When setting your time limit, you can consider some questions: are there any urgent factors that will determine when this goal needs to be met?, is this a realistic deadline for this goal to be completed?, do I need to factor in any times when I won't be able to work on the goal?.

2.3.2. Open questions and coaching conversation

The coaching process is based on the interaction between the coach and the coachee. For this reason, a coach must have such competences as active listening, understanding the other person, empathy, openness, skillful questioning, etc. A coaching conversation is designed to provoke thinking, develop awareness and generate new perspectives. The examples of open questions start with:

- what?
- how?
- why?,
- in which sense?,

The purpose of open questions is to encourage the client to reflect more deeply and discover their own answers. It is very important that the coach does not give his own proposals and solutions, because the coachee is supposed to find them.

In this way, the person in the process can reach for their own resources, which is not only a value in itself, but also builds self-confidence, as well as greater responsibility for everyday activities and solving problems and challenges they face in their professional or private life.

A coach should not ask closed questions (e.g. whether?), because they usually lead to simple and short answers (e.g. yes, no, don't know, good, etc.) that do not provide more information about the issues discussed.

2.3.3. Feedback 360

360-degree feedback is a coaching technique that usually involves obtaining anonymous opinions from various people in the environment (co-workers, superior, caregiver, colleagues, friends or close family members). In coaching, it concerns areas related to the goal, such as communication competences, the ability to cooperate, punctuality, etc.

360-degree feedback can be conducted by both the coachee and the coach (after he has given his consent). Structured interviews and electronic or paper surveys are used for this purpose. The coachee answers the same questions as other people asked to complete the survey. Then the information obtained is analyzed. A key part of this process is to compare the survey results with the coachee's self-report.

Thanks to this method, the coachee has the opportunity to reach a lot of new information that may be surprising or even shocking to him. However, it should be remembered that when talking to the coachee (giving him feedback), you should do it in an empathetic way. 360-degree feedback allows not only to quickly discover areas that can be covered by coaching, but also to gain a very broad perspective, helpful in achieving the goal that has been previously defined. Identifying the diagnosed deficiencies will allow for better development planning. Importantly, 360-degree feedback allows you to receive feedback and evaluation that cannot be received in any other way. Although opinions can sometimes contradict each other, it is worth taking them into account as inspiration for the entire process.

2.3.4. JOHARI window

The JOHARI window is used to get to know oneself, explore self-awareness, which then leads to improved communication with others and the pursuit of more fruitful cooperation. In management, they can be used for effective team building or as a feedback tool. The JOHARI window method assumes that a human being is made up of different types of characteristics:

- those everyone knows about (ideal for personal development discussions),
- those of which coachee is not aware of (creates an opportunity to seek feedback),
- those that others do not know about (gives you the opportunity to share, thoughtfully),
- those that no one is aware of (offers you the opportunity to unlock your potential with fresh challenges).

Such a division creates four squares, the so-called four Johari windows[8] (Figure 3):

- The open area (known by yourself, and know by others too). This group includes features that we are familiar with. We easily admit to them or just like to show them. We share them without any problem if there is such a need and we are happy to tell others about them. These are our habits, external characteristics, behaviors, statements and opinions, skills and talents, plans and dreams. It is an area that creates the so-called our public self, and presents how we want to be perceived.
- Hidden area (known by yourself, but unknown by others). This part is a private sphere that we do not want to share, for various reasons. It can be a sense of shame, a desire to protect given information so as not to expose our weaknesses, or a simple reluctance to be associated with a given feature or phenomenon. We are very familiar with the features in this part, but we do not want others to know as much about them. In the hidden window of Johari there are secrets and mysteries, intrusive habits, unfulfilled desires, and topics that we consider taboo, or are inconvenient for us.
- Blind area (features unknown by yourself, but known by others). In the blind area there are qualities that we ourselves do not see, but others do. These are most often unintentional things, such as an unconscious reaction to a message, nervous tics (which we do not know about), gestures, unconscious behaviours.
- Unknown area (unknown by yourself, and unknown by others too). In this area of the unknown Johari window lies the deepest information that we do not entrust to others, but we do not know it either. These are deeply buried feelings that we have repressed so strongly that we do not notice them. There are also repressed desires, fears, traumas, which, despite our unawareness, affect our lives and translate into our current relationships, views, and way of life. Some behaviours, habits or beliefs result from things that are in this area. This Johari window is the most difficult to explore. Most often, we learn about it from feedback, which will lead us to deeper conclusions, or from a new situation in which we behave differently than usual, surprisingly.

[8] SkillPacks: The Johari Window model: examples, exercises & self-development tips. Access online: https://www.skillpacks.com/johari-window-model/

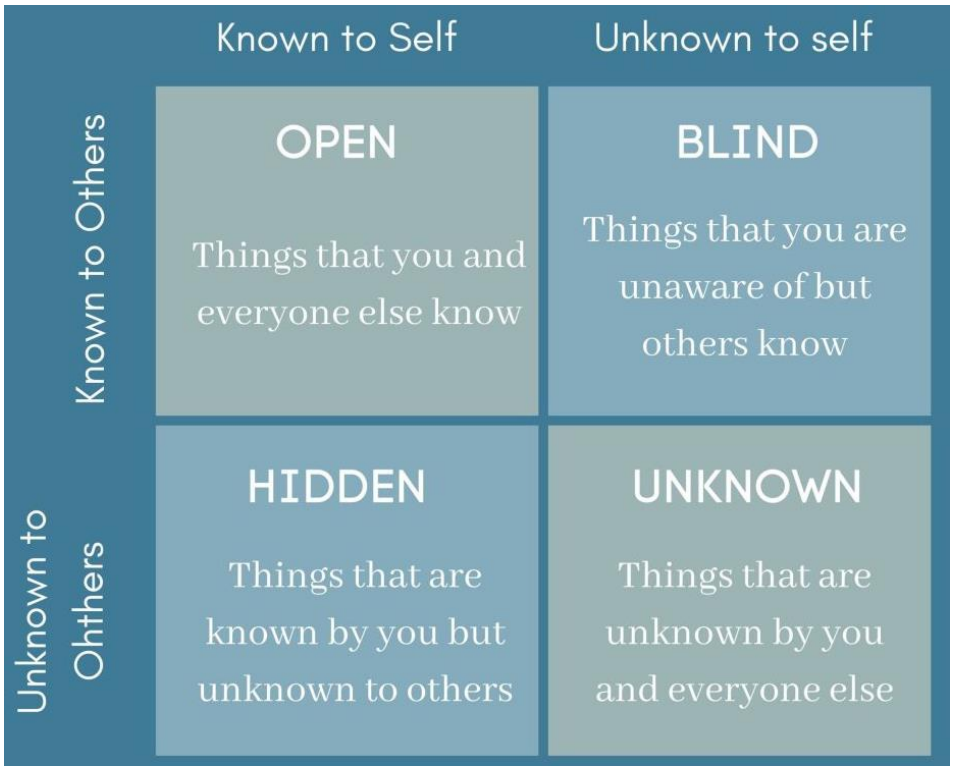


Figure 3. Johari window[9]

All areas of Johari together form a picture of the coachee's personality (who and what he is). It allows the coachee to see the disadvantages (weak points) and work on them or, on the contrary, to notice his strengths that he was not aware of. The advantage of using this tool is that it requires the coachee to come out of his perspective and look at himself with an external eye, just like others (colleagues, colleagues, family, friends, etc.) simply see the coachee.

To perform the Johari window, a wide list of personality traits (positive and negative) is needed. From this list (Table 1), the coachee chooses the traits that he thinks best describe him. Other people who take part in this task do the same (they choose the traits that, in their opinion, best describe the coachee). Then, a comparison of the traits listed by the coachee and other participants is made in order to assign them to the appropriate Johari window (open, blind and hidden). We assign the traits listed by both the coachee and the participants to the "open" window. To the "blind" window the traits that the coachee did not mention, but other participants mentioned. To the "hidden" window the traits that the coachee mentioned, but not other participants. The traits from the list not selected by anyone go to the "unknown" window.

[9] Source: Jenny Nurick Blog. The Johari Window. Access online: https://jennynurick.com/the-johari-window/

Table 1. List of selected adjectives referring to the character traits

able	accepting	adaptable	bold	brave
caring	jolly	clever	versatile	self-confident
dignified	empathetic	energy	extravert	amicable
happy	helpful	idealistic	independent	ingenious
introverted	courteous	competent	logical	loving
modest	nervous	attentive/ observer	organized	patient
proud	silent	reflective	relaxed	religious
seekers	assertive	aware	reasonable	sentimental
playing pranks	spontaneous	sympathetic	disciplined	trustworthy
imperious	shy	sensitive	warm	mature
wise	witty	giving	intelligent	reliable
violent	indecisive	hostile	in need of constant attention	ignorant
perplexed	not very sensitive	without emotions	heedless	intolerant
irresponsible	devoid of imagination	irrational	distracted	loud
inelastic	grim	vulgar	dissatisfied	vain
childish	impatient	causing panic	conflictual	predictable
cowardly	common	withdrawn	cynical	weak
lazy	aggressive	quiet	……	……

Depending on the goal of the exercise or the time available, the number of selected features can be limited (e.g. to eight positive and eight negative). You can also skip the use of

list character traits and provide the character traits based on your own feelings. After the JOHARI window developed in this way, we move on to the next part, namely discussion or reflection on the results obtained.

2.4. Coaching - supplementary materials and knowledge extension

More information about coaching and the tools that can be used in this process can be found here:

- Chris Delaney: 25 Free coaching tools and techniques. Portal "Employmentking.co.uk". Access online: https://christopher-delaney.com/wp-content/uploads/2013/09/25-free-coaching-tools-and-techniques.pdf
- Shokkin Group Netherlands: Compilation of coaching tools. Project "Coach'EM: Discovering Youth Coaching" – Erasmus+ programm. Access online: https://www.salto-youth.net/downloads/toolbox_tool_download-file-2279/CoachEm_Tools.pdf
- The Coaching Tools Company.com: Coaching Tools, Forms, Templates & Exercises. Access online: https://www.thecoachingtoolscompany.com/
- Mindful Coaching Tools.com: Free Coaching Tools. Access online: https://www.mindfulcoachingtools.com/free-tools
- Erickson Coaching International: Coaching Tools & Processes. Access online: https://www.youtube.com/playlist?list=PLhoJYDNBwHwnDaNpvkEzcQu0KHtoBmv6C
- Special Olympics: Coaching Guide, Principles of Coaching. Special Olympics Coaching Guide – General Sections. Created: December 2003. Access online: https://www.specialolympicsga.org/wp-content/uploads/2010/02/Principles+of+Coaching.pdf
- SkillPacks: The Johari Window model: examples, exercises & self-development tips. Access online: https://www.skillpacks.com/johari-window-model/

3. Tutoring

3.1. Introduction

Tutoring is an innovative, personalized method of didactic work focused on discovering and developing the individual potential of the student. Tutoring is based on the relationship between the master and the student, but without creating unnecessary formal boundaries that usually occur during traditional didactic classes. It is rather a kind of partnership cooperation between the tutor and tutee. It is a form of personalized education using both a scientific and developmental approach. It is a departure from the mass nature of education. Tutoring is a process of supporting the development of the student by strengthening their independence, agency and responsibility for their own development. It focuses on the student's strengths and goals. Tutoring is a time for building self-awareness and reflection on further multi-dimensional professional, scientific, personal and social development[10],[11].

Tutoring is additional learning and academic support that can be provided by a teacher, other school staff, an experienced peer, or a professional tutor. While the common perception is that tutoring is simply the act of teaching students a subject, there is more to it. Tutors can also help students learn how to learn as well as what to learn. They can work with students to create a learning process that best suits their individual learning style and are there to support students in discovering it.

Tutoring is most effective when the tutor and student have a relationship of trust and communication. If a student does not feel comfortable expressing their struggles openly to the tutor, they will not receive the help they need to succeed. Creating an environment of trust and transparency is key to maximizing the student-tutor partnership. Tutoring is for students who are struggling academically as well as those who are gifted.

Especially when it comes to learning loss, effective tutoring can go a long way in helping students catch up on their learning. It requires intensive, high-dose tutoring (ideally in one-on-one settings) that identifies areas of greatest need and then helps rebuild skills and restore lost knowledge in a given subject. As students catch up, tutoring helps them focus on other key

[10] Colvin J.W. (2007), *Peer tutoring and social dynamics in higher education*, „Mentoring & Tutoring: Partnership in Learning" 2007, vol. 15(2), s. 165–181, Access online: https://doi.org/10.1080/13611260601086345

[11] White S., Groom-Thomas L., Loeb S. (2023). A Systematic Review of Research on Tutoring Implementation: Considerations when Undertaking Complex Instructional Supports for Students. (EdWorkingPaper: 22-652). Retrieved from Annenberg Institute at Brown University. Access online: https://doi.org/10.26300/wztf-wj14

skills and concepts. By addressing these more specific areas of learning, students can grow and increase their own potential (be more confident or self-aware).

In turn, many high-achieving, bright students seek tutoring to enrich themselves, learn more, and get ahead. Tutoring can be very helpful when it focuses on a specific skill or area of interest; it is especially fruitful for students who want to get a head start on career skills.

Finally, it's important to recognize that tutoring is not teaching. While there is some overlap between teaching and tutoring, they are not the same thing. First, the setting is usually very different. A teacher imparts knowledge and skills to their students in a class, which typically consists of 10 to 25 students. Tutoring, on the other hand, can be as personal as one-on-one instruction or small group sessions. However, one of the most important differences between tutoring and teaching is the personalization of instruction. A teacher must adapt to the learning needs of several students at once; a tutor in a one-on-one setting is able to structure the lesson around each student's specific strengths, struggles, personality, interests, and learning styles. This typically leads to more effective learning and faster student development, which often translates into better academic performance and greater engagement.

3.2. Types of tutoring

The goals of tutoring are individually tailored to the needs of the tutor. They are achieved through periodically prepared written works (e.g. essays) or other tasks developing the student's academic or professional competences. The tutor-mentee relationship is based on the principle of voluntariness of both parties, i.e. the tutor voluntarily joins the tutoring program, and the student independently chooses his/her tutor based on his/her interests and tutoring goals. As a result, **the tutoring can take various forms, such as:**

1) **based on the number of students**:
   - individual,
   - group,
2) **based on the method of delivery**:
   - direct (in person),
   - indirect (on-line).
3) **based on the targets**:
   - academic,
   - scientific,
   - developmental,
   - peer.

Individual (one-on-one) tutoring: this format is usually the most effective type of tutoring because it focuses on just one student. It allows the student and tutor to develop a more personal relationship focused on specific areas of learning and content that need to be covered. With one-on-one tutoring, the tutor can get a better sense of how the student works and learns, thus adapting the lessons for maximum impact.

Small group tutoring: it usually involves one tutor and a few students (usually 2 to 5 students). Small group tutoring introduces a peer-to-peer learning element to the session, where students learn not only from the tutor, but also from their peers. Although students will not receive the level of individual attention that a tutor could provide in a one-on-one setting, small groups can still allow for some personalization and one-on-one time while other students in the group work.

Group tutoring: it usually performed in a classroom setting, often involves one tutor and multiple students (5+ students). Students have the opportunity to learn from their peers in this setting, but individual attention is minimal and severely restricted. Students who struggle in a classroom setting may not benefit from this type of tutoring.

In-person tutoring: stationary tutoring can take place in a variety of locations (the student's home, the tutor's home, the school, or a library or community centre). This type of tutoring is especially beneficial because the tutor can observe the student's body language first hand, which helps plan the course of the lessons. In-person tutoring also allows the tutor to make sure the student is focused on the work. A student-friendly setting increases the comfort level and the experience of the meetings.

Online tutoring: although it lacks some of the characteristics of in-person tutoring, online tutoring can be quite effective. It is important to note that online tutoring is very different. However, thanks to the benefits of online technology and tools that enhance the learning session tutoring, the student can receive individual attention, as well. Online tutoring in a one-on-one format still allows the tutor to personalize each session to his specific challenges and needs. Unfortunately, the direct interaction between the tutor and tutee is limited that might cause some problems in terms of trust building and emotional communication.

Academic tutoring aims to develop the student's passions and interests in various fields within the dominant disciplines of knowledge at a given units. It can be pursued at different levels of study.

Scientific tutoring is focused on diagnose scientific interests, as well as to develop research and writing skills, in addition, meetings (tutorials) are aimed at students looking for

the basics of good research skills or planning further scientific carrier in the future. This path is mainly carried out in master's studies and prepares for doctoral studies.

Developmental tutoring is oriented on diagnosing the student's professional preferences, predispositions and abilities. It can be implemented at various levels of studies.

Peer tutoring, which is a special form of cooperative learning in which a more experienced student (tutor) offers help and support to one less experienced student. Through peer tutoring, both the tutor and their tutee develop their knowledge or skills. There are several ways to apply peer tutoring in practice, including: peer tutoring of people of the same or different age, unilateral or reciprocal, used in small or large groups, preceded by training or without additional training, and carried out online or in the form of individual or group meetings.

3.3. Benefits of tutoring

Tutoring is very beneficial in several ways. First, it gives students the opportunity for individual, personalized attention and learning that they may not receive in a traditional school setting. It also allows the student to work on a specific topic or subject outside of the group/classroom to catch up or develop new areas.

Tutoring encourages and improves self-directed learning, self-pacing, responsibility, communication, and independence, all traits that are crucial for success in life outside of university. But perhaps most importantly, tutoring can improve a student’s self-confidence and self-esteem as they gain the skills and knowledge they need to succeed.

Other benefits of tutoring for tutee[12]:

- gains a close relationship with the tutor who has time for him, understands him and supports him,
- learns about their strengths and acquires the ability to use them,
- becomes more independent and responsible (including for the process of their own education),
- acquires the ability to learn independently (including the selection and evaluation of the source of information),
- accepts and has self-esteem,
- develops his/her own interests,

[12] Brdulak J., Gotlib J., Koziołek R., Uriasz J. (2003): MODEL OF TUTORING IN ACADEMIC EDUCATION. Project: Masters of Didactics Ministry of Education and Science, Warsaw, 16 October 2023, ISBN: 978-83-964241-1-2

- can make decisions independently,
- skilfully plans their own development,
- is open and kind to others,
- has the courage to formulate and proclaim his or her own views,
- finds the sense of learning and passion in action.

3.4. Implementation of the tutoring process

It should be noted that there is no single scheme for tutoring. It depends primarily on three variable factors: the student's needs and expectations, the personality of the tutor and the style of work[13]. Nevertheless, four basic stages of tutoring can be distinguished[14]:

1) building a relationship between an academic teacher and a student and concluding a contract in which the rules, methods and forms of cooperation will be defined,
2) defining the purpose of cooperation – the teacher and the student determine what they will work on, what results they want to achieve and how the effectiveness of this cooperation will be checked,
3) achieving the goal, i.e. regular work of the tutor and tutee during tutorials (meetings), but also independent work of the student between meetings,
4) evaluation of the entire process – reflections expressed by both the student and the academic teacher, as well as a summary of the results of cooperation and feedback from both parties.

The first stage is considered to be crucial in the entire tutoring process due to the fact that it determines the correct performance of the other phases. It introduces the student's values, but also intellectual deficiencies, abilities and skills, cognitive styles, professed values and personal plans[15].

The organization of work in the academic tutoring method is based on direct meetings between the academic teacher and the student. One of the recommended tools for work is an essay, which contains an argumentative reference to the researched and discussed problem. It is prepared by the student and is the basis for conducting discussions with the tutor. The essay

[13] Machowska-Okroj S. (2023): Tutoring jako metoda rozwoju studenta w kontekście obowiązującego paradygmatu oraz jako element doskonalenia jakości kształcenia (*Tutoring as a method of student development in the context of the current paradigm and as an element of improving the quality of education*). Journal „Teoria i Praktyka Dydaktyki Akademickiej", 2023, t. 2, nr 1, page 14.
[14] Czekierda P. (2015): Czym jest Tutoring? *(What is tutoring?*), [in:] Tutoring. Teoria, praktyka, studia przypadków. (ed.): P. Czekierda, B. Fingas, M. Szala. Wolters Kluwer, Warsaw 2015, page 24.
[15] Ibidem, page 33.

has an open form, but it requires commitment from the student, among other things, through familiarization with the literature on the subject and an in-depth analysis of the problem under study[16].

In order to ensure the proper course of the tutoring process, the tutor's meetings with the tutee should be systematic and their dates should be set in advance. In academic practice, tutorials are usually held regularly (once a week, once every two weeks), which gives about 8-15 meetings per semester. It is also important to ensure (if necessary) constant contact with the tutor between scheduled meetings (via e-mail, phone call or online meeting).

The following basic guidelines may be helpful in organizing any form of tutoring:

1) defining learning objectives (the intended learning objectives should be defined in relation to tutors and mentees, learning objectives should be formulated in a clear and specific way),
2) transparent method of implementation (established rules and procedures should be transparent - they can be written down in a script for the mentee and the tutor): it should be specified what forms of interaction between the mentee and the tutor are desirable/undesirable, the procedures must include a temporary schedule of meetings, it is advisable to provide materials and educational (and other) activities,
3) monitoring (it is necessary to properly monitor the tutoring process by the tutor and verify that the tutor and the mentee comply with the established rules and procedures - if necessary, they can be modified),
4) evaluation (regularly evaluate the course of activities in order to achieve a successful outcome, i.e. verify that the tutor and mentee are achieving the intended learning outcomes – in the absence of progress, the rules and procedures may be changed).

3.5. Selected tutoring tools

The main tools with which the tutor effectively supports the tutoring process in his or her developmental or educational path are questions, active listening or the SMART approach used to set and parameterize the goals of the tutee. Questions are a particularly valuable tool for releasing the tutor's intellectual potential, thanks to which the tutee is able to

[16] Ibidem, page 34.

independently develop solutions to problems or strategies for achieving the final goals. This is because the questions:

1) they turn out to be the strongest method of awakening self-awareness,
2) expand understanding,
3) are a catalyst for the learning process,
4) delegate responsibility to the learner,
5) empower the learner,
6) they build internal motivation.

The tutor working with the tutee on his personal development by means of questions is designed to arouse reflection in the tutee, provoke him to think about the situation and possible solutions. In this case, the GROW model works well, as it is used as the dominant structure of a single meeting, but also of the entire tutoring process. During the tutoring process, the Cartesian questions as tool can be used, as well. For instance, the tutee can answer the question of what will or will not happen when he achieve or not achieve his goals and tasks).

When discussing the tutoring tools used in the developmental tutoring method, one cannot omit many exercises (i.e. Gallup talent list), thanks to which the tutee can gain insight into their situation and work out the solutions they want[17].

3.6. Development circle (life circle)

The life circle allows you to illustrate the level of satisfaction in the most important areas of the tutor's life. With this tool, you can work with the values that are currently important to the tutee.

The exercise consists in the tutee designating the key spheres of his life or values (categories) on his own (or with the help of the tutor), and then putting them on the circle (usually about 10-12 categories). There can be many ideas for categories, in addition to those indicated in figure 4, others can also be considered, such as: a sense of security, religion, a sense of value, leadership, service to others, achievements, or prestige. Next, the tutee evaluates the designated categories (using, for example, a score from 1 to 10, in which 1 is an unsatisfactory level and 10 is a fully satisfactory level), so that an analysis of his life situation

[17] Ibidem, page 9.

can be carried out. This is done by answering open coaching questions. The main goal is to determine how sustainable the life of a tutee is currently[18].

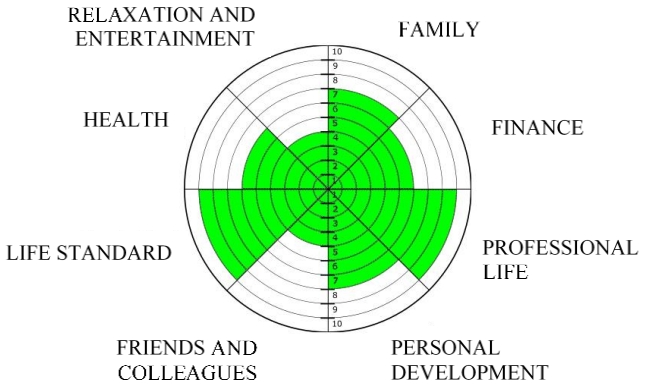
Examples of categories	Coaching questions
	✓ What do you feel and think about your life when you look at a drawing? ✓ Which values arouse the greatest emotions and why? ✓ Did anything surprise you? ✓ Which areas require the most attention? ✓ What would a score of 10 give you for each value? ✓ What happens if you don't make any changes? ✓ In which areas can you make the fastest changes? ✓ Which of these categories would you like to improve the most? ✓ What prevents you from making a change? ✓ Who and how could help you make the change? ✓ Which category can you start with? ✓ When will you start acting?

Figure 4. Life circle[19]

Among the many coaching tools available, the life circle is often and willingly used because it has many benefits and applications, including:

- is a simple tool liked by tutee,
- allows to define a system of values,
- allows to determine the level of satisfaction in individual areas,
- allows to determine priorities and directions of changes,
- makes aware of conflicts in the system of values,
- allows to get to the essence of the tutee problem,
- mobilizes to make changes,
- promotes the introduction of work-life balance,
- allows to shift your attention and time from one area to another,
- helps in making important life decisions,
- strengthens and determines the direction of change through self-awareness,
- it is conducive to reflection on one's life situation.

[18] Anna Dobosz: Koło życia – narzędzie coachingowe. Access online: https://www.annadobosz.pl/kolo-zycia/
[19] Source: Dobosz A.: Koło życia - narzędzie coachingowe. Access online: https://www.annadobosz.pl/kolo-zycia/

It is especially worth using a life circle in the tutoring process if tutee:

1) feels a conflict of values,
2) intends to make an important life decision,
3) wants to have an impact on personal development,
4) wants to understand his current situation,
5) experiences a re-evaluation as a result of an important life event,
6) experiences repetitive patterns,
7) has problems in relationships, work or other areas,
8) wants to identify the current state of life and define a vision of life in the future,
9) uses the support of a tutor,
10) uses the support of a psychotherapist.

3.7. Model SIGN

Often a big problem that tutee face is identifying strengths (the activities that make you feel strong). These are skills and abilities that are so easy that they seem so effortless and difficult to notice. The SIGN method is a revolutionary assessment technique that makes strength mapping relatively easy. Importantly, the tutee is able to discover his own strengths as well as opportunities to develop new skills and techniques (Table 2).

Table 2. Model SIGN

Symbol	Meaning	Description
S	**Success**	You succeed at activities in which you're strong. Strengths are where you feel successful.
I	**Instinct**	You instinctively know how to accomplish a task. Strengths are activities that you are naturally drawn to.
G	**Growth**	You grow each time you perform a strength. Strengths are where you learn the most, come up with the most new ideas, and have the best insights.
N	**Need**	You feel a need to be involved in a activity. Strengths are where you feel the need to spend more time.

The key to this method is to clarify and validate your strengths by examining the conditions that make a given activity particularly engaging:

- does it matter why I am doing it?,
- does it matter who I am doing it for?,
- does it matter when I am doing it?.
- does it matter what the activity involves?.

Once your strengths are identified, you will be better prepared to accomplish your tasks/goals and create conditions for excellence.

3.8. Model GROW

The GROW model is a widely recognized and effective coaching and mentoring tool that can facilitate personal and professional growth. By guiding individuals through a structured process of goal setting, reality assessment, option exploration, and action planning, the GROW Model can help people overcome challenges, achieve desired outcomes, and experience a greater sense of fulfilment.

The GROW model consists of four stages[20], within which the goal is defined, the facts are analyzed, the possibilities are considered, and the activities required to achieve a specific intention or project are planned (Figure 5).

Figure 5. Model GROW[21]

GOAL: the establishment of a clear and specific goal is a key issue. Having a well-defined goal not only provides direction but also serves as a source of motivation. A goal should be SMART (specific, measurable, attainable, relevant, and time-bound). This ensures that the goal is realistic, achievable, and can be evaluated for progress. When setting a goal, it is essential to consider its importance and relevance to your life or career. It should be something that truly matters to you and aligns with your values. Additionally, visualizing the end result can provide added motivation and help clarify the goal.

[20] Imperial: The GROW model. Personal Tutors' guide. Access online: https://www.imperial.ac.uk/personal-tutors-guide/developing-students/coaching/the-grow-model/
[21] Source: The Pathfinder Coach. GROW Model. Access online: https://thepathfinder.org/grow-model/

REALITY: the second stage involves examining the current reality. This requires an honest assessment of where you are in relation to your goal. By understanding your present situation, you can identify the gap between your current reality and your desired outcome. During this stage, it is crucial to gather relevant information and data that will help you gain a clearer understanding of your situation. This may include evaluating your skills, knowledge, resources, and any barriers that may be preventing you from reaching your goal. Reflecting on past experiences and learning from them can also provide valuable insights.

OPTIONS: this stage of concentrates on exploring options and identifying obstacles. This stage involves brainstorming and generating a list of potential strategies, actions, and resources that can help you achieve your goal. It is essential to consider multiple options and weigh their pros and cons to determine the most suitable course of action. Simultaneously, it is vital to recognize and address any obstacles that may hinder your progress. Obstacles can be both internal (such as limiting beliefs or self-doubt) and external (such as lack of resources or support). Identifying these obstacles allows you to develop strategies to overcome them and move closer to your goal.

WILL: here, you decide on the specific steps you will take to achieve your goal and create an action plan. The plan should include a timeline, resources needed, and a method to track progress. Commitment and motivation are crucial during this phase. To maintain momentum, it can be helpful to break your goal into smaller, manageable tasks and celebrate small successes along the way. Additionally, having a support system in place, such as a coach, mentor, tutor or accountability partner, can provide encouragement and guidance.

However, it is crucial to acknowledge the model's limitations and adapt the approach as needed to suit individual needs and circumstances. Ultimately, the GROW Model is a valuable tool in one's personal and professional development journey, providing a framework for setting and achieving meaningful goals.

3.9. Model GOLD

The GOLD model (figure 5) is a conversation focused on goals, results, learning and conclusions (table 3): what will I do differently?. It is an example of obtaining feedback and a tool to support tutee in his development. It focuses on learning based on personal tutee experiences. It is used when the actions of a given person (i.e. tutee) have caused negative

consequences or when the level of performance of the assigned task does not meet expectations[22],[23],[24],[25] (i.e. tutor).

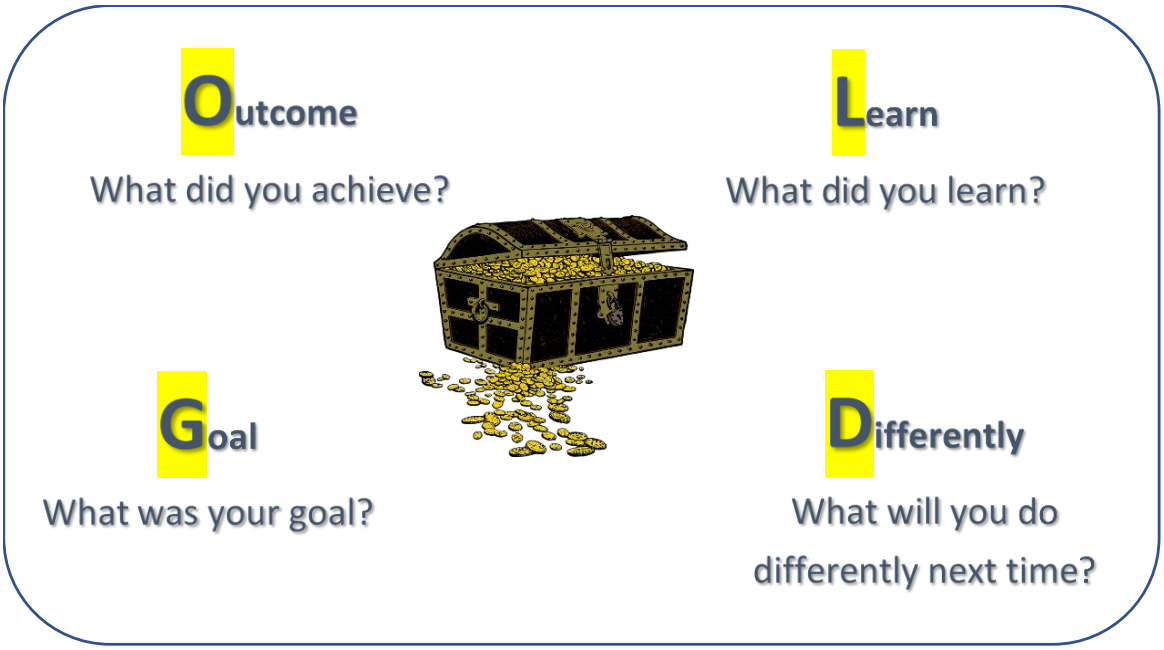


Figure 5. Model GOLD

Table 3. Activities in GOLD model

Issue	Questions to be answered
GOAL	What was your goal? What did you intend to achieve? What were you aiming for? What was supposed to be the result of your action?
OUTCOME	What was the outcome? What was the actual result? What have you achieved? What went well? What else can you work on?
LEARN	What did you learn? What conclusions can you draw from this? What did you take out from this?? What other opportunities do you see now?
DIFFERENTLY	Next time what will you do differently? What will you do differently next time? What will you do more or less? What will you take into account when such a situation arises again? Where will you start? Where will you end up?

[22] Czarkowska L. D., Wujec B. (2011). When is change possible? From session structure to the energy of change in coaching. Coaching Review 1/2011 (3), pp. 53-74.
[23] Rzycka O. (2010). Extraordinary power to ask questions in people management. Warsaw: Oficyna a Wolters Kluwer business, pp. 253-254.
[24] https://kariera.sempai.pl/metoda-gold-jak-mozemy-uczyc-sie-na-bledach/
[25] https://goldmodel.co.uk/

Finally, on the basis of all the thoughts, we prepare a real action plan that we will consistently put into practice. It should be remembered that if you want to learn something from your own mistakes, you need to meet one basic condition – be aware that you have made it and not blame the failure on everything and everyone around you. You should think through each mistake well and try to work through it, break it down into factors, analyze it, know exactly what it resulted from.

3.10. Selected hints and advices for tutor for successful tutoring

The rule of the tutor is crucial to achieve success in the tutoring program. There are some tips that can be helpful for a tutor, such as:

- let the tutee brainstorm (broadly),
- keep the available time in mind,
- in advance:
  - let the tutee develop an action plan for task execution,
  - ask questions which suggest a purposeful approach for task execution,
  - let the tutee decide for himself hoe to execute the task,
- in between:
  - check the available time and the progress made,
  - delegate the task to check the time regularly to a tutee,
- check whether the tutee is participating actively,
- check whether the proposed solution is in line with the task demands,
- check tutees' comprehension by giving feedback and by asking differentiated questions (it should be rather so called "open questions), such as:
  - what does ……mean?,
  - summarise the characteristics of ……,
  - can you give an example of ……..,
  - in what is …….different from/comparable to ……?,
  - why do say that?
  - does everyone agree?
  - can you explain why….?,
  - can you elaborate on that?
  - what are the strengths/weaknesses of ……?,
  - what can you conclude about……?,

- check whether the final task solution corresponds with the task demands,
- check to what degree the learning objectives are met by the tutee,
- check whether tutees still has questions,
- reflect on the peer collaboration.

3.11. Selected hints and advices for tutee for successful tutoring

The final success of tutoring is influenced not only by the tutor's work style and experience in organizing and conducting classes. The tutee's activity during meetings and his/her engagement are also very important. The most important hints or advices that can be helpful for tutee in tutoring are:

- remove distractions (set aside time and mental space to work with your tutor in a focused way),
- arrive on time for scheduled sessions (it ensures the possibility of connection with your chosen tutor),
- decide how you prefer to communicate (the use of text-chat type or voice-audio communication sources with your tutor),
- be prepared to engage with your tutor (a live session is an active experience in which tutor asks questions and presents opportunities for you to implement strategies with your tutor's guidance),
- give your tutor a moment to read over the assignment and the course material (come prepared with the basics of your assignment, including your assignment directions, writing prompt, unit or chapter title, and other key details - the more information you can provide to your tutor at the beginning of the session, the quicker your tutor is able to assess your needs and begin supporting you).
- come with questions or discussion topics (review the material beforehand and make a list of specific questions or topics you prefer to be covered during your session),
- think about how you need assistance with your assignment (for example, help understanding assignment instructions, brainstorming/starting assignments, checking your progress, understanding specific concepts, or checking your work just before handing it in – the more you share your concerns with your tutor, the better they will be able to tailor the session to your individual needs),

- keep in mind that tutors are rather not affiliated with your school (tutors do not usually have specific information pertaining to your courses – the more you tell about the assignment you are working on, the better they target their help),
- tutors do not have access to the answers for assignments (they do not provide the answers, they guide the tutee how to solve problems on their own),
- know when to ask your instructor (If you have specific questions about grading/rubric, instructor preferences or expectations, how to turn in assignments, or other course-specific information, please talk with your instructor or Teaching Assistant before requesting assistance from your tutor),
- be happy with yourself (asking for help is an act of courage - receiving in return the support from a tutor that you need to succeed is a reward for overcoming your fears).

3.12. Tutoring - supplementary materials and knowledge extension

More information about tutoring and its tools can be found here:

- Casey Cowburn: Tutor Training Manual. Alfred State, Student Success Center. Access: https://www.alfredstate.edu/sites/default/files/downloads/Tutor%20Training%20Manual.pdf
- Montgomery County Community College: Tutor Training Manual 2020. Access online: https://www.mc3.edu/choosing-montco/assets/tutoring/docs/training-manual.pdf
- PBCC: Tutor Development Manual. Palm Beach Community College, Student Learning Center. Access online: https://www.palmbeachstate.edu/slc/Documents/tutordevmanual.pdf
- The Learning and Skills Development Agency: Key skills and the role of the tutor. Good practice guide. Access online: https://dera.ioe.ac.uk/id/eprint/6497/1/Good%20Practice%20Guide%20Key%20Skills%20and%20the%20role%20of%20the%20tutor.pdf

4. Design Thinking

4.1. Introduction

The Design Thinking (DT) method was developed in the 1960s in the United States at Stanford University in the heart of Silicon Valley, California. There the technique was then tested and refined, then in the following decades the knowledge was transferred to other countries. Currently, the process is being taught in top design and business schools around the world. It is considered one of the most promising methods in the context of innovation. It has brought many satisfied clients and companies and helped entrepreneurs from all over the world to solve problems with new and innovative solutions. As a universal method, it can be implemented in small businesses, corporations or start-ups. Design thinking focuses on the need to generate ideas and find solutions (products, services, systems) to unsolved problems[26]. As a holistic concept of design cognition and design learning, it enables effective collaboration in multidisciplinary teams, ultimately influencing positive change in the world.

The origins and basic principles of the Design Thinking process are presented, along with examples of application in teaching Food Value Chain topics. The discussed technique, thanks to its structuring and flexibility, provides deep adaptation to the needs of potential users and practicality in implementation. In the context of students, it has a very positive impact on the development of their creativity and out-of-the-box thinking. In addition, it strengthens collaboration skills and shapes analytical skills. With the abilities acquired in their working lives, students will be better prepared to face challenges and innovate, including in private spheres.

4.2. Stages of Design Thinking in the context of the food value chain

Design Thinking, thanks to its human-centered approach and focus on creativity, is ideally suited to activities related to food production, delivery and consumption. It fits perfectly as a tool to drive innovation in the food value chain (FVC), which is currently facing numerous challenges from sustainability to stakeholder preferences to food safety. DT consists of a 5-step process (Figure 6) that involves all group members and produces innovative solutions that provide answers to real customer-oriented problems.

[26] Lindberg T., Noweski C., Meinel C. (2010): Evolving Discourses on Design Thinking: How Design Cognition Inspires Meta-Disciplinary Creative Collaboration, Technoetic Arts: A Journal of Speculative Research, 2010, Vol. 8, pp. 31-37.

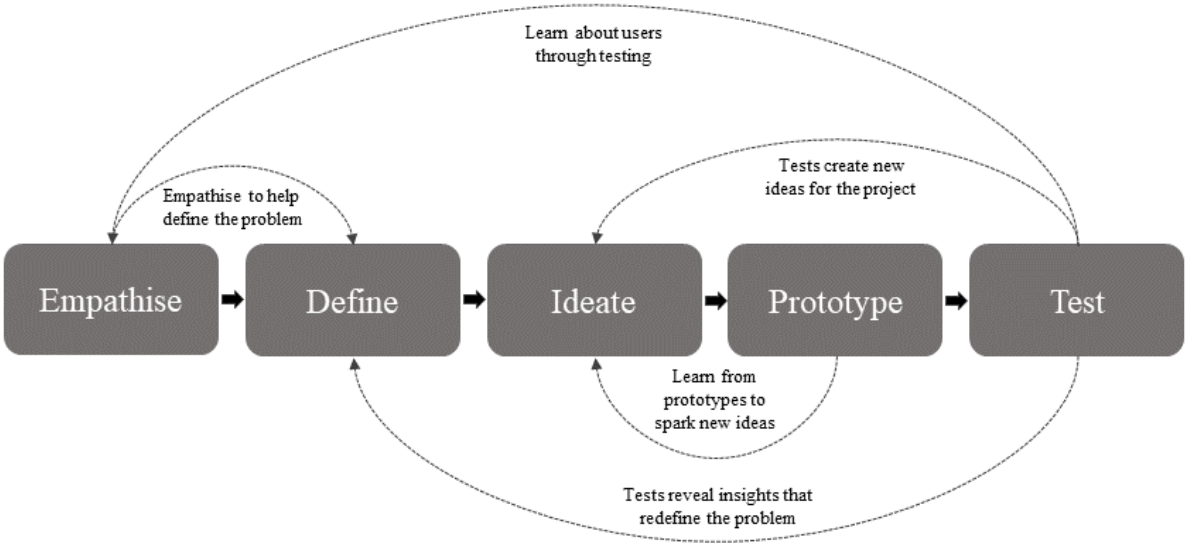


Figure 6. Five stages used in Design Thinking process[27]

Five stages used in Design Thinking process (on the example of FVC) [28],[29],[30]**:**

1) **Empathise.** For the best understanding of the demand for a product or service that meets the expectations of users, it is necessary to know their preferences. Therefore, the Design Thinking process starts with empathy. Persons involved initially need to understand who the potential target users are and what they expect from the product. During this stage, you should get to know them as well as possible through observation and interaction by conducting, for example, face-to-face interviews. The process discussed should end with defining the given problems according to the needs and interests of the target group.
2) **Define.** The first step in the stage under discuss will be to analyze the data from the empathy phase and come up with the first conclusions. Next, define the problem of the target group that we are tasked with solving. The question to be answered is what needs and challenges have consistently emerged? What common themes and models have you observed? The final step is to formulate what is known as a problem statement, which will be a collection of all the information gathered from the target group. An in-depth definition of the problem will make sure that further efforts focus on the right solution.

[27] Own elaboration based on: Fabri M., Andrews P.C.S., Pukki H.K.: Using Design Thinking to Engage Autistic Students in Participatory Design of an Online Toolkit to Help with Transition into Higher Education, International Journal of Psychology and Educational Studies, 2022, Vol. 9(1), pp. 196-210.
[28] Stevens E. (2023): What Is the Design Thinking Process? The 5 Steps Complete Guide. CF Blog, Career Foundry. Access online: https://careerfoundry.com/en/blog/ux-design/design-thinking-process/
[29] Foodtechpathshala: Design thinking and Food Industry. The website Foodtechpathshala.com. Access online: https://foodtechpathshala.com/design-thinking-and-food-industry/
[30] Friss Dam R., Yu Siang T. Empathy Map – Why and How to Use It. The website of Interaction Design Foundation. Access online: https://www.interaction-design.org/literature/article/empathy-map-why-and-how-to-use-it

3) **Ideate. O**nce you have an in-depth understanding of your target group along with their expectations of the proposed product, you should focus on generating ideas. A clearly defined problem will help when coming up with innovative solutions. In this stage, those involved in the process should not be judged for the ideas they generate. This will free up out-of-the-box thinking to discover new perspectives. Brainstorming sessions, mind mapping and sketching are just some of the techniques used to stimulate creativity. It is important to constantly refer back to the problem that was specified earlier and generate as many ideas as possible - even those that may be potentially unworkable.

4) **Prototype**. In this stage, the most interesting ideas collected should be transformed into a preliminary tangible product. It can be a simple paper model, a mock-up, a sketch or a digital model that can be tested on a specific user group. Through an in-depth interview with users, it will be possible, based on feedback, to make necessary changes to the final product offered. The activities discussed will ensure that the resulting good will solve the specific problem posed by the target group.

5) **Test.** The final step in the Design Thinking process is testing prototypes with real users. The phase under discussion is designed to gather as much feedback on the product as possible during the interaction. The testing phase will quickly identify any design flaws that need to be addressed. Based on the information obtained, necessary improvements should be made. The product offered will not always meet the requirements of the target group. Sometimes it will be necessary to return to the empathy stage or to conduct ideation sessions again before creating the best prototype.

4.3. Tools used in the DT process

Design Thinking in each of the five phases offers a number of tools to support participants. Below are examples of them used in each phase.

The first phase of "Empathise" is commonly used, for example:

1) **Empathy map** (Figure 7) - is created to gather as much information as possible about users, such as a potential product, their wants and needs. The empathy map aims to determine what the user thinks, feels, sees, says, does and hears.

2) **Persona creation** - creating profiles of potential product users to help understand their target behavior[31].

[31] Dahiya A., Kumar J. (2018): How Empathizing with Persona Helps in Design Thinking: An Experimental Study with Novice Designers, International Conferences Interfaces and Human Computer Interaction 2018; Game and

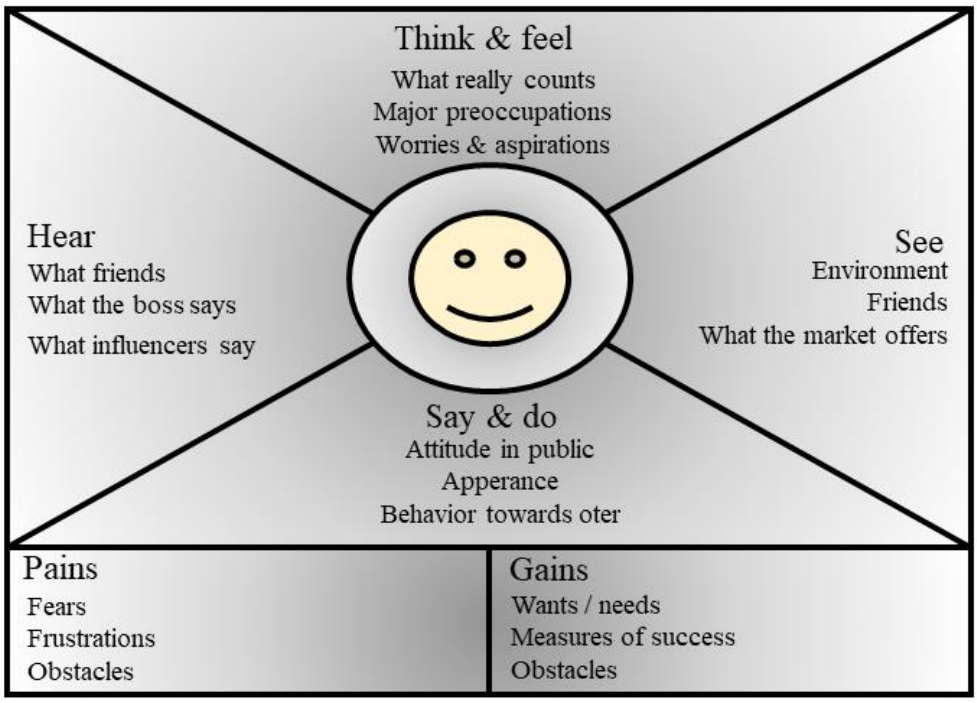


Figure 7. Empathy map[32]

In the second phase "Define" process uses:

1) **„5 Whys"** – tool to analyze the deeper causes of the problem[33]
2) **problem dictionary** – defining problems in short sentences helps identify the root cause of problems[34]

During the third phase "Ideate", methods will be useful:

1) **Brainstorming** – a traditional method designed to generate as many ideas as possible in a short period of time[35]
2) **Mind mapping** – visualizations representation of relationships between different ideas using diagrams[36]

Entertainment Technologies 2018; and Computer Graphics, Visualization, Computer Vision and Image Processing 2018.

[32] Own elaboration based on: Muotka S., Togiani A., Varis J.: A Design Thinking Approach: Applying 5S Methodology Effectively in an Industrial Work Environment, 33rd CIRP Design Conference, LUT University, Lappeenranta, Finland.

[33] Pojasek R.(2000): Asking "Why?" Five Times, Environmental Quality Management, 2000, Vol. 10(1), s. 79-84.

[34] Kozłowski M.: Design Thinking w testach (stadium przypadku). BlogerSii, Warszawa. Access online: https://sii.pl/blog/design-thinking-w-testach-studium-przypadku/

[35] Tschimmel K. (2012): Design Thinking as an Effective Toolkit for Innovation, Proceedings of the XXIII ISPIM Conference: Action for Innovation: Innovating from Experience, Barcelona, 2012. ISBN 978-952-265-243-0.

[36] Kokotovich V. (2008): Problem Analysis and Thinking Tools: An Empirical Study of Non-Hierarchical Mind Mapping, Design Studies, 2008, Vol. 29, s. 49-69.

In prototyping (the fourth phase "Prototype"), it will be useful to include methods:

1) **Storyboard** – visualization of a user's journey through a product, service or experience. It can combine sequences, text or sketches. Its task is to portray the emotions of the potential user and ultimately empathize with them[37]
2) **Mockups and interactive prototypes** - using tools to create and present interactive ideas for testing[38]

For testing (the fifth phase "Test") is commonly used:

1) **User testing** – a simple test session where users interact with the prototype and provide feedback.
2) **Feedback grid** – a structure for analyzing the opinions of potential users[39]

4.4. Examples of topics to use in working with FVC students

Example I: Reducing the incidence of waste in restaurants

Task name: „*Reducing waste in gastronomy – how to deal with it?"*

Description:
Restaurants generate a high amount of waste. This consists of organic waste and disposable packaging, which litters the environment. The team is tasked with creating an innovative solution to reduce the problem under discussion. It is important that it supports the restaurant sector in the process.

Stages in the Design Thinking process:

1. Empathise: conduct interviews with suppliers, restaurateurs and customers. Identifying the main problems
2. Define: „How can we reduce the occurrence of waste while supporting restaurant profitability?"

[37] Cserti R. (2024): 28 best Design Thinking tools and software. SessionLab. Access online: https://www.sessionlab.com/blog/design-thinking-online-tools
[38] Yudhanto Y., Pryhatyanto W.M., Sulandari W. (2022): Designing and Making UI/UX Designs on the Official Website with the Design Thinking Method, 2022 1st International Conference on Smart Technology, Applied Informatics, and Engineering (APICS), Surakarta, Indonesia, 2022, s. 165-170.
[39] Kozłowski M.: Design Thinking w testach (stadium przypadku). BlogerSii, Warszawa. Access online: https://sii.pl/blog/design-thinking-w-testach-studium-przypadku/

3. Ideate: generating ideas on, for example: reusing plastic packaging, reintroducing bio-waste into the environment (setting up compost bins), recycling
4. Prototype: creation of prototype applications, composters
5. Test: conduct a broad discussion on the functionality of the solutions and their potential costs

Example II: Building a regional product brand

Task name: "*Strong agricultural sector - how to promote a new regional product*?".

***Description*:**
A small, family-owned company specializing in fruit processing produces a high-quality product (e.g., jam, puree). The team will be tasked with design an effective promotional strategy to highlight the product in the local market.
Stages in the Design Thinking process:

1. Empathise: getting to know the expectations of potential customers of the article (simulated interviews with potential customers)
2. Define: *"How can you help local producers build a strong brand in the local market that will attract customers?"*
3. Ideate: social media and mainstream media campaigns
4. Prototype: creation of an advertising campaign outline, media promotion plans
5. Test: presentations of ideas in front of the group and evaluation of them together

5. Brain Storming

5.1. Introduction

Brainstorming is one of the most common methods of stimulating creativity in a group, in which members spontaneously share ideas and thoughts to find the best solutions to real-life problems[40]. Alex Osborn in the 1930s in the United States[41] first developed this method, which was then used in business environments to enhance creativity. Later, its use was extended to different fields and environments, such as higher education, where it is currently used very frequently. The main objective of a brainstorming session is to generate as many ideas as possible within a specific time frame. The ideas generated during the task are not evaluated before the session is completed, leading to different conclusions. Although not all ideas are useful, the initial concepts can be used as a starting point for more useful solutions that can eventually be applied in practice[42] ,[43],[44].

One of the basic techniques for generating innovative ideas used in various environments is presented. Its origin, basic principles, phases and examples of techniques are discussed. The method enhances the creativity of students by providing a solid basis for developing unconventional solutions. It is based on simple principles, including suspending criticism, encouraging creative thinking, leaning on the ideas of others, favoring quantity over quality and promoting the free exchange of ideas. Widely known and frequently used around the world, this method requires minimal investment and can be effectively applied in the academic community to power innovation in the food value chain.

5.1. Principles of brainstorming

Brainstorming has six main principles as followed:

1. **Do not limit your imagination –** always go outside the box when brainstorming, and that is the way to proceed in this specific case. Try to see through the eyes of potential users, look at some elements from different perspectives.

[40] Wachowiak P. (2007): Kształtowanie umiejętności przedsiębiorczych, Kształtowanie postaw przedsiębiorczych a edukacja ekonomiczna, Szkoła Główna Handlowa w Warszawie.
[41] Osborn A. F. (1948): Your Creative Power: How to Use Imagination.
[42] Unin P., Bearing P. (2016): Brainstorming as a way to approach student-centered learning in the ESL classroom, Procedia-Social and Behavioral Sciences, Vol. 224, pp. 605-612.
[43] Drapeau P. (2014): Sparking Student Creativity: Practical Ways to Promote Innovative Thinking and Problem Solving, ASCD.
[44] Schlee R. P., Harich K. R. (2014): Teaching creativity to business students: How well are we doing?, Journal of Education for Business, Vol. 89(3), pp. 133-141.

2. **Don't judge, don't criticise**. Try to generate as many ideas as possible and hold back any criticism of them. This is very important in order not to kill an idea in its seed. There will be time to evaluate possible ideas later in the process.
3. **Build on the ideas of others.** Use the ideas of others and generate new solutions based on it. Combine ideas and come up with innovations.
4. **The more ideas, the better.** In the initial stages of a brainstorming session, it is not the quality of the ideas that counts, but their quantity. Allow members of the process to fantasize, even from ridiculous ideas can further evolve into interesting ideas
5. **Allow others to finalize the thought.** Be sure to listen to the end of each person participating in the brainstorming. Perhaps different perspectives on the issue will inspire in you an innovative solution to the problem being discussed?[45].

In addition to the principles listed above, there may be more additional brainstorming rules (examples on Figure 8).

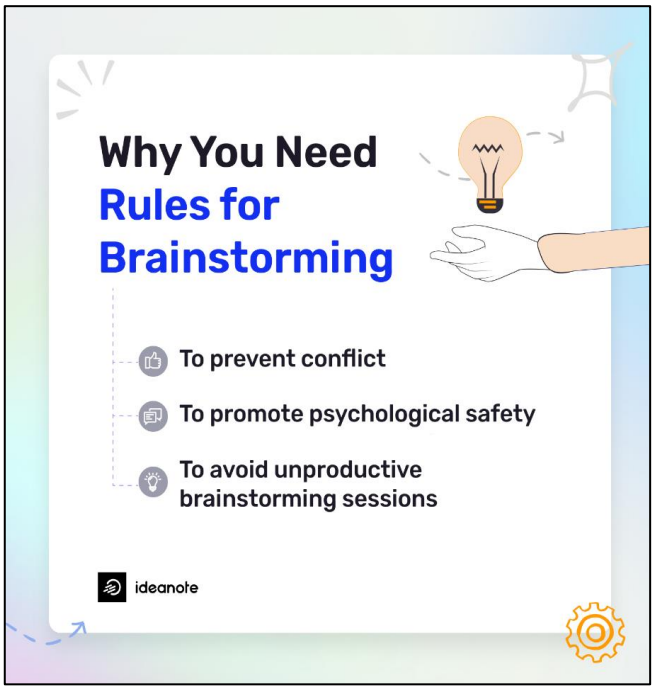


Figure 8. Key reasons for establishing clear rules during brainstorming sessions[46]

We need rules for Brainstorming because of conflict prevention, psychological safety promotion and avoiding of unproductive brainstorming sessions (Figure 8).

[45] Strojek J.: Burza mózgów – przykłady, etapy, oraz zasady brainstormingu!. UpSkill Jakub Strojek. Access online: https://upskill.net.pl/burza-mozgow-jakiej-nie-znacie/#Zasadyburzymozgow
[46] Source: Ideanote: 7 Essential Ground Rules for Productive Brainstorming Sessions. The website of Ideanote.io. Access online: https://ideanote.io/blog/brainstorming-rules

5.2. Team organization and phases of the brainstorming process

The brainstorming process involves two teams:

- Idea generation team
- Evaluation team

The members of the idea generation team should be a group of up to 15 people. It should include experts in the field under consideration (40-70% of the team), experts in related fields (20-50% of the team), and members characterized by general knowledge in many fields. To create an atmosphere of freedom and unrestrictedness, team members should be equal in rank. The group elects a leader, who directs the work of the team using brainstorming principles. A secretary is also chosen to record the ideas proposed by team members.

The evaluation team should consist of up to three people who are specialists in the field being discussed. Their task is to evaluate the final ideas of the group generating ideas. Team members should be open to new ideas, and be characterized by their ability to distinguish between traditional and innovative ideas.

The brainstorming process has 3 phases:

- Preparation (problem formulation)
- Idea generation
- Analysis and selection

The first step in the three-stage brainstorming phase will be to familiarize process members with the accepted rules and form teams. An important element is to embolden the participants to speak in public as a group, thus avoiding passive participation in the process. In the phase discussed, it is important to determine the time of the session and to notify the topic of the planned work in the idea generation session.

Next second stage of the brainstorming process phase begins with writing down the session's target problem on the board. For adequate understanding of the problem by the participants, the leader can be asked to interpret it. Team members then propose ideas, which are written by the secretary on the board. For the order of the session, proposals should be made in advance by giving the signal of raising hands. The work is managed by the leader, each single vote taken can propose only one idea. Participants in brainstorming should note

down their ideas on sheets of paper. In the absence of ideas, the leader should announce his ideas (for these purposes, control lists of questions are used) and encourage team members to develop them. A standard idea-generating session should not last more than an hour, while due to the different types of brainstorming variations, exceptions to the rule may occur. In addition, due to the likelihood of finding solutions after the session, some use a synectic break. It consists of sending a list of ideas to the participants 24 hours after the stage is over in order to apply additional ideas. Final lists are given back to the leader.

The final stage is the final evaluation of ideas by pre-selected specialists. If necessary, the session participants may be asked to give clarifications. The evaluation should result in the creation of three lists of ideas, including:

- ideas that are possible to implement without significant inputs,
- ideas possible to implement after a certain time, requiring inputs,
- ideas that are impossible to apply at the moment.

5.3. Examples of brainstorming techniques

Examples of brainstorming techniques are:

- **Discussion 66.** This technique does not involve the formation of a single team, but several teams of six people having the task of generating ideas. Thanks to the division into groups, some advantages are gained over the traditional technique version, that is:

a) each group may have slightly different perspectives on a particular problem, which can positively affect the diversity of proposed solutions,

b) in a situation where teams are competing, each team is aiming to outperform the others and create more original ideas.

- **Technique 635.** The group responsible for generating ideas includes six people, each of whom notes down three suggestions for potential solutions on a piece of paper for five minutes. The next step is to pass the sheet to a neighbor who sits to his right. On each sheet, participants write down three new propositions. These cannot be identical ideas that have already been written down previously, however, they can be modified. This activity is performed five times until all the sheets have gone through a full circle. The technique is more effective than traditional brainstorming because it quickly generates multiple solutions to ideas and stimulates the participants' motivation[47].

[47] Wachowiak P. (2007): Kształtowanie umiejętności przedsiębiorczych, Kształtowanie postaw przedsiębiorczych a edukacja ekonomiczna, Szkoła Główna Handlowa w Warszawie.

6. E-learning and Blended Learning

6.1. Description of the methods

Modern higher education in the 21st century has three key objectives: firstly, to provide students with in-depth expertise in their academic fields; secondly, to develop in students the generic competencies and thirdly, to encourage them to reflect on their daily activities, including especially their learning processes[48]. These goals can be achieved through the use of teaching methods which have been developed very intensively recently, especially during the Covid-19 pandemic. At that time, students had limited opportunities to attend classes so learning, research and exchange are mainly done according to e-learning or blended learning methods[49]. The e-learning market was valued at around $250 billion in 2020 and is expected to reach over $1 trillion by 2027. This significant growth reflects the pace of change in approach to education in both academic and corporate contexts[50].

Modern teaching methods such as e-learning and blended learning, which have become increasingly important in recent years, are discussed. E-learning is a form of education that combines self-directed learning using electronic technologies with traditional teaching methods. The popularity of e-learning is due to its flexibility, individualization of the pace of learning and cost reduction. Blended learning, on the other hand, combines traditional methods with online activities. This hybrid form of education benefits from increased learning efficiency, time savings and optimized course management. Teaching in education is likely to continue to include hybrid approaches, combining the best aspects of traditional and high-tech teaching to create more flexible, engaging and effective educational methods.

The term e-learning has come to refer to a modern form of education encompassing a wide range of different learning techniques and methods. It combines self-directed learning using available electronic technology with traditional methods in which the learner learns from the teacher[51]. The e-learning system can be illustrated by the following figure 9.

[48] Njenga, J.K.; Fourie, L.C.H. The Myths about E-Learning in Higher Education. Br. J. Educ. Technol. 2010, 41, 199–212, doi:10.1111/j.1467-8535.2008.00910.x.
[49] Katal, A.; Upadhyay, J.; Singh, V.K. Blended Learning in COVID-19 Era and Way-Forward. In Sustainable Blended Learning in STEM Education for Students with Additional Needs; Ahuja, N.J., Kumar, A., Nayyar, A., Eds.; Contributions to Environmental Sciences & Innovative Business Technology; Springer Nature Singapore: Singapore, 2023; pp. 55–85 ISBN 978-981-99-3496-6.
[50] Grand View Research E-Learning Market Size, Share & Trends Analysis Report By Technology, By Provider, By Application, By Region And Segment Forecasts, 2020-2027. Access online: https://www.grandviewresearch.com
[51] Clarke, A.; Klebanowski, M. E-learning nauka na odległość; Wiedzieć Więcej; Wydawnictwa Komunikacji i Łączności: Warszawa, 2007; ISBN 978-83-206-1615-6.

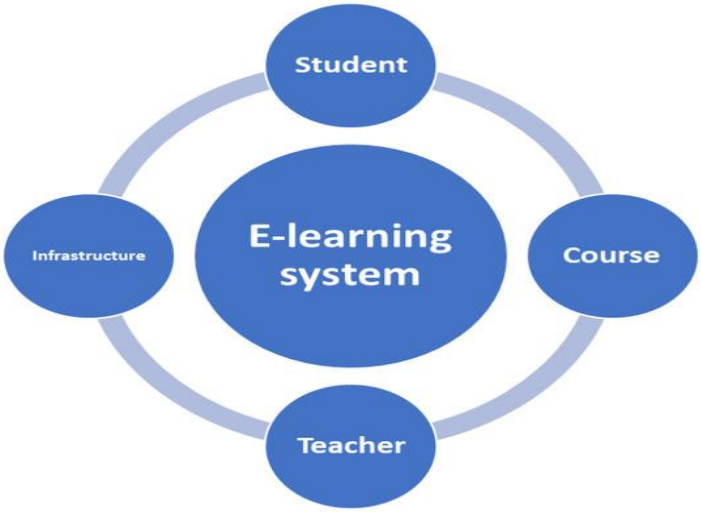


Figure 9. The e-learning system[52]

All these elements of the system are related to each other, determining its performance. The evaluation of the different elements of this learning environment show the special role of the teacher in this system[53].

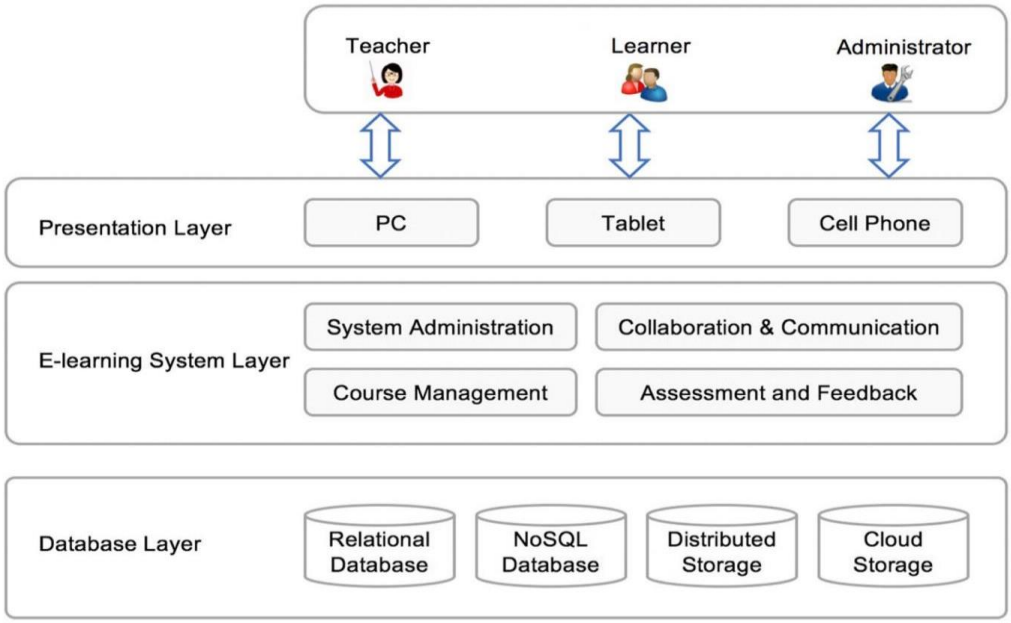


Figure 10. Modern Framework for E-learning Systems[54]

The obnoxious availability of high-speed networks, low-cost computers and storage devices has led to significant advances in cloud computing technology[55]. Therefore, it is now more reasonable to present the e-learning system in the scheme that is shown on Figure 10.

[52] Lu, D.-N.; Le, H.-Q.; Vu, T.-H. The Factors Affecting Acceptance of E-Learning: A Machine Learning Algorithm Approach. Educ. Sci. 2020, 10, 270, doi:10.3390/educsci10100270.
[53] Ibidem
[54] Ibidem

6.2. E-learning – classification, benefits and e-learning platforms

There are currently two types of e-learning systems: Massive Open Online Course (MOOC) platforms and Learning Management Systems (LMS)[56].

- MOOC platforms are open to a large number of individuals who are intended to learn. Even though some courses are produced by certain universities, they are not limited to student in post-secondary institutions.
- LMSs are usually implemented for postsecondary institutions. Thus, they are not by default open to the general public, only a certain group of people can have access to it.

E-learning offers many benefits. The rising popularity of e-learning is due to its main advantages related to the possibility of:

- individual rate of own work in mastering learning materials,
- flexible self-study time,
- reduction of learning costs,
- possibility of individual contact with the teacher through the e-learning system,
- greater learning variety thanks to extensive access to multimedia.

Students using the e-learning platform paid particular attention to:

- flexibility of learning time,
- availability of high quality learning materials,
- the ability to engage with the course content,
- interaction with teachers and intuitive support systems,
- cost-effectiveness and time commitment.

Modern universities have their own platforms for e-learning students. This is also the case at Wroclaw University of Environmental and Life Sciences (UPWR). offers various types of e-learning courses to students via the website https://www.ckno.upwr.edu.pl.

Figure 10 shows a screenshot of an example e-learning course intended for FVC students (course name: Soil fertility and plant nutrition).

[55] Liu, M.; Yu, D. Towards Intelligent E-Learning Systems. Educ. Inf. Technol. 2023, 28, 7845–7876, doi:10.1007/s10639-022-11479-6.
[56] Ibidem

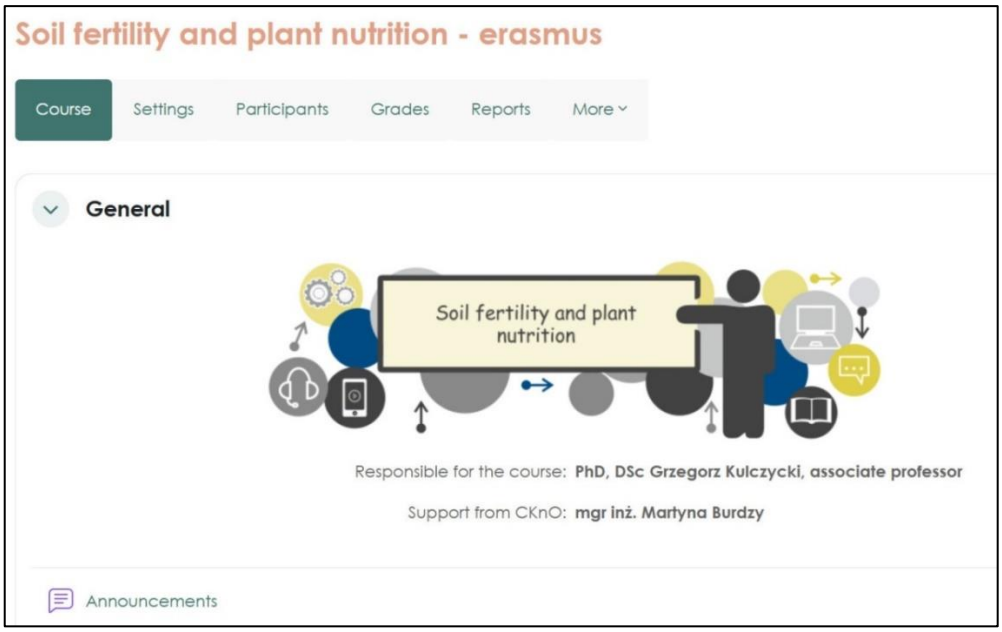


Figure 10. Screenshot from the e-learning course "Soil fertility and plant nutrition"[57]

E-learning courses prepared for distance learning are placed on various types of educational platforms. Most popular examples of such platforms are: Coursera, edX, Udemy, Khan Academy, in Learning, Future Learn and Datacamp. More information about these platforms can be found in Table 4.

Table 4. Chosen data about the most popular E-learning platforms

E-learning platform	Website	Scope of training
coursera	https://www.coursera.org	Cooperates with universities all over the world, offering online courses.
edX	https://www.edx.org	Offers a wide range of academic courses in various disciplines.
udemy	https://www.udemy.com	Proposal of courses, both academic and practical at affordable prices
Khan Academy	https://www.khanacademy.org	Offers free educational courses in maths, science or history.
in Learning	https://www.linkedin.com/learning	Offers courses focused on developing professional skills such as programming, project management or graphic design.
Future Learn	https://www.futurelearn.com	Works with universities and educational institutions to offer courses in a variety of disciplines.
datacamp	https://www.datacamp.com	Offers courses in data, programming and data analysis.

[57] UPWR – Platform for remotely teaching. UPWR, Wroclaw, Poland. Access online: https://www.ckno.upwr.edu.pl

6.3. Blended learning

Modern developments in technology, including computers, tablets and high-speed Internet access, make it possible to combine different methods in the learning process. An example of this is the blended learning - hybrid form of education, which integrates traditional teaching methods with remote computer-based activities (Figure 11).

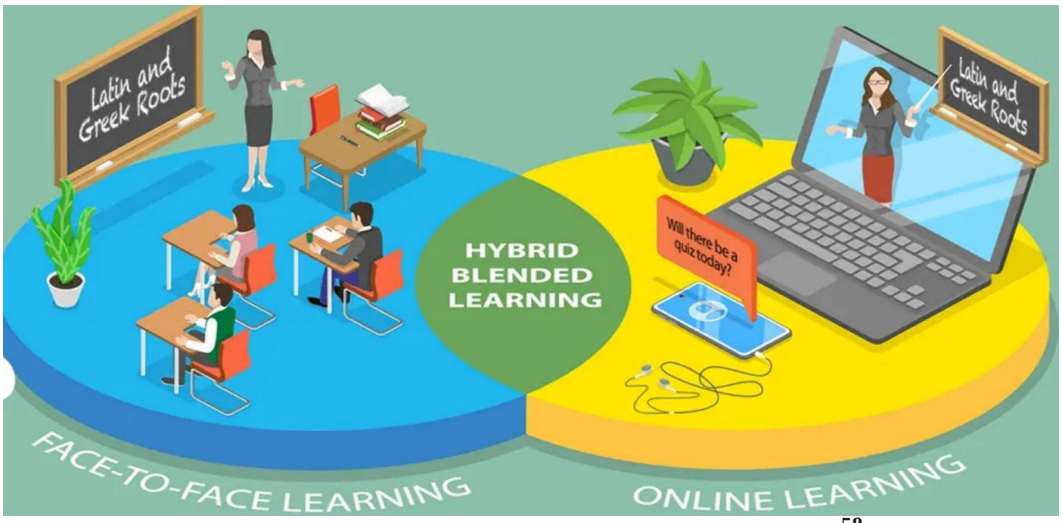


Figure 11. Teaching in hybrid blended learning[58]

Hybrid learning tools include[59]:

- video conferencing,
- learning management systems,
- online exercises,
- online discussion forums,
- pre-recorded video instruction

Potential advantages of blended learning:

- reduced cost of attendance for students in training,
- ability to learn at their own pace, combined with a progress tracking function,
- increased teaching efficiency,
- time saving for students and teachers,
- face-to-face meetings enhance students' self-learning motivation,
- optimization of course management.

[58] Domingo, A., Prestwick House Blog (2024):What Is Blended Learning and How Does It Work? Prestwick House. Access online: https://www.prestwickhouse.com/blog/post/2022/08/what-is-blended-learning-and-how-does-it-work?srsltid=AfmBOoqiIjpvDCEu5OwIoDR_vynCLfqboS9n9Vjiqiq8Sj7KcAwXeoYc

[59] Choudhury, D. (2021). Adapting to Change: Hybrid Teaching, LinkedIn. Access online: https://www.linkedin.com/pulse/adapting-change-hybrid-teaching-debdutta-choudhury/

Examples of effective blended learning models[60]:

- **Flipped classrooms**

  Online: Sharing theoretical content via different types of media

  Face-to-face: Discussion and problem solving

  Outcome: Effective use of teacher and student time

- **Lab rotation**

  Online: Pre-lab preparation, information and safety procedures

  Face to face: Practical laboratory exercises

  Online: Analysis of the results obtained in the laboratory

  Outcome: Effective use of time spent in the laboratory

- **Field exercises**

  Online: Basic research and methodological preparation

  Face to face: Data collection in the field

  Online: Collaborative data analysis and report preparation

  Outcome: Improved experiential learning in the field

- **Hybrid Seminar Model**

  Mixing online and in-person discussions

  Online: Students explore topics alone and share first thoughts

  In-person: Group discusses deeply and finds common ground

  Result: Discussions that include more students and show deeper thinking

[60] Garrison, D.R.; Kanuka, H. (2004): Blended Learning: Uncovering Its Transformative Potential in Higher Education. Internet High. Educ. 2004, 7, 95–105, doi:10.1016/j.iheduc.2004.02.001.

7. Self-learning methods

7.1. Introduction

Self-learning has a historically long and rich history that dates back to antiquity, and its methods have evolved as technology has advanced. From ancient scrolls to modern printed books, access to literature has been a fundamental part of self-learning. The development of public libraries in the 19th century made it possible for people to access scientific, philosophical and literary literature independently. A form of early distance learning was correspondence courses, which pioneered modern forms of online education. Through the development of the internet and digital technologies, self-learning has reached a new level. It is now possible to use countless educational resources such as e-books, tutorials, discussion forums or online courses. Self-learning is now more effective, interactive and accessible on a larger scale than ever before.

Self-learning is a process of learning. Knowles[61] defines that "Self-learning is the process by which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, selecting and implementing appropriate learning strategies, and evaluating learning outcomes." Brookfield[62] [2] defines "Self-learning as learning in which the conceptualization, design, conduct and evaluation of a learning project are driven by the learner."

Self-directed learning is a process in which students take full control of their education, identifying needs, setting goals and evaluating results. The practice has evolved from ancient methods to modern digital platforms, offering benefits including expanded knowledge, adaptability, resourcefulness, career development, critical thinking and innovation.

Successful self-learners can follow a five-step approach: setting goals, creating schedules, staying organized, engaging in communities and embracing failure. By combining multiple strategies, such as cooperative learning, structured approaches, active reading, hands-on application, visual learning and teaching others, students can develop and acquire valuable lifelong learning skills.

[61] Knowles, M.S (1975):. Self-Directed Learning: A Guide for Learners and Teachers; Association Press, 291 Broadway, New York, New York 10007 ($4, 1975).
[62] Brookfield, S.D. (2009):Self-Directed Learning. In International Handbook of Education for the Changing World of Work: Bridging Academic and Vocational Learning; Maclean, R., Wilson, D., Eds.; Springer Netherlands: Dordrecht, 2009; pp. 2615–2627. ISBN 978-1-4020-5281-1.

7.2. Why self-learning is important and how good a self-learner are you?

Learning is natural, though some people are much more deliberate learners than others. It is a process that enables you to move from where you are to where you want to be[63]. Self-learning is a powerful tool for personal development, professional success, and adapting to the ever-changing demands of modern life.

Self-directed learning increases for students (Figure 12):

- general and specific knowledge,
- adaptability to specific conditions,
- resourcefulness and problem solving,
- increased career opportunities,
- critical thinking and self-discipline,
- innovation and creativity.

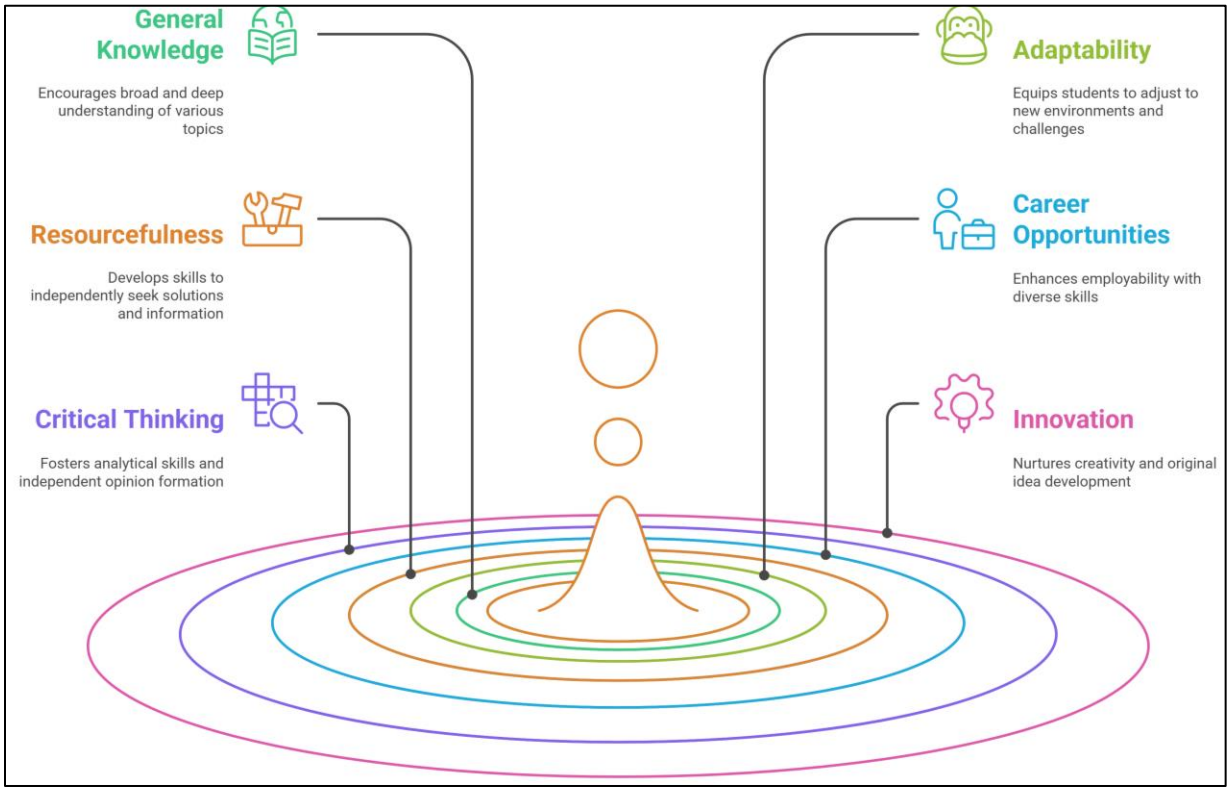


Figure 12. Benefits of self-directed learning[64]

[63] Meurisse, T. (2022): Master Your Learning: A Practical Guide to Learn More Deeply, Retain Information Longer and Become a Lifelong Learner; Donovan, K.J., Ed.; Independently published. ISBN 979-8-4177-1219-7.
[64] Guglielmino L.M. (2008): Why Self-directed learning? International Journal of Self-Directed Learning, 5(1), 1-14.

Meurisse[65] offers a test to find out how effective a learner you are. To do this, rate yourself on a scale from 1 to 10 for each of the statements below (where 1 is mostly false and 10 is mostly true):

- I often get lost in the sea of information available to me.
- Having a strong desire to learn, I often consume too much content too quickly, without using active learning techniques like recall.
- I read and reread the same textbooks without making a conscious effort to recall what I've read.
- When thinking of how far I am from reaching my goals, I feel discouraged or overwhelmed.
- I often put off doing important tasks that would allow me to make tangible progress toward my goals.
- I learn a lot of things but never master any of them.
- I forget most of what I read even when the topic genuinely interests me.
- I often remember insignificant details, facts or statistics, while losing track of the big picture.
- I assume that because I read a lot about a topic, I know it very well (i.e., I believe I'm more knowledgeable than I really am).
- I often study things I'm not really interested in or curious about, and I do so to please others or to look cool.

If you get a high score, it means you have a lot to do to improve your learning skills.

7.3. Skills, techniques and strategies for effective self-learning

Self-study can enable students to take control of their education, developing skills that are key to academic success and personal development. Here are some tips on how to approach self-study effectively:

- set clear and realistic goals,
- create a consistent learning routine,
- use a variety of resources,
- practice active learning,
- check yourself regularly,

[65] Meurisse, T. (2022): Master Your Learning: A Practical Guide to Learn More Deeply, Retain Information Longer and Become a Lifelong Learner; Donovan, K.J., Ed.; Independently published. ISBN 979-8-4177-1219-7.

- seek feedback and adapt,
- manage your time effectively,
- find a support system,
- be patient and persistent,
- be flexible and open to change.

Figure 13 also shows some powerful tips for self-learning.

Figure 13. Skills to learn for students[66]

Effective learning involves more than one approach. The diagram above (Figure 14) shows six complementary learning strategies that work together. Collaborative learning enables knowledge sharing in groups, while structured learning organizes the learning journey. Active reading deepens engagement with the text through annotation, while learning by doing reinforces understanding through practice. Visual and multimedia learning uses a variety of media formats, while writing and teaching consolidates knowledge by explaining to others. By combining these methods, students can create a personalized and comprehensive approach to acquiring and consolidating knowledge across subjects and contexts.

[66] Pinterest The Top 10 Learning Techniques Infographic - e-Learning Infographics | Learning Techniques, Study Skills, Learning Methods Available online: https://www.pinterest.com/pin/teaching-students-effective-study-strategies--152700243595311079/ (accessed on 8 September 2024).

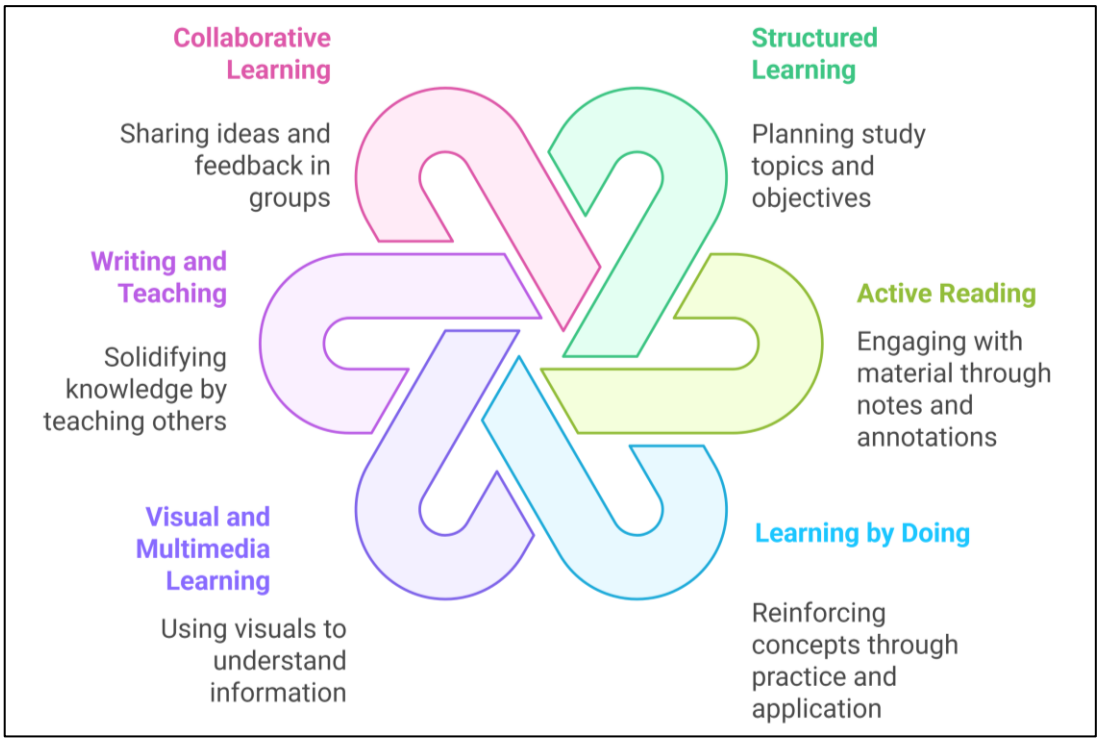


Figure 14. Techniques and strategies for effective learning[67]

Figure 15. Five-step staircase model for successful self-learning

[67] Dunlosky, J.; Rawson, K.A.; Marsh, E.J.; Nathan, M.J.; Willingham, D.T. (2013): Improving Students' Learning with Effective Learning Techniques: Promising Directions from Cognitive and Educational Psychology. Psychol. Sci. Public Interest, 14, 4–58, doi:10.1177/1529100612453266.

The figure 15 shows a five-step staircase model for successful self-learning. Starting with ***Setting clear goals*** as a necessary first step, students then ***Create a schedule*** and ***Stay organized*** to structure their further education. As they progress, successful self-learners ***Engage in Community*** to share knowledge and receive feedback, ultimately learning to ***Accept Failure*** as a valuable part of the development process. Successful self-learning requires a methodical approach in which each strategy supports the next[68].

7.4. An example of self-study

Here is a model plan for a student preparing for a difficult and important exam. It could be an exam at the end of one of the courses related to the Food Value Chain (FVC) area (such as: biochemistry, biophysics, agricultural management, plant protection, soil cultivation and fertilization, food marketing, engineering and machinery, food processing, etc.). This plan includes a self-study process divided into 5 steps (see Figure 15):

1. Set clear goals

- Identify all topics covered in the exam
- Identify the most difficult areas
- Determine the desired level of proficiency for each topic
- Set a minimum target score to be achieved

2. Create a schedule

- Divide the material into smaller, logical sections
- Allocate specific time for each topic based on difficulty level
- Schedule daily 90-minute study sessions
- Include extra time for exercises and sample tests.

3. Be organized

- Create structured notes with key formulas and definitions.
- Develop a master list of all necessary data to memorize.
- Organize materials by topic in a digital or physical binder.
- Prepare a progress tracking tool to monitor mastered topics.

4. Get involved in the community

- Join a study group with other students preparing for the same exam.
- Schedule consultations with an instructor or teaching assistant.
- Use online forums and platforms such as Stack Exchange to ask questions.
- Find a mentor who has successfully passed the course in the past.

5. Accept failure

- Keep a log of mistakes made in practice assignments to learn from them.
- Revisit difficult concepts regularly without getting discouraged.
- Repeat difficult exercises until.

[68] Zimmerman, B.J. (2002): Becoming a Self-Regulated Learner: An Overview. Theory Pract., 41, 64–70, doi:10.1207/s15430421tip4102_2.

8. Flipped Classroom

8.1. Description of the method

The development of technology, its gradual encroachment on school reality and the desire to translate this trend into tangible benefits for education are the determinants of many experiments and innovations currently taking place in education. One such endeavor is the flipped classroom method, gaining recognition from practitioners around the world.

Flipped classroom (also known as ***flipped teaching*** or ***flipped lesson***) is a teaching approach in which traditional classes and homework swap places. Students independently review didactic material introducing a topic (issue) before class. Then the time in class is spent on implementing the acquired knowledge and practicing specific skills in practice (during discussions, group work, demonstrations or exercises), under the guidance of the teacher. The method can be effectively implemented in stationary, blended and remote forms.

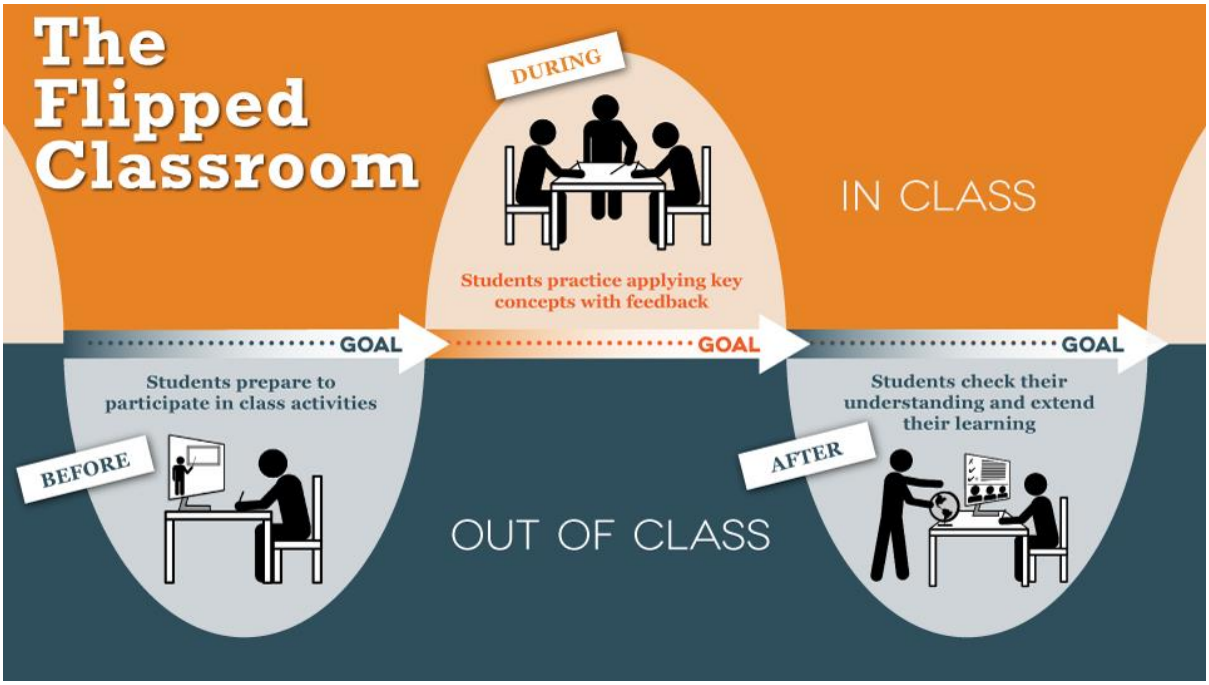


Figure 16. Stages of preparing, conducting a flipped lesson and deepening the students' knowledge[69]

The purpose of this method is to change the pattern of a given form of education (e.g. lecture, exercises), which is that students master a topic on their own before class, and during class they consolidate and practice it under the guidance of the teacher. Students work with the teaching material at their own pace.

[69] Source: TrainEasy Blog: Understanding flipped classrooms. Access online: https://traineasy.net/blog/39/understanding-flipped-classrooms

This method requires the teacher to relinquish the position of all-knowing expert, who is entirely responsible for directing the process and its outcome, in favor of the role of a guide who helps, explains and supports learners. The teacher ceases to be the only, or even the primary, source of information for the learner. He/she prepares a starting point for him/her in the form of a package of materials and information, as well as guidance for further, independent information seeking[70].

The flipped classroom model promotes the development and improvement of communication skills, critical thinking, problem-solving learning and group cooperation. It is largely about gaining knowledge through experience. In the flipped classroom, students use their previous experience and current knowledge to assimilate and understand new learning material[71].

The flipped classroom has gained recognition among researchers, educators and students around the world. Since it is widely believed that learners are motivated by curiosity, it can be amplified by introducing unconventional and pattern-breaking teaching methods. The main advantage of the flipped classroom is that we aim to make students more independent. In the flipped classroom, students are familiarized with the material before class, so they have given the opportunity to individually adjust the pace at which information is absorbed to their ability. The teacher, on the other hand, is relieved of the obligation to present the material in the form of a handout in class, and the time thus saved can be spent, for example, on creative discussions or solving problems that a new topic may have caused the students.

Working with this method may initially cause various difficulties - for example, not all students will conscientiously prepare at home for work in class. However, the experience of teachers working with this method shows that over time these difficulties fade away, and the benefits cannot be overestimated. Therefore, it is worth not stopping at one flipped lesson, but to conduct a whole series with the same class or group of students - concerning one or different topics. The use of the flipped classroom method with the tools presented allows students to not only learn by reading texts prepared in advance by the teacher or watching presentations recorded by the teacher, but also by doing interactive exercises. This way of learning is more engaging, helps to assimilate new information, and provides a chance to create grounded and multi-level knowledge.

[70] Fundacja Szkoła z Klasą (2024): Odwrócona lekcja – o pracy metodą flipped lesson, The project „Szkoła z Klasą 2.0". Access online: https://www.szkolazklasa.org.pl/wp-content/uploads/2016/11/odwrocona-lekcja-o-pracy-metoda-flipped-lesson.pdf

[71] Gandecka K., (2024): Odwrócona klasa (Ang. Flipped classroom), Centrum e-Learningu i Innowacyjnej Dydaktyki AGH, Access online: https://www.cel.agh.edu.pl/nmk-metody/odwrocona-klasa-flipped-classroom/

8.2. Short history of the so-called inverted class

It is likely that the concept of the flipped classroom was born out of reflection on the results of various educational studies. First of all, it would be appropriate to pay attention to the work of A. King[72], who noted that learning must not take a passive form - students should be involved in the lesson as much as possible. E. Mazur addressed the issue of cooperation between students and encouraged them to engage in short discussions in pairs and groups on the topic under discussion[73]. B. Walvoord and V. Anderson[74], on the other hand, concluded that new lesson materials should be available before the class, which can thus be devoted to analysis of issues and reflection, and the beginning of the class does not have to focus on introducing a new topic, material, or vocabulary[75].

However, two chemistry teachers are considered the originators of the flipped classroom model as we know it today: Jonathan Bergmann and Aaron Sams[76],[77]. Both noticed that their students were skipping lessons quite often. The reasons were varied - sports competitions, extra classes or even trouble getting to school. Absences were primarily related to difficulties in mastering the material presented in class. So Bergmann and Sams came up with the idea of videotaping their lessons so that absentees could catch up on everything this way and get rid of the feeling that they were behind. Soon the chemists modified their concept and started recording not the class activities, but themselves, even before the lesson in question. They then distributed the recordings to students so that they could watch them at home and prepare for a later class discussion[78] [Bergmann & Sams 2012]. Bergmann and Sams' work was quickly recognized by researchers and teachers alike.

[72] King A. (1993): From Sage on the Stage to Guide on the Side, „College Teaching", vol. 41(1), p. 30–35.
[73] Mazur, E. (1997), Peer instruction: A user's manual, Upper Saddle River, NJ: Prentice Hall.
[74] Walvoord, B.E.F., Anderson, V.J. (1998): Effective grading: A tool for learning and assessment, San Francisco, Calif: Jossey-Bass Publishers.
[75] Równiatka A. (2020,): Nauka w trybie tzw. odwróconej klasy w teorii i praktyce, „Języki obce w szkole", nr 4, pp. 25-26.
[76] Halili, S.H., Zainuddin, Z. (2015): Flipping the classroom: What we know and what we don't, The Online Journal of Distance Education and e-Learning, vol. 3(1), p. 28–35.
[77] Wolff, L.-C., Chan, J. (2016): Flipped Classrooms for Legal Education, Singapore: Springer Singapore.
[78] Bergmann, J., Sams, A. (2012): Flip your classroom: Reach every student in every class every day, Eugene, Oregon: International Society for Technology in Education.

8.3. Seven steps for preparation a flipped lesson

In a flipped lesson, it is the student who becomes active in the process of acquiring knowledge. But in order for a flipped lesson to be successful, the teacher should first plan and prepare it well. **To work effectively with the flipped lesson method, the teacher can divide his activities into the following seven steps**[79]:

Step 1. Planning the lesson and the lesson preparation process

Preparation should begin with a careful analysis of the assumptions of this method and the selection of issues that are best suited for implementation in this mode. The teacher should think through the objectives of the lesson, just as when working with the traditional method. The next step is to think about the content that will be included in the homework before class and the tasks and exercises that will be carried out in the lesson. It's important then to plan how to facilitate students' independent learning of this content, which would normally be given to them by the teacher in class. This is a key element for the success of a flipped lesson.

Step 2. Preparation of materials for self-study and preparation of materials for practice during lessons

The choice of materials is very important. First of all, because the teacher is responsible for the reliability of the recommended sources. The older the students, the more freedom they can be given to search for information on their own - but you should always discuss with them how they searched for it and whether the sources they used are trustworthy. Feel free to make the free search for information about additional tasks, deepening their knowledge. The basic content that will need to be referred to in class should be provided to the students by the teacher. The second reason why the selection of materials is so important is their level of attractiveness and accessibility. Keep in mind that the materials from which the student will learn at home are meant to replace the teacher's lecture for him. It is worthwhile for the form to affect several senses. It is necessary to think about the method of implementation and make a choice of tools. The teacher can create a videotaped lecture for students, a podcast, or prepare a database of accessible, interesting materials found on the Internet. It is worth considering whether we will use an educational platform, which will include, for example: presentations, videos, photos, source texts, tasks, puzzles, etc., or whether selected materials will be made available to students in other ways.

[79] Fundacja Szkoła z Klasą (2024): Odwrócona lekcja – o pracy metodą flipped lesson, The project „Szkoła z Klasą 2.0". Access online: https://www.szkolazklasa.org.pl/wp-content/uploads/2016/11/odwrocona-lekcja-o-pracy-metoda-flipped-lesson.pdf

Step 3. To introduce the students to the topic, the problem question, the purpose of the class (the preceding lesson)

The idea of the teaching process depends on the teacher. He is the one who should propose to the students the problem-question - the topic they will learn about. He should do it in such a way as to awaken their interest, curiosity (or take care of an emotional attitude to the issue - it can be, for example, disbelief due to incompatibility with previous or common knowledge). It is best to choose a topic that, for whatever reasons, will be attractive to students. The presentation of the issue to be dealt with by the students should be combined with the embedding of the topic in the students' existing knowledge. Students try to recognize, recall what they already know about the topic, ask relevant questions, think and plan to search for new information.

Step 4. Giving students work to take home and pointing out sources and/or providing materials for self-study

The teacher informs the students about how they will work. He warns that their task will be to acquire knowledge on the assigned topic on their own. He presents the students with the objectives and tells them exactly what they need to prepare for the chosen lesson. It is worthwhile for the instruction to imply both familiarization with the materials and completion of the task. This can be, for example, reading the definition of the phenomenon under discussion and watching a video explaining the mechanism of its operation and making a note in the form of a mind map, or performing the task in student teams. This task should help them organize, categorize their new knowledge. The teacher must make sure that the instruction to students on what and how they must prepare has been understood by all. Learning the content set for self-mastering should not take more time for the student than traditional homework. The difference is that this time should be used for the student's preparation of a new range of material.

Step 5. Independent acquisition of knowledge by students on the assigned topic (students' work at home)

Students work independently in a manner agreed with the teacher. This is the key stage of work. They can perform tasks individually or in teams, most often outside the classroom - at home. They use materials prepared by the teacher, and can also create their own database of interesting links to sites and share them with the rest of the class by creating open documents on the web. Fragments of prior knowledge are complemented with new knowledge, experiences, ideas. Students analyze, classify, categorize, synthesize. They learn to draw

conclusions and value. They document their work according to the way planned by the teacher and prepare to show the results of their work during the lesson.

Step 6. Organize the students' knowledge, verify the information they have acquired and use it in practical, engaging tasks (lesson)

Now the teacher must help the students control the chaos of information, help distinguish what is valuable and important from what is of little or no use, or unrelated to the topic. This stage takes place in the classroom, in the presence of the teacher. Students should have a chance to verify their own knowledge and assess their level of understanding of the material. Under the teacher's guidance, they share what they have learned and perform exercises, experiments, tasks, etc. proposed by the teacher. They test whether they can put their knowledge and skills into practice.

Step 7. Discuss and summarize the topic and the process of acquiring knowledge and skills (lesson).

At the end of the cycle of activities, students check with the teacher whether they have succeeded in achieving their goals. The teacher makes sure that the topic has been fully discussed and understood by everyone. The students have time to verify their actions and knowledge - they can ask the teacher about the incomprehensible passages, dispel their doubts. They also confront the knowledge and questions of their colleagues. Thanks to the fact that they acquire theoretical knowledge at home, and during the lesson they can deepen it through conversation with the teacher, classroom discussion or practical exercises, tasks, experiments or solving specific research problems, they gain awareness that the knowledge they have gained can and should also be used later. They can thus observe that the answers they obtained at home or in a lesson with the teacher can become the basis for raising new questions: what can be done next, what is still worth checking, what is worth learning or finding out?

8.4. Advantages of the flipped lesson method

Flexible. Limited time is often an obstacle faced by employees in continuous training, but the flipped classroom method eliminates the need for long and time-consuming lectures. Instead, online courses take over the instructor's role and serve as the main source of information. They take much less time than face-to-face learning, because they are easier to "squeeze" in between other daily tasks and can be attended anywhere, anytime. For this reason, it is also the preferred learning style of many employees[80].

[80] EasyLMS (2023): Odwrócona klasa: zalety i wady. Access online: https://www.easy-lms.com/pl/centrum-wiedzy/nauka-szkolenie/zalety-i-wady-odwroconej-klasy/item10610

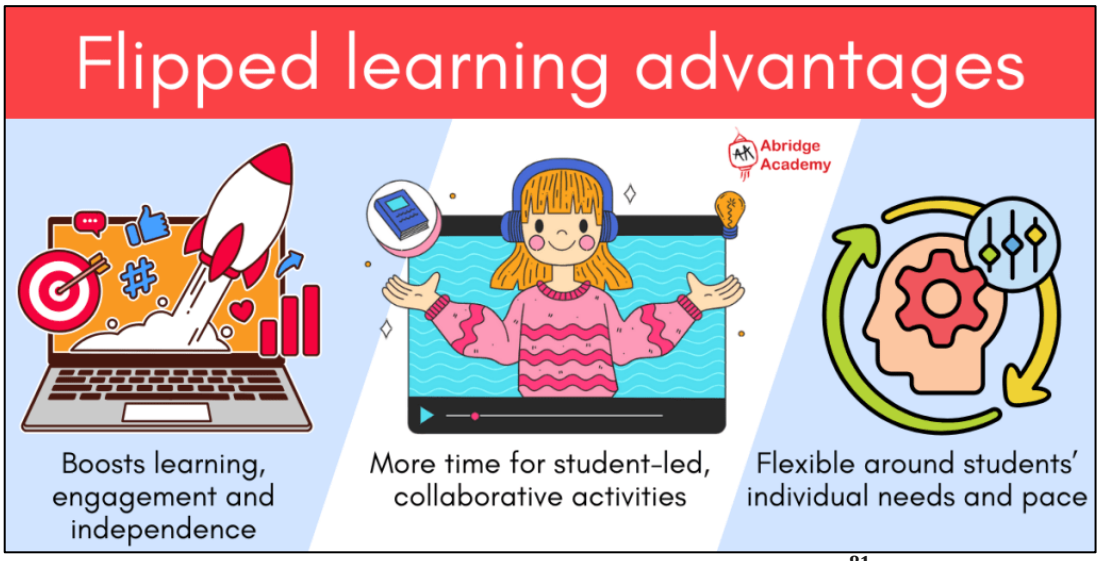


Figure 17. The advantages of flipped learning[81]

Personalized. The flipped classroom method can be helpful in launching a continuous education program at school, giving students the opportunity to spend time on what they need most. The flipped classroom method supports self-directed learning, allowing participants to allocate adequate time to topics they don't understand, and to review areas in which they are professionals more quickly[82].

Encourages active learning. The flipped classroom helps students take an active role. In traditional situations, it is the teacher who decides what knowledge to share and how. Consequently, during a lecture, it is easy for students to take a passive stance. The flipped classroom gives learners the opportunity to direct their learning. It is up to them to master the required material. Moving learning content from lectures to online courses is not only more convenient, but as research shows, learners take more notes and are less distracted[83].

Promotes hands-on learning. The flipped classroom uses contact time with the teacher as an opportunity to put into practice the knowledge gained. In a flipped classroom, time can be used to practice skills instead of passively listening to a lecture. For example, someone would independently learn the theory of soccer, such as its history and rules of the game, in order to then actually practice the sport with the coach and team. That's why the flipped classroom method ensures that the knowledge gained is applied in everyday work[84].

[81] Source: Abridge Academy (2024): Access online: https://abridgeacademy.com/flipped-learning-boosts-student-learning-and-teacher-earnings/
[82] Cevikbas M., Kaiser G., (2022): Promoting Personalized Learning in Flipped Classrooms: A Systematic Review Study, Sustainability, 14(18), 11393, https://doi.org/10.3390/su141811393
[83] Reuell P., (2013): Online learning: It's different, "Harvard Staff Writer", April 3, 2013. Access online: https://news.harvard.edu/gazette/story/2013/04/online-learning-its-different/
[84] Soft Chalk (2024): Flipped Learning: Interactive Hands-On Lectures. Access online: https://softchalk.com/2024/02/flipped-learning-interactive-hands-on-lectures

8.5. Disadvantages of the flipped classroom

Requires a lot of self-discipline. The student-centered nature of the flipped classroom can be an obstacle for employees struggling with self-discipline. The employee must be motivated to engage with the educational content and devote the time required to learn. It is not enough to come to a lecture and passively absorb what the lecturer shares. In fact, more employees may have problem with this than it seems! In a survey of 204 employees, 41% indicated that their level of self-motivation was a barrier to participating in online learning[85].

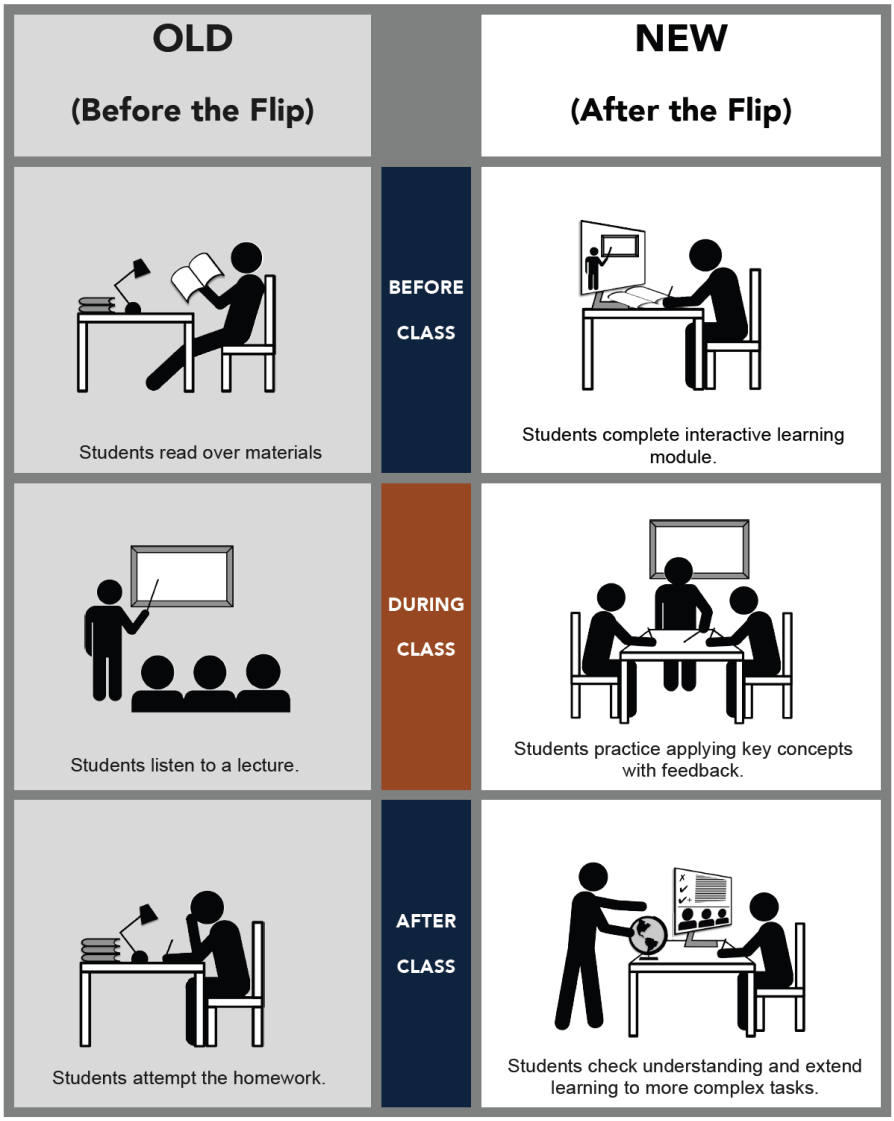


Figure 18. Comparison of traditional and flipped lessons[86]

[85] Kraml M. (2024): Advantages and Disadvantages of Flipped Classroom in Adult Education Using Distance Learning for Learning Programming, EPH – International Journal of Educational Research, 8(1), p.26-31, doi:10.53555/ephijer.v8i1.109

[86] Source: Flipped Classroom, The University of Texas at Austin, Center for Teaching and Learning, https://ctl.utexas.edu/instructional-strategies/flipped-classroom

Dependent on technology. In the flipped classroom method, employees get most of their information from online training content rather than from instructors. However, some individuals may have difficulty using technology. In 2016. 26% of adults worldwide were unable to operate computers. It also happens that employees don't have the right equipment for online learning. Without convenient access to electronic devices, working speakers or a reliable internet connection, it will be difficult for them to participate in online learning[87].

Resistance to change. Although a flipped classroom ultimately saves time for both the instructor and staff, preparing the first flipped course will require more time and energy than continuing with the status quo. Instructors must introduce employees to a completely new concept. Employees will need time to adjust and accept the transition from a passive to an active learning style[88].

8.6. Flipped Classroom – example of a good practice

The following example describes a proposal for the reversal of one class, within the course Introduction to Unix systems, carried out in the first year of engineering studies of the first degree, in full-time mode, in the course of Computer Science. The author of this example is Krzysztof Kluza who is the Doctor of Technical Sciences in the discipline of Computer Science[89].

Recognized difficulty that students have. The problem that arises regarding login due to, for example: incorrect use of the command or data used for login, incorrect settings of access rights to files and directories, thresholds with exceeding disc limits due to too many files.

Step 1. What materials before the class? Teacher will record a short video showing how to log into the system and in what situations a login problem may occur. In addition to the video, there will also be a short list of problems they may encounter.

Step 2. How will students process the material before class? A short quiz (or an H5P interactive crossword puzzle-type task) where they will be required to enter the appropriate login command for the given user and server information, as well as determine what might be wrong with the account based on the screenshot shown.

[87] Strobel Education, 2023, The Flipped Classroom: Overcoming 6 Common Challenges and Objections. Access online: https://strobeleducation.com/blog/the-flipped-classroom-common-challenges/

[88] Voigt Ch., Vogelsang K., Hoppe U. (2021), The Effect of Resistance to Change on Students' Acceptance in a Flipped Classroom Course, Proceedings of the 13th International Conference on Computer Supported Education (CSEDU 2021) - Volume 2, p. 15-22, DOI: 10.5220/0010283800150022

[89] Kluza K. (2024): Zarządzanie Projektami Informatycznymi. Studia Podyplomowe. Kadra. Access online: http://wozpi.agh.edu.pl/plan-studiow/kadra/krzysztof-kluza/

Step 3. How will the knowledge be structured in class? Students are expected to work in pairs, one person in a pair is given a command to run on their account (a program that will create a large file or many files, or change access rights), and then both people are expected to look for a solution to this problem and unlock the account.

Step 4. What to do during F2F activities? Discuss the various methods of finding the largest files in the system and deleting them when disk limits are exceeded, as well as the proper use of access rights (securing their files). For homework, in turn, they will have an interactive crossword puzzle on access rights (H5P) to complete.

8.7. Ideas for using Flipped Classroom at Food Value Chain studies

A proposal for a flipped lesson on FVC, in which students learn the basic material at home, and class time is used for discussion, problem solving and practical activities. When preparing the plan of lesson, it is worth dividing it into several key parts, taking into account:

1) Lesson objectives

- Students will understand what a value chain is in the context of food production and distribution.
- They will learn about the different stages of the value chain: production, processing, distribution, retail and consumption.
- They will learn to identify the different actors involved in the food chain and their role.
- They will be able to analyze the impact of various factors on value added at each stage of the chain.
- Students will understand the importance of sustainability in the food value chain

2) Pre-lesson assignments (home study materials)

(a) Educational films and videos. Short videos about the food value chain. For example: "What is the food value chain?" or videos on selected examples (e.g., value chain in the production of chocolate, coffee, rice). A video on sustainability in the food chain and the impact of business decisions on the environment.

(b) Article or presentation. An article/presentation on what the value chain is in the context of the agri-food sector. An example in the form of an infographic can also be included.

(c) A set of reflection questions:

- What stages does the food value chain include?

- Who is responsible for producing food at different stages of the value chain?
- What are the factors that affect the value of food in the different phases of the chain?
- How does innovation in production affect the value of the chain?

3) Lesson plan (during class time). Lesson duration: 90 minutes.

Introduction (10 minutes): Review of pre-lesson material: Brief discussion of key concepts and definitions. Students can share their thoughts and answers to the questions they were asked to prepare before the lesson.

Mini lecture (brief reminder): Presentation of the general principles of the value chain, with an example illustrating the different stages: production, processing, distribution, sale and consumption.

The main part (40 minutes), including:

Group case study (20 minutes): Students will be divided into groups and given a specific example of a value chain (e.g. banana, meat, coffee production). Each group will analyze the role of each actor at different stages of the value chain, thinking about factors that can increase the value of the product (e.g. technology, sustainability, environmental certification). The results of the analysis are presented by the groups in the form of a table or diagram.

Discussion on sustainability (20 minutes): What sustainability challenges can occur at each stage of the value chain? How can the efficiency of the food chain be improved to meet growing demand while maintaining sustainability?

Summary (15 minutes). Presentation of ideas: Students share their solutions and ideas for improving the value chain. Short question and answer session: Clarification of doubts and discussion of issues that may be unclear to students.

Final summary (5 minutes).

Homework: Students are given an assignment to create a simple diagram or mind map depicting the value chain of a selected food product (e.g., from field to table in the case of flour, from farm to store in the case of milk).

4) Additional materials

Infographics: Examples of different value chains, e.g. value chain of coffee, chocolate, fruit, meat. Examples of innovation in value chains: Technologies changing the way food is produced and distributed (e.g., blockchain in food traceability).

5) Assessment and evaluation methodology

Evaluation of students' activity during the discussion: Participation in group work, ability to justify choices. Evaluation of the quality of homework: Consistency and correctness of presentation of the value chain of the selected product.

6) Post lesson assessment materials

Short online quizzes on the stages of the value chain and the role of different actors. A discussion forum where students can ask questions and share their thoughts on sustainability in the food chain.

7) Various tools to support the flipped classroom

Quizlet: for creating fiches on key concepts in the value chain.

Padlet: for collaborating on creating mind maps.

Kahoot: for conducting a quiz at the end of the lesson.

This lesson plan allows students to gain theoretical knowledge at home, and during the class, the focus can be on active problem solving, case analysis and discussion, which promotes a deeper understanding of the topic.

8.8. Flipped Classroom - supplementary materials and knowledge extension

More information about the method of flipped classroom can be found here:

- Schell J., How to Transform Learning-With Teaching. Access online: https://mazur.harvard.edu/files/mazur/files/rep_690.pdf
- Flipped classroom – podstawowe założenia, zalety i ograniczenia. Access online: https://flexible.learning.ubc.ca/files/2015/03/flipped-classroom.pdf
- Flipping the Classroom - Simply Speaking, Access online: https://www.youtube.com/watch?v=26pxh_qMppE
- Flipping The Classroom With FIZZ: Katie Gimbar & Dr. Lodge McCammon at TEDxNCSU. Access online: https://www.youtube.com/watch?v=a5bYuYvl42I
- Gerstein J., Flipped Classroom: The Full Picture for Higher Education. Access online: https://usergeneratededucation.wordpress.com/2012/05/15/flipped-classroom-the-full-picture-for-higher-education/

9. Methods of soft skills development

9.1. Introduction

Soft skills are psychosocial competencies that accompany us in our daily and professional lives. It is a certain set of qualities that allows us to cooperate with others, adapt to a changing environment or perform tasks dutifully and on time. Each of us has different predispositions and skills, as a result of our personality and character. Among the most popular skills are: communication skills, flexibility, openness to change or resistance to stress. We can develop soft skills through various methods. We can also improve our skills by becoming a kind of master. The methods for each skill differ, but they can also be used together or complement each other. Which method we decide on is entirely up to us. Their development requires our personal commitment, regularity and dedication. Nevertheless, it contributes to long-term career success and increased personal satisfaction. It is worth asking, why do we need soft skills? The answer is simple - for everyday functioning, building relationships with the environment or making decisions. Soft skills are particularly important in a professional career - every career advancement is accompanied by the development of soft skills. Therefore, it is important to use and develop them properly.

9.2. Soft skills – definition and importance

Soft skills are a set of interpersonal, social, communication competencies that a person possesses and are a result of his personality traits. They belong to psychosocial skills and are the opposite of hard skills (e.g., driving license). They allow building relationships with the environment, communication, conflict resolution or adaptation. Having and developing soft skills brings many benefits in both professional and personal life.

What soft skills we have is a direct result of our personality and character. This means that each of us may have the same skills, but they will function differently in each of us - phlegmatic vs. choleric. Soft skills are therefore not universal, they are subjective in nature. How they developed in us depends on many factors, such as experience, observation, cultural factors, religion or age. Soft skills can change, which means we can work on them and develop them. It is also the case that they change under the influence of the environment or certain events.

Soft skills are extremely important in both personal and professional life[90]. They allow us to cooperate with other individuals, to find ourselves- react (cope) in different situations.

[90] Chavan S. V., (2020): The Importance of Soft Skills, International Journal of Science and Research, Volume 9 Issue 5, May 2020.

Having soft skills is especially important at work, where every day we interact with other employees and superiors, make decisions under time pressure or stress. They also include critical thinking, creativity and the ability to handle stress, which helps make better decisions and solve problems. Soft skills are therefore essential for coping with daily responsibilities and can be crucial to personal or professional success. Soft skills help us achieve better results in both our personal and professional lives by supporting us to build strong relationships, adapt to change and solve problems effectively.

Having well-developed skills, i.e. communication, time management, teamwork or problem solving, is particularly important for professional or personal success. Soft skills allow us to cooperate with others, deal effectively with difficult and often stressful situations or find our way in a changing environment. We remember from biology lessons that every organ that is not used dies. The same is true of soft skills. We need to use them in our daily lives, including our professional lives. Through various methods we can effectively develop or improve soft skills. Various types of workshops or training can support the process of developing our competencies. However, it is necessary to keep in mind our own commitment and determination. By systematically developing soft skills, we can increase our productivity, flexibility and satisfaction with work and daily life.

9.3. Examples of soft skills

The following are basic soft skills with a description.

- **Communicativeness** - a way of communicating with another person, it is the ability to give clear messages and receive them from the other party, it is also the ability to listen actively.
- **Assertiveness** - is the ability to express one's opinion and needs, while respecting the rights or opinions of others. It is the ability to express rejection.
- **Independence** - is the ability to work individually, in an independent manner. It is also the ability to formulate conclusions and make decisions independently, while accepting the consequences of actions.
- **The ability to work in a team** - it is related to the ability to be communicative-they should be correlated with each other. This skill is the ability to work with other team members to accomplish specific tasks and achieve a common goal. It is the ability to cooperate, exchange knowledge, experience and adapt to the conditions of the group.
- **Flexibility** - is the ability to adapt to changing circumstances, such as working conditions (e.g. organization). It also involves quick adaptation to and acceptance of change. It is

also a form of agreement with another person, which can be achieved through mutual concessions.

- **Time management** - is the ability to organize time appropriately - to plan and organize one's work effectively. Good work organization and time management are key to avoiding delays and frustration. Prioritizing and delegating tasks are related to this skill.

Importantly, it is possible to learn any of the skills mentioned above or improve the ones we already have, as will be discussed further on. Depending on our profession, our soft skills will vary. The following are soft skills for a shipping specialist and an accountant (Table 5).

Table 5. Soft skills of shipping specialist and an accountant[91]

TYPE OF SOFT SKILLS	SHIPPING SPECIALIST	ACCOUNTANT
INTERPERSONAL COMMUNICATION	Simple, clear, fast and yet precise messages avoid errors in the organization of transportation.	The need to communicate clearly and precisely with non-financial professionals - communicating complex financial issues in simple terms.
TIME MANAGEMENT	Good organization of work - the hierarchy of tasks to be performed and the ability to manage time allow you to carry out multiple tasks simultaneously and avoid delays and downtime.	The work of accountants is heavily dependent on deadlines. They must be able to adjust their work to top-down deadlines, such as filing tax returns. On an ongoing basis, they must keep current accounts.
PROBLEM SOLVING	The shipping specialist must be able to react quickly to problems that arise, look for such solutions to reduce losses and satisfy customers.	The ability to identify, evaluate and solve problems is very important in your profession. Errors in financial or tax records can expose the employer to legal and financial consequences.
FLEXIBILITY AND ADAPTABILITY	The shipping specialist must be flexible and ready to adapt to sudden changes - route changes, shipping standards, production delays, bad weather.	An accountant must be flexible, ready to change and adapt quickly to changing laws, accounting standards or procedures. He or she must also adapt to internal guidelines and changing accounting systems software.
STRESS RESISTANCE	The work of shipping specialist is stressful - he must be at the ready to make quick and appropriate decisions or delegate tasks. However, he must be resilient to stress and be able to work effectively even under difficult conditions.	An accountant must be able to work under pressure - filing returns, auditing. Remaining calm and resilient to stress is indeed important in this profession to guard against mistakes in daily work.
TEAMWORK	A shipping specialist must be able to work as a team. He works with different teams on a daily basis and delegates tasks to them. Teamwork is crucial for effective and timely completion of tasks.	Accountants collaborate with other teams or departments of the company. The ability to collaborate is essential for the finance team to accomplish its tasks and for internal processes (primarily billing) to function properly.

[91] Source: own compilation based on job advertisements at www.linkedin.com

Both a shipping specialist and an accountant have so-called “universal” soft skills (see Table 5), but their use will vary within the scope of their professional duties. Each profession also has other “own” specific soft skills, i.e. those that are “inherent in the core” of the profession, such as sales representative - strong negotiation skills and doctor - working under pressure and empathy.

9.4. Methods of developing soft skills

We already know what soft skills are and how important they are in personal and professional life. We also know that they can change under the influence of various factors and serve to achieve certain goals. We can develop or improve existing skills, but also acquire new ones. In this section, we will focus on how to develop soft skills. Developing soft skills requires self-discipline, regular practice and openness to learning. It is an ongoing process-it requires a time commitment and repetition. It is important to be aware of your progress and systematically improve these skills in everyday situations.

There are many effective **methods for developing soft skills** *(examples below)***:**

- **Self-reflection and analysis of one's own soft skills** - this method involves identifying one's strengths and weaknesses in the area of soft skills. We determine which ones need improvement, such as communication, teamwork, stress management. This method includes analyzing situations where our actions or reactions could have been different and learning from them for the future.
- **Developing communication skills** - this method involves “stepping into the shoes” of the listener; it is the adaptation of messages and choice of words to the recipient. In order to break the barrier of fear, at first it is advisable to practice speeches with close people, and then with the participation of more people. Such activities will help you gain confidence and cope with conveying information to a larger group.
- **Teamwork** - join a team and actively participate in teamwork, this will allow you to understand different perspectives of performing a task or solving a problem. Share your insights with others, collaborate on projects - get out of your comfort zone. Try to include others in decision-making - show that you value their opinion.
- **Work with your time** - this method involves organizing your work - responsibilities. To manage your time effectively, learn to prioritize tasks by their importance. Try to set yourself a daily schedule of activities - from urgent to less important tasks. If you are working on a project, divide it into stages. Also, don't be afraid to delegate tasks to other

people. You can use the Eisenhower Matrix[92] - divide your tasks into 4 categories: urgent and important, non-urgent but important, urgent but unimportant, and non-urgent and unimportant (Figure 19).

Figure 19. Eisenhower Matrix[93]

To better manage your time, prepare yourself a matrix with each day of the week. Write down the tasks to be done on it and prioritize them. At the beginning of the following week, you can make an analysis of what you managed to do this week and indicate what you could do to be more efficient or when to schedule time for rest. Use the pattern presented graphically in Figure 19.

- **Relaxation techniques** - pressure of tasks or time causes stress. Our thought process is impaired, we react nervously to new tasks, we have trouble making decisions. To better cope with stress and broader pressure, it is worth practicing relaxation techniques, deep breathing[94], meditation or yoga. A good way is "square breathing"[95] (Figure 20). It involves following a sequence: inhaling for 5 seconds, holding air in the lungs for 5 seconds, exhaling for 5 seconds, holding air in the lungs for 5

[92] Access online: https://www.productplan.com/glossary/eisenhower-matrix/
[93] Source: https://medium.com/@jepozdemir/eisenhower-matrix-a-strategic-approach-to-task-management-a81b06e0bfdd
[94] Nestor J. (2020): Breath: The New Science of a Lost Art. Riverhead Books.
[95] Very Special Tales (2019): Square Breathing (Video Tutorial + Free PDFs- Including a Box Breathing Inspired Game). Access online: https://veryspecialtales.com/square-breathing/

seconds. We can perform several such blocks. Breathing exercises bring many positive results for our mental and physical health. Also learn to recognize the symptoms of stress and respond to them appropriately before they translate into your work, effectivity or relationships with others. Take breaks at work and don't bring work home. "Square breathing" is presented graphically in Figure 20.

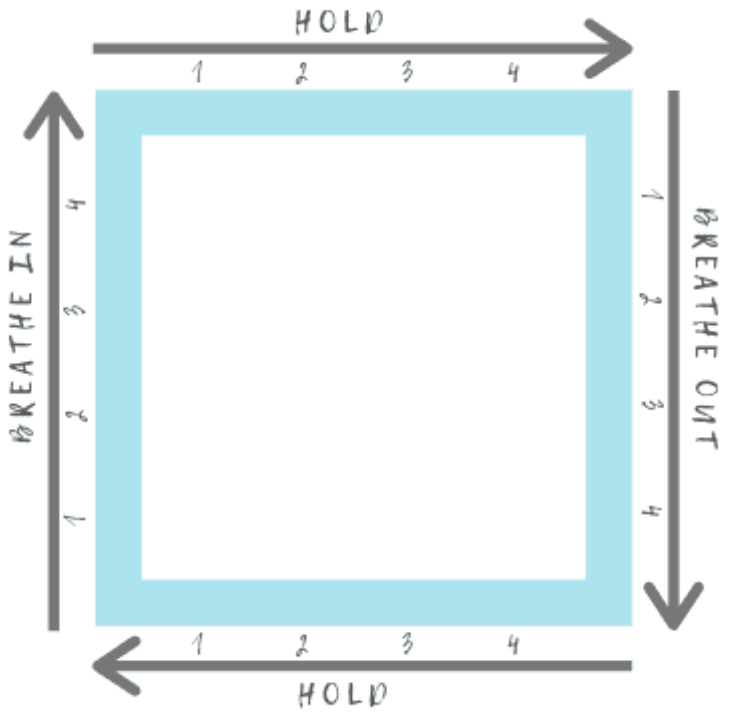


Figure 20. Square breathing[96]

- **Participation in workshops and trainings** - undoubtedly, the development of soft skills depends on practicing them. It is worthwhile to take part in trainings on soft skills development, such as negotiation, leadership, communication or problem solving. Workshops are a good way to practice existing as well as new skills. They also provide an opportunity to try doing something new and interfering in an interesting environment or with a bery good background - including coaching.
- **Learning by imitation**[97] - be an observer and a follower. This method involves observing and analyzing the behavior of people you think are masters of a particular soft skill. Note their reactions or actions in certain situations and try to apply these skills to yourself. You too can be a master!

[96] Source: Very Special Tales (2019): Square Breathing (Video Tutorial + Free PDFs- Including a Box Breathing Inspired Game). Access online: https://veryspecialtales.com/square-breathing/
[97] Hussein A., Gordon R., Gaber M., Elyan E., Jayne Ch. (2017): Imitation Learning: A Survey of Learning Method. Access online: https://core.ac.uk/download/pdf/141207521.pdf

- **Feedback** - when working on the development of your soft skills, it is worth following the process. You can summarize your work and achieved goals yourself. It's also a good idea to ask loved ones or co-workers if they have noticed a change, e.g. in communication, decision-making. Be open to others' opinions and criticism - they are opportunities for further development.
- **Practice assertiveness**[98] - this is a very important soft skill. Sometimes you may hear that we are not very assertive and should let go. How to work on it? Don't be afraid to express your opinion in a direct way, but with respect for other recipients. It's worth making friends with the word "no." Practice expressing your opinions and needs openly, but without aggression. Practice assertive behavior when you don't like something or when you want to express your own opinion. Expressing your boundaries is very important for your own well-being, efficiency and productivity.
- **Problem solving** - in any team or stage of a project, problems can arise. A method that allows you to find a solution is the **5 WHY method**[99] (Figure 20).

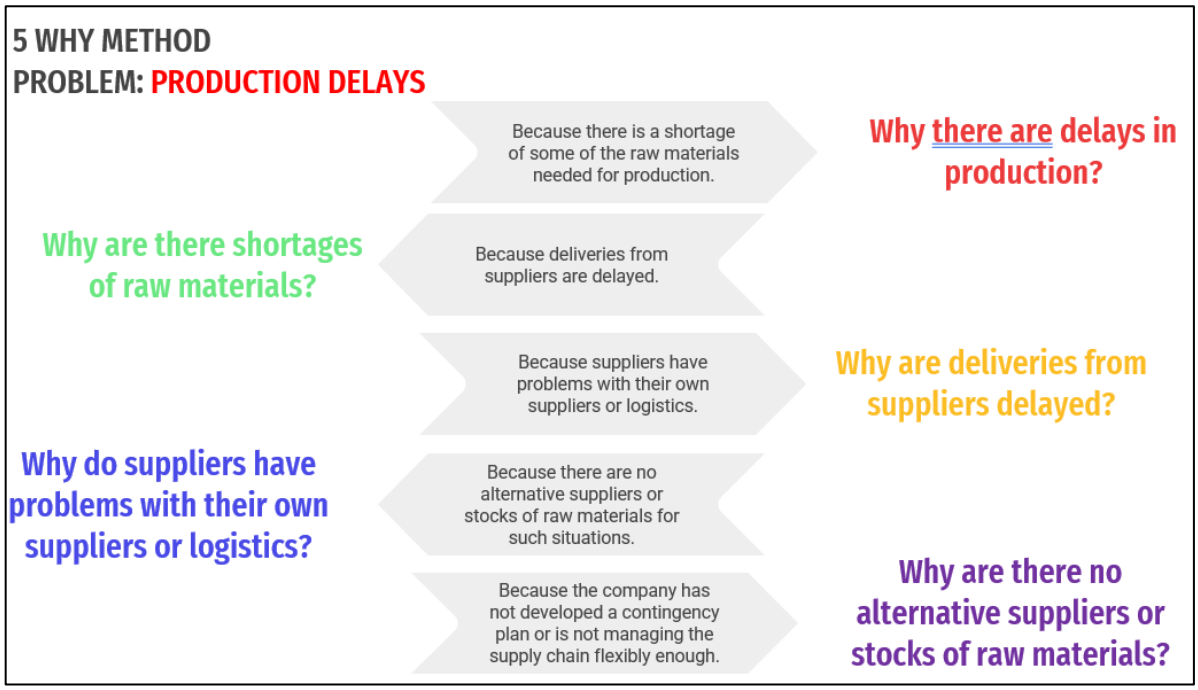


Figure 20. '5 Why' matrix

The 5 Why method involves asking 5 "why?" questions to get to the cause of the problem (Figure 20). The answers obtained can be important in resolving the problem and making the right decision.

[98] Paterson Randy J., The Assertiveness Workbook: How to Express Your Ideas and Stand Up for Yourself at Work and in Relationships, New Harbinger Pubn, 2022. Smith Manuel J., When I Say No, I Feel Guilty: How to Cope--Using the Skills of Systematic Assertive Therapy, Bantam Doubleday Dell Publishing.
[99] Master Class (2021): How to Use the 5 Whys Technique for a Root Cause Analysis Access online: https://www.masterclass.com/articles/how-to-use-the-5-whys-technique-for-a-root-cause-analysis

9.5. Examples of tasks developing soft skills to be performed by students in the field of developing soft skills

Here is a proposal of tasks to develop your students' soft skills. The whole thing is divided into seven tasks in the following order:

1) Prepare 2 A4 sheets of paper. On each, write the key soft skills for your chosen profession and how they are used (following the example of Table 1). On the other, write how these skills can be improved, and how they can help in the future.
2) Prepare a mini workshop for students. Divide the students into groups of 4. Have each student tell about his/her internship/internship. Tell the students to try to concentrate fully on the interviewee. Ask them to ask questions and paraphrase to make sure they really understood the interviewee.
3) Ask 1 or 2 students to present a selected supply chain problem to the group in the form of a story. The other students should use the active listening method. Have each student write the most important observations - what caught their attention, interested or bored them, how was the communication with the listeners, how did the speakers deal with stress?
4) Ask the students to make a matrix of daily study (essay, test, study) and daily life-related duties at the beginning of each week throughout the month. At the end of each week, analyze which tasks were fully accomplished, what was the efficiency and how they managed their time. Consider what can be improved.
5) 2x times a week, while the group is doing some chores, take a 10-minute break. Ask the students to find a comfortable position for themselves. You can cover the windows, turn on relaxation music. During the break, do breathing exercises, perhaps “square breathing”. You can also offer a short meditation. Ask students for feedback - How did it affect their mood? Did they relax?
6) During an upcoming team project, suggest a group leader. If he or she agrees, ask him or her what leadership goals he or she wants to achieve. After the project is completed, ask for feedback from the other team members. Also ask the team leader for feedback - what are his insights? Has he managed to improve or develop his organizational and cooperation skills?
7) Prepare case-studies about the problem of food waste through a malfunctioning supply chain. To solve the problem, suggest dividing into 3-4 groups. Let each group, using the 5 why? method, try to resolve why such a problem arose. Analyze the answers and look for the best solution.

10. Business simulation

10.1. Introduction

Learning through experience is one of the most effective methods of acquiring knowledge. One such method is business simulations, often considered a game learning method. It is a way of training employees, students or pupils on the basis of certain simulations specific to a particular industry, problem or entrepreneurs. Their aim is to acquire practical business skills, especially managerial, planning and teamwork competences. They develop analytical, strategic and critical thinking skills. Through business simulations, participants can test different strategies, scenarios or decisions, but without affecting the actual situation of the company. It is a versatile tool for making the right decisions for your organisation in the future.

Business simulations are an effective teaching and learning method. They can be used in a scientific environment (schools or universities), but also in a business environment (companies). By recreating real business processes in a controlled environment (online and offline), it is possible to acquire knowledge of economic phenomena and develop various skills. It is also a method that allows for the improvement of existing skills, as simulations can be applied to company activities.

Business simulations allow participants to make decisions and analyse the consequences and risks of actions taken. Through business simulations, participants can understand the complexity and interconnectedness of organizational processes, identify risks in the business environment and develop skills in strategic thinking, resource management or process and cost optimization. Today's business simulations usually take place through the use of virtual environments, which increases their usefulness and universality (huge potential for use). Thanks to the use of modern technology, business simulations are becoming more and more useful and precise. Combining theory and practice, business simulations provide effective support for science and business in adapting to the challenges of the modern world.

10.2. Business simulation – general information

There are many definitions of business simulations. According to H.P. Schröder and L. Ciucan-Rusu, business simulations: ‘Often called business games make an unavoidable solution for training managers, because they allow theory to be applied into practice in a risk-

free environment, and encourage team working in the process of decision-making'[100]. A similar definition is provided by A.Blažič, C. Ribeiro, J. Fernandes, J. Pereira and T. Arh: 'Business simulation games are considered as effective tools for the empowerment and mediation of business content learning'[101]. In addition, they point out that business simulations contribute to a real understanding of the business environment and the situations that may occur in it. Another definition of business simulation is presented by A. Barišić and M. Prović, who point out that business simulation is an active learning method that allows for the development of important competences, especially entrepreneurship[102]. Business simulations are a learning method that allows participants to improve analytical and personal skills.

Business simulations are often referred to as simulation games and these terms are often used interchangeably. This is primarily due to the similarity between the two. Both are case studies that are based on a certain action scenario and do not happen in reality. In practice, there are also managerial games which, as a training method, support the learning and competence development of managers in a created (often virutal) socio-business environment and under competitive conditions. Another similarity is that both a business simulation and a simulation game relate to conditions that may actually occur in the market or in the organisation's environment. Both methods aim to develop certain solutions appropriate to a given enterprise under the conditions created by the simulation scenario, analysing and evaluating the consequences of actions.

It can be considered that a business simulation is a training tool that realistically depicts the phenomena occurring in the conduct of business activities and allows important decisions to be made in accordance with the adopted strategy or management model and thus develops the skills and competences of the participants[103]. It is often referred to as a game, because the effects of actions within the simulation are not implemented in reality. It is therefore a learning from mistakes.

[100] Schröder H.P., Ciucan-Rusu L. (2012): Business Simulation. Conference: Best Entreprenneurship 2012. At: Tirgu Mures Romania. Access: https://www.researchgate.net/publication/280387309_Business_Simulation
[101] Blažič A., Ribeiro C., Fernandes J., Pereira J., Arh T. (2012): Analysing the Required Properties of Business Simulation Games to Be Used in E-Learning and Education. Intelligent Information Management, 4, p. 348.
[102] Barišić A., Prović M. (2014):, Business simulation as a tool for entrepreneurial learning. The role of business simulation in entrepreneurship education. Education for Entrepreneurship - E4E 2014; 4, p.98.
[103] Barnaby J., Devins D., Beech N. (2020): Using simulation to develop business strategy skills of entrepreneurs-Some reflections on a pilot. Industry and Higher Education, 1-6.

10.3. Features and functions of business simulations

We know that business simulation is a method of learning by doing. However, it is important to identify the features that distinguish it from other training methods. Among the most important characteristics can be pointed out:

- **Realism** - a relatively realistic description of a given situation, phenomenon or problem so that participants can learn in an environment close to the real one[104].
- **Acting on a proven model or principles** - business simulations are created by experts who create an appropriate model and principles for a given scenario in relation to real-world conditions.
- **Complexity or focus on a single problem or area** - in the case of complexity, business simulations may cover many areas simultaneously, e.g. in the aspect of the company's operations, allowing understanding of interdependencies and processes in the organisation; they may also be limited to a selected problem or area, e.g. the creation of an advertising campaign.
- **Interactivity and participation** - in business simulations, competition is usually abandoned, all participants have an active, and as a rule, equal influence on the course of the simulation through making decisions, managing resources or planning activities, everyone works towards achieving the set goal - participants vs. environment/conditions.
- **Experimentation** - simulations allow multiple scenarios to be tested without risk or cost in real-world conditions.
- **Dynamism** - decision-making is often limited by time, knowledge or resources, depending on the decision taken, the internal situation of a given company may change dynamically, as well as the external environment, which will influence the further course of the simulation.
- **Feedback** - simulations provide information on the results of actions immediately, which allows conclusions to be drawn from a previous decision and potential consequences and effects of actions to be assessed.

These exemplary features of business simulations distinguish them as an effective training and analysis method.

[104] Costin Y., O'Brien M. P., Slattery D. M. (2018): Using Simulation to Develop Entrepreneurial Skills and Mind-Set: An Exploratory Case Study. International Journal of Teaching and Learning in Higher Education. Volume 30, Number 1, p. 138.

Business simulation is one of the scientific methods with many applications and advantages, and these can define its functions. The basic functions with their description are shown in the Figure 21.

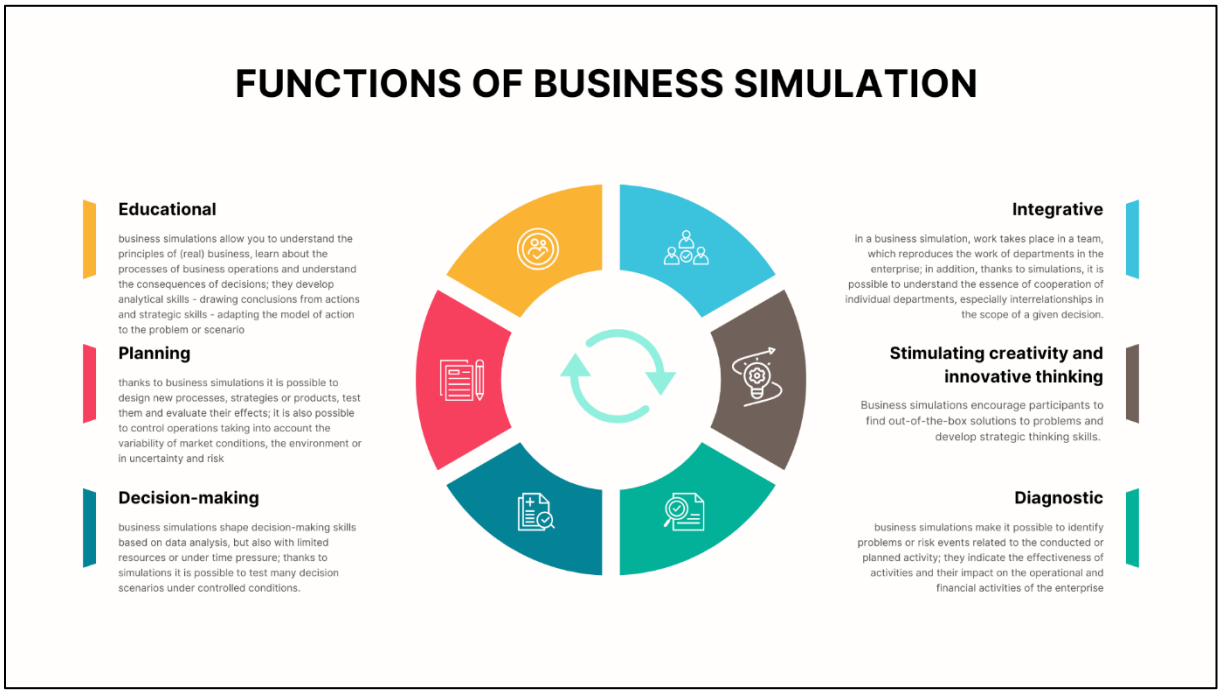


Figure 21. Functions of business simulation

The business simulation functions presented on the Figure 21 are interrelated and interact with each other. Through the diagnostic function (e.g. problem identification), we acquire knowledge (learning function), which we can then use and make decisions (decision - making). The functions of business simulations influence efficiency in organizations, reduce risks and provide knowledge about internal processes and resource optimization.

Business simulations can be used in a school or university environment, so that pupils and students can learn and then understand the processes involved in business - enterprise operations. They can also be used in an established business. The functions outlined above are appropriate for both environments.

10.4. How to conduct a business simulation

Business simulations can be conducted in both traditional (offline) and virtual (online) forms, depending on the needs, available resources and preferences of the organization. In both cases, the preparation of a business simulation requires careful planning and

consideration of the relevant aspects, i.e. the problem and objectives of the simulation, participants and tools.

Online forms of business simulations can be divided into the following categories:

- **E-learning platforms**
  - Accessible via a web browser or applications.
  - Examples: Simultrain, CapSim.
- **Simulation games (serious games)**
  - Based on real business dynamics.
  - Different scenarios for simulation, e.g. negotiation.
- **Videoconferencing and online collaboration tools**
  - Simulation scenarios that are implemented through applications like Zoom, MS Teams, Miro, Trello**.**
- **VR (virtual reality)**
  - Participants 'enter' a virtual world that simulates specific business environments.
  - Can be used in project or production management training.

Traditional offline simulations can be made in forms:

- **Board and simulation games**
  - Games in which players solve business challenges, often designed around a given problem.
  - Examples: 'Monopoly Business Edition', "GoVenture".
- **Workshops and group simulations**
  - Participants divided into groups carry out business scenarios in real time under the guidance of a trainer (simulation facilitator).
- **Case studies and role-playing**
  - Participants are assigned specific roles in the company (may be preceded by a skills analysis) and are responsible for a particular position or department.
  - Analysis of real business cases.

Business simulation is a process consisting of a number of steps that must be carried out in succession for the method to fulfil its functions and objectives. The graphic below shows the stages of running a business simulation (Figure 22).

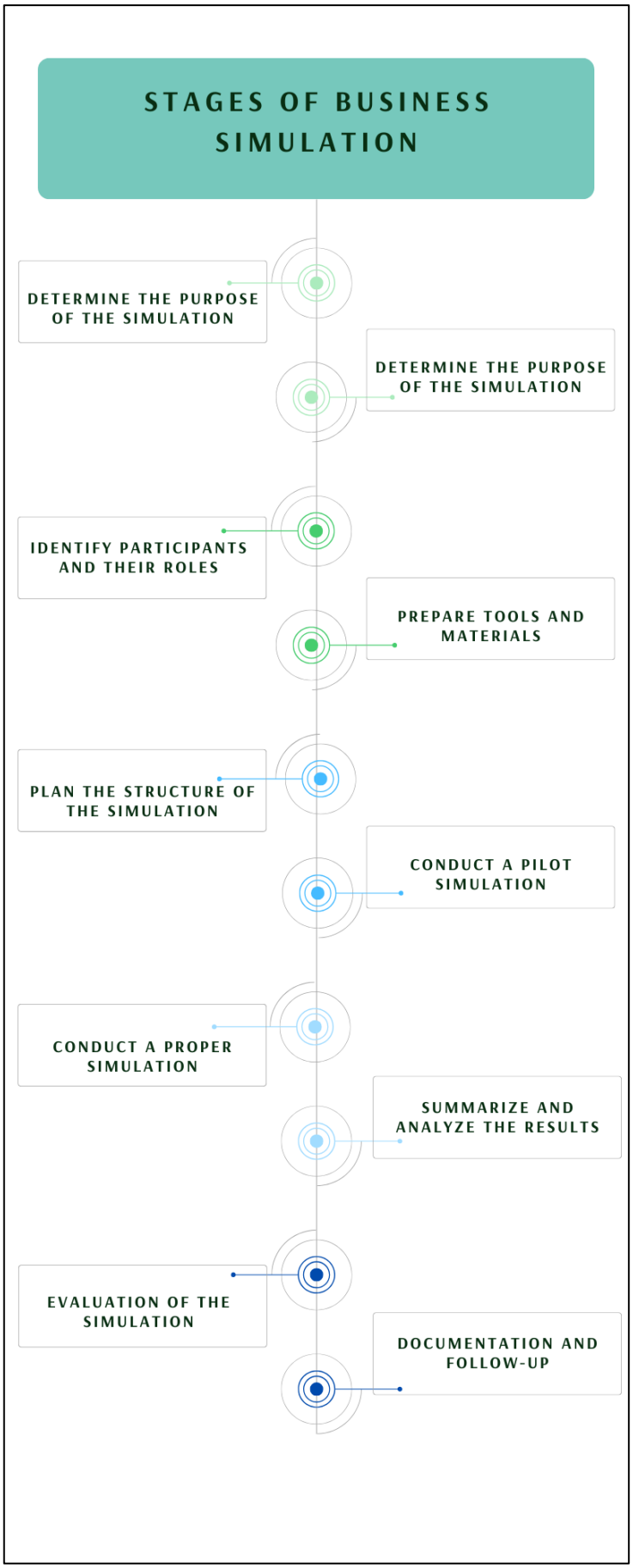


Figure 22. Business simulation – step by step

The proposed activities for the different 10 stages of business simulation (see Figure 22) are presented below.

1) The purpose of the simulation

- Define what you want to achieve with the simulation, i.e.
- Testing new business strategies - new processes, management models.
- Analyzing the impact of introducing new products or innovations.
- Improving decision-making processes in the organization.

Case: *Teaching participants budget and supply chain management in a food manufacturing company.*

2) Scope and scenario of the simulation

- Define realistic situations to be simulated.
- The scenario should be 1:1 - reflecting the actual problems and challenges of the business or venture.
- Scenario:
  - Context (e.g., industry, market, external environment, economic conditions)
  - Roles of participants (e.g., director, managers, analysts, auditor, accountant decision makers).
  - Major challenges (e.g., new strategy, new product introduction, crisis management, financial problems).

3) Identify the participants and their roles

- Roles can include specific positions in the organization (e.g., manager, accountant), but also actors from the external environment (e.g., customers, suppliers).
- Example groups:
  - Group responsible for planning the strategy.
  - Group responsible for managing operations of production.
  - Group responsible for planning the budget.

4) Tools and materials

- Identify the resources and tools needed to run the simulation, e.g:
  - Programs/applications/platforms (e.g., spreadsheets, simulation applications).
  - Instructions for participants.
  - Company and other data (e.g., initial budget, market indicators, benchmark).
- Tools:
  - Offline: Task cards, flip charts, charts.
  - Online: Simulation software (e.g. SimulTrain, Capsim, Revas), Excel or other platforms.

5) Establishing the structure of the simulation

- A business simulation must have stages to make it clear and understandable to participants.
  - Stage 1: Introduction - Discuss the principles and purpose of the simulation
  - Stage 2: Working through the simulation - Making decisions in designated rounds.
  - Stage 3: Analysis of results - Evaluating the effects of the actions taken and presenting the results.
  - Stage 4: Summary - Discussion of conclusions and lessons learned.

6) Conduct a pilot simulation

- Prepare one round of the simulation as a test - check that the scenario works properly and that the rules of the simulation are understood by the participants.
- Identify problems at this stage so that the simulation can fulfill its functions and achieve its goals.

7) Conduct a proper simulation

- During the simulation, try to actively participate in it - be an active observer:
  - Monitor (but do not control) participants' actions, provide support and guidance.
  - Inform about the approaching end of the round
  - Encourage interaction and cooperation.
  - Collect feedback after each round - what decisions were made and what actions implemented.

8) Summarize and analyze the results

- After completing the simulation, discuss the results obtained:
  - Present the results of each group (e.g., profits achieved, performance indicators, risk level, ESG indicators).
  - Compare specific or selected strategies and decisions of the participants.
  - Discuss the results obtained and decisions made.
  - Suggest what conclusions can be drawn from the simulation and what actions/decisions can be applied to reality.

9) Evaluation of the simulation

- Ask participants for feedback on the simulation. Based on this feedback, evaluate whether the objectives of the simulation were achieved.

10) Documentation and follow-up

- Produce a report with the results of the simulation and recommendations for the organisation - school, university or company. Further simulations can be carried out based on the lessons learned.

10.5. Proposal for the use of business simulations in the FVC

Below are 3 suggestions for business simulations that can be used on the FVC studies:

1. **<u>Issue</u>: Optimization of the supply of fresh foodstuffs (logistics)**
   Goal: *Minimise losses due to short shelf life of products (e.g. fruit, vegetables, meat).*
   <u>Simulation</u>: The business simulation scenario should include the following elements:

- Modelling the supply chain from suppliers (e.g. producers) through distribution centres to shops.
- Analysis of transport times, product storage conditions and delivery schedules.
- Variable (seasonality) and random factors (transport delays, power cuts).
- Experiments with different ordering strategies, e.g. just-in-time delivery.

2. **Issue: Supply crisis management**

Goal: *To assess the resilience of the supply chain to disruption*.

Simulation: The business simulation scenario should be based on the elements of crisis management:

- The occurrence of an emergency event - a disrupted supply chain due to strikes at a manufacturing company, a breakdown of a production process or a natural disaster (a fire that destroyed land infrastructure).
- The need to take measures to mitigate a supply crisis, e.g. attracting new suppliers, managing existing resources, changing and optimising supply routes.
- Assessment of the costs of crisis management - operating costs, inventory, customer satisfaction, reputation.

3. **Issue: Impact of climate variability on the food supply chain**

Goal: *Understanding the impact of climate variability on the availability of agricultural products.*

Simulation: The scenario for this simulation should take into account climate change factors and their consequences:

- Introduction of consequences of climate change (e.g. drought, flooding, temperature changes).
  - Temporal shift - seasonal crops and rainfall.
  - Reduction of water resources.
- Crop diversification - reducing the risk of losses in the event of extreme weather conditions.
- Storage and transport of agricultural products taking into account the possibility of delays or crop damage.
- Investment in technology - weather monitoring systems, irrigation, cold storage or silos.
- Identifying the risk of losses in the supply chain and developing a risk mitigation strategy.

11. Problem-Based Learning

11.1. Description of the method

The modern world and the conditions of life and functioning at school, work and society are changing very dynamically. New technologies appear in virtually every area of life. Virtually every area of life is experiencing very rapid progress driven by innovation. Unfortunately, many teachers rely on knowledge and competences that have become outdated. In order to function efficiently in such dynamically changing conditions, regardless of whether it concerns everyday life or professional work, one must acquire a very important competence, which is the ability to quickly adapt to the changing reality. The basis for adapting to rapid changes is the ability to learn independently and explore new phenomena, in other words, effective learning[105],[106].

Research and observations of the effectiveness of classic teaching methods, such as lecturing or lecture, conducted over the years show that the one-way transfer of knowledge between lecturer and student is not effective enough. This type of classic approach usually does not engage the student sufficiently, reducing him to the role of a passive listener. In the past, when access to reliable and up-to-date knowledge was much more difficult, this method worked, but today the students and challenges are different. The above observations led to the development of the so-called "flipped education", in which the student/listener finds the necessary information on his own, using commonly available knowledge, and at the same time learns to think critically, associate and analyze, with the help of the teacher[107],[108].

One of the 'flipped learning' methods is **Problem-Based Learning**. The basis of the method is an attempt to find a solution to a specific, real problem, defined by the leader, a company or another socio-economic entity. The essence of the method is that students do not receive any theoretical support in the form of materials, lectures or exercises at the beginning. Students themselves must acquire all possible knowledge necessary to solve the problem, and then learn to share it during meetings with the project group so that the entire team can benefit

[105] Nilson L. B. (2010): Teaching at its best: A research-based resource for college instructors (2nd ed.). San Francisco, CA: Jossey-Bass.
[106] Zembski S. (2018): Nauczanie problemowe w praktyce. Zeszyty Naukowe. Quality. Production. Improvement. No 2 (9), 177-187.
[107] Amador J. A., Miles L., Peters C. B. (2007): The Practice of Problem-Based Learning. Anker Publishing Co., Bolton, MA.
[108] De Graaff E., Kolmos A. (2007): History of Problem-Based and Project-Based Learning. Brill Publ.

from it[109]. The advantage of this approach is that, in addition to specific competences, it develops young people's ability to communicate and work in a group, which, unfortunately, can be a problem.

The teacher or coordinator is only a mentor, supporting the group in the learning process. Its role is primarily to provide substantive supervision, which assures students of the validity of their theses and critical assessment of progress and the quality of results[110].

This type of pedagogy challenges students to actively participate in the learning process rather than passively obtain information. In active learning, students actively create their own knowledge by engaging in learning processes through many different means, such as exploration, research, discussion, reflection, processing, synthesis, analysis, experimentation[111].

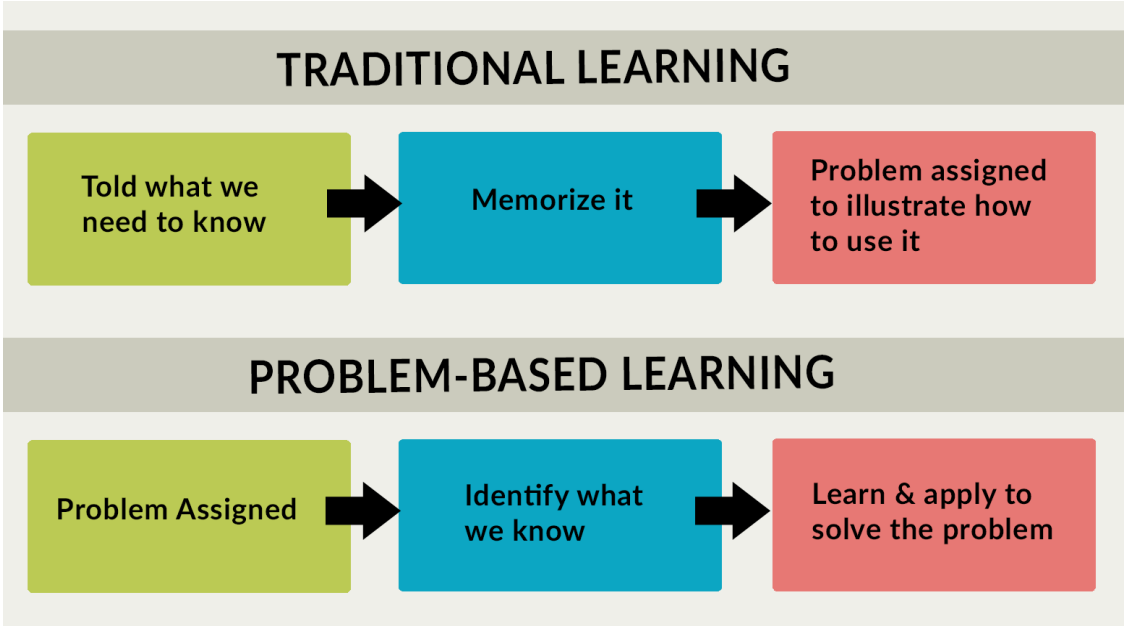


Figure 23. Difference between traditional and PBL learning approaches[112]

The differences between traditional learning and the problem-based learning method are well illustrated in Figure 23.

Teaching through problem solving is a relatively young educational method, the values of which are appreciated by both the main trends in educational theorists, i.e. constructivists and

[109] Leon J.S., Winskell K., McFarland D.A., del Rio, C. (2015): A case-based, problem-based learning approach to prepare master of public health candidates for the complexities of global health. American Journal of Public Health, 105,(S1), S92-S96.
[110] Wood, D. (2003): ABC of learning and teaching in medicine: Problem based learning. British Medical Journal. 326: 328–330. doi:10.1136/bmj.326.7384.328
[111] Nilson L. B. (2010): Teaching at its best: A research-based resource for college… op.cit.
[112] Leon J.S., Winskell K., McFarland D.A., del Rio, C. (2015): A case-based, problem-based learning… op.cit.

cognitivists[113]. According to Howard Barrows et al.[114], the creator of the PBL idea, this method is characterized by 6 components: firstly, it is student-oriented; students work in small groups of 3-5 people; the lecturer plays the role of a facilitator - supports the communication process within the group, motivates to work and relieves tension in conflict situations; groups work on solving practical tasks; participants develop soft skills while working; students acquire knowledge and information through group work and individual involvement.

The problem-solving method is strictly focused on the recipient - i.e. the student. The teaching process according to the PBL philosophy is closely related to working with the problem, the task that needs to be solved. Knowledge is hidden in the process of solving a task, and educational goals are achieved while working on solving it. Students work in small groups to solve a practical problem that models certain elements of reality. PBL is a practical method of education and learning based both on team cooperation by developing a common position, and on individual work, e.g. searching for data and information. It is a method that stimulates both the search for information, its processing and reasoning[115],[116]. It forces participants to self-reflect, to critically evaluate and evaluate the acquired knowledge elements in terms of their effectiveness and usefulness in solving the problem based on group discussions and developing a common strategy. Nowadays, thanks to the Internet, we have enormous access to large amounts of data. The problem is their processing and verification.

Searching for a solution to a problem very often requires interdisciplinary knowledge and stimulates individual group members to become interested in other areas of science. PBL is a method that perfectly highlights and uses the correlations between basic, theoretical and practical knowledge. Develops skills of effective group cooperation and communication on an equal basis. Working in a small group on equal terms gives you the opportunity to face interpersonal conflicts and sometimes the difficult art of negotiation. It brings out the positive qualities of participants, teaches them to make well-thought-out decisions and helps build an ambitious approach to present their best in the group. A small group makes it difficult to create factions and coteries[117].

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[113] De Graaff, E., Kolmos, A. (2003): Characteristics of problem-based learning. International Journal of Engineering Education, 19(5), p. 657-662.

[114] Barrows H.S., Tamblyn R.M. (1980): Problem-Based Learning: An Approach to Medical Education. Springer Publishing Company, New York.

[115] Rollins School of Public Health, Emory University: PBL Problem-Based Learning. Access online: https://sph.emory.edu/rollins-tlc/course-design/problem-based-learning/index.html

[116] Hung W., Jonassen D.H., Lui, R. (2008): Problem-based learning. In J.M. Spector, M.D. Merrill, J.V. Merrienboer & M.P. Driscoll (Eds.), Handbook of Research on Educational Communication and Technology. (pp. 485-506). Taylor and Francis.

[117] Leon J.S., Winskell K., McFarland D.A., del Rio, C. (2015): A case-based, problem-based learning… op.cit.

The student's work on the project serves to develop creativity and innovation, is inspiring and teaches responsibility. The teacher acts mainly as a guardian of the so-called facilitator - helps in formulating the most important questions and goals, keeps track of meeting dates and task completion, works on the careful selection of task topics and controls their degree of difficulty adapted to the level of the group. He acts as a friendly guide, stimulating and organizing work on the project in the initial phase. In subsequent stages, he is a mentor and moderator, always ready to support the group with comments, but he never gives ready-made solutions to the problem. An important element of the method is that the effects of the project teams' work are presented publicly. The evaluation of the team's work is discussed jointly by all students and the lecturer[118].

An important characteristic of the problem-based teaching method is the clarity of the task and the determination shared by the entire team to achieve the set goal. Already during the initial phase of the project, when analyzing the problem, students discuss together what tools and what type of knowledge they will need for implementation[119]. Goals are defined by the task force. Students define them themselves and treat them as their personal paths leading to solving the issue. Problems must always be authentic, presenting practical tasks, often of the optimization or improvement type. Therefore, it is very important to properly select the problem to suit the intended educational goals and the group's capabilities[120].

An important aspect of the PBL method is that it supports the student in identifying with the task and provides reflection on the acquired knowledge and cognitive process. The facilitator stimulates students to verify ideas and exchange ideas. These elements of the PBL method satisfy constructivists because the problem is solved step by step, as if building subsequent steps on previously performed elements[121].

From the point of view of cognitive scientists, in the PBL method, information is processed at the individual and group level. Activation and adaptation of acquired and acquired new knowledge takes place already during the initial stages of work on the project. Usually, the process of searching for and acquiring information and various techniques and tools for searching and solving a problem is activated much more often than during regular classes (lectures or exercises)[122].

[118] Wood, D. (2003): ABC of learning and teaching in medicine… op.cit.
[119] Leon J.S., Winskell K., McFarland D.A., del Rio, C. (2015): A case-based, problem-based learning… op.cit.
[120] Hung W., Jonassen D.H., Lui, R. (2008): Problem-based learning… op.cit.
[121] De Graaff E., Kolmos A. (2007): History of Problem-Based and Project-Based Learning… op.cit.
[122] Hung W., Jonassen D.H., Lui, R. (2008): Problem-based learning… op.cit.

Research on the relationship between motivation and Problem-Based Learning has shown that problem-based activities can improve satisfaction, increase interest, and consequently improve students' willingness to participate in learning tasks. A student who is truly interested in a topic is more focused, more capable of deep processing, and will continue to learn. Intrinsic motivation in students is enhanced by the fact that: they can see the importance of what they are learning, the topic has practical significance for them, the task is stimulated, interesting or questioned, students have a sense of authenticity of the problem, they have autonomy and responsibility for making decisions, they perceive that they can be successful in a given topic. PBL group members know the assumptions and conditions of validity of theories and theorems much better than others. Even though their theoretical knowledge is not subject to any verification, each time the task they solve requires them to carefully study the possibilities of using particular tools and verify the effects.

11.2. Main features of the problem-based teaching method

The starting point are problem-based tasks: teachers present students with specific, real problems or situations that they may encounter in the real world. These tasks are the starting point for the learning process. The key is to formulate the task correctly, tailored to the listeners' abilities[123].

Active participant role: students play an active role in the learning process. Instead of passively receiving information, they gain knowledge on their own by examining, analyzing and synthesizing information to solve problems.

Interdisciplinarity and multi-level teaching: the problem-based teaching method often involves various fields and disciplines of knowledge, which allows students to understand the problem from different perspectives. Everyone brings some information, knowledge and experience. This promotes interdisciplinarity and the development of critical thinking skills[124].

Teamwork: students work in small groups to exchange ideas, share knowledge and work together to solve a problem. This group interaction also helps develop soft skills such as communication, group work management, the ability to discuss and argue and reach a compromise.

[123] Zembski S. (2018): Nauczanie problemowe w praktyce… op.cit.
[124] Perkins D. (2020): The 5 Phases Of Project Based Learning contributed. Access online: https://www.teachthought.com/project-based-learning/phases

The role of the facilitator: the teacher acts as a guide, mentoring students in the problem-solving process. It improves finding solutions to problems and obtaining results. Instead of traditional knowledge transfer, the teacher directs the learning process, stimulates it, corrects it and models it.

Evaluation of the problem: solving process and the end result - evaluation in problem-based learning covers both the process itself and the end result of students' work. Both the ability to solve a problem and such elements as the ability of individual students to cooperate in a group, their creativity and critical thinking, the ability to present results and argumentation, the method of argumentation, the process of obtaining information and synthesizing conclusions are assessed.

11.3. Benefits of using the problem-based teaching method

Teaching using the problem-solving method provides a number of benefits for the individual student, the task group and the teacher[125],[126],[127],[128]. They are presented below.

Development of practical skills: the method focuses primarily on solving real problems. Hence, it is crucial to correctly formulate the task to be performed. This approach gives the feeling that the acquired knowledge is not just a theory that can be used or not, but an exercise in real tasks. This helps students develop practical skills necessary for career development. Thanks to this, the motivation to learn increases. Students acquire skills in analysis, problem solving, communication and cooperation, which they will use in their future professional job.

Practicing and increasing interpersonal skills: by working in groups, students develop the skills of cooperation, communication, negotiation and seeking compromise in solving problems and possible conflict situations. These skills are crucial in a work environment and society based on individualism. It makes students aware that their decisions and actions affect others and this must be taken into account.

Motivation to learn: problem-based learning can increase students' motivation to learn because the problem they are trying to solve has a direct connection to reality and their future work. This makes the learning process more engaging, motivating and interesting for students.

[125] Biello S., Yoss S., Walker E. R., Druss, B., & Lang, D. L. (2020): Addressing public mental health challenges: A mixed-methods evaluation of problem-based learning. Pedagogy in Health Promotion.
[126] De Graaff, E., Kolmos, A. (2003): Characteristics of problem-based learning… op.cit.
[127] Perkins D. (2020): The 5 Phases Of Project Based Learning contributed. Access online: https://www.teachthought.com/project-based-learning/phases
[128] Wood, D. (2003): ABC of learning and teaching in medicine: Problem based learning… op.cit.

Shaping critical analytical thinking: the process of defining and analyzing the problem, assessing existing knowledge and collecting information, developing a solution within the method develops critical thinking skills. Students learn to classify and evaluate information, make rational choices and decisions, and argue their position.

Ability and necessity for interdisciplinary thinking: the problem-based learning method often engages different areas of knowledge and skills in problem solving, which in turn enables students to look at issues from different perspectives. This approach develops the ability to think interdisciplinary.

Independent learning and improvement: thanks to the problem-based teaching method, students learn to be independent in acquiring knowledge. They do not receive all the information, but they must obtain it from various sources and select it critically. Nowadays, the Internet has become the basic source of knowledge. Unfortunately, a huge amount of knowledge is often accompanied by an excess of information, often incorrect or too superficial. This requires a critical selection of sources and the quality of the information itself. Thanks to this, they are more responsible for their learning process, which prepares them to act independently outside the academic environment in their future professional career.

Preparation for future real-life work situations: problem-based learning prepares students to cope with a dynamic and changing professional environment. Students learn example problem situations occurring in practice and use the previously acquired general and theoretical knowledge from classes to solve real problems based on examples from real activities.

Presentation of results: after completing the project, participants present the results of their work to the group.

Multi-faceted assessment: the problem-based learning method allows you to assess not only the final results of the project, but also the learning process. Teachers assess both students' individual commitment, ability to cooperate in a group, and the process of approaching problem solving. Students document individual stages of solving the problem on worksheets[129],[130].

[129] Barrows H.S., Tamblyn R.M. (1980): Problem-Based Learning: An Approach to Medical Education… op.cit.
[130] Rollins School of Public Health, Emory University: PBL Problem-Based Learning… op.cit.

12. Project-Based Learning

12.1. Description of the method

Project-based learning is not a new educational technique. Already at the beginning of the 16th century, this method was used by architecture and engineering students in Italy[131]. The first mentions in Poland come from the beginning of the 20th century[132]. However, it was only in the 21st century that the project method became the center of the global transition of education from traditional forms focused on the transfer of knowledge from the teacher to learning focused on the student's own development. This is possible thanks to easier access to knowledge. Projects differ from traditional learning primarily in that students themselves obtain information about a (broader than usual) issue, develop it (not only in a typical written form), and then present the results of their work to others. This requires commitment and an unconventional approach from the student, self-discipline and regularity[133],[134],[135].

According to Szymański's definition: the project method comes down to the fact that a team of learners independently initiates, plans and carries out a certain undertaking and evaluates its implementation. It is best if the source of the project is the world of everyday life, not abstract science. The starting point should be a problem situation, an intention, taking some initiative, setting a goal, and the ending point should be a broadly understood project[136],[137].

The result of the project may be a model, presentation, mock-up, drawing, etc. What is important is that the project is based on extensive instructions prepared by the teacher and that it is implemented for a long time and can be extended for the entire semester. During this time, the student acquires information, systematizes it, and the teacher directs actions towards specific paths. Teaching and learning using the project method combines the most effective teaching practices, one could say, it is the quintessence of what is most important in the learning process. It allows students to develop responsibility, self-direction, communication,

[131] Alacapınar F. (2008): Effectiveness of project-based learning. Egit Aras. 33:17–34.
[132] Barak M, Shachar A. (2008): Projects in technology education and fostering learning: The potential and its realization. J Sci Educ Technol. 17: 285–296.
[133] Alacapınar F. (2008): Effectiveness of project-based learning.. op.cit.
[134] Mikina A., Zając B. (2006): Jak wdrażać metodę projektów? Poradnik dla nauczycieli i uczniów gimnazjum,liceum i szkoły zawodowej, Oficyna Wydawnicza Impuls, Kraków.
[135] Thomas J.W. (2000): A review of research on project-based learning. San Rafael (CA): The Autodesk Foundation. 2000 March:1–45.
[136] Dzierzbicka W. (1963): Metoda projektów. Eksperymenty pedagogiczne w Polsce w latach 1900-1939. Praca zbiorowa pod redakcją B. Suchodolski. Zakład Narodowy Ossolińskich, Wydawnictwo PAN.
[137] Harmer N, Stokes A. (2014): The benefits and challenges of project-based learning: A review of the literature. Plymouth, MA: Pedagogic Research Institute and Observatory (PedRIO); 2014 [cited 2020 May 28].

teamwork, and project management skills. Moreover, it provides a safe space to make mistakes and draw conclusions thanks to the teacher's supervision[138],[139],[140].

Like any method, this one does not allow all possible learning goals to be achieved to the same extent. When deciding to use it, we should be aware of its advantages and limitations[141].

An important and most important feature of the project method is the independent work of students, often on issues that they have chosen themselves. This creates an opportunity to awaken their personal commitment and interest in the area they deal with. This will certainly make it easier for the teacher to conduct classes even if he uses other methods.

In this method, the role played by students also undergoes a fundamental change. By completing projects, they take greater responsibility for the teaching process and completed tasks, and are no longer just passive recipients of the content addressed to them by an academic teacher. By working on a project, students over time become "experts" in the issue that is the topic of the project[142].

The Project-Based Learning method is a modern approach to education, allowing for an interesting and unconventional way of implementing specific tasks at the university and contributing to solving problems posed within them. At the same time, it has many advantages in developing intellectual and practical skills that students should shape in the process of their own education.

12.2. Phases of implementing the Project-Based Learning

In most cases, carrying out design tasks can be divided into three phases[143]:

Phase I – Project preparation

Phase II – Carrying out the work planned in the project

Phase III – Assessment of project results

In all three of the above-mentioned phases, the teacher and student should undertake specific activities. They are presented below in the form of a table. Table 6 presents the

[138] Kilpatrick W.H. (1918):: The Project Method, Teachers College Record, XIX, 4.
[139] Kokotsaki D, Menzies V, Wiggins A. (2016): Project-based learning: A review of the literature. Improving Schools. 1-11.
[140] Stevenson J.A. (1930).: Metoda projektów w nauczaniu. Przekł. W. Piniówna, Książnica-Atlas, Lwów-Warszawa.
[141] Thomas J.W. (2000): A review of research on project-based learning. San Rafael (CA): The Autodesk Foundation. 2000 March:1–45.
[142] Szymański M.S., (200): O metodzie projektów. Wydawnictwo Akademickie Żak, Warszawa.
[143] Barak M, Shachar A. (2008): Projects in technology education and fostering learning: The potential and its realization. J Sci Educ Technol. 17: 285–296.

activities of the teacher and student in the first phase (preparing the project). The second stage of the project is the implementation phase, the activities of which are summarized in Table 7. The last element of the work is evaluation, i.e. assessment of the project, which is in Table 8.

Table 6. Project-Based Learnig - activities of teacher and student in phase of project preparing

Teacher activity	Student activity
Familiarizing students with the specificity of working with the method projects, especially when before they did not carry out projects.	Presentation and discussion of good examples, especially when carrying out projects for the first time, e.g. project descriptions, reports, material effects, video recordings, etc.
Selection of an issue to be implemented using project methods based on the analysis of learning outcomes and possible opportunities to take actions between subjects.	Possibility to submit your own project ideas.
Introducing students to the issue – an informational and motivational task, intended to arouse their interests, indication of possible ones to consider problems, motivated to action.	Choosing a project topic, taking into account own interests, predispositions, opportunities and educational outcomes e.t.c.
Selection of groups for project implementation - an academic teacher may allow students to independently select groups, especially when the group is interested in the subject of the project or based on identifying preferred roles in the team or other established criteria.	Independently selecting a team to implement the project in accordance with the criteria agreed with the teacher or carrying out the project independently.
	Gather preliminary information and consider possibilities of implementing the project, which is particularly important to specify project topics. Identifying sources help and advice.

Table 7. Project-Based Learnig - activities of teacher and student in phase of project execution

Teacher activity	Student activity
Regular consultation meetings with students. Providing students with the opportunity to participate in consultations with other academic teachers.	Participating in consultations organized by the teacher(s) - meeting deadlines, preparing specific questions, preparing partial reports, if previously agreed, skillfully using advice and tips obtained.
Providing students with independence in undertaken activities – intervening in difficult and crisis situations. Supporting students' activities, when necessary. Systematically observing and assessing students' progress in working on the project within the deadlines indicated in the project description.	Taking systematic actions in solving specific problems related to the implementation of the project: - collecting and storing information needed to solve the problems posed in the project, - selection and analysis of collected information, - choice-oriented reasoning optimal solution, - implementation of the project in practice.
Assistance and supervision in working on the report, providing e.g. software, materials, etc.	Preparation of a project report as specified by the teacher academic structure (elaboration computer, use of photos, lists, etc., depending on the nature project)
Creating conditions for it to be carried out presentations by students, e.g. organizing classes summarizing completed projects, providing the necessary means of presentation, etc.	Preparation of a project presentation taking into account previously agreed requirements parameters such as: presentation time, possibility of technical use presentation means, group participation in the resentation, etc.
	Presentation of the project on a group forum or organized exchange of student ideas.

Table 8. Project-Based Learnig - activities of teacher and student in phase of project evaluation

<table>
<tr><th>Teacher activity</th><th>Student activity</th></tr>
<tr><td>Evaluating the project report in accordance with adopted criteria, taking into account including aspects such as:
– originality and innovation of the topic and methods activities, sources of information,
– compliance of the scope of the report with the assumptions goals,
– substantive content of the work, independence in the performance of work,
– report structure,
– language of the report,
– aesthetics of the report.</td><td rowspan="3">Self-assessment that can take place both during the project implementation and after its completion. Self-assessment can help develop a student's awareness of their own learning processes, strengths and weaknesses, and for an academic teacher it can become valuable information about how the student works, how to motivate and support him or her.</td></tr>
<tr><td>Evaluating a material product (if execution was assumed) in accordance with the adopted ones criteria, taking into account among others other aspects such as:
– originality and innovation of the solution,
– compliance of the product with the assumed goals,
– how to use what you have and what you have acquired knowledge,
– aesthetics of workmanship,
– economic and ecological values, functionality, etc.,
– independence of work.</td></tr>
<tr><td>Evaluation of the project presentation in accordance with the established criteria
criteria, taking into account, among others, aspects such as:
– logic of the presentation layout,
– using appropriate terminology,
– use of visual means,
– professionalism,
– division of tasks in the group.
You can also be invited to evaluate the presentation other academic teachers or
external experts.</td></tr>
<tr><td>Project assessment – compliant projects with the established criteria, taking into account:
– planning and implementation of tasks,
– planning and financial management of the project,
– promotion of the project, etc.</td><td rowspan="2">Inferring about work on project and its final effects:
– indication of the project's strengths and possibly aspects of the problem which failed to resolve and why,
– formulating conclusions for the future.</td></tr>
<tr><td>Conducting a final assessment as feedback to the student: what are the strengths sides of his work where problems arose and what conclusions can be drawn from it for the future - in the form of a discussion with a group of students or an assessment card provided to them.</td></tr>
</table>

12.3. Opportunities to develop student competences thanks to Project-Based Learning

Working on a project provides many opportunities to develop new, necessary skills and competences. With appropriate commitment and motivation, through participation in the project, students, in addition to the knowledge and practical skills described in the learning outcomes, will develop personal and social competencies needed in the modern labor market, such as[144],[145]:

- **Communication** – working with the project method forces you to develop the ability to communicate effectively at the stage of planning, implementation and evaluation of the project among people involved in the project.

- **Creative thinking** – working with the project method allows students to exceed and break traditional thinking patterns. There is room for greater creativity and creative freedom, a more unconventional and often innovative approach[146].

- **Team working** – currently, the ability to work in a team is becoming one of the basic requirements of employers. We are brought up to be independent and individual, and we have to work in teams. It should be remembered that everyone who starts working in a team brings certain talents, ingenuity, specialist knowledge and a wealth of experience or ideas. A group can perform better than the sum of all individual abilities allows. We achieve a synergy effect. However, cooperation means much more than just being in the same group with others. It is necessary that there is a task whose result will be achieved through joint efforts and that there is a common goal in pursuit of which the success of each group member depends on the success of all. In practice, this means exchanging ideas, sharing resources and assigning tasks, supporting and helping each other, and the participation of each group member in the success[147],[148].

[144] Fatih Ayaz M, Söylemez M. (2015): The effect of the project-based learning approach on the academic achievements of the students in science classes in Turkey: A meta-analysis study. Egit Bilim. 40: 255–283.
[145] Dzierzbicka W. (1963): Metoda projektów. Eksperymenty pedagogiczne w Polsce w latach 1900-1939. Praca pod red. B. Suchodolski. Zakład Narodowy Ossolińskich, Wydawnictwo PAN.
[146] Harmer N, Stokes A. (2014): The benefits and challenges of project-based learning: A review of the literature. Plymouth, MA: Pedagogic Research Institute and Observatory (PedRIO).
[147] Donnelly R, Fitzmaurice M.: Collaborative project-based learning and problem-based learning in higher education: A consideration of tutor and student role in learner-focused strategies. In O'Neill G., Moore S., McMullin B. (editors), (2005): Emerging issues in the practice of university learning and teaching. Dublin: AISHE/HEA, p. 87–98.

- **Problem solving** – working with the project method indicates many emerging situations that require intervention by searching for methods and ways of solving the problems that arise. While working on the project, students have the opportunity to practice problem-solving methods of various topics and levels of difficulty. They should be motivated to use the acquired experience in new and unusual situations, adapting them to new conditions[149].

- **Using information** - working with the project method gives you the opportunity to train the ability to search for the most necessary information in various sources, select it, select it and use it in order to achieve the set project tasks.

- **Decision making** - working with the project method develops students' ability to make team and individual decisions and take responsibility for them. Presentation of results and defense of one's position - working with the project method allows students to develop the ability to use various techniques of preparing and conducting presentations and the ability to present their own and the group's achievements.

[148] Stevenson J.A. (1930): Metoda projektów w nauczaniu, przekł. W. Piniówna, Książnica-Atlas, Lwów-Warszawa.
[149] Fowler J., Walker R. (1996): Materiały szkoleniowe – kurs „Metodologia projektów" w ramach programu Phare Term. Szczecin.

13. Reflective Thinking

13.1. Reflective Thinking – description of the method and benefits for students and teachers

Reflective thinking is the process of analysing and evaluating our thoughts, experiences, and actions in order to gain deeper context and perspectives, which is supposed to lead to better decisions in the future[150]. The result of the reflective thinking process should be better outcomes based on previously acquired knowledge and experience.

Reflective thinking is the ability to think about WHAT we do and HOW we do it. Reflective thinking helps us understand something better by taking into account emotions, feelings, knowledge, and previous experiences, and at the same time is an attitude of openness to new solutions based on the obtained facts and thoughts. It requires moving away from established solutions and using mental effort to analyze the state and search for new, better solutions.

Reflection is a form of thinking that can be used in a planned way to achieve some goal or expected result, or it can be an unexpected outcome from the state of being "reflective"[151]. Reflection is considering why what you did or plan to do matters, whether it can be done better than in the past, or what solution seems best in a given situation or context.

Reflective thinking gives students a lot of freedom and allows them to use their natural path of development. Students make progress thanks to their activity and experience. However, the teachers are very important because they organize these didactic processes, i.e. reflection is a planned form of education.

Reflective Thinking is a method to support the teaching process for students and teachers. Through reflective thinking, students and teachers become active players in their learning journey, constantly adapting and developing based on their reflections. Reflective thinking helps students identify their strengths and weaknesses, define learning goals, and consider alternatives. For teachers, reflective thinking can help improve teaching practice and make teaching decisions based on data and previous experiences.

[150] Proctor Edu: Reflective Thinking – Definition & Meaning. Access online: https://proctoredu.com/glossary/reflective-thinking

[151] Moon J. (2004): Reflection and Employability. Learning & Employability Series. University of Exeter. Access online: https://www.qualityresearchinternational.com/esecttools/esectpubs/Reflection%20and%20employability.pdf

Detailed benefits of using reflective thinking for students:

1) Increases awareness through better understanding of yourself and your environment.
2) Prepares you to solve problems and make decisions more effectively.
3) Develops creativity and creative thinking.
4) Allows you to better understand the material and assimilate it for a longer period of time.
5) Develops learning skills and strategies.
6) Facilitates dealing with difficult emotions and situations.
7) Increases self-confidence.
8) Allows you to achieve a higher level of social maturity.
9) Allows you to get to know your strengths and areas worth working on.
10) Develops the ability to evaluate your own progress.

13.2. Models of Reflective Thinking - examples

In order to develop reflective thinking in classes with students, it is worth getting to know and using different models of this method. There are many models of reflective thinking in the literature. The most famous authors of reflective thinking models include Schön, Borton, and Gibbs[152].

13.2.1. Schön Model

According to Donald Schön, reflective learing results from[153]:

- **Reflection in action.** It is a process that includes a given activity and at the same moment reflecting on what we are doing. Student learning results from conscious analysis of one's own activity and the ability to make changes to it during the activity. Student thinks critically, tries out different approaches, and experiments during a given activity. Reflection in action is about learning from one's own actions and experience. It is a conscious process, but it does not have to be verbalized.
- **Reflection on action.** Reflection on action is an analysis of what happened from a certain time perspective. Learning comes from deep, intellectual reflection, which is

[152] Perkowska-Klejman A., 2013: Modele refleksyjnego uczenia się (A models of reflective learning). Journal „Teraźniejszość – Człowiek – Edukacja ", Nr 1(61), pp. 75-90.
[153] Schön D.A. (1987): Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Profession, Jossey-Bass Publishers, Oxford.

not accompanied by time pressure. Conscious analysis of the action often requires verbalization through discussing what happened with the activity partner or mentor. Analysis of the experience can also take place in written form. When reflecting on one's own practice, new cognitive values are created. The effect of reflection on action is new knowledge.

13.2.2. Borton Model

Terry Borton proposed a model of reflective thinking consisting of 3 stages, which are briefly described by the questions: what?, so what? and now what?[154]:

1) **WHAT?** This is a detailed description of the experience being analyzed that involves asking questions beginning with "what?", for example: What happened? What did I do? What was I trying to achieve? What was good or bad about this experience?
2) **SO WHAT?** This stage includes analysis and evaluation of what happened. The student makes in-depth inferences about the event and reflects on what is associated with this experience. Examples of guiding questions: What is the most important thing about what happened? What can I learn more from the experience?
3) **NOW WHAT?** In the final stage, we consider alternative courses of action and choose what to do next. We ask ourselves: what can I do now?, what do I need to do now?, what could I do later?, what might be the consequences of these events?

13.2.3. Gibbs Model

According to Graham Gibbs, reflection is a key category of the learning process and occurs at each of the six stages of the model he developed. The additional value of this concept is the emphasis on the role of emotions in learning[155]. Gibbs' model is cyclical and is divided into six key areas (Figure 24).

[154] Borton T. (1970): Reach, Teach and Touch. McGraw Hill, London.
[155] Gibbs G. (1988): Learning by doing: A guide to teaching and learning methods. Oxford Further Education Unit, Oxford.

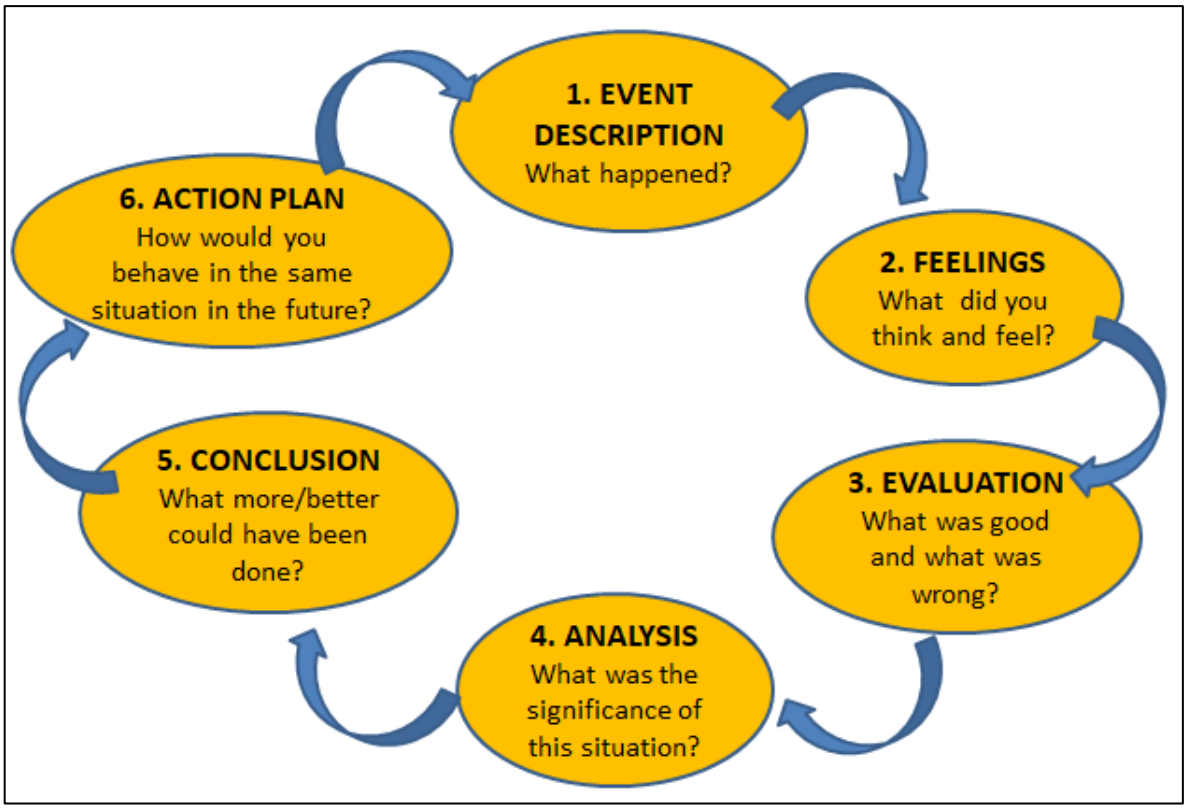


Figure 24. Six stages of the Gibbs' Reflective Thinking Model

The description of the 6 stages of the Gibbs model is as follows[156]:

1) **EVENT DESCRIPTION** – 1st stage. The event description is a detailed description of the facts that make up the event. The student reports on the activity, its participants and witnesses, the context and the result. He/she considers: where was he/she?, who else was there?, what were they doing?, what were others doing?, what was the context of the event?, what was the involvement?, what was the result of the activity?
2) **FEELINGS** – 2nd stage. In the second stage, the student should consider feelings, thoughts and their own attitude before and during the event. Questions for this stage may be: try to remember what you thought and felt at the beginning, how others influenced what you thought and felt?, what do you think about this event now?
3) **EVALUATION** – 3rd stage. Student makes here an estimate, which consists of assessing the causes of the event and their possible consequences. A good solution here is to point out the good and bad sides of the analysed experience. Evaluation is an attempt to assess and explain what happened. At this stage, the student wonders what went well and what went wrong in general, and what he/she did right or wrong?

[156] G. (1988): Learning by doing: A guide to teaching and learning methods… op.cit.

4) **ANALYSIS** – 4th stage. Analysis is a review of the event, which involves thinking about the meaning of the situation being discussed. The auxiliary questions at this stage are: what does this event mean to me and what is my role in it? Analysis can be done by examining each element of the event in detail. We explain separately: what went well?, what did I do well?, what did others do well?, what went differently than it should have?, how did others influence this element?
5) **CONCLUSION** – 5th stage. At this stage is an in-depth assessment of what happened. The student bases his/her criticism on what he/she knows and on external information about the discussed situation. The student formulates conclusions: what else could have been done? what should I not have done? At this stage, it is important to remember the purpose of reflection, which is to learn from experience. Detailed analysis and "honest research" are the conditions for a valuable learning opportunity.
6) **ACTION PLAN** – 6th stage. Last stage where is consists of thinking about how to behave in the future if a similar problem or situation occurs to the one that occurred in the past. Reflection is expressed by asking: if I would to find myself in this situation again, how would I act, knowing what I know now? In other words, at this stage the student looks into the future in case a similar problem/ situation/ project/ event is encountered again.

13.3. Tips, tools and examples for implementing reflective thinking in an educational work with students

In this section you will find information about tips, tools and examples that you can use in your work with students. They are universal regardless of the field of study, so they can also be successfully used among students related to the Food Value Chain.

Tips for introducing reflective thinking into the teaching process:

1) Start with short exercises and simple questions.
2) Present the benefits and explain in what situations the ability to think reflectively is useful or necessary.
3) Get students used to the reflection process by regularly using elements of this method in your teaching.

4) Do not evaluate the conclusions and the way students speak. Prepare a space and atmosphere that gives a safety and confidence for your students and will facilitate opening up to discussions and student involvement.
5) Let's focus on LISTENING to the answers and opinions and critical thinking of our students.
6) Let the students feel that you are interested in what they have to say and you are curious about their opinions (this also applies, or maybe especially, to those students who do not engage in the teaching process).

Figure 25 presents tools for developing reflective thinking in the process of education at the university level.

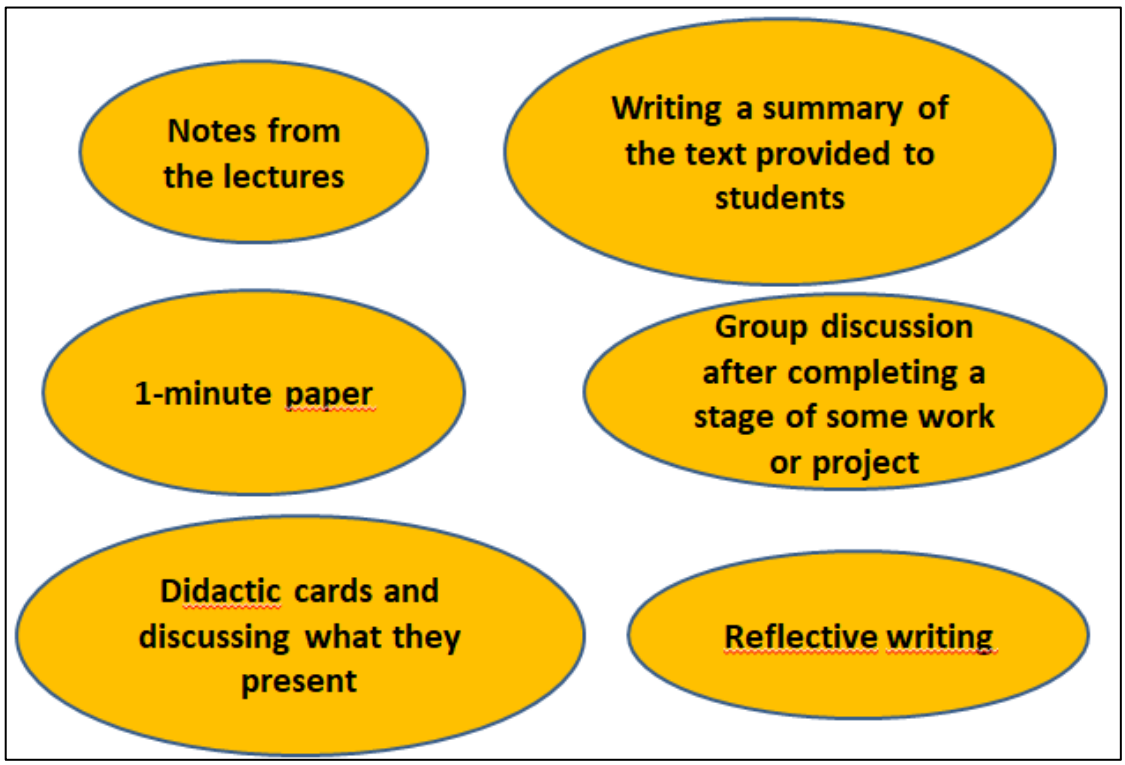


Figure 25. Useful tools of developing Reflective Thinking

Some tools that can be used to implement reflective thinking in work with students:

1) **Notes from the lectures.** Taking notes from lectures helps in the process of memorizing knowledge and collecting the most important information, reflections and observations. Notes can be taken classically in paper form or in electronic form if students can use modern IT tools such as smartphones, tablets or computers with appropriate software.

2) **Writing a summary of the text provided to students**. The teacher provides a text from a specific area of knowledge (with some information, data and/or description of problem or situation), and students are asked to summarize it with identifying their feelings and impressions that they experienced while reading the text.
3) **1-minute paper.** A one-minute paper is a very short activity (duration: 1 minute or less) written at the end of a class in response to a question asked by the teacher, which prompts students to reflect on the material covered that day. This activity can also provide useful feedback to the teacher.
4) **Group discussion.** This is about conducting a group discussion after completing a stage of some work or project. This allows for a team evaluation of what has been done and drawing conclusions for improvement.
5) **Didactic cards and discussing what they present.** Didactic cards are a form of educational resources supporting the learning process. They should show images related to a given course, problem or project. These images can be directly related to a given topic or those that trigger appropriate associations. Educational cards can be purchased in a ready-made form or prepared independently as part of the educational process. Their use allows knowledge to be transferred through play, and additionally stimulates the activity of brain cells, improves memory, supports intelligence and makes it easier to focus on a specific task. **For example, in FVC studies**, if the course concerns food marketing, the teaching cards should have pictures associated with product, pricing, distribution or promotional policy related with food assortment, and in the case of a plant cultivation course, the cards should have pictures of crop plants in various stages of growth and development, various weeds, or visualizations of crop diseases or the effects of improper soil cultivation or fertilization.
6) **Reflective writing.** Reflective writing involves documenting your reaction to experiences, opinions, events, or new information. Reflective writing can take the form of putting your thoughts down on paper, conducting a monologue on paper, or articulating certain considerations that allow you to systematize certain issues or problem elements that you are considering.

Here is an example of using '**Reflective Thinking' and 'Reflective Writing' in writing a master thesis by a student.** The entire process of writing a thesis is divided into three parts: reflect, review and refine, and we use the following guiding questions in them:

1) **REFLECT**. What stages did the process of writing a bachelor's thesis consist of? How did the writing process proceed? What did you feel while writing your bachelor thesis?
2) **REVIEW**. What was good? What didn't you manage to do? What mistakes did you make? What could have been done differently? What did this experience teach you?
3) **REFINE**. What could have been done better when writing a master's thesis? What actions do you want to take to achieve the goal of a good quality master's thesis?

13.4. Reflective Thinking - supplementary materials and knowledge extension

More materials about reflective thinking as a teaching method can be found here:

- The Open University: Open course "Succeeding in postgraduate study, Session 2: Reflective thinking, reflective learning and academic writing". The Open University, Milton Keynes, UK. Access online: https://www-open-edu.translate.goog/openlearn/mod/oucontent/view.php?id=51386&_x_tr_sl=en&_x_tr_tl=pl&_x_tr_hl=pl&_x_tr_pto=rq&_gl=1*1vezvko*_up*MQ..*_ga*MTE2NTA0OTk3MC4xNzQxNTczMjc0*_ga_Z74G55VLY4*MTc0MTU3MzI3My4xLjEuMTc0MTU3MzMwMS4wLjAuMTM2NTAxNDMzNg..*_ga_43365CF947*MTc0MTU3MzI3Mi4xLjEuMTc0MTU3MzMwMS4wLjAuMTAzMTk2NjI2Nw..
- Perkowska-Klejman A. (2024): Does Tutoring Develop Reflexivity? Multidisciplinary Journal of School Education, 13(1(25), 131–151. Access online: https://doi.org/10.35765/mjse.2024.1325.07
- Video „Gibbs Reflective Model with an Example – Simplest Explanation Ever". Available online: https://www.youtube.com/watch?v=f_wprGcziso
- Video „Jak uczyć myślenia krytycznego? (How to teach a critical thinking)". Available online: https://www.youtube.com/watch?v=PcefQdySMb0
- Video „Reflective Teaching (Explained for Beginners in 3 Minutes". Available online: https://www.youtube.com/watch?v=f_wprGcziso
- Video „Understanding Reflective Practice". Available online: https://www.youtube.com/watch?v=iBmtH0Qx0YU&t=40s

14. Gamification

14.1. Introduction

The constantly changing reality requires constant adaptation. These changes concern all aspects of human life, including education. The digital revolution forces the search for innovative solutions that will make the teaching process more attractive and effective. One way to meet the expectations of modern youth in the context of learning is gamification, i.e. the use of game elements and rules in a context unrelated to traditional entertainment. Growing competition, diverse expectations and challenges related to motivation and commitment make it one of the effective tools for engaging and mobilizing people to the desired actions. Gamification can therefore be a response to the needs of the world, which wants to increase efficiency and also to introduce fun and satisfaction into everyday activities.

Recent times have been a period of very rapid changes in education. Traditional teaching is increasingly being enriched with activating methods of education, one of which is gamification described in the study. Although its elements have been used in education for years (e.g. the use of assessments, which can be treated as specific badges or points), the need to make the teaching process more attractive, increase motivation and commitment, and also create positive habits are just some of the positive aspects of gamification of classes. Thanks to this method, the development of social and personal competences is observed in participants.

Gamification will enjoy growing popularity in the near future, which will probably contribute to its evaluation and expansion of the areas in which it can be implemented. The possibilities of this method are enormous, and technological development (e.g. the development of artificial intelligence) creates further opportunities for it.

14.2. Gamification – general issues

Table 9 presents some definitions of gamification that emphasize its various aspects from design techniques, through the impact on behavior, to engagement and motivational goals.

Table 9. The concept of gamification

Authors	Definition
Deterding S. and colleagues[157]	Gamification is the use of game elements, game mechanics and game design techniques in contexts other than games in order to increase user engagement and motivation.
Werbach K. and Hunter D.[158]	Gamification is the use of game elements, such as points, badges, leaderboards, and challenges, in non-game situations to influence people's behavior and engagement.
McGonigal J.[159]	Gamification is the process of designing activities in a way that increases the sense of engagement, purpose, and reward, as in games, helping people achieve specific goals in the real world.
Kapp K. M.[160]	Gamification is the application of game principles, elements, and strategies to non-game situations to influence participants' behavior and improve their experience.
Siadkowski J.[161]	Gamification is a field that uses game mechanics to encourage people to do things they usually don't feel like doing or don't know they can do differently.
Tkaczyk P.[162]	Gamification is the transfer of game mechanisms (including computer games, but not only) to the real world to change human behavior.

Gamification is a relatively new concept that emerged as a natural evolution of the application of game theory and game mechanisms in areas that were not previously related to games. The aim of gamification is to:

- support the formation of positive habits and motivate to take specific actions,
- thanks to engaging elements such as a reward system, levels, challenges or competition, it encourages systematicity and commitment to specific behaviors,
- using various gamification tools, this process becomes more attractive and satisfying.

[157] Deterding S., Dixon, D., Khaled R., Nacke L. (2011): From Game Design Elements to Gamefulness: defining "gamification". Proceedings of the 2011 annual conference extended abstracts on Human factors in computing systems, s. 2425-2428
[158] Werbach K., Hunter D. (2012): For the Win: How Game Thinking Can Revolutionize Your Business. Wharton Digital Press.
[159] McGonigal J. (2011): Reality Is Broken: Why Games Make Us Better and How They Can Change the World. The Penguin Press
[160] Kapp K. M. (2012): The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education. Pfeiffer.
[161] Siadkowski J. (2014): Grywalizacja! Zrób to sam! Poradnik. Warszawa, p. 5
[162] Tkaczyk P. (2024): Grywalizacja: Jak zastosować mechanizmy gier w działaniach marketingowych. Onepress, p. 10

Gamification can be a very effective motivational tool, but it is associated with risks that should be carefully considered before its implementation. Here are some examples of the risks associated with implementing gamification:

- reward addiction (users can become addicted to rewards and points awarded for performing certain actions. As a result, they can focus on earning points rather than on achieving the main goals, such as learning, engaging in the community, or achieving real business goals).
- inequality and demotivation (gamification can lead to a situation where only the most active or best players earn rewards, which can demotivate people who are not able to compete at the same level).
- foreshortening (focusing on short-term goals, such as earning points or levels, can lead to neglecting long-term goals).
- too much competition (excessive competition can lead to stress and pressure, especially when users feel that they have to constantly compete with others to earn rewards).
- misalignment with organizational goals (gamification, if not properly aligned with organizational goals, can lead to a mismatch between user actions and expectations) organization).
- oversimplification of complex problems (competition can cause simplification of complex processes, which can lead to omitting important but difficult aspects).
- disruption of authenticity and value (gamification elements can make user actions mechanical, performed only to earn points or rewards).
- privacy and data security issues (gamification applications often collect large amounts of personal data and information about user behavior, which can raise privacy and security concerns).
- increased costs and resources (implementing gamification systems requires investment in appropriate technology, management, and the creation of educational materials and challenges).

In the context of the above issues, it is crucial to find a balance between gamification elements and the actual goals of the organization, in order to avoid excessive focus on rewards and points, while effectively motivating users to carry out valuable actions.

According to Janusz Korczak: "education is the art of combining pleasure with learning". His approach to education and upbringing was based, among other things, on the belief that learning should be an engaging and pleasant process. Today, didactics is also looking for

attractive teaching methods that will result in greater effectiveness of education, stimulate creativity and contribute to the creation of positive experiences. One of the ideas that meets such expectations may be the previously described gamification[163].

Elements of gamification can become an effective motivational and engaging tool, however, when planning classes using this method, it is worth remembering a few "golden rules of gamification", which are presented in Figure 26.

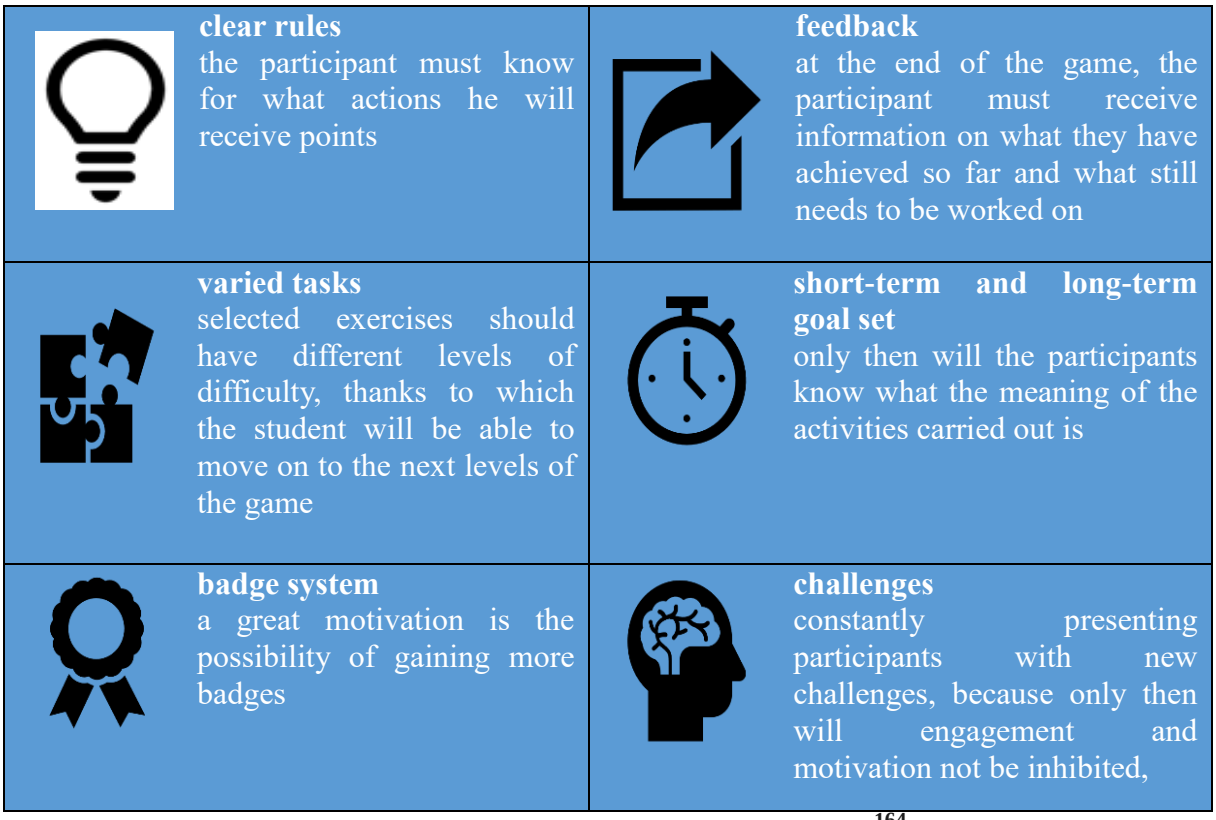


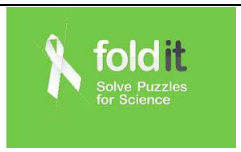
Figure 26. Golden rules of gamification[164]

Below are examples of applications with elements of gamification The growing use of new technologies in education opens up new opportunities for gamification. Currently, there are many educational applications and games on the market that use elements of gamification. The most popular educational application and games are in Table 10.

[163] Prażmowska-Bartoszek K. (2022): Jak skutecznie „odkurzyć" stare planszówki? Granie w gry i tworzenie gier, czyli o roli grywalizacji w praktyce nauczycielskiej- wskazówki praktyczne. In M. Szabłowska-Zaremba (ed.), Gra i grywalizacja w kulturze XXI wieku. Lublin 2022, Poland, p. 12-23.

[164] Source: own study based on Cognitus.pl Blog. Access online: https://cognitus.pl/blog/gamifikacja-w-edukacji-co-warto-wiedziec/

Table 10. Examples of educational applications and games

Kahoot![165]		An app that lets you create interactive quizzes
Quizizz[166]		An app that lets you create quizzes that students can solve in real time
Duolingo[167]		The most popular apps for learning foreign languages
Foldit[168]		An educational game that helps solve real scientific problems
Mathletics[169]		An educational application that combines mathematics with elements of gamification.

The use of applications and interactive games in education is gaining importance. The pandemic period contributed to the implementation of these tools in education. The following years will certainly contribute to their development, especially since an increasingly wider group of pupils, students and listeners use new technologies.

14.3. Golden Talars – an example of a scenario for using gamification in work with students

Below is an example of a gamification scenario (the game Golden Talars: Extreme Mission) that can become an inspiration for educators.

[165] Source: Kahoot.com. Access online: https://kahoot.com/
[166] Source: Quizizz. Access online: https://quizizz.com/?lng=pl
[167] Source: Duolingo.com: Access online: https://pl.duolingo.com/
[168] Source: Scistarter.org: Access online: https://scistarter.org/foldit
[169] Source: Mathletic.com: Access online: https://www.mathletics.com/uk/

Golden Talars: Extreme Mission

Goal The Golden Talars: Extreme Mission game is an interactive way to learn economics, which engages participants in competition, developing knowledge and skills by solving economic puzzles. The game combines elements of competition with education, giving players the opportunity to gain knowledge that they can use to save the country and earn the title of hero. The introduction of gamification elements, in which students compete to win golden thalers through activity during lectures and answers to puzzles related to the subject of the course, was intended to improve attendance at the economics lecture.

Benefits of introducing gamification elements in classes

- Increased attendance: Students will be more motivated to regularly attend lectures, knowing that their presence and activity will be rewarded.
- Increased engagement: Gamification elements will make lectures more interactive and engaging, which will allow for better knowledge acquisition.
- Knowledge development: By answering riddles and preparing their own, students will have the opportunity to deepen their knowledge of economics.

Plot: There is great uncertainty in the country - the Minister of Economy, a key figure in the management of state finances, has been kidnapped by a mysterious criminal group. The kidnappers demand a ransom in the form of a huge sum of gold thalers, and time is running out - if the appropriate amount is not collected by the end of the semester, the Minister will be executed and the country will plunge into crisis. The only hope is a group of brave people who will take up the challenge and compete to obtain the thalers. The task is to collect golden thalers by answering weekly economic puzzles that appear in subsequent classes. Sometimes the answers will require not only knowledge, but also creativity and logical thinking to get as many thalers as possible.

Game rules:

1. First round – Collecting thalers:

- Players participate in 12 classes, during which they will solve puzzles related to various aspects of economics, management or marketing.
- For each correct answer, the player receives 1 thaler.

- The player can earn additional thalers in 13 classes by preparing a puzzle for other participants, then the scoring looks like this:
  - ♣ 1 thaler for preparing a puzzle,
  - ♣ 2 thalers for a situation when none of the participants correctly answers the puzzle.

2. Second round – Economic Tournament:

- After the first round (in 14 classes), the players who collect the most thalers move on to the second round – the Economic Tournament.
- In this stage, participants must answer more complicated questions about economic theory. Topics range from basic principles to advanced problems in economics, finance, global markets, and economic policy.
- The highest scorers in this stage receive additional thalers:
  - ♣ 1st place – 3 additional thalers,
  - ♣ 2nd place – 2 additional thalers,
  - ♣ 3rd place – 1 additional thalers.

3. Final – Freeing the Minister:

- At the end, after adding up all the thalers won in both rounds, the player with the most thalers becomes the hero of the country.
- The player with the most thalers receives the key to the dungeons where the Minister of Economy is held, and frees him, restoring order and stability to the country.
- Depending on the number of thalers collected, players can also participate in other activities, such as organizing humanitarian aid for the country, negotiating with kidnappers, or implementing economic reforms that will prevent future crises.

Additional game elements:

- Ranking: The game has a dynamic ranking system that tracks players' performance at each stage. Players can compete to be the best economist in the game.
- Co-op mode: Ability to cooperate with other players in acquiring thalers, sharing puzzles, and exchanging strategies.

Awards for the Best:

At the end of the semester, the winners of the competition for golden thalers will be announced. In addition to additional points for evaluation, students will receive symbolic prizes (e.g. books on economics, tickets to scientific events) and the title of "Hero of Economics".

15. Effectuation Theory as a teaching method

15.1. Introduction

The 21st century demands higher education methodologies that not only give deep expertise but also foster creativity, adaptability, and entrepreneurial thinking. Effectuation theory, originally conceptualized in the context of entrepreneurship, has found significance in educational settings to promote decision-making under uncertainty, taking advantage of available resources, and focusing on controllable outcomes. This teaching methodology aligns well with developing competencies needed in dynamic fields, including the food value chain.

Effectuation theory offers a practical and adaptable framework that resonates with the needs of modern education, particularly in dynamic fields such as the food value chain. By embedding this methodology into curriculum, educational institutions can cultivate a generation of students equipped to tackle complex, uncertain challenges. In addition, it enables students to gain entrepreneurial skills that go beyond traditional forecasting and planning. They learn to take advantage of their unique set of skills, networks, and experiences; strategically limit potential losses; co-create with stakeholders; transform unexpected challenges into innovations; and take deliberate action to shape the trajectory of their ventures. In doing so, they become adept and resilient entrepreneurs capable of thriving in complex and evolving markets.

15.2. The definition of effectuation theory

Effectuation theory is an approach to decision-making that emphasizes starting with available means (who you are, what you know, and whom you know) and co-creating new opportunities with stakeholders, rather than trying to predict the future. Saras Sarasvathy introduced the concept in the early 2000s[170], highlighting five key principles (Figure 27).

[170] Sarasvathy, S. D. (2008): Effectuation: Elements of entrepreneurial expertise. In Elements of Entrepreneurial Expertise New Horizons in Entrepreneurship series. Edward Elgar Publishing. DOI:10.4337/9781848440197

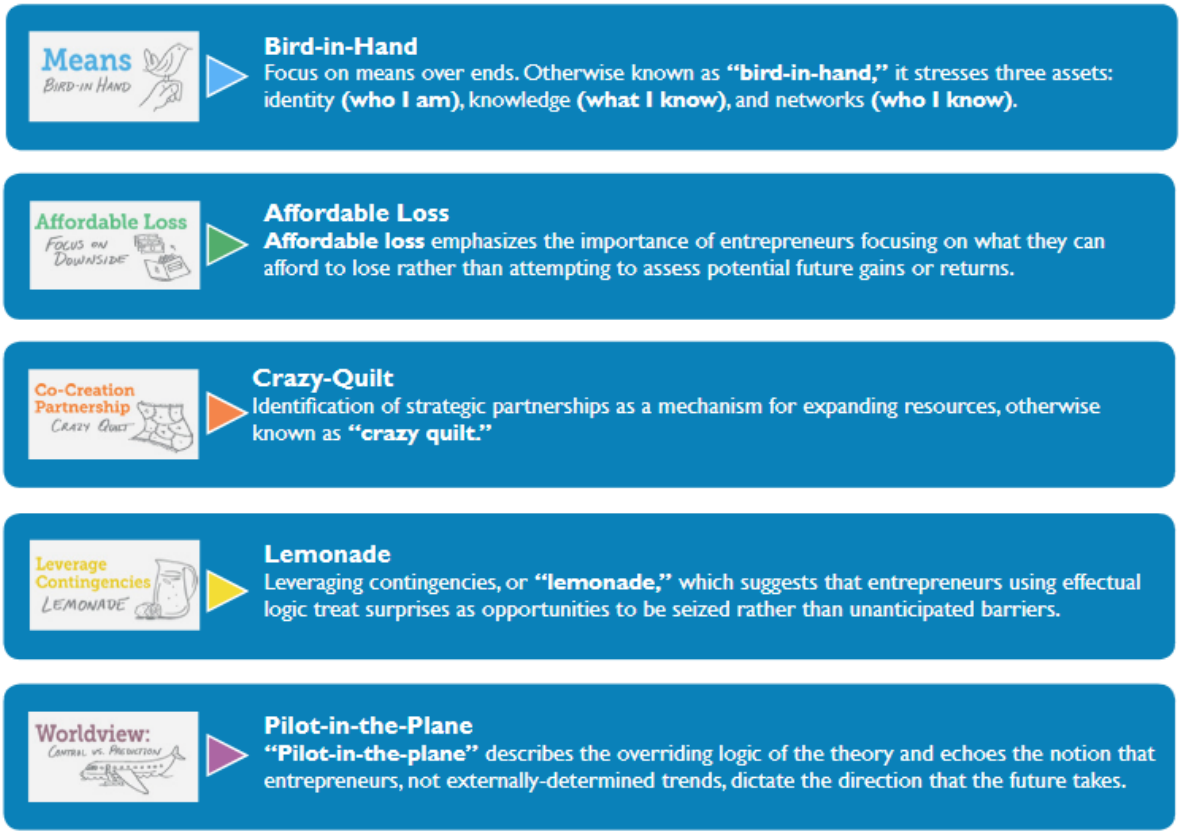


Figure 27. Five principles of effectuation theory[171]

Here is a descriptive presentation of the five principles of effectuation theory.

1) **Bird-in-hand principle**: suggests that individuals should begin with an assessment of their current resources such as: their identity, knowledge, and connections rather than starting with a fixed goal. In a university setting, professors can encourage students to evaluate their skillsets, networks, and interests to define project goals. For instance, in a course on the food value chain, students could inventory their culinary skills, local connections, or knowledge of sustainable agriculture. This approach ensures entrepreneurial ventures are authentic and based on existing capabilities[172],[173].

2) **Affordable loss principle**: discusses the affordable loss principle in entrepreneurship, which prioritizes limiting downside risk over maximizing expected returns. This approach is valuable in higher education, where students can prototype and test business ideas with minimal cost. By making small-scale, manageable experiments, students learn to handle

[171] Source: "Effectuation 101." Society for Effectual Action. Online: https://www.effectuation.org/?page_id=207 . (Accessed December 3, 2019). In: Bitga A., Feige D., Pallatino Ch.: Summary Brief: Effectuation Theory: Helping Young Entrepreneurs Start Their Business. USAID, Youth Power Learning, p. 3. Access online: https://22657557.fs1.hubspotusercontent-na1.net/hubfs/22657557/Public%20Documents%20For%20Site/YPL%20Effectuation%20Summary%20Brief_0.pdf

[172] Effectuation.org: Effectuation 101. Access online: https://effectuation.org/effectuation-101 (accessed on 6 December 2024)

[173] El-Kafafi, S. (2022): Entrepreneurial Leadership Effectuation in Higher Education after the COVID-19 Pandemic. African Journal of Economics, Politics and Social Studies, 1(1), 97-105.

uncertainty, gather feedback, and iterate without significant risk. This method complements project-based learning, allowing controlled failures to teach important lessons and contribute to success[174],[175].

3) **Crazy quilt principle**: emphasizes the importance of forming partnerships with other self-selected stakeholders who bring complementary skills, resources, and perspectives. In educational settings, students can be encouraged to collaborate across disciplines—for instance, teaming a nutrition science student with a business major and a design student. Together, they might co-create a short supply chain for a campus-based farm-to-table project. Educators can facilitate introductions to community organizations, local growers, or nonprofit entities within the food value chain to help students experience how networks and collaborative efforts generate new ideas, markets, and pathways to implementation[176],[177].

4) **Lemonade principle**: encourages embracing and leveraging unexpected events as opportunities rather than fearing them. In a food system course project, supply chain disruptions can be seen as chances for innovation. Educators can facilitate this by using simulations, role-plays, or real-world challenges requiring students to adapt their strategies in response to unpredictability. This practice fosters resilience and resourcefulness, essential skills for handling the complexities of volatile markets and the food value chain's social, economic, and environmental aspects[178],[179],[180].

5) **Pilot-in-the-plane principle**: advises entrepreneurs to focus on controllable factors rather than predicting the future. In academia, this means teaching students to manage elements within their control, such as networking with local producers or impacting consumer choices through storytelling, rather than forecasting global market trends. This approach helps students realize their actions can shape their venture's path, emphasizing their influence on entrepreneurial outcomes even in complex environments[181],[182].

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[174] Youthpower.org: Effectuation Study Training Guidance. Access online: https://www.youthpower.org/sites/default/files/YouthPower/files/resources/Effectuation%20Study%20Training%20Guidance%20final_0.pdf (accessed on 6 December 2024)

[175] Memar, N., Sundström, A., & Larsson, T.: Teaching causation and effectuation in the large classroom: A production–trade game, 2021, Journal of Management Education, 45(3), 438-478.

[176] SSES Learninglab: Teaching effectuation from theory to pedagogy. Access online: https://learninglab.sses.se/workshops/teaching-effectuation-from-theory-to-pedagogy/ (accessed on 6 December 2024)

[177] YouthPower.org. Access online: https://www.youthpower.org/ (accessed on 6 December 2024)

[178] Sarasvathy, S. D. (2008): Effectuation: Elements of entrepreneurial expertise. In Effectuation… op.cit.

[179] Read S., Sarasvathy S., Dew, N., Wiltbank R. (2016): Effectual entrepreneurship. Routledge.

[180] Dew N., Read S., Sarasvathy, S. D., Wiltbank R. (2009): Effectual versus predictive logics in entrepreneurial decision-making: Differences between experts and novices. Journal of business venturing, 24(4), 287-309.

[181] Effectuation.org: Effectuation 101. Access online: https://effectuation.org/effectuation-101 ... op.cit.

[182] SSES Learninlab: Teaching effectuation from theory to pedagogy. Access online: … op.cit.

Figure 28 shows a cyclical process that begins with the resources you already possess: your identity, knowledge, and network and moves toward setting achievable goals, engaging with others, and gaining their commitment.

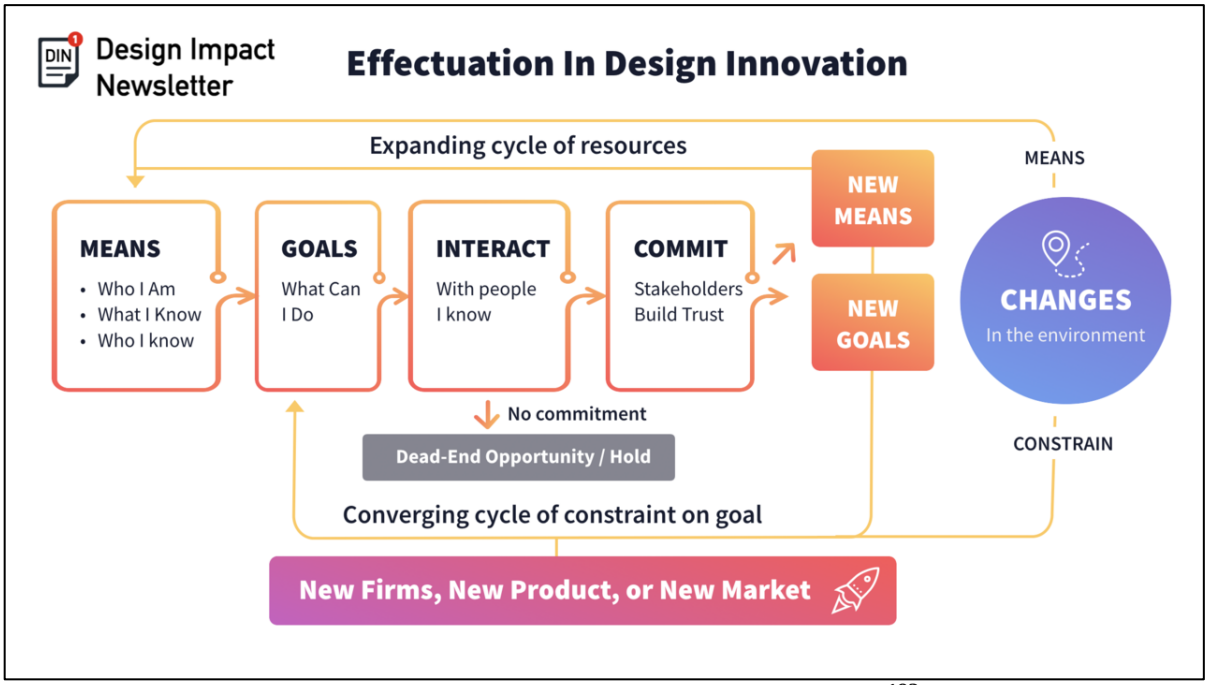

Figure 28. Effectuation in design innovation[183]

This iterative cycle (Figure 28) adapts to changes in your environment, allowing you to refine both your means and your objectives as you learn from real-world interactions. In essence, it's a dynamic approach that thrives on starting with what you have at hand, leveraging relationships, and steadily evolving toward innovative outcomes even when resources, time, and clarity are limited. Only after understanding this cycle does it make sense to explore the underlying effectuation theory and its five key principles.

15.3. Ideas for using the effectuation theory in working with FVC students

If you want to use the effectuation theory in your work with students in the field of Food Value Chain (FVC), you can use the following suggestions for didactic classes:

- **Case-based learning and simulations**: presenting students with real or hypothetical scenarios in the food value chain (for example, designing a sustainable packaging prototype (Figure 29) that require them to identify existing resources, form partnerships, and adapt to emerging constraints.

[183] Source: Deby J. (2022): Effectuation in Design Innovation. LinkedIn. Access online: https://www.linkedin.com/pulse/effectuation-design-innovation-deby-joevita (accessed on 12 December 2024)

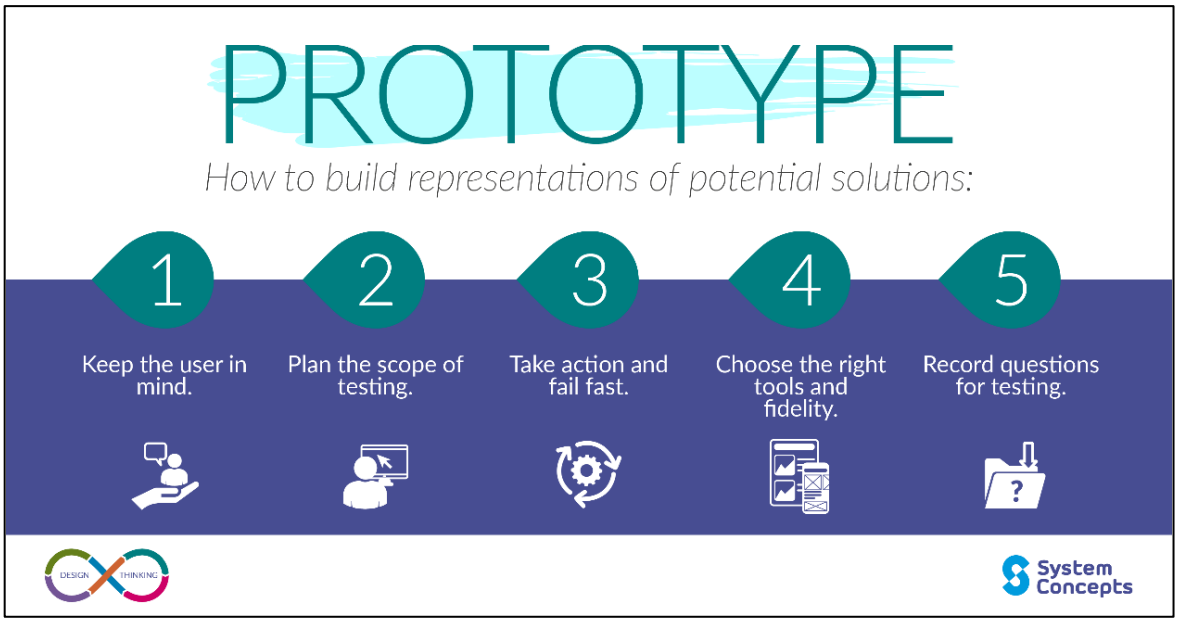

Figure 29. Prototype process[184]

- **Interdisciplinary teamwork**: encourage students from agriculture, business, engineering, environmental sciences, and other relevant fields to form cross-functional teams (Figure 30). Such interdisciplinary collaborations reflect the crazy quilt principle and enable a richer learning experience.

Figure 30. Spider-Web concept map of a hypothetical agricultural systems research team[185]

[184] Source: System Concepts: Design Thinking: Prototype. Access online: https://www.system-concepts.com/insights/design-thinking-prototype/ (accessed on 12 December 2024)

- **Interactive prototyping and reflection**: assign projects that require multiple rounds of testing, feedback, and iteration, where students learn to embrace setbacks (lemonade principle) and refine their offerings while managing affordable.
- **Mentorship and networking opportunities**: providing access to networks of entrepreneurs, alumni and industry professionals, helping students practice forming partnerships and building their 'crazy quilt' of relationships.
- **Field visits and stakeholder interactions**: facilitating direct engagement with local farmers, food cooperatives, community-supported agriculture (CSA) groups, and Non-Governmental Organizations (NGOs) to expose students to the complexities of the food system and foster co-creation of solutions that reflect the bird-in-hand and pilot-in-the-plane principles (Figure 31).

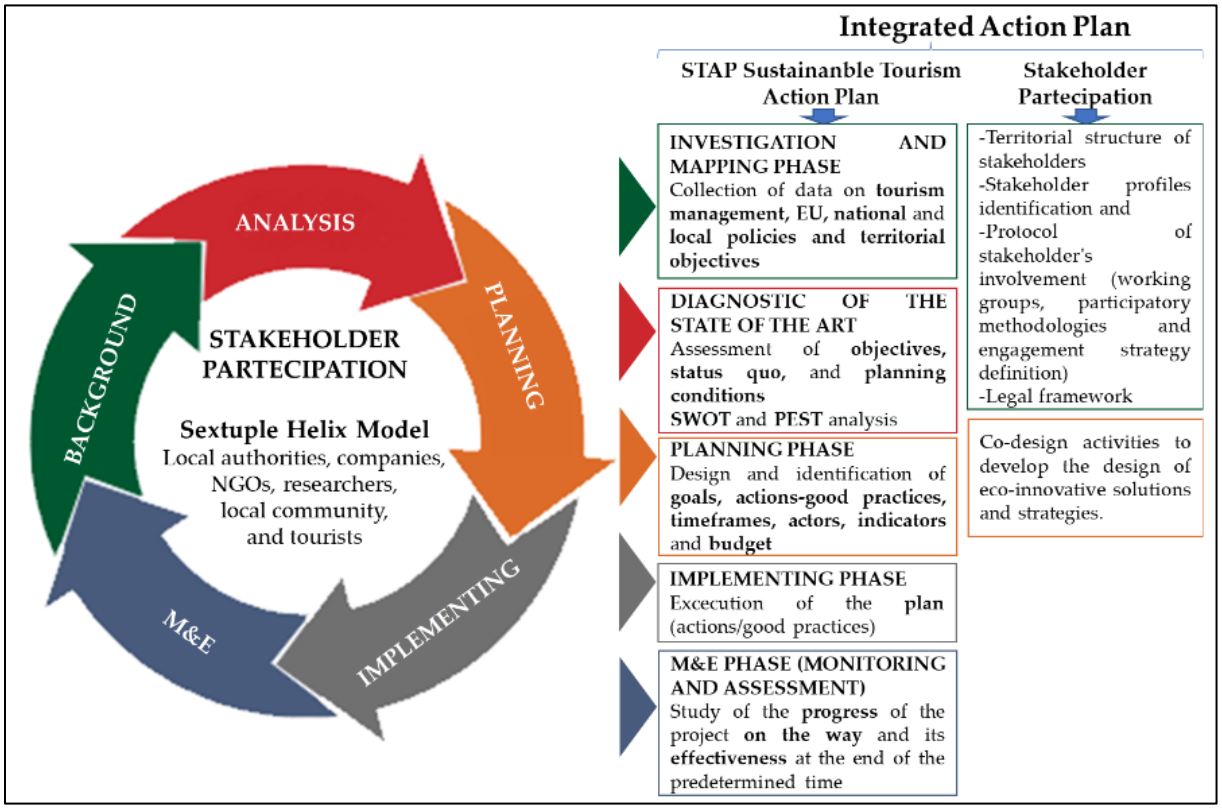

Figure 31. This process focuses on developing the Municipal Integrated Action Plan (IAP) and emphasizes the role of stakeholder participation, using sustainable tourism as an example[186]

[185] Drinkwater L.E., Friedman D., Buck L. (2016): Systems Research for Agriculture: Innovative Solutions to Complex Challenges. SARE Handbook Series 13. Sustainable Agriculture Research & Education, USA, p. 30. Access online: https://www.sare.org/publications/systems-research-for-agriculture/chapter-two-collaboration-decision-making-and-organizational-structure-for-agricultural-systems-research/developing-a-collaborative-team/ (accessed on 12 December 2024)

[186] Spadaro, I., Pirlone, F., Bruno, F., Saba, G., Poggio, B., & Bruzzone, S. (2023): Stakeholder participation in planning of a sustainable and competitive tourism destination: The Genoa integrated action plan. Sustainability, 15(6), 5005. Access online: https://www.mdpi.com/2071-1050/15/6/5005 ; https://doi.org/10.3390/su15065005

15.4. Benefits of teaching with effectuation theory

The increasing popularity of effectuation theory as a teaching method is due to its ability to empower students to embrace uncertainty, create value from existing resources, and foster a mindset that thrives amidst ambiguity. By applying effectuation principles, students become more adept at navigating real-world challenges, working collaboratively, and adapting to constantly shifting conditions. As a result, educational experiences grounded in effectuation not only strengthen entrepreneurial thinking, but also raise resilience and long-term success.

The growing popularity of effectuation theory as a teaching methodology stems from its distinctive strengths, including:

- Enhancing entrepreneurial thinking and adaptability among students.
- Encouraging collaboration and the development of strong, diverse networks.
- Offering a structured yet flexible framework for navigating uncertainty.
- Promoting creativity and innovation through experimentation rather than prediction.

To deepen your understanding of effectuation theory, several online courses offer comprehensive self-learning opportunities on Udemy, Coursera, and edX Courses.

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NOTES

The Teacher Toolkit on Teaching Methodology

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More about the CHAIN project:

- Official website: **https://project-chain.eu/**
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