Co-funded by the
Erasmus+ Programme
of the European Union

Rodica Zimbru

STEAM as an approach for developing essential life skills

Training kit for teachers

Suceava, 2020


E=MC²
a²+b²=c²
v_f=v_i+at
H₂O

Co-funded by the
Erasmus+ Programme
of the European Union

Rodica Zimbru

STEAM as an approach for developing essential life skills

Training kit for teachers

Suceava
February 2020

This project is funded with the support of the European Commission. The content of this study does not reflect the official opinion of the European Union. Responsibility for the information and views expressed in this study lies entirely with the author(s).

Introduction

Adult education

Adult education is based on: **experience** and dialogue.
The experience belongs to two verbs: **to do** and **to observe**.
The dialogue is between **me** and **the others**.

The researchers identified four adult learning stages:

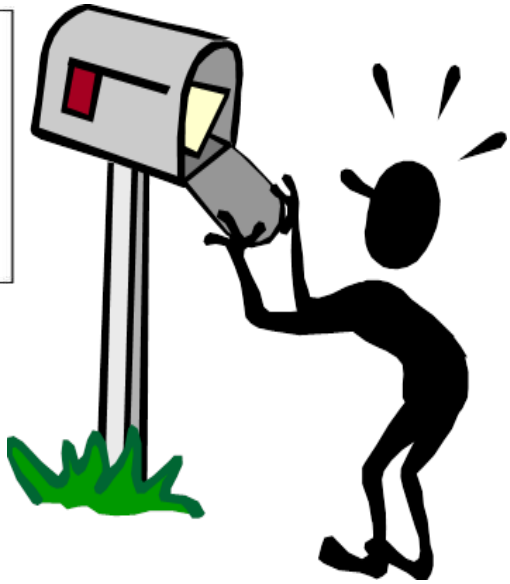
- **incompetent - unconscious:** does not know what to do and does not know does not know. He behaves as if he is gifted. (-) x (-) = (+);
- **incompetent - conscious:** aware of the fact that he does not know, could learn; it's a change;
- **competent - conscious:** the graduate. He knows that he is good, he also has the proof. Ex: I took the exam, I got the driving licence, so, give me the car.
- **competent - unconscious:** eg: drivers, listening to music while driving, teachers who do not necessarily need a methodical guide, etc. At this stage metacognition is reached.

Why do we learn? What do we want?

We want ... **CASH**:
⇒ **K**nowledge
⇒ **A**ttitudes
⇒ **S**kills
⇒ **H**abits (skills / behaviors)

So from a training course we want knowledge plus some attitudes.

> **Education is not the learning of facts, but the training of the mind to think.**
> — Albert Einstein



Lifelong motivation test

What are the reasons you participate into lifelong learning? Circle one of the 4 numbers.
Be honest with yourself, there is no right or wrong answer.

1 - does not motivate me 2 - partially motivated 3 - moderate motivation 4 - high motivation

1.	I'm looking for information for information's sake	1	2	3	4
2.	I have common interests with friends (husband / wife)	1	2	3	4
3.	I want professional advancement	1	2	3	4
4.	To become a more effective citizen	1	2	3	4
5.	Get rid of boredom	1	2	3	4
6.	To have someone's recommendations	1	2	3	4
7.	To satisfy a mind that is always looking for something	1	2	3	4
8.	To get rid of the daily frustrations	1	2	3	4
9.	To be accepted by others	1	2	3	4
10.	Get a higher status in my work	1	2	3	4
11.	To supplement a limited previous education	1	2	3	4
12.	Not to become a vegetable	1	2	3	4
13.	To have the knowledge to complete my further studies	1	2	3	4
14.	To fulfill my need for association and friendship	1	2	3	4
15.	To keep up with the competition	1	2	3	4
16.	Let me get rid of the straps of my profession	1	2	3	4
17.	To participate in group activities	1	2	3	4
18.	To develop my professional competence	1	2	3	4
19.	To find a solution to my personal problems	1	2	3	4
20.	To earn a diploma	1	2	3	4
21.	To get rid of the TV	1	2	3	4
22.	To help the community	1	2	3	4
23.	To win human relations	1	2	3	4
24.	To be a few hours without daily responsibilities	1	2	3	4
25.	I only learn for the sake of learning	1	2	3	4
26.	Get acquainted with nice people	1	2	3	4
27.	To get a contrast with the rest of my life	1	2	3	4
28.	Take a break from the routine of life	1	2	3	4
29.	Improve my ability to serve humanity	1	2	3	4
30.	Keeping up with others	1	2	3	4
31.	Improving my level of social connection	1	2	3	4
32.	To fulfill the official requests	1	2	3	4
33.	To maintain / improve my social position	1	2	3	4
34.	Let's get rid of an unhappy relationship	1	2	3	4
35.	Driver a contrast to my education	1	2	3	4
36.	To conform to someone else's suggestions	1	2	3	4
37.	I only learn to learn	1	2	3	4
38.	Make new friends	1	2	3	4
39.	Increased ability to work in the community	1	2	3	4
40.	I follow someone else's instructions	1	2	3	4

Interpretation of the test

Sum up your scores for the following statements.
Then, divide them with the number of the statements of each situation.

Social contact	***Social Stimulation***	***Professional advancement***	***Community service***	***External expectations***	***Cognitive interests***
2	5				
9	8	3	4	6	1
14	12	10	22	30	7
17	16	11	23	34	25
19	21	13	29	36	37
26	24	15	39	40	
31	27	18			
33	28	20			
38	35	32			
Total Media	**Total Media**	**Total Media**	**Total Media**	**Total Media**	**Total Media**

Module 1
1.1 Psychological and pedagogical approaches related to basic life skills

What are life skills?

Life skills is a term used to describe a set of basic skills acquired through learning and/or direct life experience that enable individuals and groups to effectively handle issues and problems commonly encountered in daily life.
They include creativity, critical thinking, problem-solving, decision-making, the ability to communicate and collaborate, along with personal and social responsibility that contribute to good citizenship – all essential skills for success in the 21st century, both for healthy societies and for successful and employable individuals.

Life skills touch upon issues that are:

- real: they actually affect people's lives
- Topical
- sometimes sensitive: they can affect people on a personal level, especially when family or friends are involved
- often controversial: people disagree and hold strong opinions about them
- ultimately moral: they relate to what people think is right or wrong, good or bad, important or unimportant in society.

Why do we need to teach life skills?

Democracies need active, informed and responsible citizens, who are willing and able to take responsibility for themselves and their communities and contribute to the political process.
Democracies depend upon citizens who, among other things, are:

- aware of their rights and responsibilities as citizens
- informed about social and political issues
- concerned about the welfare of others
- able to clearly articulate their opinions and arguments
- capable of having an influence on the world
- active in their communities
- responsible in how they act as citizens.

These capacities do not develop unaided; they have to be learnt. While certain life skills may be acquired through our everyday experience in the home or at work, they are not sufficient to adequately equip citizens for the active role required of them in today's complex and diverse society.
If citizens are to become genuinely involved in public affairs, then a more systematic approach towards citizenship education is essential.

How does training in life skills benefit young people?

⇒ It helps them to develop self-confidence and successfully deal with significant life changes and challenges, such as bullying and discrimination.
⇒ It gives them a voice at school, in their community and in society at large.
⇒ It enables them to make a positive contribution by developing the expertise and experience they need to assert their rights and understand their responsibilities, while preparing them for the challenges and opportunities of adult and working life.

Source: https://www.britishcouncil.gr/en/life-skills/about/what-are-life-skills

Classification, prioritization, their impact in someone's life, the need of developing them from a specific age, in order to succeed in life.

The World Health Organization identified 5 basic life skills that are crucial to cultivate and learn in order to have a better and more productive life.
Ranging from creative thinking to learning to cope with stress, these skills should be instilled in youth during their education and nurtured over a lifetime. Although the best time to develop these skills is during one's youth, the second best time is right now.
It's no secret that our education system isn't ideal. Many of the life skills we need aren't being taught; instead, we focus on programming youth with industry-specific skills to prepare them for the workforce. Too often, this means that kids are graduating from high school and college ill-equipped to handle the broader challenges found in life. Though important, learning the structure of a cell won't teach you how to de-escalate conflict before it goes too far, and learning how to find the value of x won't teach you how not to crumble under pressure. Not only do life skills improve one's quality of life, they are also attractive to employers, who need workers that are mentally stable and well equipped to handle challenges and responsibilities that aren't listed on the job description.
That's why the World Health Organization (WHO) identified five fundamental life skills that are relevant for everybody, regardless of culture, education, or background.

Specifically, the WHO focused on psychosocial skills rather than skills like, say, financial management or learning to cook. These are broad abilities that one can improve over time through conscious effort that deal with one's sense of self, sense of others, and cognitive abilities.

1. Decision-making and problem-solving

Everybody, even trust-fund babies, are faced with challenges and difficulties in their lives. Not all of us are talented at overcoming these challenges, however. Some misinterpret the premise of a problem, others work themselves in circles and get caught up in analysis paralysis. One way to make decisions and solve problems effectively is to follow Kristina Guo's DECIDE system, which she initially developed for health care managers:

- define the problem
- establish the criteria and constraints
- consider all the alternatives
- identify the best alternative
- develop and implement a plan of action
- evaluate and monitor the solution and feedback when necessary

2. Creative thinking and critical thinking

We all know that there are few domains that don't rely heavily on creative and critical thinking. Defining critical thinking, though is a very slippery task. "At one level we all know what 'critical thinking' means — it means good thinking, almost the opposite of illogical, irrational, thinking," wrote Dr. Peter Facione in his essay **"Critical Thinking: What It Is and Why It Counts."** But there's more to it than that vague definition, of course. Facione asserts that "Critical thinking [is] purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based." Put simply, it's a self-aware, focused, analytical way of looking at things.
As it turns out, one of the best ways to improve one's critical thinking skills is to study the humanities. The trend has been to think of the humanities as some kind of vestigial tail trailing behind the rest of the more cutting-edge fields of study, a holdover from a time when poets were actually celebrities.

3. Communication and interpersonal skills

The Irish playwright George Bernard Shaw once said, "The single biggest problem with communication is the illusion that it has taken place." Without becoming gifted, or at least competent, in communication, you're at risk for experiencing constant misunderstandings and needless fights and arguments.
Good communicators make more money, have higher self-esteem, have better marriages, and are sought out more by employers. Although social anxiety can make it challenging to get out there, seeking out metacognitive therapy

has been shown to be very effective. If it's feasible, just stepping out of one's comfort zone and intentionally practicing communication is perhaps the most effective method at improving this crucial life skill.

4. Self-awareness and empathy

Self-awareness and empathy are two sides of the same coin. Together, they constitute an understanding of the experiences, emotions, and thinking that take place both within oneself and in others. Researcher Phillipe Rochat described self-awareness as "the most fundamental issue in psychology" and for good reason. Little in life would not be improved by a thorough understanding of ones' own motivations. Research has shown that practicing mindfulness can promote self-awareness and empathy, critical skills that can combat drug addiction, reduce stress, and promote a stronger understanding of others. Many of the life skills mentioned in this list overlap, but none are quite as influential as self-awareness and empathy.

Coping with emotions and coping with stress

One of the few certainties in life is that things will go wrong. Learning how to handle these inevitable challenges with grace and resilience is essential. According to the American Psychological Association, there are ten methods for learning to promote resilience and bounce back from life's challenges:

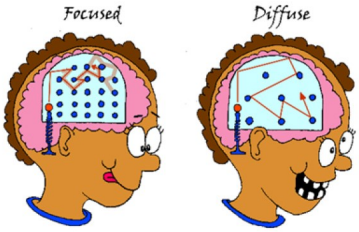
- make connections with friends and family members.
- avoid seeing crises as insurmountable problems.
- accept that change is a part of living.
- develop realistic goals and work towards them regularly.
- take decisive actions.
- look for opportunities for self-discovery, especially when faced with hardship.
- nurture a positive view of yourself.
- keep things in perspective. When face-to-face with a significant challenge, it can be easy to lose the big picture.
- maintain a hopeful outlook.
- take care of yourself by paying attention to your needs and feelings and by staying in good shape.

Source: https://www.skillscan.com/sites/default/files/Three%20Types%20of%20Skills%20Classification.pdf

5. Learning to learn

The following two spamm films will offer you some relevant information.
Sursa: https://www.youtube.com/watch?v=SA2cvyIwqkE
https://www.youtube.com/watch?v=WttZAXoKmbI

Learning-to-learn skills are essential for effective lifelong learning to develop over the entire lifespan. These skills, which consist of cognitive and metacognitive learning strategies, largely have been neglected in analyses of issues surrounding lifelong learning and in policy development. This article draws particularly upon the work of Weinstein, Meyer, Schraw and other cognitive psychologists to outline some of the knowledge and skills required and some of the educational implications for their development from a human developmental psychology perspective. Much of the initial work in establishing these skills needs to lie with schools for reasons of access and equity. However, since mastery of cognitive and metacognitive skills is not likely to be fully achieved by the end of secondary schooling, with metacognitive skills in particular only likely to reach fuller development through work experience, there are important implications for educators at further and higher education levels.

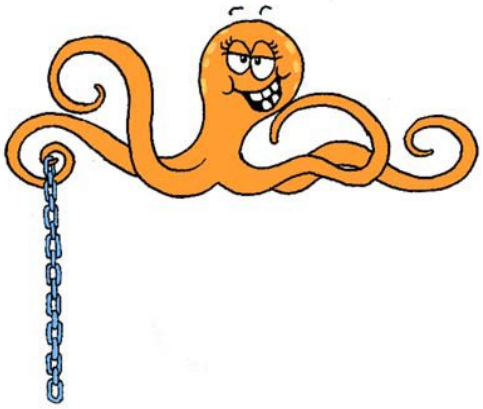


Here come **10 Top Ideas to Help Your Learning**

1. Make use of both the intense focused and relaxed diffuse modes. If you are getting frustrated, it's time to switch to another topic. Or get some physical exercise!

2. Create brain links with practice, repetition, and recall. Practice important problems so you can easily recall each step. Solutions, concepts, and techniques should flow like songs in your mind.

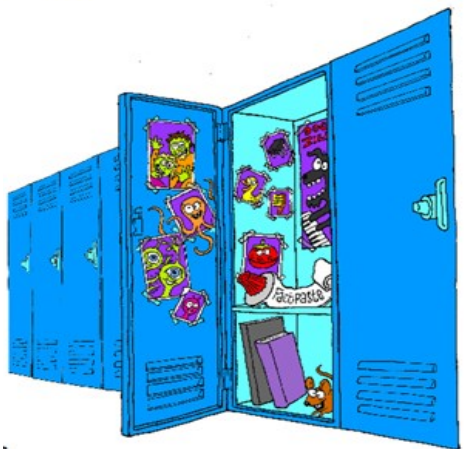
3. Interleave. Don't just keep practicing with slight changes in the same basic technique. Switch back and forth between different techniques. This will allow you to see when to use a technique. Books usually don't help you interleave. You will have to practice skipping back and forth between the ideas in different chapters yourself.



4. Space out your learning. Practice over at least several days. This gives time for your new synapses to form.

5. Exercise! Exercise feeds your neurons. It also allows you to grow new and stronger synapses.

6. Test yourself. Have others test you. Teach others. All of these are related to recall.
Testing and recall are the best ways to strengthen your learning.

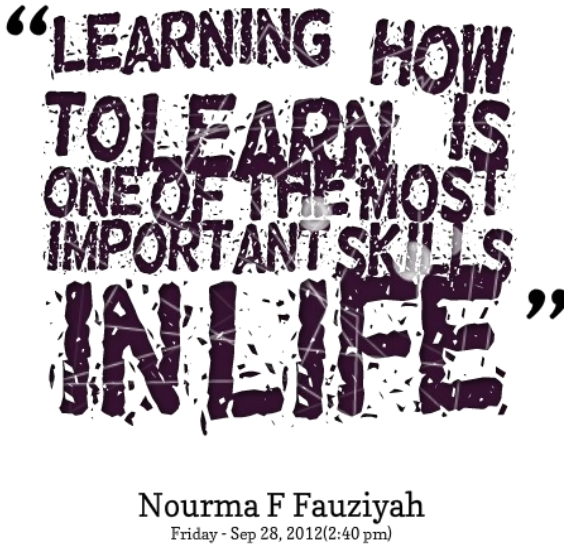


7. Use funny pictures and metaphors to speed your learning. Start using memory palaces.

8. Use the Pomodoro Technique to build your ability to focus and relax. Just turn off all distractions, set the timer to 25 minutes, focus, and then reward yourself.

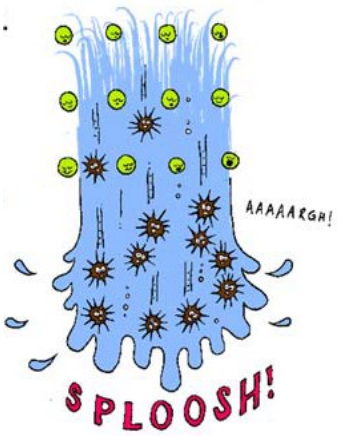
9. Eat your frogs first. Start your most difficult work first. That way you can either finish it or take a break to let your diffuse mode help you.

10. Find ways to learn actively, outside of your usual classes. Look online for other explanations. Read other books. Join a club. If you don't find a club in the subject that interests you, see if you can start one.



Sursa: https://barbaraoakley.com/books/learning-how-to-learn/

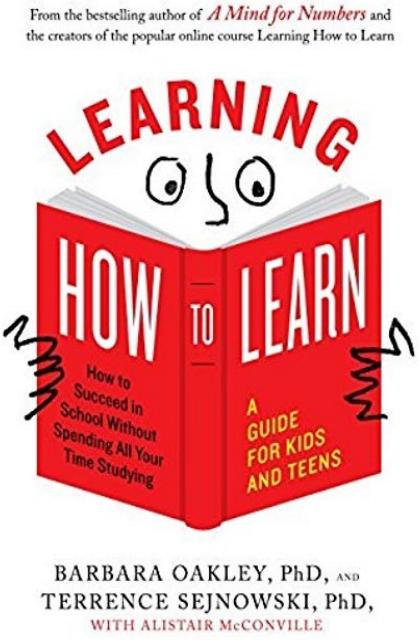
Ten Pitfalls to Avoid in Your Learning



1. Not getting enough sleep. Sleep makes your brain links stronger. It washes away toxins in your brain. If you don't get a good night's sleep before a test, nothing else you have done will matter.
2. Passive reading and rereading. You need to practice active recall, not just let your eyes pass over the same material.
3. Highlighting or underlining. Don't be fooled! Just highlighting or underlining big chunks of text doesn't put anything in your head. Make brief notes about the key concepts you are reading. Do this in the margin or on a piece of paper. These notes help you create a set of brain links of the key concepts.
4. Glancing at the solution to a problem and thinking you understand it. You need to solve the problem yourself.
5. Cramming. Last minute learning doesn't build solid sets of brain links.
6. Lazy learning. Don't just practice easy material. That's like learning to play basketball by focusing on your dribbling. Use deliberate practice—focus on what you find most difficult.

7. Ignoring your book. If you are using a textbook in your studies, remember to take a picture walk through your book or course notes before you get going. And be sure to read about how to do problems before trying to solve problems!
8. Not clearing up points of confusion. Are there just a few points you don't get? Chances are, these are precisely the points that will be asked about on the test. Be sure to get help from your teacher or your friends.

9. Distractions. Choose somewhere you can focus when you study. It's often a good idea to leave your smartphone turned off and out of reach.
10. Chatting with friends instead of studying with them. Good study groups can be a great way to help you learn. But "study groups" that mostly gossip instead of study aren't much use.



> "Learn is a verb – you have to do it, it is not done to you or for you"
> *Jackson, 2010*

6. Leadership skills

What is leadership?

The word "leadership" can bring to mind a variety of images. For example:

- a political leader, pursuing a passionate, personal cause.
- an explorer, cutting a path through the jungle for the rest of his group to follow.
- an executive, developing her company's strategy to beat the competition.

Leaders help themselves and others to do the right things. They set direction, build an inspiring vision, and create something new. Leadership is about mapping out where you need to go to "win" as a team or an organization; and it is dynamic, exciting, and inspiring.

Yet, while leaders set the direction, they must also use management skills to guide their people to the right destination, in a smooth and efficient way.

In this article, we'll focus on the process of leadership. In particular, we'll discuss the "transformational leadership" model, first proposed by James MacGregor Burns and then developed by Bernard Bass. This model highlights visionary thinking and bringing about change, instead of management processes that are designed to maintain and steadily improve current performance.

According to the idea of transformational leadership , an effective leader is a person who does the following:

⇒ creates an inspiring vision of the future.

⇒ motivates and inspires people to engage with that vision.

⇒ manages delivery of the vision.

⇒ coaches and builds a team, so that it is more effective at achieving the vision.

Leadership brings together the skills needed to do these things. We'll look at each element in more detail. Therefore, leadership is proactive – problem solving, looking ahead, and not being satisfied with things as they are. It combines the analytical side of vision creation with the passion of shared values, creating something that's really meaningful to the people being led. Leaders can also motivate and influence people through their natural charisma and appeal, and through other sources of power , such as the power to pay bonuses or assign tasks to people. However, good leaders don't rely too much on these types of power to motivate and inspire others.

Effective leadership is about all of this – and it's exciting to be part of this journey!

Sursa: https://www.mindtools.com/pages/article/newLDR_41.htm

1.2 Psychological approaches of STEAM concept

The XXI century requires from its citizens: pro-active attitude, problem solving abilities, creativity, multitasking, initiative, anticipative capacity, teamwork, empathy. There is a tendency in the curriculum to focus on integrative approaches, in which school subjects to interfere and offer the pupils a global viewpoint of the information, linking them to the real life.

The solution comes from the collaborative learning, using STEAM approach. STEAM is a curriculum based on the idea of educating students in five specific disciplines — science, technology, engineering art and mathematics — in an interdisciplinary and applied approach. Rather than teach the five disciplines as separate and discrete subjects, STEAM integrates them into a cohesive learning paradigm based on real-world applications, this way it stimulates pupils' learning motivation. Pupils' participation in active learning can strengthen relationships within the school, improve the classroom climate, accommodate a variety of learning styles and provide alternative ways of learning. There are some preoccupations in this area.

Bulgaria (http://www.stemcoalition.eu) and Greece (https://stem.edu.gr), consider that STEM attempts to transform teacher-centered teaching into teaching where problem solving and discovery-exploratory learning play a predominant role in the curriculum. The Romanian educational system (https://beaconing.eu) needs some new challenges and STE(A)M approaches could revive the interest for studying science, technology, math and engineering subjects. In Portugal (https://www.voced.edu.au) and Lithuania (http://ims.mii.lt), they work on two important aspects: the development of effective and attractive STEM curricula and teaching methods, and improved teacher education and professional STEM development.

What is STEAM?

STEAM is a curriculum based on the idea of educating students in five specific disciplines — science, technology, engineering art and mathematics — in an interdisciplinary and applied approach. Rather than teach the five disciplines as separate and discrete subjects, STEAM integrates them into a cohesive learning paradigm based on real-world applications, this way it stimulates pupils' learning motivation. Pupils' participation in active learning can strengthen relationships within the school, improve the classroom climate, accommodate a variety of learning styles and provide alternative ways of learning.

In addition to the connection of objects with real life, this approach provides an opportunity for the student's creativity. With this approach, the activities of schoolchildren poses a number of tasks that need to be addressed. With the help of such tasks, the child not only generates interesting ideas, but also immediately implements them. Thus, he learns to plan his activities on the basis of the task and the available resources, which will surely be useful to him in real life. At the International Conference "STEAM forward", held in 2014 in Jerusalem, the following statements were made:

- attracting children to STEAM. This education should start from the earliest preschool age, and therefore it is necessary to introduce programs in kindergartens;
- the language of science is English, because if we want to study science and be a scientist, we need to know this language.
- looking for STEAM education programs for girls. Girls in science, due to their accuracy, can do what boys can't do sometimes.

Thus, the future perhaps belongs to technologies, and the future of technologies, to teachers of a new format, who are deprived of prejudice, do not accept the formal approach and can, with their knowledge, "blow up the brain" to students and expand their horizons to infinity. The future depends on the Great Teachers STEAM!

STEM (science, technology, engineering, and mathematics)

STEM is an educational program developed to prepare primary and secondary students for college and graduate study in the fields of science, technology, engineering, and mathematics (STEM). In addition to subject-specific learning, STEM aims to foster inquiring minds, logical reasoning, and collaboration skills. In the United States, the program helps immigrants with skills in the STEM subjects obtain work visas. In addition, STEM focuses on perceived education quality shortcomings in these fields, with the aim of increasing the supply of qualified high-tech workers.

Educators break STEM down into seven standards of practice (or skill sets) for educating science, technology, engineering, and mathematics students:

- learn and apply content
- integrate content
- interpret and communicate information
- engage in inquiry
- engage in logical reasoning
- collaborate as a team
- apply technology appropriately

STEAM Education is an approach to learning that uses Science, Technology, Engineering, the Arts and Mathematics as access points for guiding student inquiry, dialogue, and critical thinking. ... These are the innovators, educators, leaders, and learners of the 21st century!

In recent years there has been a growing focus on the need to better prepare students for higher education and arm them with the skills and knowledge they will need to be successful innovators in a 21st century workforce. STEAM has gained popularity among educators, parents, corporations and institutions, as well as the President of the United States, as a way to fulfill this need. By engaging students around the subjects of Science, Technology, Engineering, Arts and Math, STEAM aims to spark an interest and life long love of the arts and sciences in children from an early age. Science, Technology, Engineering, Art, and Math (STEAM) are similar disciplines in that all involve creative processes and none uses just one method for inquiry and investigation. Teaching relevant, in demand skills that will prepare students to become innovators in an ever evolving world is paramount, not only for the future of these students but for the future of the country.

STEAM is an educational initiative created by the Rhode Island School of Design that adds the arts to the original STEM framework. According to the Rhode Island School of Design, “The goal is to foster the true innovation that comes with combining the mind of a scientist or technologist with that of an artist or designer.” The addition of the arts to the original STEM framework is important as practices, such as modeling, developing explanations, and engaging in critique, and evaluation (argumentation), have too often been underemphasized in the context of math & science education.

STEAM empowers teachers to employ project-based learning that crosses all 5 disciplines (science, technology, engineering, arts, math) and fosters an inclusive learning environment where all students are able to engage and contribute. As opposed to traditional models of teaching, educators using the STEAM framework bring the disciplines together, leveraging the dynamic synergy between the modeling process and math and science content in order to blur the boundaries between modeling techniques and scientific / mathematical thinking. Through this holistic approach, students are able to exercise both sides of their brain at once. Beyond the classroom both scientists and engineers use models—including sketches, diagrams, mathematical relationships, simulations, and physical models—to make predictions about the likely behavior of a system. They also collect data to evaluate the predictions and possibly revise the model as a result.

Why is STEAM so important?

In today's world, setting students up for future success means exposing them to these disciplines holistically in order to develop their critical thinking skills. "Education is under pressure to respond to a changing world," writes Jeevan Vasagar in a Financial Times article, *Countries that excel at problem-solving encourage critical thinking*. "As repetitive tasks are eroded by technology and outsourcing, the ability to solve novel problems have become increasingly vital."

And the earlier students are exposed to the STEAM disciplines, the better. In a study by Microsoft Corporation it was shown that 4 in 5 STEM college students (78%) say that they decided to study STEM in high school or earlier and one in five (21%) decided in middle school or earlier. Yet, only 1 in 5 STEM college students feel that their K–12 education prepared them extremely well for their college courses in STEM. There also appears to be a major disparity in the female to male ratio when it comes to those employed in STEAM fields. Getting more girls interested in STEAM disciplines is another facet of the movement.

Not only does a STEAM framework teach students how to think critically, problem solve and use creativity, it prepares students to work in a field that is poised for growth.

The growing movement towards a STEAM framework in grades both primary and higher education is gaining traction and for good reason. Students who are taught under a STEAM framework are not just taught the subject matter but they are taught how to learn, how to ask questions, how to experiment and how to create.

Moving from the current standard approach to teaching towards a holistic interdisciplinary method only makes sense in a world facing so many challenges and opportunities.

Source: https://onlinedegrees.sandiego.edu/steam-education-in-schools/

Another point of view related to this concept mentions that STEM/ STEAM-based programmes take an integrated approach to learning and teaching, which requires an intentional connection between curriculum learning objectives, standards, assessments, and lesson design/implementation.
STEM/STEAM learning applies meaningful maths, science, and technology content to solve real-world problems through hands-on learning activities and creative design.
"STEAM is more than just the traditional science technology engineering arts and maths subjects on their own they're opportunities where subjects combine to form interesting new subjects such as bio engineering and biotechnology," explains John Durant, MIT Adjunct professor.

Why is STEAM important?
Global skill shortages in STEAM-related fields are redefining educational priorities. Schools are starting STEAM-based learning programmes to equip students with the skills and knowledge needed to thrive in the 21st century. STEAM learning will not only produce tomorrow's designers and engineers; it will develop innovative mindsets and the ability to problem-solve, ensuring that our students become creators of technology, not just passive consumers

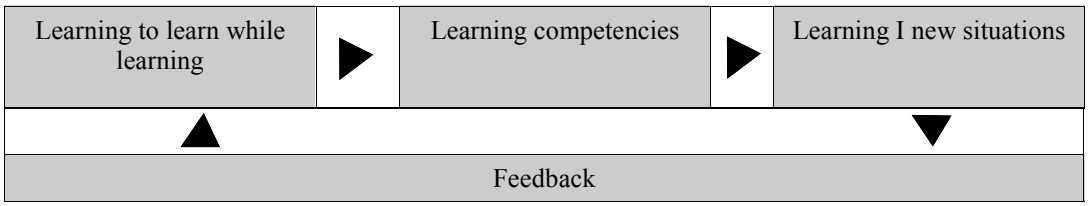
Benefits of STEAM learning:
Students who participate in STEAM learning:

⇒ think outside the box
⇒ feel safe to express innovative and creative ideas
⇒ feel comfortable doing hands-on learning
⇒ take ownership over their learning
⇒ work collaboratively with others
⇒ understand the ways that science, maths, the arts, and technology work together
⇒ become increasingly curious about the world around them and feel empowered to change it for the better.

Module 2
2.1 Learning to learn methodology

What is learning to learn? – a European definition

- The ability to pursue and persist in learning
- To organize one's own learning, including through effective management of time and information, both individually and in groups.
- Awareness of one's learning process and needs, identifying available opportunities.
- Ability to overcome obstacles in order to learn successfully.
- Gaining, processing and assimilating new knowledge and skills.
- Seeking and making use of guidance.
- Build on prior learning and life experience: at home at work, in education and training.
- Motivation and confidence.



How to define learning to learn:
There are many different definitions – at least 40 (Stringer, 2006), developed typically within two separate research paradigms:
- cognitive psychology paradigm: mechanisms used to internalise knowledge
- social cultural paradigm: learning embedded within social context

European definition refers to the ability to access, gain, process and assimilate new knowledge and skills, followed by the ability to reflect critically on the purposes and aims of learning.
The definition of **learning to learn** also contains numerous references to how learning to learn is embedded in social relationship and the social context, for example, it references group work, 'seeking and making use of guidance' and building on 'life experiences'.

Assessing learning to learn – a framework, University of Helsinki

Learning to learn: *"the ability and willingness to adapt to novel tasks, activating one's commitment to thinking and the perspective of hope by means of maintaining one's cognitive and affective self-regulation in and of learning action*" (Hautamäki et al., 2002, p. 39).
It *"comprise various domains of skills and abilities. They can be divided into cognitive skills and abilities and affective control skills and abilities"* (Hautamäki et al., 2002, p. 41).

Learning to learn *"as a process of discovery about learning. It involves a set of principles and skills which, if understood and used, help learners learn more effectively and so become learners for life. At its heart is the belief that learning is learnable" . Learning to learn' offers pupils an awareness of:*
- how they prefer to learn and their learning strengths,
- how they can motivate themselves and have the self-confidence to succeed,
- things they should consider such as the importance of water, nutrition, sleep and a positive environment for learning,
- some of the specific strategies they can use, for example to improve their memory or make sense of complex information,
- some of the habits they should develop, such as reflecting on their learning so as to improve next time". (The Campaign for Learning, 2007

Comparison PISA frameworks and Learning to learn framework

- "Identifying a proposition" – close to reading literacy, but different purpose and context
- "Using rules" – close to mathematic literacy, but mathematics is used as a mean to provide a task
- "Testing rules/propositions" - close to scientific literacy
- "Using mental tools" – close to problem solving, but problem solving was only a part of PISA 2003

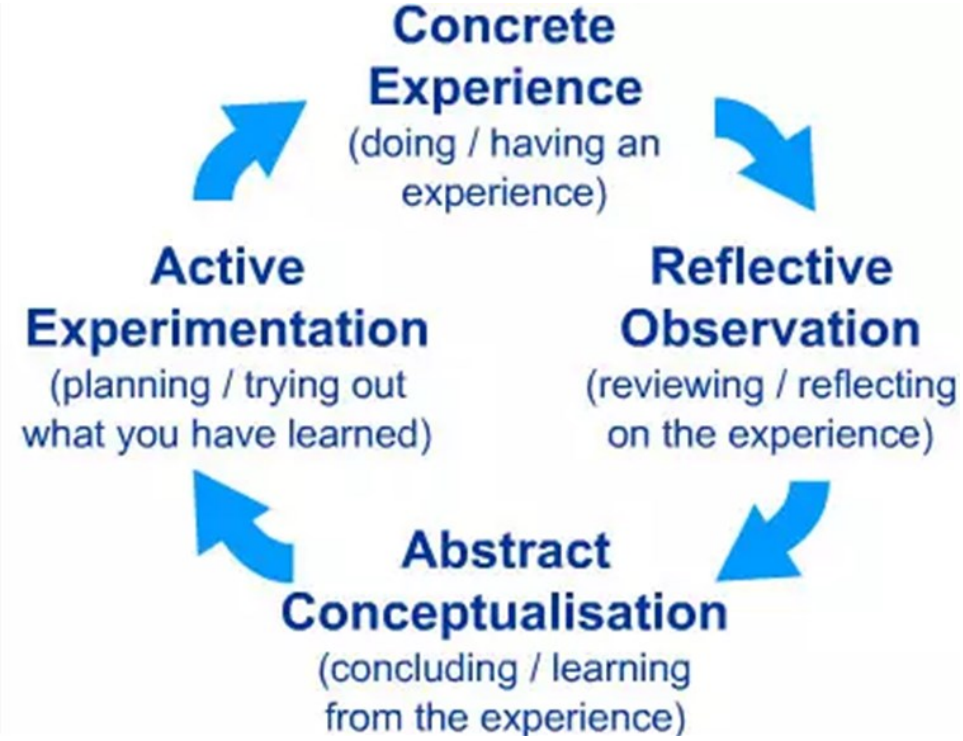
Basic knowledge in mathematics, science and reading comprehension as tested in international tests are obviously closely related to learning to learn, but if tests in those subjects could be used to measure learning to learn this would mean that learning to learn is more or less the same as reading literacy, mathematic literacy, science literacy and problem solving taken together.
Reading literacy: "An individual's capacity to understand, use and reflect on written texts, in order to achieve one's goals, to develop one's knowledge and potential and to participate in society"
Mathematic literacy: "An individual's capacity to identify and understand the role that mathematics plays in the world, to make well founded judgements and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen"
Scientific literacy: "An individual's scientific knowledge and use of that knowledge to identify questions, to acquire new knowledge, to explain scientific phenomena, and to draw evidence based conclusions about science-related issues, understanding of the characteristic features of science as a form of human knowledge and enquiry, awareness of how science and technology shape our material, intellectual, and cultural environments, and willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen"
Problem solving: "Problem solving is an individual's capacity to use cognitive processes to confront and resolve real, cross-disciplinary situations where the solution path is not immediately obvious and where the literacy domains or curricular areas that might be applicable are not within a single domain of mathematics, science or reading".

2.2 Kolb's theory of learning

"Learning is the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38).

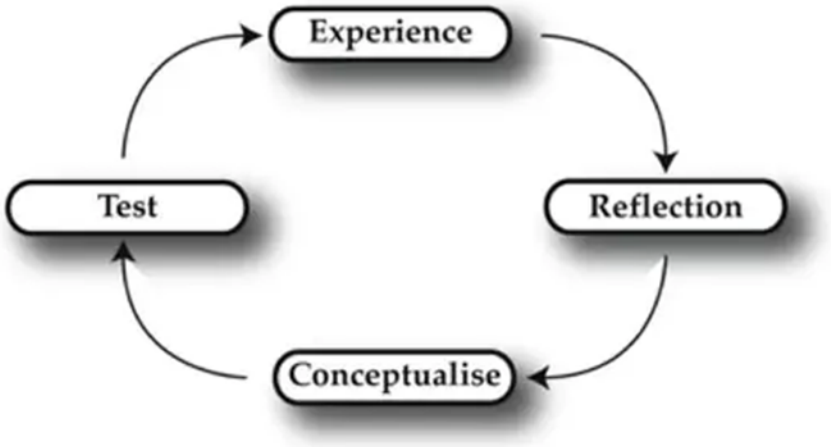
Kolb's Learning Styles and Experiential Learning Cycle

David Kolb published his learning styles model in 1984 from which he developed his learning style inventory.
Kolb's experiential learning theory works on two levels: a four-stage cycle of learning and four separate learning styles. Much of Kolb's theory is concerned with the learner's internal cognitive processes.
Kolb states that learning involves the acquisition of abstract concepts that can be applied flexibly in a range of situations. In Kolb's theory, the impetus for the development of new concepts is provided by new experiences.
The Experiential Learning Cycle
Kolb's experiential learning style theory is typically represented by a four-stage learning cycle in which the learner 'touches all the bases':



1. Concrete Experience - a new experience or situation is encountered, or a reinterpretation of existing experience.
2. Reflective Observation of the New Experience - of particular importance are any inconsistencies between experience and understanding.
3. Abstract Conceptualization reflection gives rise to a new idea, or a modification of an existing abstract concept (the person has learned from their experience).
4. Active Experimentation - the learner applies their idea(s) to the world around them to see what happens.

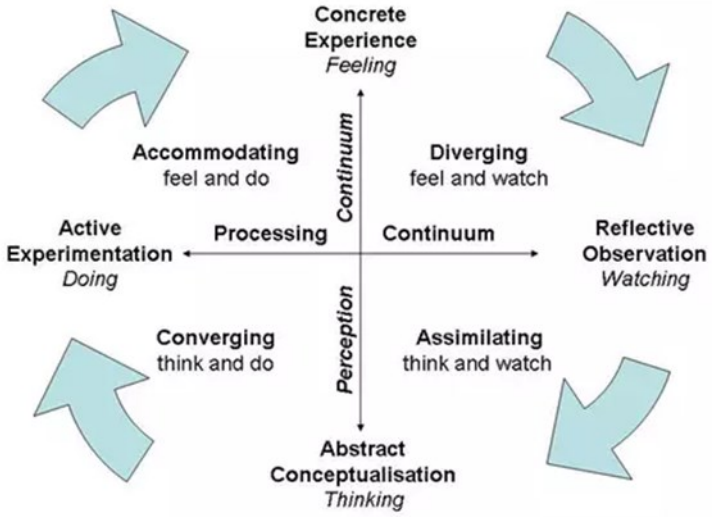
Effective learning is seen when a person progresses through a cycle of four stages: of (1) having a concrete experience followed by (2) observation of and reflection on that experience which leads to (3) the formation of abstract concepts (analysis) and generalizations (conclusions) which are then (4) used to test hypothesis in future situations, resulting in new experiences.



Kolb (1974) views learning as an integrated process with each stage being mutually supportive of and feeding into the next. It is possible to enter the cycle at any stage and follow it through its logical sequence.
However, effective learning only occurs when a learner can execute all four stages of the model. Therefore, no one stage of the cycle is effective as a learning procedure on its own.

Learning Styles

Kolb's learning theory (1974) sets out four distinct learning styles, which are based on a four-stage learning cycle (see above). Kolb explains that different people naturally prefer a certain single different learning style.
Various factors influence a person's preferred style. For example, social environment, educational experiences, or the basic cognitive structure of the individual.
Whatever influences the choice of style, the learning style preference itself is actually the product of two pairs of variables, or two separate 'choices' that we make, which Kolb presented as lines of an axis, each with 'conflicting' modes at either end.
A typical presentation of Kolb's two continuums is that the east-west axis is called the **Processing Continuum** (how we approach a task), and the north-south axis is called the **Perception Continuum** (our emotional response, or how we think or feel about it).
Kolb believed that we cannot perform both variables on a single axis at the same time (e.g., think and feel). Our learning style is a product of these two choice decisions.
It's often easier to see the construction of Kolb's learning styles in terms of a two-by-two matrix. Each learning style represents a combination of two preferred styles.



The matrix also highlights Kolb's terminology for the four learning styles; diverging, assimilating, and converging, accommodating:

	Active Experimentation (Doing)	**Reflective Observation (Watching)**
Concrete Experience (Feeling)	Accommodating (CE/AE)	Diverging (CE/RO)
Abstract Conceptualization (Thinking)	Converging (AC/AE)	Assimilating (AC/RO)

Learning Styles Descriptions

Knowing a person's (and your own) learning style enables learning to be orientated according to the preferred method.

That said, everyone responds to and needs the stimulus of all types of learning styles to one extent or another - it's a matter of using emphasis that fits best with the given situation and a person's learning style preferences.

Here are brief descriptions of the four Kolb learning styles:

Diverging (feeling and watching - CE/RO)

These people are able to look at things from different perspectives. They are sensitive. They prefer to watch rather than do, tending to gather information and use imagination to solve problems. They are best at viewing concrete situations from several different viewpoints.

Kolb called this style 'diverging' because these people perform better in situations that require ideas-generation, for example, brainstorming. People with a diverging learning style have broad cultural interests and like to gather information.

They are interested in people, tend to be imaginative and emotional, and tend to be strong in the arts. People with the diverging style prefer to work in groups, to listen with an open mind and to receive personal feedback.

Assimilating (watching and thinking - AC/RO)
The Assimilating learning preference involves a concise, logical approach. Ideas and concepts are more important than people.
These people require good clear explanation rather than a practical opportunity. They excel at understanding wide-ranging information and organizing it in a clear, logical format.
People with an assimilating learning style are less focused on people and more interested in ideas and abstract concepts. People with this style are more attracted to logically sound theories than approaches based on practical value.
This learning style is important for effectiveness in information and science careers. In formal learning situations, people with this style prefer readings, lectures, exploring analytical models, and having time to think things through.
Converging (doing and thinking - AC/AE)
People with a converging learning style can solve problems and will use their learning to find solutions to practical issues. They prefer technical tasks, and are less concerned with people and interpersonal aspects.
People with a converging learning style are best at finding practical uses for ideas and theories. They can solve problems and make decisions by finding solutions to questions and problems.
People with a converging learning style are more attracted to technical tasks and problems than social or interpersonal issues. A converging learning style enables specialist and technology abilities.
People with a converging style like to experiment with new ideas, to simulate, and to work with practical applications.
Accommodating (doing and feeling - CE/AE)
The Accommodating learning style is 'hands-on,' and relies on intuition rather than logic. These people use other people's analysis, and prefer to take a practical, experiential approach. They are attracted to new challenges and experiences, and to carrying out plans.
They commonly act on 'gut' instinct rather than logical analysis. People with an accommodating learning style will tend to rely on others for information than carry out their own analysis. This learning style is prevalent within the general population.

Educational Implications
Both Kolb's (1984) learning stages and cycle could be used by teachers to critically evaluate the learning provision typically available to students, and to develop more appropriate learning opportunities.
Educators should ensure that activities are designed and carried out in ways that offer each learner the chance to engage in the manner that suits them best.
Also, individuals can be helped to learn more effectively by the identification of their lesser preferred learning styles and the strengthening of these through the application of the experiential learning cycle.
Ideally, activities and material should be developed in ways that draw on abilities from each stage of the experiential learning cycle and take the students through the whole process in sequence.
Source: https://www.simplypsychology.org/learning-kolb.html

Let's see how do you learn:

This test is conducted to verify the learning method / style. To accomplish this, give the highest grade, from 1 to 4 terms that characterize your learning style and the smallest one, to that term that is far from your style.

You will find it difficult to select the word that describes your learning style, because there is no right or wrong answer here. The features described below are just as good. The purpose of this questionnaire is to see how you learn, not how much, or how well you do it.

Instructions:

There are 9 sets of 4 words, in the same row. Order the 4 words on the same line, giving 4 points to the term that best characterizes your learning style, 3 to the term immediately closest to your style, then 2, and 1 to the term that characterizes you least as learning style. Make sure you only use numbers 1 through 4. Do not just tick.

1.	_ discriminative	_tempted	_involved	_practical sense
2.	_receptive	_relevant	_analytical	_impartial
3.	_feeling	_looking	_thinking	_ active
4.	_accepts	_takes risks	_evaluative	_conscious
5.	_intuitive	_productive	_logical	_questioning
6.	_abstract	_observer	_specific	_active
7.	_present-oriented	_reflective	_future-oriented	_pragmatic
8.	_experimenter	_observer	_conceptual	_active
9.	_intense	_reserved	_rational	_responsible

SCORE: Sum up the score from the positions given below .
EC (concrete experience): 2, 3, 4, 5, 7, 8 = ...
RO (reflective - observer): 1, 3, 6, 7, 8, 9 = ...
AC (conceptual abstract): 2, 3, 4, 5, 8, 9 = ...
AE (active experiment): 1, 3, 6, 7, 8, 9 = ...

The biggest number you get summing up the positions reflects your learning style. It is very important for you to know it, because the researchers in pedagogy affirm that every teacher teaches according to his learning style.
Sometimes, the results are very close to each other, this means that you might mix your learning style, also your teaching one, as it depends on several factors, such as the class, the subject you are teaching, the lesson you have to deliver, sometimes some personal factors may occur and they influence you.

2.2 Pedagogical approaches of STEAM concept - Science, Technology and Art

Please, see this video firstly:
https://www.youtube.com/watch?v=YB_QhFFPpLs
It gives you an overview about how easy some activities can be organized at any learning level.

Team work 1
Here comes a list of available materials and prices:
Objective:
to emphasize the role of communication, decision making, problem solving, leadership skills in the learning motivation at any age.

Description	Amount Available	Price in YOX per item	Units con-sumed	Cost
Raw Eggs	5	for free		
Paper Straws	24	3		
Wooden Pencils	6	6		
Balloons	6	20		
Paper Cups	2	40		
Pipe Cleaners	12	4		
Paper Clips	12	1		
Elastic Bands	10	4		
Paper Tissues	6	8		
Inner Soles	2	30		
Index Cards	6	6		
Ball of String	1m	20/m		
Chewing Gum	2 Pkts	5/pkt		
Sellotape	1 roll	20/roll		
Scissors	1 pair	20/hr		

All materials will be counted in the overall cost of the project, including wasted materials.
The scissors must be hired for a minimum of one hour at a rate of 20 YOX per hour.

Scenario and Requirements

Mr Humpty de la Moad, the new owner of Moad Hall in the county of Morfolk (which is a region noted for its poultry) has decided to invite the local community on Easter day to a fete on the theme of 'Man in the Universe'. At the end of the day he wishes to organise a 'Drop of 1000 eggs'.

Working as a team, you must design a toy: it is compulsory that one raw egg to be placed inside a package in such a way that, when the package is dropped from a height of between 3 and 5 meters on to concrete, the egg **will not break**. The egg **must remain intact**. If not, you will be disqualified.

You may only use the material available for the construction of the package. Each item has a price (price list attached). The client wishes to purchase 800 examples of a 'down-market' product, and 200 examples of a 'beautiful and exotic' product. The 'down-market' product must not cost more than 80 YOX, and the 'up-market' product must not cost more than 200 YOX.

You have three eggs. You are not obliged to use all your materials and you should try to avoid waste. Only the materials in the list can be used. You must not modify the eggs in any way. They cannot be boiled or emptied. The 1000 eggs must all land safely with no eggs broken, because the eggs are to be given to the local children at the end of the day.

It is important to decide how your team will organize itself early on in the project. Then you must find the best way to design and fabricate two prototypes which will satisfy the special requirements of the event, as defined by the client.

You have 70 minutes to prepare your prototypes, as well as a 10-minute presentation to the client and the other syndicates which must include the following information:

⇒ the name of your company and the name of each product
⇒ the communication or promotions strategy
⇒ the unique aspects of each product and any special features or benefits
⇒ a description of the learning experience
⇒ long-term improvements for each product.

Each team must also prepare and present to the client a summary of the costs of each product and explain how they have chosen to guarantee the quality of each product.

Assessment sheet

	Team	Team	Team	Team	Team
A functional model toy – Economy Model					
A functional model toy – Luxury Model					
A team presentation to the client as per the brief:					
The name of your company and the name of each of your toy models					
A communication or promotions strategy					
A detailed summary of the costing of each of your toy models					
The unique aspects of each of your toy models					
Any special features or benefits of each of your toy models					
Long-term improvements for each of your toy models					
A description of your team's learning experience whilst completing this activity					
Quality and reliability guarantee of the quality of each toy model.					
A functional model toy – Economy Model **(Points: 20)**					
A functional model toy – Luxury Model **(Points: 20)**					
A team presentation to the client as per the brief **(Points: 60, 50, 40)**					
Total					
Position/Points					

Module 3
3.1 Lateral thinking theory of Edward de Bono and how it influences critical thinking of pupils

The lateral thinking theory

Lateral thinking is a manner of solving problems using an indirect and creative approach via reasoning that is not immediately obvious. It involves ideas that may not be obtainable using only traditional step-by-step logic.

The term was promulgated in 1967 by Edward de Bono. He cites the Judgment of Solomon as an example, where King Solomon resolves a dispute over the parentage of a child by calling for the child to be cut in half, and making his judgment according to the reactions that this order receives.

Edward de Bono also links lateral thinking with humor, arguing there's a switch-over from a familiar pattern to a new, unexpected one. It is this moment of surprise, generating laughter and new insight, which facilitates the ability to see a different thought pattern which initially was not obvious.

According to de Bono, lateral thinking deliberately distances itself from the standard perception of creativity as "vertical" logic, the classic method for problem solving**.**

Lateral thinking has to be distinguished from critical thinking.[4] Critical thinking is primarily concerned with judging the true value of statements and seeking errors whereas lateral thinking focuses more on the "movement value" of statements and ideas.

A person uses lateral thinking to move from one known idea to new ideas. Edward de Bono defines four types of thinking tools:

1. idea-generating tools intended to break current thinking patterns—routine patterns, the status quo
2. focus tools intended to broaden where to search for new ideas
3. harvest tools intended to ensure more value is received from idea generating output
4. treatment tools that promote consideration of real-world constraints, resources, and support.

Source: https://en.wikipedia.org/wiki/Lateral_thinking

Lateral Thinking and Edward de Bono

Dr. Edward de Bono is regarded by many as the leading world authority in the field of creativity. He is the inventor of the phrase "Lateral Thinking" which is now in the Oxford English Dictionary. His Lateral Thinking tools are based directly on how the brain functions as a self-organizing information system. He has worked for over thirty years in the field with major corporations all over the world.

Here are some notes from Dr. de Bono on the definition of Lateral Thinking. There are a number of ways of describing or defining Lateral Thinking.

1. "You cannot dig a hole in a different place by digging the same hole deeper."
2. "Lateral Thinking is for changing concepts and perceptions instead of trying harder with the same concepts and perceptions."
3. "In self-organizing information systems, asymmetric patterns are formed. Lateral Thinking is a method for cutting across from one pattern to another."

The use of the terms "lateral thinking" and "creative thinking" is interchangeably because creative thinking is much more widely known. The word "creative" in the English language has a very broad meaning and includes the bringing into existence of something new. We do not accept creating a mess as being creative because the new thing **is supposed to have value**. For example, artists are creative because they create new things that have value. Yet many artists are productive stylists who produce within the same perceptions and style of expression. There may be very little of the change in perceptions and concepts that is central to Lateral Thinking. So one of the reasons for creating and using the term "Lateral Thinking" is to distinguish this kind of artistic creativity from the thinking involved in creating new perceptions and new concepts.

There are, of course, artists who also change concepts and perceptions and who do use Lateral Thinking as such. This seems to particularly apply to musicians in both popular and classical music. There are also playwrights, novelists, architects, and others who have used Lateral Thinking to open up new concepts and perceptions. Even so, the Lateral Thinking course does not pretend to turn a participant into an artist.

Source: http://www.debonogroup.com/lateral_reading.php

Dr. Edward de Bono

- Born in Mal ta in 1933
- M.D., Ph.D., (medicine & psychology)
- Faculty at the universities of Oxford, London, Cambridge and Harvard
- World-renowned consultant to business, governments, schools and industry
- Author of 62 books in 47 languages
- Originator of the following:
- Direct teaching of thinking as a skill (CoRT – Cognitive Research Trust - Thinking Programme)

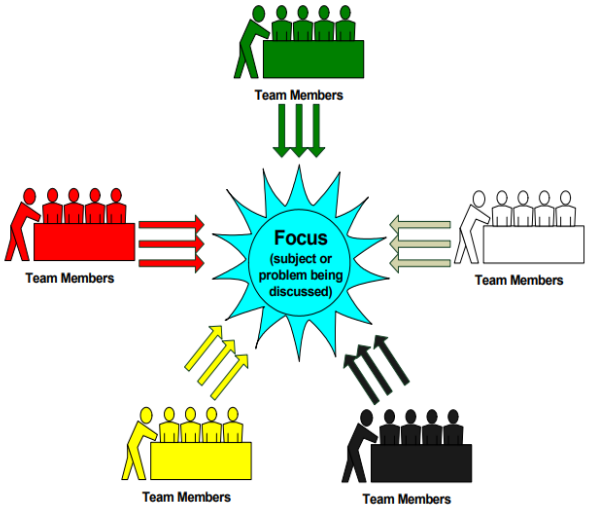
– Lateral Thinking (1967)
– Parallel Thinking (1985)
– Six Thinking Hats (1985)

Traditional thinking

Traditional thinking is 2400 years old, based on the philosophies of Socrates, Plato and Aristotle – Socrates used to point out 'what was wrong' to clarify the concepts – Plato believed that we can see only shadows of truth as we go through life – Aristotle believed that people would put together different 'boxes' in their mind based on their experience & judge things into one of those boxes – So, traditional thinking is concerned with "what is" which is determined by analysis, judgment & argument. It is not constructive or creative and doesn't involve design. It is also called 'argument', 'adversarial', or 'western' thinking Partial exploration of subject / problem Involves analysis, judgment and argument There is no focus and thinks about too many aspects / things at a time Traditional thinking is not collaborative or cooperative.

Parallel Thinking

All members look in the same direction at any moment .
Direction changes one after other.
All views are put down in parallel.



Lateral Thinking

Puzzle 1: Three switches outside a windowless room are connected to three light bulbs inside the room. How can you determine which switch is connected to which bulb if you may enter the room only once?

See the popular lateral thinking puzzles below:

Answer: Switch one light on for a minute; turn it off and turn another on. Go into the room and feel the off bulbs. The warm bulb is connected to the first switch, the on-bulb is connected to the second and the cold bulb is connected to the third switch.

Puzzle 2: A man is replacing a wheel on his car, when he accidentally drops the four nuts used to hold the wheel on the car, and they fall into a deep drain, irretrievably lost. A passing girl offers him a solution which enables him to drive home. What is it?

Answer: Use one nut from each of the other three wheels. Puzzle 3: A truck is stuck at a road under a bridge. It's just a couple of inches too high to pass under. Any other route, avoiding the bridge would add a couple of hours to the journey. A young boy comes along and again saves the day. How? Answer: Let air out of the tires till the truck is low enough.

Puzzle 4: A man lives on the tenth floor of a building. Every day he takes the elevator to go down to the ground floor to go to work. When he returns he takes the elevator to the 7th floor and walks up the stairs to reach his apartment on the 10th floor. He hates walking so why does he do it? Clue: on rainy days he goes up in the elevator to the tenth floor.

Answer: The man is dwarf and can only reach the button for the 7th floor. On rainy days he uses his umbrella!

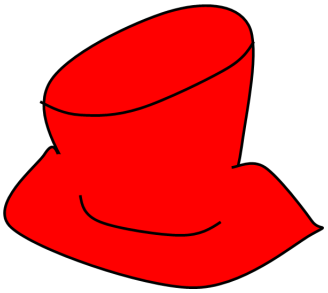
Puzzle 5: A landlord is threatening to evict a father and his beautiful young daughter, unless she agrees to marry him. In a fal se gesture of sincerity, he offers her an opportunity for her and her father to remai n in the house, without marrying him. He has a silk bag in which he says he has placed a white and a black stone from the footpath on which they're standing. If she picks the white stone from the bag, without looking, she wins; if she picks the black, she loses. However, the young girl saw him place two black stones in the bag. She can't expose him in front of the witnesses without angering him and making things worse. How does the clever girl win?

Answer: She withdraws a stone and instantly drops it into those on the ground and is lost. T o know what color it was, they must look at the stones remaining in the bag.

Introduction to Six Thinking Hats

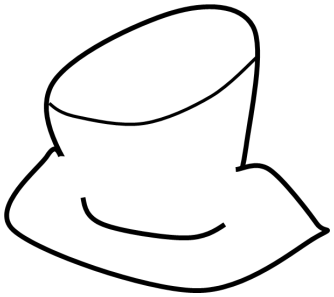
Please, see the video: https://www.youtube.com/watch?v=oHiwpz7r4wY
A method for effective team meetings, problem solving, decision making and proposal/design evaluation. A method based on the concept of parallel thinking, which can be used in businesses, schools and families for resolving issues and making decisions.
It can be used by businessmen, professionals, teachers, students, children or individuals.
There are six different color imaginary hats that you can put on or take off. Hats help a group to use parallel thinking. Color of hat identifies the type or direction of thinking. The main idea is to have the group "wear only one hat at a time".
Source: https://www.miun.se/siteassets/fakulteter/nmt/summer-university/bonopdf

The Red Hat



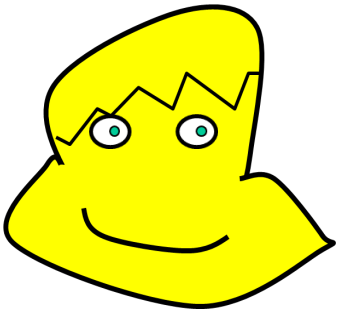
- What do you feel about the suggestion?
- What are your gut reactions?
- What intuitions do you have?
- Don't think too long or too hard.

The White Hat



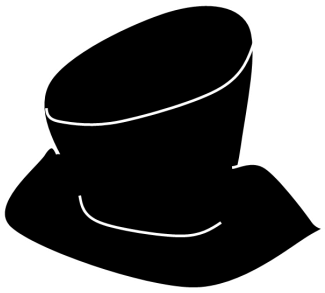
•The information seeking hat.
•What are the facts?
•What information is available? What is relevant?
•When wearing the white hat we are neutral in our thinking.

The Yellow Hat



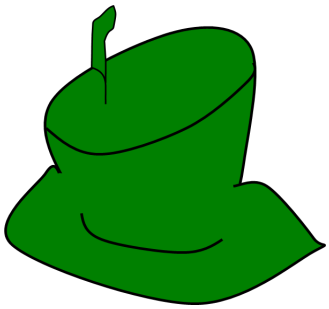
•The sunshine hat.
•It is positive and constructive.
•It is about effectiveness and getting a job done.
•What are the benefits, the advantages?

The Black Hat



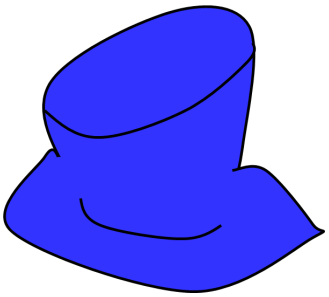
- The caution hat.
- In black hat the thinker points out errors or pit-falls.
- What are the risks or dangers involved?
- Identifies difficulties and problems.

The Green Hat

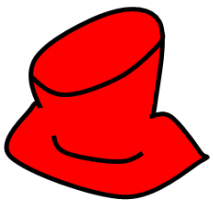


- This is the creative mode of thinking.
- Green represents growth and movement.
- In green hat we look to new ideas and solutions.
- Lateral thinking wears a green hat.

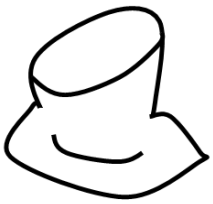
The Blue Hat



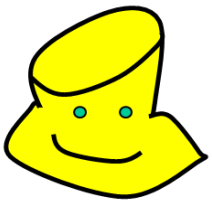
- The control hat, organizing thinking itself.
- Sets the focus, calls for the use of other hats.
- Monitors and reflects on the thinking processes used.
- Blue is for planning.



Intuitive

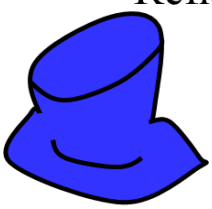


Informative

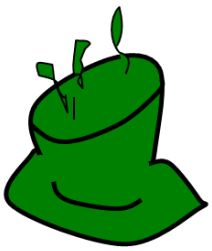


Constructive

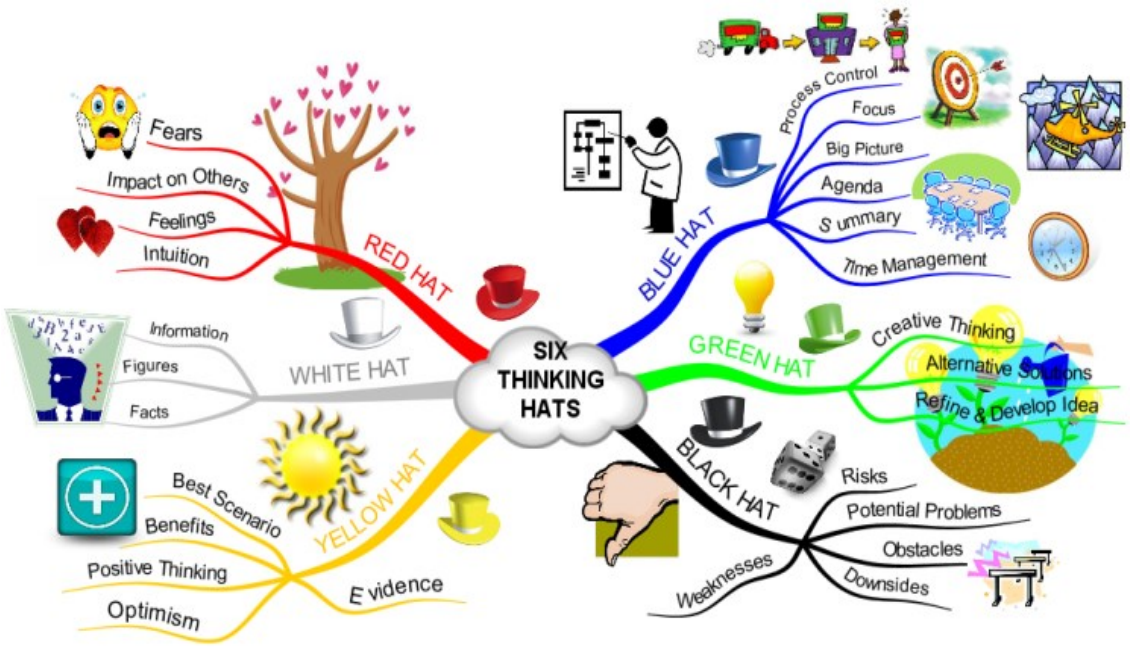
Reflective

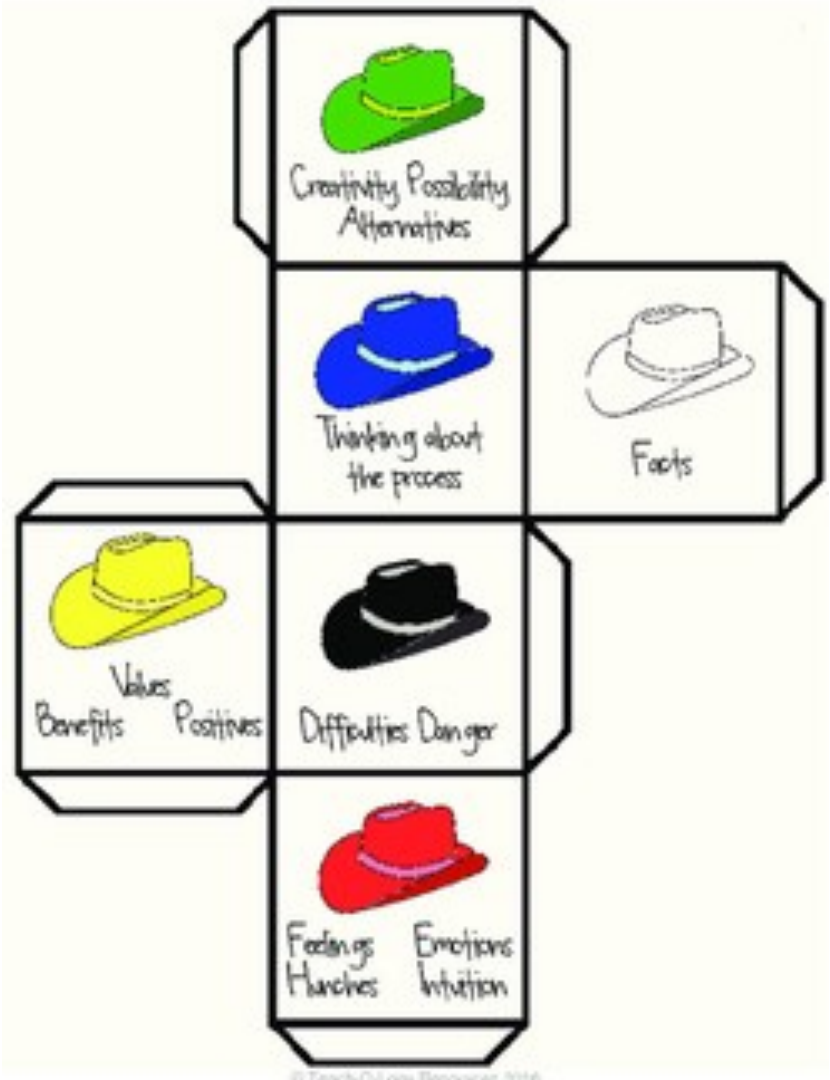


Creative



Cautious





The critical thinking - a brief conceptualization

You are invited to see this video, before going deeper into the theory of this concept: https://www.youtube.com/watch?v=J0yEAE5owWw .

Critical thinking… the awakening of the intellect to the study of itself.
Critical thinking is a rich concept that has been developing throughout the past 2,500 years. The term "critical thinking" has its roots in the mid-late 20th century. Below, we offer overlapping definitions which together form a substantive and trans-disciplinary conception of critical thinking.
Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness.
It entails the examination of those structures or elements of thought implicit in all reasoning: purpose, problem, or question-at-issue; assumptions; concepts; empirical grounding; reasoning leading to conclusions; implications and consequences; objections from alternative viewpoints; and frame of reference.
Critical thinking — in being responsive to variable subject matter, issues, and purposes — is incorporated in a family of interwoven modes of thinking, among them: scientific thinking, mathematical thinking, historical thinking, anthropological thinking, economic thinking, moral thinking, and philosophical thinking.
Critical thinking can be seen as having two components:
1) a set of information and belief generating and processing skills, and
2) the habit, based on intellectual commitment, of using those skills to guide behavior.
It is thus to be contrasted with:

1) the mere acquisition and retention of information alone, because it involves a particular way in which information is sought and treated;
2) 2) the mere possession of a set of skills, because it involves the continual use of them;
3) 3) the mere use of those skills ("as an exercise") without acceptance of their results.

It varies according to the motivation underlying it.

When grounded in selfish motives, it is often manifested in the skillful manipulation of ideas in service of one's own, or one's groups', vested interest. As such it is typically intellectually flawed, however pragmatically successful it might be. When grounded in fairmindedness and intellectual integrity, it is typically of a higher order intellectually, though subject to the charge of "idealism" by those habituated to its selfish use.

Critical thinking of any kind is never universal in any individual; everyone is subject to episodes of undisciplined or irrational thought. Its quality is therefore typically a matter of degree and dependent on, among other things, the quality and depth of experience in a given domain of thinking or with respect to a particular class of questions. No one is a critical thinker through-and-through, but only to such-and-such a degree, with such-and-such insights and blind spots, subject to such-and-such tendencies towards self-delusion. For this reason, the development of critical thinking skills and dispositions is a life-long endeavor.

Another Brief Conceptualization of Critical Thinking

Critical thinking is self-guided, self-disciplined thinking which attempts to reason at the highest level of quality in a fair-minded way. People who think critically consistently attempt to live rationally, reasonably, empathically. They are keenly aware of the inherently flawed nature of human thinking when left unchecked. They use the intellectual tools that critical thinking offers – concepts and principles that enable them to analyze, assess, and improve thinking. They work diligently to develop the intellectual virtues of intellectual integrity, intellectual humility, intellectual civility, intellectual empathy, intellectual sense of justice and confidence in reason. They realize that no matter how skilled they are as thinkers, they can always improve their reasoning abilities and they will at times fall prey to mistakes in reasoning, human irrationality, prejudices, biases, distortions, uncritically accepted social rules and taboos, self-interest, and vested interest. They strive to improve the world in whatever ways they can and contribute to a more rational, civilized society. At the same time, they recognize the complexities often inherent in doing so. They avoid thinking simplistically about complicated issues and strive to appropriately consider the rights and needs of relevant others. They recognize the complexities in developing as thinkers, and commit themselves to life-long practice toward self-improvement. (~ Linda Elder, September, 2007)

Source: https://www.criticalthinking.org/pages/defining-critical-thinking/766

3.2 Emphasizing the anticipation capacity, pro-active attitude and creativity

What is anticipatory capacity?

Anticipatory Capacity is the capacity to continuously develop and apply knowledge acquired through a structured approach to anticipate: (1) changing scenarios as stakeholder needs and systems context change over time; (2) to consider their consequences; and (3) to formulate design decisions in response. It provides organization & persons with ability to make decisions based on predictive models created and utilized during the design process.
There are three enablers for **anticipatory capacity:**
1. Existence of appropriate dynamic systems competencies in workforce
2. Methods for performing anticipatory thinking, analysis, and decision making in design of systems
3. Model-based environment to enable anticipatory design and decision making

Pro-active attitude

The definition of ***proactive*** is someone who takes an active role in dealing with something before it needs to be taken care of, assuming an active, rather than passive, role in doing, accomplishing, etc. It was also defined as *"acting in advance to deal with an expected change or difficulty"*.
We can deal with each problem as it pops up, or we can take a proactive stance and try to prevent future problems. Another definition is *"doing something to influence or make changes happen and being prepared for change to happen"* (Longman Business Dictionary).
The proactive approach will enable an acquirer to select targets from a larger population of companies. We must be reactive rather than proactive, because becoming motivated and taking initiatives involves gaining power. We have to create a proactive cultural awareness of risk issues at corporate and at the individual level. As a proactive enforcer a field man must always be prepared for the unexpected.

Source: https://www.ldoceonline.com/dictionary/proactive

Creativity

Creativity is one of those traits that people seem to have an intrinsic understanding of, but if you actually ask them to define it, they get tripped up. It's easy to come up with a list of creative people (Frida Kahlo, Steve Jobs and Steve Wozniak, Einstein), and the outcomes of creativity (a novel, an invention, a new way of looking at the world), but it's difficult to wrap your head around the actual concept of creativity. The more I researched this article, the more I realized creativity is an incredibly nuanced phenomenon.

Creativity is the ability to transcend traditional ways of thinking or acting, and to develop new and original ideas, methods or objects.

Let's break that down:

- **It's an ability.** It's also an ability to run a mile, or to do calculus or recite a Shakespearean sonnet (Shall I compare thee to a summer's day?). So creativity is a skill that is specific to an individual. For some people, it might seem to come naturally, but it is something that anyone can improve at if they give it the time and effort.
- **It transcends traditional ways of thinking or acting.** Transcending means you're going above and beyond. It's recognizing the limitations of what already exists, and trying to improve upon it.
- **It develops new and original things.** I think the key word here is developing. Creativity goes beyond imagining: it's about developing. If it's an idea, you go out and do the research to prove it. If it's a new process you try and test it to see if it works. If it's an object, you build it.

Let's wade a bit deeper and try to really understand what creativity is (and why you should or shouldn't care).

Creativity is a pattern of thinking. So we know that creativity is an ability that allows people to develop new ideas, but that still feels a bit vague and intangible (kind of like saying swimming is the ability to not drown in water - technically true, but not particularly useful if you're going for a deeper understanding, or you know, wanting to not drown). Put on your floaters and let's dive into the deep end. All skills originate in our brains: whether it's physical (learning to do the breaststroke) or mental (learning to solve an algebraic equation), it's all about neurons in the right part of your brain firing over and over again until what you're doing becomes ingrained.

Creativity is the skill to transcend traditional ways of thinking and come up with new ideas. But where do these new ideas come from?

When it comes to creativity, neuroscientists have identified three large-scale (and aptly named) networks of the brain that are important:

1. *The executive attention network* helps you pay attention and focus
2. *The imagination network* allows you to daydream or imagine yourself in someone else's shoes
3. *The salience network* let's you identify when things you have buried deep in your brain are salient to the world around you (e.g. you're going for a hike and taking in the scenery, and you notice this plant… realize it looks familiar… and that it's poison ivy! And you just saved yourself from a terrible itchy rash.)

The more active these networks are in your brain, and the more they work together, the more creative you are.

So going back to our original question: what is creativity? Creativity is a skill that allows you to draw understanding of the world around you, connect those observations to your existing knowledge reservoirs, and imagine new applications of your knowledge on the world.

Is there a connection between creativity and intelligence?

In 1999, researchers Sternberg and O'Hara provided a framework of five possible relationships between creativity and intelligence:

⇒ Creativity is a type of intelligence
⇒ Intelligence is a type of creativity
⇒ Creativity and intelligence are overlapping constructs (they have some traits in common)
⇒ Creativity and intelligence are part of the same construct (they're basically the same thing)
⇒ Creativity and intelligence are distinct constructs (there is no relationship between them)

There are studies that provide evidence in favor of each of these perspectives, but thus far none has been overwhelming in its conclusions. So essentially there's nothing that shows if you're smarter you're more creative. But there's nothing showing that there's not a correlation either.

Why should you care about creativity?

Well, if you care about your career, it's probably worth the investment. Both individuals and businesses value hold those with creative qualities in high regard. According to a survey by Adobe, people that identify as creative earn 17% more money than those who don't. Similarly, in a survey of 1,500 CEOs, IBM found that creativity is the number one trait needed for business success.

And yes, the data from these surveys is based on opinion or self-reported creativity levels, but even if the scientists might squawk, it's probably worth paying attention to. Basically, your boss and your boss' boss both think creativity is important. And that makes sense as the definition of a creative person is literally someone who comes up with good ideas and can bring them to fruition. In today's world, that is exactly the fuel that drives business success. So if you want to get ahead, start churning out those ideas like a barrel of monkeys. (Am I doing it right?)

The Importance of Creativity in Life

Research shows that everybody is creative. In school, those who can write a good story or draw beautiful pictures are considered the special ones who are creative. But research shows that all people are creative.

In fact, creativity is one of the most important characteristics of being human. It is one of the main traits that make us successful as individuals and as a species. Our workshops don't merely talk about being creative—we spend our class time actively getting people to jump in and do creative work. We have found in our 25 years of teaching The Creativity Workshop that if we let our hand move faster than our brain, the hurdles to creativity disappear.

The astonishing thing is how easy it is with the right techniques to get people who think they have no creativity at all to do very innovative and imaginative work.

An ideal environment for teaching creativity includes exercises and techniques that are supportive, playful, surprising, and value process over product.

In case you have doubts about your own creativity there are scientific studies to prove it. American neurologist Alice Flaherty in her book The Midnight Disease, talks about the neural basis of creativity:

"A creative idea will be defined simply as one that is both novel and useful (or influential) in a particular social setting."

Flaherty says that this applies to business, IT, science and math as much as it does to what we typically think of as “creative” fields, such as fiction writing, art or theatre.

Creativity in education

The world is changing so rapidly now that just learning a specific skill set and following it exactly won’t get us very far. What prepares students for life beyond the classroom is learning how to be more creative, which includes flexibility in perception and execution of tasks.

Schools have started acknowledging the importance of creativity in classrooms. Courses in creativity are now provided by academia because it is now common knowledge that only creativity can help students succeed in the 21st century.

Creativity is no longer relegated in the classroom to subjects like English, art, or music. Teachers and professors are beginning to emphasize creativity in the sciences, as well.

Why we need creative educators

Sir Ken Robinson, an international advisor on education, once interviewed Hans Zimmer, the Oscar winning German composer. Zimmer apparently was an unruly child at school. He was thrown out from 8 schools.

When his parents took him to the ninth, the head teacher figured out how to get Zimmer involved in education just by talking to him. The head teacher organized for him to study music because Zimmer said he liked music. This led to his successful career.

Not just Zimmer’s music but the teacher and her teaching method are also creative. This again is proof of the importance of creativity in educators. Zimmer was lucky as the head teacher was creative in her teaching methods.

But in today’s greatly synchronized teaching environment there is little scope for creativity.

During a recent experiment, a creative writing task was given to science and arts students. To everyone’s surprise, the science students performed much better than arts students. The experiment showed the value of creative thought for scientists in the workplace. What makes their organizations excel is the creativity and innovation of these scientists.

Creativity in all of its forms should be embraced by educators if they want to nurture happy, well balanced students. The right kind of thinkers for future generations can be cultivated only through this method.

"The principle goal of education should be to create people who are capable of doing new things, not simply of repeating what other generations have done-men who are creative, inventive, and discoverers." – Jean Piaget

Help students embrace this creativity is what educators should aim for. Let students give wings to the imagination without the fear of failure.

"It is the supreme art of the teacher to awaken joy in creative expression and knowledge." – Albert Einstein

Teachers should become creative themselves if they want to instill creativity in their students, schools, and fellow educators.

Creativity – a crucial skill for professionals

Creativity is no longer just seen as what artists and musicians process. It's a crucial skill for professionals in all fields.

The "20% rule" is practiced by most of the biggest and successful businesses in the world. This means that they are encouraging their employees to set aside 20% of their work time to exploring new ideas and thinking creatively.

In the modern business world creativity is valued as the most important business skill, says a recent survey.

For organizations the world over creativity and innovation are the number 1 strategic priorities.

The annual strategy survey by the Boston Consulting Group shows innovation and creativity as the top ranked tactical imperatives.

Can Creativity be taught?

Yes, creativity skills can be learned. You need an interest in the creative process, the desire to explore and a spirit of curiosity.

Several studies have been conducted on the effectiveness of creative training. These studies show that well-designed creativity training programs typically improve creative performance in students, teachers and working professionals in all fields.

Creative Thinking and Creative Problem Solving

Being creative in the workplace goes far beyond making the prettiest spreadsheet or the most colorful PowerPoint presentation. Instead, there are two main ways that creativity is absolutely needed in the workplace: creative thinking and creative problem solving. Creative thinking is pretty simple to define, but a bit harder to implement. Basically, if you're a creative thinker, it means that you come up with ideas that are entirely unique.

It's easy to come up with the same rote concepts for a project or a new campaign, especially if you've used them before. But when you start thinking creatively and getting a little daring, you may be surprised at what your brain can come up with. It's this "throw everything to the wall and see what sticks" method that creative thinkers truly shine at.

An additional bonus to being a creative thinker is that you understand the success in failure. I know this sounds a bit strange, but hear me out: creative thinkers know that one's talents are best used to make results that might come from unordinary circumstances or out-of-the-box methods.

To get these results, you may need to take a risk–something that can be frowned upon in the workplace. This can also be a bit scary, because it means you might fail. If you're forever trying for success (because failure is not an option), then you'll be reticent to step out of your bubble. You'll be using your creativity in ways that guarantee safe and secure results, and that's not what creative thinking is for. Shaking up the status quo is the modus operandi of creative thinkers, and is one of the biggest reasons why creative thinkers are valued in the workplace.

Creative problem solving comes into play when trying to fix an issue that has many possible resolutions. While a lot of problems in the workplace have one or two clear solutions, creative people have the ability to look at all sides of the issues, and many times can come up with solutions that might be completely new and interesting.

Employees and managers benefit from creative problem solving because it can take them–and sometimes the company itself–in a whole new direction. It pays to stray off the beaten path.

Team work 2

Objective:
to emphasize the role of communication, decision making, problem solving, leadership skills in the learning motivation at any age.

Theme: Build a bridge

Materials: cardboard boxes, glue, scotch, fry sticks, scissors, colloured A4 papers, rope/thick thread, a toy trailer containing half kilo packet.

Tasks: there are 4 groups, made of 6 participants (in our case, one from each country), who get the same materials. They will decide together what type of bridge they build (one over a river, or a railway, or a street/highway), how it will look like. They have total freedom to do it in any way they wish. The only one challenge is that the bridge has to stand and support up to 1 kg material on it (as if a big trailer passes over it).

Allocated time: 45 minutes working, 5 minute presentation of the activity, and the proof it "survives".

Evaluation: will be done as an inter-evaluation. Each team will evaluate another team's bridge, according to the following criteria: design, usefulness, resistance, shared ideas, promotion (the way it was presented), using a 1 to 4 scale. The maximum score is 20.

Team work 2

Objective:
to emphasize the role of communication, decision making, problem solving, leadership skills in the learning motivation at any age.

Theme: build the highest tour which stands and doesn't fall down

Materials: 10 A4 papers, 1 scotch, scissors, markers (to draw or write national elements on the building)

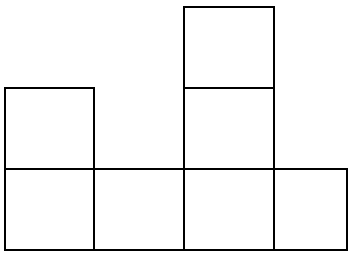
Tasks: the participants are divided into 6 groups, according to the country they come from. They get the materials, all groups have the same amount of materials. They have to build the higher building /tour, which is able to stand alone.

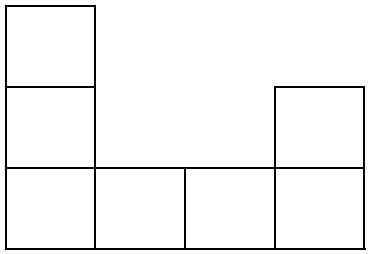
Allocated time: 20 minutes

Evaluation: the winner tour is the highest one which stands alone.

Team work 3

Objective:
to emphasize the role of communication, decision making, problem solving, leadership skills in the learning motivation at any age.
Theme: Be efficient, with minimum costs
Materials: one A4 paper, sugar cubes or wooden cubes.
Tasks: the participants are divided into groups of 4 persons. They have to use the minimum number of sugar cubes to create an arrangement that looks like the images before, when seen from two different sides.
The winner team is the one who has the arrangement with the minimum number of cubes.





Team work 4
Objective:
to emphasize the role of communication, decision making, problem solving, leadership skills in the learning motivation at any age.
Theme: Be an efficient entrepreneur
Materials: sheets of paper, rulers, tape, scissors
Tasks: the participants are divided into groups of 3 persons. They can "buy" as many materials as wanted to create the longest chain, made by loops.
Each group will be awarded 5.00 Euro per loop.
Costs:

- Sheets of paper at €75 per sheet
- Ruler at €20.00
- Tape at €25.00
- Scissors at €50.00

The group with the highest profitability wins. Profitability means costs of the chain (5 euro x n - n = the number of loops) minus the costs of the bought materials.
Allocated time: 20 minutes for work, 5 minutes for presenting the result.

Module 4
4.1 Games and their importance in developing life skills and learning motivation

Johan Huizinga's theory about playing games

Johan Huizinga was a Dutch historian who lived from 1872 to 1945. His book, ***Homo Ludens: A Study of the Play Element in Culture***, published in 1938, suggested the instinct for play as the central element in human culture and examined the role of play in law, war, science, poetry, philosophy, and art. He saw all human activities as playing where "…the great instinctive forces of civilized life have their origin: law and order, commerce and profit, craft and art, poetry, wisdom and science. All are rooted in the primaeval soil of play."
His book, Homo Ludens, which literally means "Man, the player," is a wide-ranging work describing the many aspects of the influence of play on culture. He saw the evidence of play being older than culture, since animals can be seen engaging in play. After his lengthy attempt to describe the characteristics of play he concluded:
"Summing up the formal characteristics of play we might call it a free activity standing quite consciously outside 'ordinary' life as being 'not serious,' but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress their difference from the common world by disguise or other means."
With a basic understanding of play, Huizinga felt that play imposes rules to be followed and creates order. To cooperate in play, all involved must stay within the moral structure of the rules and adhere to them or the game is spoiled.4 With this premise established, he attempted to tie aspects of play to cultural activities, such as contests, rituals, seasonal festivals, and religious activities, where rules are followed and people are taken out of ordinary life for a limited time and place much like play allows.
Huizinga suggested that civilization did not come from play, but play has been seen in many aspects of it. However, he asserts that civilization has played an important role in diminishing the role of the playing.

Source: https://ro.wikipedia.org/wiki/Johan_Huizinga

Games in our lives, as considered by cultural personalities

1. Play is important to education, learning, and human development

a) John Locke: Play is the most important to children.

Quotation: *"...the chief art is to make everything that children have to do, sport and play too."* (p. 38, ***Some thoughts concerning education***, 1902).

b) Immanuel Kant: Children learn by playing.

Quotation: *"...children should be allowed to learn everything as it were in play."* (p. 67, ***Education,*** 1960).

c) J. C. Friedrich von Schiller: A man is completed through play.

Quotation: *"...man only plays when in the full meaning of the word he is a man, and he is only completely a man when he plays."* (***Letters on the Aesthetic Education of Man***, 1794)

d) Friedrich Froebel: Play is the highest level of child development.

Quotation: *"Play is the highest phase of child-development – of human development at this period: for it is self-active representation of the inner – representation of the inner from inner necessity and impulse."* (p. 55, ***The Education of Man,*** 1887).

e) G. Stanley Hall: Play is the basis of education.

Quotations: *"Play must be regarded as the greatest of all educational forces, the foundation of education."* (p. 128, ***Genetic Philosophy of Education***, 1912).

"Education must begin in play, ..." (p. 112, ***Genetic Philosophy of Education***, 1912).

f) Johan Huizinga: Play is one bases of civilization. Play and culture are closely related, but play is not subordinated to culture.

Quotations: *"...whereas for us the whole point is to show that genuine, pure play is one of the main bases of civilization."* (p. 100, ***Nature and Significance of Play as a Cultural Phenomenon***, 2005).

"It [play] adorns life, amplifies it and is to that extent a necessity both for the individual – as a life function – and for society by reason of the meaning it contains, its significance, its expressive value, its spiritual and social associations, in short, as a cultural function." (p. 104, ***Nature and Significance of Play as a Cultural Phenomenon***, 2005).

"...real civilization cannot exist in the absence of a certain play-element..."

Civilization will, in a sense, always be played according to certain rules, and true civilization will always demand of fair play' (p.687, ***Play and Contest as Civilizing Function***, 1955).

"...real civilization cannot exist in the absence of a certain play-element, for civilizationpresupposes limitation and mastery of the self, the ability not to confuse its own tendencies with the ultimate and highest goal, but to understand that it is enclosed within certain bounds freely accepted. Civilization will, in a sense, always be played according to certain rules, and true civilization will always demand of fair play." (p.687***, Play and Contest as Civilizing Function***, 1955).

2. Education should be fun/ play engages children in learning

a) Plato: Education is fun.

Quotation:

"...but let early education be a sort of amusement;' (The original French word also means, play.") (p. 455, **Republic**, 1946).

b) John Dewey: Children engage in schoolwork through play.

Quotation:

"Experience has shown that when children have a chance at physical activities which bring their natural impulses into play, going to school is a joy, management is less of a burden, and learning is easier." (p. 228, **Democracy and Education**, 1916).

3. Play as the basis of future career/later life

a) Plato: Play in childhood is the preparation for future career.

Quotations:

"According to my view [to education], anyone who would be good at anything must practice that thing from his youth upwards, both in sport and earnest, in its several branches: for example, he who is to be a good builder, should play at building children's house…

For example, the future carpenter should learn to measure or apply the line in play; and the future warrior should learn riding, or some exercise for amusement, and the teacher should endeavor to direct the children's inclinations and pleasures, by the help of amusements, to their final aim in life." (p. 21 – 22, **The Laws,** 1960).

"The soul of the child in his play should be guided to the love of that sort of excellence in which when he grows up to manhood he will have to be perfected." (p. 22, **The Laws,** 1960).

b) Friedrich Froebel: A man's later life has its root in the play of childhood.

Quotation:

"The plays of childhood are the germinal leaves of all later life; for the whole man is developed and shown in these, in his tenderest dispositions, in his innermost tendencies.

The whole later life of man, even of the moment when he shall leave it again, has its source in this period of childhood…" (p. 55, **The Education of Man**, 1887).

c) Karl Groos: Play is the preparation for later life.

Quotation:

"Among primitive races, where the life work is for the most part guided by natural impulse, at least in the case of males, boys may get sufficient preparation from play for their later life, though even they usually have some instruction at the outset." (p. 400, **The Play of Man**, 1901).

d) Rudolf Steiner: Play helps children prepare next level in life.

Quotation:

"What occurs as the social element in play from the change of teeth until puberty is a preparation for the next period of life." (p. 221, **The Renewal of Education**, 2001).

4. Social development and play

a) Friedrich Froebel: Play promotes social development.

Quotation:

"Spontaneous play is the outcome of vital energy and buoyancy, and under the guidance of the teacher, may be utilized in social development." (p. 340, **The Education of Man,** 1887).

b) John Dewey: Play is the mediator between child and society.

Quotation:

"When exercises which are prompted by these instincts [to explore, to manipulate tools and materials, to construct, to give expression to joyous emotion, etc] are part of the regular school program, the whole pupil is engaged, the artificial gap between life in school and out is reduced…" (p. 228, **Democracy and Education**, 1916).

c) Lev Vygotsky: Play promotes children's social development, bridging imagination and reality.

Quotations:

"Play is more nearly recollection of something that has actually happened than imagination." (p.103, **Mind in Society**, 1978).

"It is the essence of play that a new relation is created between the field of meaning and the visual field – that is, between situations in thought and real situations" (p. 104, **Mind in Society**, 1978). *"thus, play creates a zone of proximal development [Vygotsky's sociocultural theory of learning] of the child."* (p. 102, **Mind in Society,** 1978).

d) Jean Piaget: Play contributes to socialization.

Quotation:

"In an earlier research on the game of marbles (The Moral Judgment of the Child, Chap. I) we saw the seven-year-old child substituting fro the egocentric play of his earlier years a game involving rules and the team spirit. The same thing happens in the case of collective symbolic games, in which we find, from the age of seven to ten or eleven, an ever-increasing co-ordination of roles and an expansion of the socialization begun at the previous level." (p.140, **Play, Dreams and Imitation in Childhood**, 1962).

e) Jerome Bruner: Play prepares children to socialization if play with others.

Quotation:

"Plainly, play with other children does have a therapeutic role or, in any case, an important role in helping children to take their place more easily in the stressful social activities of later life." (p.62, Play, **Thought, and Language**, 1983)

5. Intellectual/cognitive development and play

a) G. Stanley Hall: What children do in play is the basis of their knowledge.

Quotations:

"Everything the child does in free play can be made the basis of knowledge" (p. 200, **Genetic Philosophy of Education,** 1912).

"Play activities afford an opportunity, as nothing else can, of holding together variety upon expression in motor form, thus leading in turn to new experience which is at once coordinated with the old." (p. 200, **Genetic Philosophy of Education**, 1912).

b) John Dewey: Plays and games enhance ability of organization.
Quotation:
"The rhythm, the competition, and cooperation involved in most plays and games also introduce organization." (p.162, How we think, 1910).
c) Rudolf Steiner: Imaginative play can help children prepare for the academic challenges in elementary schools.
Quotation:
"Waldorf kindergartens also prepare children for the academic challenges of elementary school, but they do so by engaging the will through meaningful life activities, by cultivating the feelings through the arts, and by stimulating creativity and fantasy through imaginative play." (p.97, **Rhythms of Learning,** 1998).

6. Emotional development and play

a) Sigmund Freud: Play helps children deal with bad experiences and frustrations (Repetitive play). Play also can help kids to handle negative feelings associated with traumatic events.
Quotations:
"We see that children repeat in their play everything that has made a great [also passive] impression on them in actual life, that they thereby abreact the strength of the impression and so to speak make themselves masters of the situation." (p. 15, **Beyond the Pleasure Principle,** 1922).
"In the play of children we seem to arrive at the conclusion that the child repeats even the unpleasant experiences because through his own activity he gains a far more thorough mastery of the strong impression than was possible by mere passive experience." (p. 43, **Beyond the Pleasure Principle**, 1922).

7. Development of creativity and play
a) Rudolf Steiner: Imaginative play stimulates creativity and fantasy.
Quotation: *"Waldorf kindergartens also prepare children for the academic challenges of elementary school, but they do so by engaging the will through meaningful life activities, by cultivating the feelings through the arts, and by stimulating creativity and fantasy through imaginative play."* (p. 97, **Rhythms of Learning**, 1998).

8. Language development and play
a) Lev Vygotsky: Children learn how to use language at play.
Quotation:
"Play is converted to internal processes at school age, going over to internal speech, logical memory, and abstract thought." (p. 548, **Play and its Role in the Mental Development of the Child**, 1933).

9. Play and work

a) Immanuel Kant: Play and work are essential for children.

Quotation:

"A child must play, must have his hours of recreation; but he must also learn to work." (p.68, **Education**, 1960).

b) G. Stanley Hall: Play and work are not different. They should share the same spirit.

Quotation:

"There must, therefore, be no fundamental distinction between play and work, not between play and study. Education must begin in play, and the play spirit must pervade all work."(p.112, **Genetic Philosophy of Education**, 1912).

10. Play reveals a person's nature

a) Friedrich Froebel: Play is *"self-active representation of the inner"* (p. 55, **The Education of Man**, 1887).

b) Jerome Bruner: Play under the control of the player provides opportunity for the person to be himself.

Quotation:

"Finally, play under the control of the player gives to the child his first and most crucial opportunity to have the courage to think to talk and perhaps even to be himself." (p. 69, **Play, Thought, and Language**, 1983).

11. Play and Adults

a) G. Stanley Hall: Adults should play.

Quotation:

"It [play] must be carried on through all the periods of education, and adult life must be suffused with its spirit" (p.112, **Genetic Philosophy of Education**, 1912).

What is the game playing?

Nowadays, the game playing is considered to be a fundamental pupil's activity, and, at the same time, an educational approach in which he develops himself from the physical, moral, intellectual and social point of view, and it is as important in pupil's life as learning and working activities.

In the **Dictionary of Psychology**, (1978), Paul Popescu-Neveanu defines game playing as a way to acquire knowledge through action. Using game playing, children develop psychological processes, those which directly reflectprocesses, such as memory, thinking, imagination. Within a game, pupils reflect the ambient, and, through imitations, they copy adults' activities and get in contact with living situations.

Janet R. Moyles (1992) considered the game playing an ideal environment for children to learn, but also a way for adults to learn about their children and their educational needs, and thus, its importance in the person's development is more evident. Schiller affirmed that "The human being is complet only when he plays games".

Norbert Sillamy, in the **Dictionary of Psychology** (1996, p. 171), defines the game playing as a physical or mental activity, without an useful final, done for simply pleasure. But he doesn't consider it being specific only for children, ("…for a kid everything is a game"), but also:

- a method to instruct (in the preschool and primary level – educational/ didactic playing);
- a method to investigate and a psychological treatment tool, especially for children: art and craft, marionettes, but also for adults: ludotherapy, as a technique used especially in psychiatry, psychotherapy, to help people to re-socialize (competitions, manual skills);
- group technique/role-play – derived from Moreno's psychodrama (communication skills, problem solving).

It is well-known that the playing problematic was researched along the time by different types of specialists who offered many arguments related to the educational importance of the ludic activities. Some of them deal with:

• the universal and permanent character. It is present in the human being's existence, no matter the age, the geography, or social features.

• the polyvalent character, meaning that for children, it is work, art, reality and fantasy. On the other side, it can have both positive and negative aspects (see the games of luck). It also can be found in different domanis, such as: medicine, psychology, pedagogy, social assistance, theatre a.s.o.

• the complex character, as it is an activity determined to develop human personality. In his work "The child and the game" (1967, p.19), Jean Château considered that through the playing the child sees the world as an anticipation of the serious preocupations of the world, an imaginary exercise of the personal future. A child who does not want to play is a child whose personality does not affirm itself, who feels comfortable being insignificant, a future person without pride, with no future (1967, pp.19-34).

Thus, some other feature of the playing were designed:

- it is a human specific activity
- it is a version of the human activities, being determined by the other activities, and determining other activities as well. It is said that learning, work and creations could not be ossible out of the playing;
- it is a conscious activity, those who do it do not confuse it with other types of activities;
- it introduces the players in a specific "world", out of the real one, where the game's rules are the law of it;

4.2 Computer games and emotional skills

Emotional development

Stress reduction / relaxation

Playing a quick game after a hard day at work or a tough day at school can do wonders. Video games can take your mind of the daily pressures and tribulations we all live with. Games relax us, putting us in a comfortable zone where for that brief moment in time we don't have to think about real life. Nice! Just be careful you don't use video games to 'escape' real life because that may lead to video game addiction.

Mood regulator

So you might be in a bad mood or even an aggressive one even. Playing a video game can quickly regulate your mood and calm you down. As long as you don't ignore the very thing that makes you angry, mood regulation is a good thing. It will make it easier to analyse the situation you're dealing with and take the appropriate steps to deal with it. For children this could be very helpful in their emotional development.

Self expression

Lots of young people in particular use video games as a way to express a view of life, an opinion or their emotions. This is possible through video game development by creating your own video game that tells your story or expresses your emotions. Video game development is getting more and more accessible for the masses and that is a great thing. A lot of people express themselves through video game art or video game-related culture.

Feelings of achievement

Playing video games is very rewarding. The developers use this technique as a way of keeping you hooked on the game. Receiving positive rewards, even if it is through an impersonal machine like a computer or tablet makes you feel good. Completing the levels within a game and ultimately the whole game gives you feelings of achievement, again beneficial to your mental wellbeing.

Rebuilding social confidence by interacting in video games

Gamers often credit their video game with reconnecting them to the community. They state that the game was a safe place to express themselves and interact socially at their pace. Online interactions are often quite basic. There is no body language, no eye contact and one can leave the conversation with one press of the button. Some will argue that only real social interactions are valuable. But perhaps for someone with social anxiety this controlled way of interacting is a good way of rebuilding confidence and skills in socializing. All these opportunities point to the fact that video games really benefit the players emotional development providing the right games are played in moderation.

Source: https://www.videogames.org.au/emotional-development/

Emotional skills

There are many types of emotional skills (also sometimes referred to as emotional intelligence). By building these emotional skills — skills like emotion regulation, empathy, and kindness — you can more easily increase your happiness and well-being. Check out the variety of emotional skills below to learn how you can build these skills and improve your life.

The researchers identified eight simple steps to be fostered and managed to acquire high-achieving commands of emotional skills.

1. Identifying and labeling feelings

Emotions can be described as a feeling and its distinctive thoughts, psychological and biological states, and the range of propensity to act. While there exist more types of emotions than words to describe them, there is a general agreement on some of them considered as primary, from which all other variations, grades, and nuances come from. Anger, sadness, fear, enjoyment, love, surprise, disgust, and shame appear to be the mother source for the whole universe of human feelings.

2. Expressing feelings

Emotions are spontaneous, and automatic responses that need to be felt and expressed. Avoiding and repressing emotions can have negative psychological consequences. But the same way, incorrectly showing them can have devastating consequences for ourselves and others. When learning how to express our feelings in a positive and timely manner, it is helpful to remember that emotions are best mastered and controlled if understood as a multifaceted phenomenon consisting of the following components: behavioral reactions (e.g., approaching), expressive reactions (e.g., smiling), physiological reactions (e.g. heart pounding), and subjective feelings (e.g. feeling amused). When becoming aware of the whole emotional expression process, it becomes easier to understand how this process is manifesting on us and how to better conduct it.

3. Assessing the intensity of feelings

Every emotion has a core emotional nucleus. On its softer manifestation, the emotion perpetuates as a "mood," which is a muted version of the core emotion and it last longer than the feeling itself.

Above, in the scale of emotional intensity, we can find "temperaments" or the

readiness to evoke a given emotion or mood that makes people melancholy or cheery. And still, beyond, we arrive at the realm of "disorders of emotions" that makes people feel perpetually trapped in a toxic emotional state, requiring clinical diagnosis and treatment.

4. Managing feelings

Being able to identify, express, and assess the intensity of emotions is vital to successfully manage them. Managing emotions in a positive manner imply that our feelings are correctly identified and communicated in a way that helps to positively release the emotion; positively being understood by others around and positively set us up closer to the realization of our goals. Anger can lead to a brutal confrontation between two people as well as to a firm determination to peacefully get away from a toxic person. Sexual impulses can lead to the reinforcement and enrichment of a personal relationship as well as to the vilest unfaithfulness.

5. Understanding the difference between feelings and actions.

Understanding the difference between feelings and actions in this process of managing emotions is crucial. While emotions are natural and automatic responses of the organism to a specific stimulus, actions are deliberate decisions that we owned and perform through a better or worst used of intelligence and willpower. There is nothing wrong with feeling something even when this feeling creates significant discomfort. At least, there is nothing that can be done about feeling this or another way. Whatever the feeling is, the focus should always be in the process of positively identifying, assessing, and managing this feeling. So when the feeling is expressed, and action is taken, this action is deliberated and intelligent enough as to get us closer to our desired positive goals. The is no responsibility for feelings but for actions.

6. Delaying gratification

Willpower is being scientifically proven to be one of the keystone habits for personal emotional management and success. Like a muscle, such as the muscles in your arms or legs, it gets stronger through exercise. The better it is trained, the bigger the chances to achieve higher goals. And consciously delaying gratification, in a world of constant, imminent and easily achievable pleasure is a great way to exercise this muscle. So when managing emotions and taking appropriate action requires to go against strong feelings, willpower is adequately trained and ready.

7. Controlling impulses

To appropriately express emotions and transform them into desire positive actions, managing the first and basic impulses to act in a simple instinctive way, learning to control and process impulses is a must. As with strengthening one's willpower, the art of controlling impulses too requires training. There are two basic stages that can help in this process.

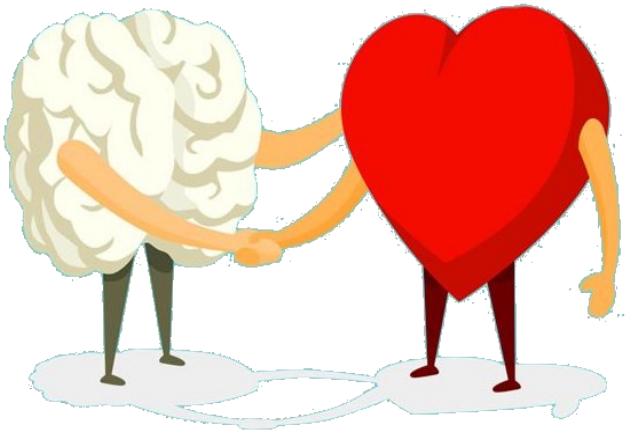
The first part of improving impulse control is setting up conditions to delay the ability to perform the action immediately. This process can be easily supported by strategically removing the source that brings the impulse (e.g., getting rid off all chocolate bars in the house).

Maintaining impulse control is the second part. It involves not giving in to the desire after the impulse is interrupted. Despite this stage being even harder than stage number one, there are several techniques that can be used to ease the process (e.g., substituting chocolate bars by any other likable but healthy backup, among many other case-specific tactics).

8. Reducing and managing stress

In all this whole process, lessening stress and anxiety is an essential element. Improving emotions management, impulse control, and appropriate decision-making requires the strengthening of willpower. As a muscle, the more it is exercised, the more it can handle. But if overused, it also loses capacity and efficiency. When the brain is too overtaxed, it is not strong enough as to always react victoriously against first impulses. For optimal emotional management, the brain needs to be free to do the job effectively.

Source: https://www.forbes.com/sites/palomacanterogomez/2019/07/02/the-8-simple-steps-to-master-emotional-skills/#a30885223862



4.3 Mobile devices' addiction

Mobile devices

A mobile device (or handheld computer) is a computing device small enough to hold and operate in the hand. Typically, any handheld computer device will have an LCD or OLED flatscreen interface, providing a touchscreen interface with digital buttons and keyboard or physical buttons along with a physical keyboard. Many such devices can connect to the Internet and interconnect with other devices such as car entertainment systems or headsets via Wi-Fi, Bluetooth, cellular networks or near field communication (NFC). Integrated cameras, the ability to place and receive voice and video-phone calls, video games, and Global Positioning System (GPS) capabilities are common. Power is typically provided by a lithium battery. Mobile devices may run mobile operating systems that allow third-party apps specialized for said capabilities to be installed and run.
Early smartphones were joined in the late 2000s by larger, but otherwise essentially the same, tablets. Input and output is now usually via a touch-screen interface. Phones/tablets and personal digital assistants may provide much of the functionality of a laptop/desktop computer but more conveniently, in addition to exclusive features.

Source: https://en.wikipedia.org/wiki/Mobile_device

Signs and Symptoms of mobile devices' addiction

At least 4 of the following signs and symptoms are thought to comprise criteria for mobile devices' addiction (especially cell phone), and the problematic cell phone overuse must cause significant harm in the individual's life:

- **A need to use the cell phone more** and more often in order to achieve the same desired effect.
- Persistent **failed attempts to use cell phone less often**.
- **Preoccupation** with smartphone use. Turns to cell phone when experiencing unwanted feelings such as anxiety or depression.
- **Excessive use** characterized by loss of sense of time.
- Has put a **relationship or job at risk** due to excessive cell phone use.
- **Tolerance**. Need for newest phone, more applications, or increased use.
- **Withdrawal**, when cell phone or network is unreachable.
  - anger.
  - depression
  - restlessness
  - tension
  - irritability

Physical Effects of Addiction

Overuse of cell phone or smartphone can result in a number of different physical problems that may cause permanent damage or be difficult to treat, including:

Digital eye strain.

⇒ The pain and discomfort associated with viewing a digital screen for over 2 hours.

⇒ Eyes begin to burn and itch.

⇒ Blurred vision.

⇒ Eye fatigue.

⇒ Digital Eye Strain can cause headaches.

Neck problems.

Also known as "text neck," which refers to neck pain resulting from looking down at cell phone or tablet for too long.[5]

Car accidents.

Many people believe that they can multitask and use their phones while driving, but this causes significant impairment and puts the driver and others on the road in danger. Research has revealed that **texting and driving can be just as dangerous as drinking and driving**.[7]

Psychological Effects of Cell Phone Addiction

Sleep disturbances.

Cell phone addiction has been linked to an increase in sleep disorders and fatigue in users. Using the cell phone before bed increases the likelihood of insomnia. Bright light may decrease sleep quality. Smartphone use could increase amount of time it takes to fall asleep. Light emitted from the cell phone may activate the brain.

Depression. Obsessive Compulsive Disorder.

Relationship problems.

Offline relationships may suffer as a result of neglect in favor of excessive cell phone and social media use.

Anxiety.

Research has found that college students who use their cell phones the most are more likely to feel anxious during downtime.

Source: https://www.psychguides.com/behavioral-disorders/cell-phone-addiction/signs-and-symptoms/

Module 5
5.1 Facing with life challenges, theory and practical aspects

Life challenges

A **challenge** is something that puts you to the test — like running your first marathon or reading War and Peace. **Challenge**, as a verb, is derived from a Latin word **meaning** "to accuse falsely," and it is still used much as it was in the 13th century, in the sense of questioning whether something is true or right. All of us experience major and minor life challenges. How we handle these struggles on a daily basis determines our physical, as well as our mental well-being. It takes only a single event to convince us we have no control over our circumstances. Sometimes these challenges consume us with guilt, panic attacks, or chronic fatigue. Our problems pressure us from every side, threatening to crush or break us. Surprisingly, all life challenges have a direct relationship in defining our purpose in life. If only we could find assurance that there was a plan or reason for the difficulties we face. We search for meaning in tragedy, questioning our reason for hope or a future. "Why me God? How can I ever forgive? I hate my life! How do I stop the pain?"
We face our greatest life challenges when we struggle to find love, security, and assurance that life truly has meaning. Our fears, unhealthy behaviors, and excessive emotional struggles result from our inability to interpret and correctly cope with our circumstances and feelings. Whether wrestling with chronic pain, forgiving infidelity, or trying to conceive, it is possible to move beyond that place of hopelessness.
Source: https://www.allaboutlifechallenges.org/life-challenges.htm

How to face life's challenges

We all know that life isn't that simple and that throughout our journey in life we might face numerous challenges, problems and setbacks.
The difference between people who succeed in life and those who don't is their ability to face life challenges correctly and not the absence of challenges.
A strong and resilient person will get hit by setbacks and life problems just like everyone else but shortly he will stand up and fight again. Learning how to face life's challenges won't only help you become more successful in life but it will also let you live a happier life.

How the way you think affects your ability to face life challenges

After years of research I found that one of the main reasons people fail to face life challenges is that they don't understand that life wasn't designed for people to succeed from the first attempt.

People are divided into two categories when it to comes to facing life's challenges, the first category have expectations of easy success, a smooth life that has relatively few bumps and of quick success.

The second group understands that they need to try more than once in order to get what they want and that they need to try different things until one of them works.

Of course it's clear that the first group are extremely vulnerable to life problems and challenges. The moment they fail they believe that something went wrong instead of realizing that success is all about trying things that don't work until something that works is found.

Your identity affects your ability to face life challenges

The way you think of yourself affects your ability to face life's challenges. If you believe that you are weak or helpless then most likely you will fulfill the prophecy by not trying again when you fail the first few times.

On the other hand if you believed that you are persistent, strong and resilient you will keep trying until you prove your beliefs true.

In the Solid Self confidence program I explained how we collect false clues in order to prove our already existing beliefs true!! So we don't acquire new beliefs based on the events we face but instead we work on reinforcing our old existing beliefs.

The formula for facing life's challenges

Here is the exact formula you need to face life's challenges:

- Its all about finding what works: Know that you have to keep trying things that don't work until you find out something that works
- Be flexible enough: Some people get the theory wrong and keep using the same methods that don't work then claim that they have tried hard enough. In order for your attempts to be effective you need to change your approach every time you try.
- Learn how to bounce: You can't avoid setbacks but you can learn how to bounce back each time you face one. See How to recover from setbacks.

Source: https://www.2knowmyself.com/How_to_face_life_challenges

7 Strategies to Face Life's Challenges

In our personal lives, and on a global scale, we face challenges that test our emotional mettle — injury, illness, unemployment, grief, divorce, death, or even a new venture with an unknown future. Here are seven strategies to help carry us through:

1. Turn toward reality

So often we turn away from life rather than toward it. We are masters of avoidance! But if we want to be present—to enjoy life and be more effective in it—we must orient ourselves toward facing reality. When we are guided by the reality principle, we develop a deeper capacity to deal with life more effectively. What once was difficult is now easier. What once frightened us now feels familiar. Life becomes more manageable. And there's something even deeper that we gain: Because we can see that we have grown stronger, we have greater confidence that we can grow even stronger still. This is the basis of feeling capable, which is the wellspring of a satisfying life.

2. Embrace your life as it is rather than as you wish it to be

The Buddha taught that the secret to life is to want what you have and to not want what you don't have. Being present means being present to the life that you have right here, right now. There is freedom in taking life as it comes to us—the good with the bad, the wonderful with the tragic, the love with the loss, and the life with the death. When we embrace it all, then we have a real chance to enjoy life, to value our experiences, and to mine the treasures that are there for the taking. When we surrender to the reality of who we are, we give ourselves a chance to do what we can do.

3. Take your time

As the story of the tortoise and the hare tells us, slow and steady wins the race. By being in a hurry, we actually thwart our own success. We get ahead of ourselves. We make more mistakes. We cut corners and pay for them later. We may learn the easy way but not necessarily the best way. As an old adage puts it: The slower you go, the sooner you get there. Slow, disciplined, incremental growth is the kind of approach that leads to lasting change.

4. Practice Gratitude

It is easy to count our troubles rather than our blessings, but such an attitude undermines our ability to draw from the good that we have been given and to see our lives fundamentally as a gift. A change in perspective can make all the difference. Recognizing the good and receiving it with gratitude is a recipe for emotional health and well-being. This attitude enlarges the possibility that we can make use of the good we have been given and even use it to cope with the difficulties that we inevitably inherit.

5. Stay Close to Your Feelings, Even the Painful Ones

Often we find our feelings scary, heavy, and confusing, so we try to keep them at a distance. But we need our feelings in order to find satisfaction, meaning, and pleasure in life. Getting rid of feelings not only backfires but it also drains us of the psychological energy that makes life worth living. Feelings are the gas in the engine of our personalities. They are the source of motivation. They are the energy, the vitality, the juice of life. Without them, our lives wouldn't have any personality, dimension, or color. There wouldn't be any joy, creativity, or fun. There wouldn't be you. There wouldn't be me. Without our feelings, nothing would really matter.

6. Accept Success and Failure as Part of Life's Journey

We are all learning: No one gets it right every time. A more compassionate attitude toward ourselves only helps us to stay in the game. The dynamic process of life—trying, succeeding, failing, and trying again—is the only way to develop lasting confidence in ourselves. We learn through experience that we can both succeed and recover from failure. We also learn to be humble and so to develop a view of ourselves as limited creatures that will always need the help and support of others. No matter how mature or successful we become, the child within always will need mentors and friends who'll see us through.

7. Tend to Your Loving Relationships

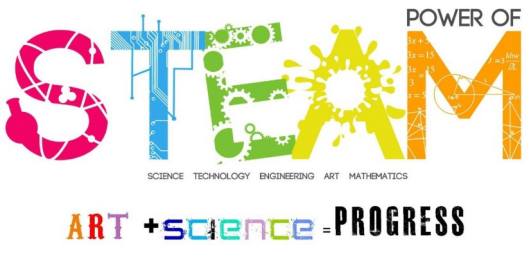
It is easy to neglect what matters most: our relationships with those we love. These relationships don't just happen magically; they grow and are sustained through attentive care and hard work. Mature love—in marriage, family, or friendships—is a dynamic, living experience. It is something you choose every day. It is something that is earned every day. It requires commitment to keep it working. It involves a daily process of overcoming the distance and honoring the separateness between us. It accepts the reality that we will hurt one another and be hurt by one another. It is the nature of being human. These pains cannot be avoided. We can only devote ourselves to do what we can do to weather them and to mend them. Love, then, is essentially repair work. We tend to the hurts. We try to heal them. We express our concern. We take responsibility for our mistakes; we learn to say we're sorry. We try to make amends. We learn to forgive; we accept the forgiveness of another. As the monks do every day, we fall down and get up, fall down and get up again.

Source: https://www.psychologytoday.com/us/blog/headshrinkers-guide-the-galaxy/201412/7-strategies-face-lifes-challenges

5.2 Pedagogical approaches of STEAM concept - Science Art and Maths

Useful bibliography:

https://www.youtube.com/watch?v=25IfcffmE7I
https://kidssteamlab.com/force-and-motion-steam-activities-for-kids/
https://www.wabisabilearning.com/blog/36-stem-project-based-learning-activities
https://tinkerlab.com/easy-stop-motion-animation-kids/
https://www.busykidshappymom.org/coffee-filter-art/
https://www.playdoughtoplato.com/water-cycle-bag/
https://www.giftofcuriosity.com/weather-science-how-to-make-a-cloud-in-a-jar/
https://www.wabisabilearning.com/blog/36-stem-project-based-learning-activities
https://www.sciencebuddies.org/stem-activities/candle-seesaw
https://www.youtube.com/watch?v=KRWOR8ryTYY
https://www.youtube.com/watch?v=qtz2fGjxdPs
https://www.youtube.com/watch?v=9qCtQldHxLU



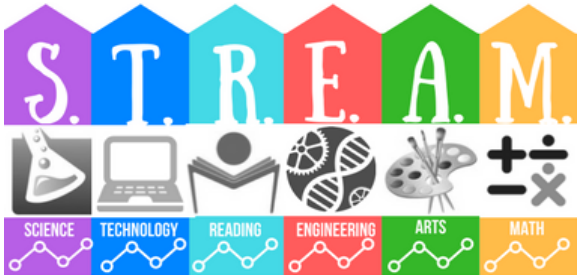


Table of content