sky4.0

Soft skills in Industry4.0

TOWARDS SUCCESS - CRITICAL THINKING

INDUSTRY 4.0 Soft Skills Work & Text Book

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Critical Thinking

Critical Thinking skills are the core of the most professional and technical jobs regardless of the field.

AND it can be **TAUGHT**!

1 Let´s start!

The root of Critical Thinking comes from 2 words: Kriticos (discerning judgement) and Criterion (Standards)

It means discerning judgement based on standards.

Here go a few interesting facts about curiosity:

- **Scientifically**, a person is armed for critical thinking.
- **Psychologically**, open-minded, curious, and self- confident people mostly tend to be critical thinkers
- **Professionally**, it provides the best chance of making the correct decision, and minimizes damages if a mistake does occur

Do you agree with the above?

What about your **Factbook**? Write below 3 things that you think critical thinker should have and no worries, there is no correct or wrong answer in all this handbook!

1.1 Ice breakers

Getting interested?

Let´s see… Critical Thinkers, a lot of times, starts with question: What, When, Who, Where…

Let us give you examples:

-What is happening? -Why is it important? -What don't I see? - Who is saying it?

Time for a small exercise: write in the form of a question, 3 things that you are thinking critically about.

What was the thinking process that you experienced when you were asking those questions?

1.2 Time for some reading!

Below, you have some interesting connections for understanding the critical thinking history and procedures.

"All reasoning is thinking but not all thinking is reasoning"

(Richard Paul)

Critical Thinking is a rich concept that has been developing throughout the past 2,500 years. It the ability to think clearly and rationally, understanding the logical connection between ideas. Critical Thinkers will identify, analyze and solve problems systematically rather than by intuition or instinct.

(Read more in the link)

Critical thinking is all about asking right questions! Building this skill helps you to assess evidence, evaluate arguments and sometimes adapt your thinking to engage different situations.

https://www.youtube.com/watch?v=HnJ1bqXUnIM

Socratic Questioning System known as the best critical thinking teaching strategy. It is an effective wat to explore ideas in depth.

(Read more in the link)

1.3 Phases of Critical Thinking

- Description Phase

  This phase starts with questions "What, when, who, where" and aims to gather the most information and argument possible. Being open minded and taking all possible points of views prevents misdirection. It is about defining clearly what you are talking about, say exactly what is involved, where it takes place, or under what circumstances. Fulfilling this function helps you to introduce a topic. More complex description will become analysis (Critical Thinking, Learning Development, Plymouth University, 2010).

- Analysis Phase

  This phase starts with questions "Why, how, what if" and aims to understanding the problem, examines evidences while distinguishing unnecessary, inert information, identifying assumptions, and understanding "what is not the case". You should examine and explain how parts fit into a whole; give reasons; compare different elements; show your understanding of relationships. In this way analysis forms the main part of any in-depth study.

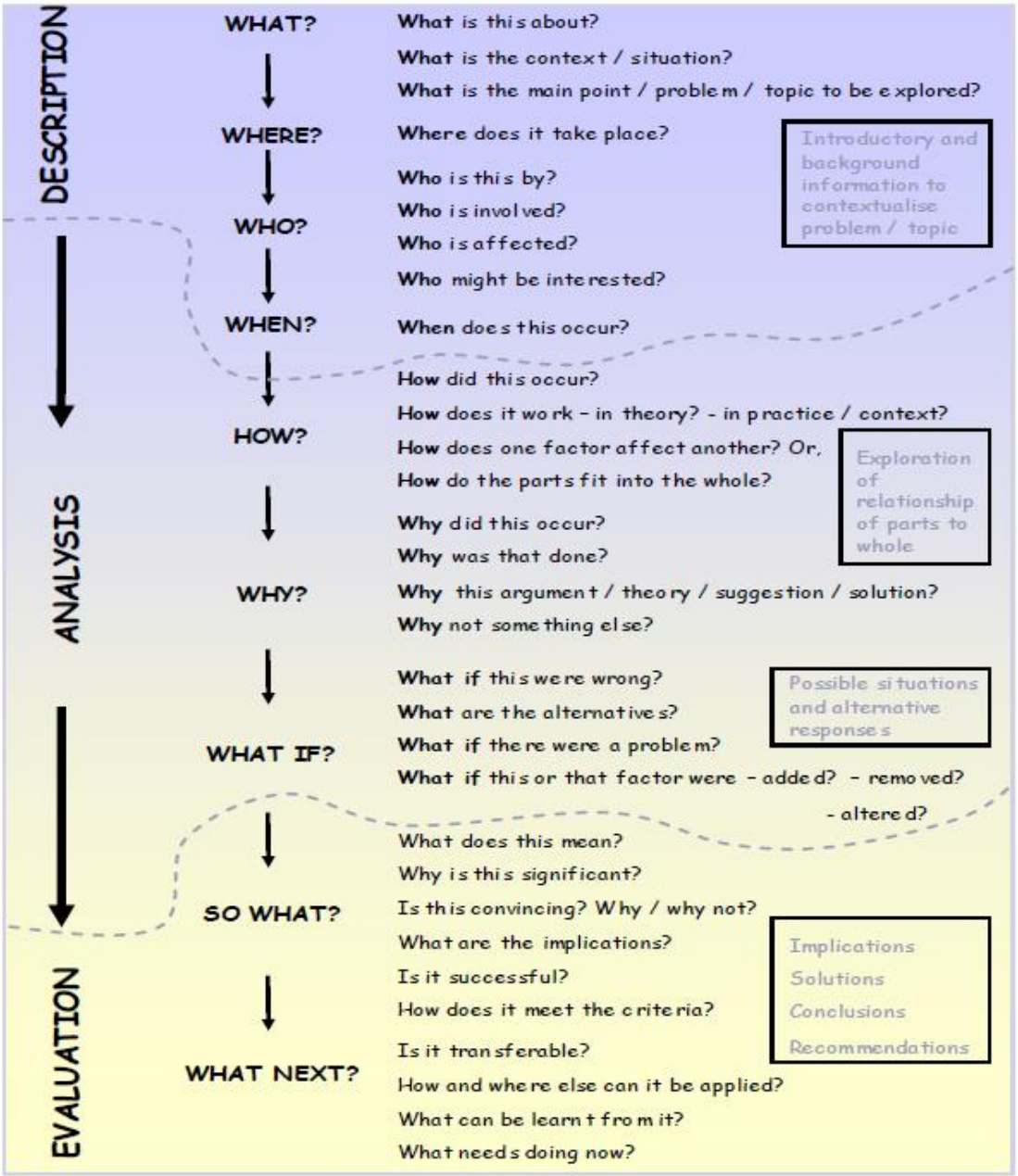
- Evaluation Phase

  This phase starts with questions like "So what, why not" and aims to evaluate the best argument/ solution and judging the success or failure before making a decision, simply to understand how strong the reasoning is. This phase utilizes strong judgements skills. judge the success or failure of something, its implications and/ or value. Evaluations lead us to conclusions or recommendations and are usually found at the end of a piece of academic work, a paper, chapter, or other text.

1.4 Warm-up

For this drill you will practice the scheme of asking questions of Critical Thinking.

Critical Thinking follows a linear model which goes from Description→Analysis→ Evaluation. Here is the model:



Source: (Critical Thinking, Learning Development, Plymouth University, 2010, http://www.learnhigher.ac.uk/learning-at-university/critical-thinking-and-reflection/critical-thinking-and-reflection-tutorial/).

Notice how the three functions are not strictly separate but lead into one another (see the dotted lines in the diagram above.) Here is an example of the model in action:

Imagine that an archaeology student has discovered something at a Roman site. As the dirt is cleaned away, the object is revealed. The archaeologist asks herself questions to help clarify her understanding:

Description			Description becoming analysis	
What is it?	*A small bowl with a handle*		What was its purpose?	*Could have been to contain liquid*
Where was it?	*At the site of a Roman villa (was this the kitchen or dining room?)*		How would it work?	*Bowl shape holds liquid and prevents spillage*
When?	*Roman period – approx 300 AD?*		Why this size and shape?	*Easy to drink from*
Who used it?	*Big house - maybe a wealthy family?*		Why the handle?	*Can be held and carried*

The archaeology student could develop her answers to these questions in a written report or assignment by reference to academic texts. This would help in building an 'argument'-e.g. to justify her view that what she has found is a drinking cup.

Now let's see how the student might also use the critical thinking model for analysis and evaluation of her find:

Analysis			Analysis becoming evaluation	
How is it made?	*Rings are evidence it was made on a wheel*		What next?	*Need to compare the design and decoration with similar objects to verify its age*
How was it decorated?	*Burnished (polished) with wavy lines typical of Roman period?*			
Why is it here?	*Kitchen or dining area?*		So what?	*Very rare to find intact pot – highly significant and valuable find!*
Why intact?	*Preserved in soft soil. Durable*			

In building her argument, the student might use her own reasoning prompted by the model, in combination with material she has read.

A small, intact pottery vessel was uncovered at the site of a Roman Villa in Worcester on 12th June 2009. The vessel is a 'fineware' cup which would have been used for drinking at table (Harris, 2004). It has a handle and is decorated by burnishing with a motif of six parallel wavy lines scored into the outside surface. It is thought that the cup may have been used by occupants of the villa, who were likely to have been members of a wealthy merchant family. Other evidence suggests that the villa was occupied between 100 and 300 AD (Smith, 2008)

There are regular symmetrical ridged rings visible on the inside of the cup, suggesting that the construction of the vessel was by turning on a pottery wheel. It is known that this method for producing pots was common throughout Gaul and Britain from the middle of the Roman period. The decoration is also typical of the period and confirms it as 'fineware' as opposed to 'coarseware' (Harris, 2008; Smith, 2004). The location of the find is not surprising since it is an item which would have been in common domestic use. The precise spot, in the corner of a ground floor room, could possibly suggest that this was a dining or a pottery storage area; although without further information from the surroundings it is not possible to be sure of this. Recent investigations of the site have resulted in an outline plan and findings (Diggings and Tinker, 2008) which speculate that this part of the villa with its mosaic floor could have been an area used for dining.

Although this vessel is not a particularly unusual pot in terms of its size and pattern, it is nonetheless a significant find because it was found intact. It is also valuable in that there is only a slight amount of damage to the patterned surface. This is rare because of the fragility of pottery and the likelihood of it being crushed under the weight of falling masonry or being trodden upon by human or animals. This pot seems to have survived whole because of the soft earth which surrounded it. It was further protected at some later stage when, luckily, an arched piece of stone fell or was placed above the pot, enclosing it within the space below the arch. In order to discover more about the vessel it will be necessary to make comparisons between it and others found from similar sites and periods. From a comparison of the decoration, style and construction of the vessel it may be possible to be more precise about its age, where it was produced and its use.

References

Diggings, I. and Tinker, B. 2008 "Findings from recent examinations at the site of a Roman Villa near Worcester". Journal of Imaginary Archaeology, Vol 26. 3. 34-50

Harris, J. 2008 Pottery Identification Sheet ONLINE: http://www.scribd.com/doc/3888712/Pottery-identification-sheet accessed 30.05.2010

Smith, D. 2004 Comparing Roman Pottery. London: Shovel Press

Try going through the example above and deciding what the function of each sentence is. Ask yourself: is it description, analysis, or evaluation- or is it a combination of one or more function?

If you go through, sentence by sentence, you will probably find it easy to see that most of the description happens in the first paragraph; the analysis in the second; and the evaluation in the third. There will always be instances where it is hard to say whether part of a text fulfils one or another function – and often two or more functions are being undertaken together. This is because using language and writing is not an exact or purely mathematical activity. People use words in different combinations and attempt to do things in various ways and for various reasons.

To be considered sufficiently 'critical', (academic) university level writing must go beyond being merely descriptive. The way academic writing follows this pattern, from description, to analysis, to evaluation', tells us something important about academic work – whether it is in the sciences, arts or humanities. All subjects, when studied at advanced levels, require these three things (description, analysis, and evaluation) to be done, and in largely that order, to tell a coherent story which is supported by critical reasoning and evidence.

1.5 Self-evaluation

In this point, you are staring to be more self-aware about your critical thinking process, so let´s take it to the next level! We will use the 5-scale evaluation form of critical thinking (Stella Cottrell. (2017). Critical Thinking Skills: Effective Analysis, Argument and Reflection, Macmillan Education UK (Palgrave Study Skills), pp. 13)

and get deeper into analysing you! Complete the self-evaluation below, and in the end, you will find an explanation about the interpretation of your score

Critical Thinking: Knowledge, skills, and attitudes

For each of the following statements, rate your responses as outlined below. There are no right or wrong answers. Note that 'Strongly Disagree' carries 0 point.

a – Strongly disagree | b – Disagree| c – Sort of agree| d – Agree| e – Strongly Agree

Joyous Exploration:		a	b	c	d	e
1.	I feel comfortable pointing out potential weaknesses in the work of experts.					
2.	I can remain focused on the exact requirements of an activity.					
3.	I know the different meanings of the word 'argument' in critical thinking.					
4.	I can analyse the structure of an argument.					
5.	I can offer criticism without feeling this makes me a bad person.					
6.	I know what is meant by a line of reasoning.					
7.	I am aware of how my current beliefs might prejudice fair consideration of an issue.					
8.	I am patient in identifying the line of reasoning in an argument					
9.	I am good at recognising the signals used to indicate stages in an argument.					
10.	I find it easy to separate key points from other material.					
11.	I am very patient in going over the facts in order to reach an accurate view.					
12.	I am good at identifying unfair techniques used to persuade readers.					
13.	I am good at reading between the lines.					
14.	I find it easy to evaluate the evidence to support a point of view.					
15.	I usually pay attention to small details.					
16.	I find it easy to weigh up different points of view fairly.					
17.	If I am not sure about something, 1 will investigate to find out more.					
18.	I can present my own arguments clearly.					
19.	I understand how to structure an argument.					
20.	I can tell descriptive writing from analytical writing.					
21.	I can spot inconsistencies in an argument easily.					
22.	I am good at identifying patterns.					
23.	I am aware of how my own up-bringing might prejudice fair consideration of an issue.					
24.	I know how to evaluate source materials.					
25.	I understand why ambiguous language is often used in research papers.					
	CORRESPONDING POINTS	*0*	*1*	*2*	*3*	*4*
	TOTAL:					

Great! That was a good reflection, now here is the interpretation of your score:

Going through the questionnaire may have raised some questions about what you know or do not know about critical thinking. The lower the score, the more likely you are to need to develop your critical thinking skills. A score over 75 suggests you are very confident about your critical thinking ability. It is worth checking this against objective feedback from your tutors or colleagues, for example. If your score is less than 100, there is still room for improvement! If your score is under 45 and remains so after completing the course,

you may find it helpful to speak to an academic counsellor, your tutor, or a supervisor to root out the difficulty.

2 Do I really need to be a "Critical Thinker" in my work?

2.1 Time for some reading!

As seen in SKY4.0 report, most part of the literature checked for conducting this investigation agreed on the importance of softs skills training in order to overcome the challenges of the new industrial framework.

At a company level, and at a societal level there will be a need of development and also adaptation of new rules and environment.

(Sky4.0 report link)

Critical Thinking is important because it ensures you have the best answer to a problem, with maximum buy-in from all parties involved- an outcome which will ultimately save employees business time, money and stress. Teaching employees critical thinking in the workplace allows them to employ the skill as a crisis happens, not after the fact. Critical thinking does not just help you arrive at the best answer, but at a solution most people embrace.

The money, time and conflict you will save in the log run is well worth the extra time and patience of implementing critical thinking in your workplace.

(Article link)

2.2 The Benefits of Critical Thinking

Did you know that Critical Thinking brings several benefits, some of them are listed below:

- *Fewer decision-making errors*

  When we start to think critically, we create different kinds of questions to the decisions that we suppose to make, and it leads us to question almost every option. Therefore, it creates and environment which there are fewer decision-making errors because it leads us to generate alternatives.

- *Seeing the bigger picture*

  Like scientific method, critical thinking contains a lot of steps and it gives us to opportunity to look at the situations/problems in wider window. Therefore, we can see the options in front of us by asking the right kind of questions. Naturally, it associates with better job performance, and workplace skills.

- *Enhances Creativity*

  There is no question that effective critical thinkers are also largely creative thinkers. A desire to think critically about even the simplest of issues and tasks indicates a desire for constructive outcomes. results.

- *Encourages Curiosity*

Effective critical thinkers remain curious about a wide range of topics and generally have broad interests. Because critical thinkers are curios by nature, opportunities to apply critical thinking skills are all around them every moment.

2.3 Whys in my work

Now that you have an idea about the benefits of critical thinking in the workplace, let's become more "personal"! In the below table you are called to organise your thoughts about critical thinking in the workplace.

WHY is critical thinking needed in the workplace	WHY it can be helpful/rewarding
• • •	• • •
WHY it can be unwanted	
• • •	

What a blast! We hope the table you just completed helps you have a more solid opinion!

3 What keeps me back of becoming a Critical Thinker?

3.1 Time for some reading!

While many people believe that your feeling precede, or are independent of your thoughts, the truth is that your feelings are products of your thoughts. When you are aware that you can choose and direct your thinking, you realize that you have the ability to better control the circumstances or your lives.

(Read more in the link)

How can we become a critical thinker what mentality should be adopted for the change? See below a video with an example:

https://www.youtube.com/watch?v=yrPb41hzYdw

3.2 Critical thinking and arguments

To become a critical thinker some should understand the context of arguments. Because critical thinking is thinking about arguments. Then here comes the question: what is an argument? Here is the link for more information (Arguments)

Now it is time to answer some questions about arguments and related terms!

Remember that an argument occurs when one or more claims (the premises) are offered as a reason for believing that another claim (the conclusion) is true. There are not many hard-and-fast rules for identifying arguments, so you'll have to read closely and think carefully about some of these (Brooke Noel Moore and Richard Parker, 2009, Critical Thinking, 9th edition, McGraw-Hill)

1. What is an argument?

An argument offers a reason or reasons for believing a claim is true. More technically, an argument consists of a conclusion and the premise or premises (the reason or reasons) said to support it.

2. Do all arguments have conclusions?

All arguments have a conclusion, though the conclusion may not be explicitly stated.

Are those statement true or false?

3. All arguments are used to try to persuade someone of something. (False)
4. Moral value judgments might all be true. (False)
5. Sometimes we transfer a favourable or unfavourable opinion of a speaker to what the speaker says. (True)

Determine which of the following items or passages contain arguments:

6. "Roddick is unlikely to win the U.S. Open this year. He has a nagging leg injury, plus he just doesn't seem to have the drive he once had." (Argument)
7. "Everybody is saying the president has made us the laughingstock of the world. What a stupid idea! He has not made us a laughingstock at all. There's not a bit of truth in that notion." (No argument)
8. "Yes, I charge a little more than other dentists. But I feel I give better service. So, I think my billing practices are justified." (Argument. Conclusion: The dentist's billing practices are justified.)
9. "Water resistant to 100 feet,' says the front of this package for an Aqualite watch, but the fine-print warranty on the back doesn't cover 'any failure to function properly due to misuse such as water immersion." This is from consumer reports of the watch. (Consumer Reports seems to be suggesting that the watch may not really be water resistant and giving a reason to support this suggestion. We would call this an argument.)
10. Does this dialogue contain an argument?

- Professor X: Well, I see where the new chancellor wants to increase class sizes.
- Professor Y: Yeah, another of his bright ideas.
- Professor X: Actually, I do not think it hurts to have one or two extra people in class.
- Professor Y: What? Of course, it hurts. What are you thinking, anyway?

- Professor X: Well, I just think there is good reason for increasing the class size a bit.

(No argument; Professor X is simply expressing an opinion. Saying that "there is good reason for increasing the class size" does not actually introduce a reason.)

11. The Directory of Intentional Communities lists more than two hundred groups across the country organized around a variety of purposes, including environmentally aware living. (No argument)
12. Computers will never be able to converse intelligently through speech. A simple example proves this. The sentences "How do you recognize speech?" and "How do you wreck a nice beach?" have different meanings, but they sound similar enough that a computer could not distinguish between the two. (Argument. Conclusion: Computers will never be able to converse intelligently through speech.)
13. Fears that chemicals in teething rings and soft plastic toys may cause cancer may be justified. Last week, the Consumer Product Safety Commission issued a report confirming that low amounts of DEHP, known to cause liver cancer in lab animals, may be absorbed from certain infant products. (Argument. Conclusion: Fears that chemicals in teething rings and soft plastic toys may cause cancer may be justified.)
14. Levi's Dockers are still in style, but pleats are out. (No argument)
15. "Can it be established that genetic humanity is sufficient for moral humanity? I think that there are very good reasons for not defining the moral community in this way." — Mary Anne Warren. (No argument: Warren says that there are reasons for her conclusion, but she does not tell us what they are.)
16. We need to make clear that sexual preference, whether chosen or genetically determined, is a private matter. It has nothing to do with an individual's ability to make a positive contribution to society. (No argument)

4 Problem Solving

"The point of critical thinking is to effectively solve problems using reasoning." (Richard Paul). Problem can sometimes be complex and linked to some other problems. Then one should prioritize, align problems that needs solution to solve the main problem. To have a better understanding of critical thinking, a problem-solving study can be used since it is an exercise in problem solving itself. Critical thinking and problem-solving go together. They both refer to using knowledge, facts, and data to solve problems effectively. But with problem-solving, you are specifically identifying, selecting, and defending your solution.

4.1 Definition of problem solving

The basic definition of problem solving is the process of identifying a problem, developing possible solution paths, and taking the appropriate course of action. So why is problem solving important?[9] Because, good problem-solving skills empower you both in your personal life and they are critical in your professional life. Employers often identify everyday problem solving as crucial to the success of their organizations. For employees, problem solving can be used to develop practical and creative solutions, and to show independence and initiative to employers.

Problem-solving can be an efficient and rewarding process, especially if you are organized and mindful of critical steps and strategies. Remember, too, to assume the attributes of a good critical thinker. If you are curious, reflective, knowledge-seeking, open to change, probing, organized, and ethical, your challenge or problem will be less of a hurdle, and you will be in a good position to find intelligent solutions. In order to solve a problem in a better and efficient way it will be helpful to have a check list, at least at the very beginning of the learning phase.
We are thinking critically and, in a problem-solving mindset when we:

- Rely on reason rather than emotion
- Evaluate a broad range of viewpoints and perspectives
- Maintain an open mind to alternative interpretations
- Accept new evidence, explanations, and findings
- Are willing to reassess information
- Can put aside personal prejudices and biases
- Consider all reasonable possibilities
- Avoid hasty judgments

4.2 IDEAL method of problem solving

You should remember that problem solving is an essential soft skill. It is the ability to recognize difficulties or complications, identify possible solutions, implement them, and finally follow up to make sure they were successful.[11] And, problem solving is a process. Most strategies provide steps that help you identify the problem and choose the best solution. two basic types of strategies: algorithmic and heuristic.
But what do you do when there is no single solution for your problem? Heuristic methods are general guides used to identify possible solutions. A popular one that is easy to remember is IDEAL (Bransford & Stein, 1993):

- **Identify the problem:** The first task is to determine if a problem exists. Sometimes when you think this point through, you may conclude that there really is not a problem, just a misunderstanding. If that is the case, fine. If not, and you determine that there is indeed a problem, you need to identify exactly what it is. According to Barry Lubetkin, a New York clinical psychologist, how systematically someone weighs the pros and cons of a problem and how clearly the person can define and state it, is also an indication of highly developed intelligence.
    - Identify the problem
    - Provide as many supporting details as possible
    - Provide examples
    - Organize the information logically

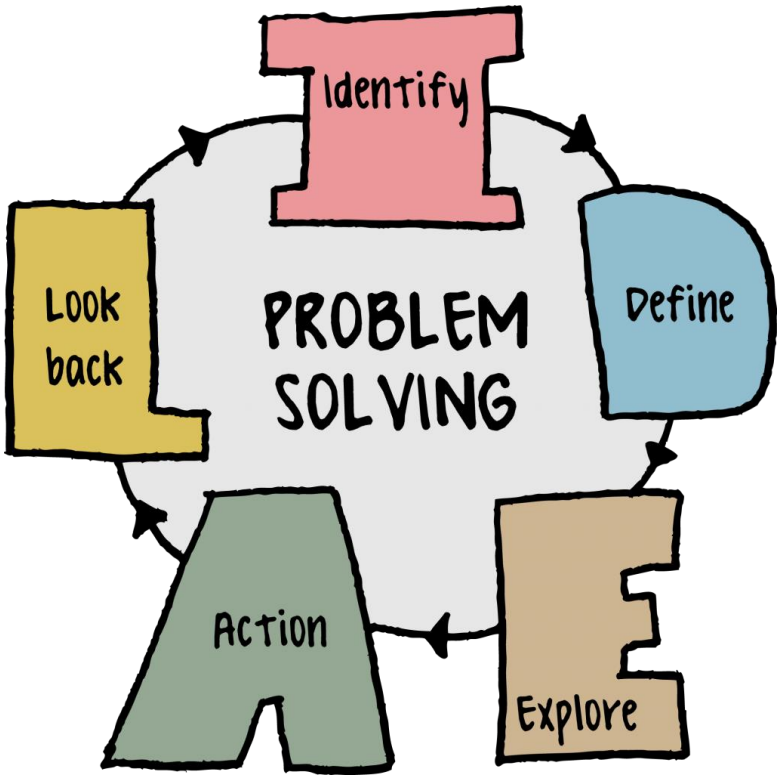
- **Define the context of the problem:** Once you have determined the problem, analyze it by looking at it from a variety of perspectives. Is it solvable? Is it real or perceived? Can you solve it alone or do you need help? Sometimes by looking at it from many angles you can come up with a resolution right away. You may also reveal a bias or narrow point of view that needs to be broadened.
- **Explore possible solutions or strategies:** Problems can be solved in many ways. Brainstorm a list of several possible solutions. Put down anything that comes to mind and then go over the list

and narrow it down to the best possibilities. Having several viable options leads to obtaining the best results.

- Use logic to identify your most important goals
- Identify implications and consequences
- Identify facts
- Compare and contrast possible solutions

- **Act on best solution:** Go over your list of possible solutions. Different situations call for different solutions. Quite often what works in one situation, may not work in a similar one. Take time to determine what will work best for the problem at hand. After all, implement your solution. Instead of approaching problems and challenges as insurmountable obstacles, we can view them as opportunities to focus on our critical thinking and problem-solving skills
  - Use gathered facts and relevant evidence
  - Support and defend solutions considered valid
  - Defend your solution

- **Look back and learn:** The look and learn phase engages learners in self-reflection, self-questioning about the process, and thinking about what has been learned and how they might learn from the experience.



Source: https://transportfutures.institute/key-problem-solving-skills/

4.3 Problem solving case study

Think about a problem that a lot of your friends have started to smoke. They always want you to go with them to buy cigarettes and keep offering smokes to you.

I Identify the problem	My problem is deciding whether to start smoking. Lots of my friends smoke and I am not sure they'll still hang out with me if I keep saying "no". I really do not think smoking is smart.	
D Define and describe the problem	Solution 1 Start smoking	Solution 2 Do not smoke
E Explore and Evaluate strategies, solutions ☺ Positives ☹ Negatives	☺ The pressure will be off. ☺ I will not lose friends' because I'll be like them. ☹ It costs a lot. ☹ My parents will find out. ☹ I know what smoking does to your lungs.	☺ I get to spend my money on stuff I really want. ☺ My lungs will be healthy. ☺ I will not get addicted. ☹ I will have to keep saying no to my friends. ☹ I might lose them as friends.
A Act on the strategies	*I choose solution 2* I am not going to smoke because it is not worth the risk. *My reasons for choosing this solution:* My grandmother tried but could not quit smoking, even after she had a serious heart attack.	
L **Look back,** evaluate the effect of your strategies and learn	I learned that friends who pressure me do to something I disagree with are not the kind of friends I want to have ... smoking really is not cool anymore.	

Source: Peel (2002). Available online (18.08.2020) t: http://www.region.peel.on.ca/health/commhlth/probsolv/probtn1.htm

5 Hands on, its practice time!

Real change can come only through constant practice that will intervene with scheduled aspects in the daily life. This chapter focuses solely on exercises that will change your thinking process (https://www.youtube.com/watch?v=gVhxvvpCglY&t=60s&ab_channel=CareerVidz, online: 24.09.2020).

5.1 Practice of Arguments

LEARNING ACTIVITY 5.5	
Duration	10 minutes

Objectives	You will work on thinking process of given statement
Methodology to implement and develop	1. Review the 3 arguments of given statement (section A) 2. What do you think of arguments? Are they weak or strong arguments? Why? 3. See the answers sheet for the explanations (section B)

Template – Practice of Arguments

A. Statement

- Should private schools be taxed more heavily to pay for state school pupils' meals?

Argument 1	Yes - Those children are going hungry!
Argument 2	No - Big businesses should be taxed instead of private schools. Taxing private schools would reduce their incentive to provide a good service and could lower the quality of teaching.
Argument 3	No - We live in a free market and therefore private schools deserve the profits they make. That is just the way it is

B. Answers

Argument 1	Yes - Those children are going hungry!
Answer	Weak Argument.
Explanation	While it may be the case that the children are going hungry, this argument is formulated as an appeal to emotion. It is trying to stir an emotional response from you rather than a rational one. Therefore, it could be considered a 'weak' argument.

Argument 2	No - Big businesses should be taxed instead of private schools. Taxing private schools would reduce their incentive to provide a good service and could lower the quality of teaching.
Answer	Weak Argument.

Explanation	This argument employs a double standard. The suggestion is that, if the schools are taxed, they will lose money and therefore have less of an incentive to make money, since they are a business. However, the solution offered by the argument would cause the same problem. If big businesses are taxed more heavily, they might have a larger incentive to move into a lower tax bracket so that they do not have to pay as much.

Argument 3	No - We live in a free market and therefore private schools deserve the profits they make. That is just the way it is
Answer	Weak Argument.
Explanation	This argument conflates descriptive (is) and prescriptive (ought) claims. The initial statement is asking whether we ought to tax private schools more heavily. This argument argues that it is the case that these schools do not have to pay higher taxes, and therefore they should not have to pay higher taxes. This is sometimes referred to as the “is/ought" fallacy.

5.2 Practice of Assumptions

LEARNING ACTIVITY 5.5	
Duration	10 minutes
Objectives	Practice on Assumptions
Methodology to implement and develop	1. Review the 3 claims of given statement (Section A.) 2. What do you think of those claims? Is the assumption made or not made? 3. See the answers for the explanations (Section B.)

Template – Practice of Assumption

A. Assumption

- If I go down to the pond today, the only birds I will see are swans.

Claim 1	There will be no ducks at the pond.
Claim 2	All swans are white.
Claim 3	There will be swans at the pond today.

B. Answers

Claim 1	There will be no ducks at the pond.
Answer	Assumption Made.
Explanation	In order to only see swans at the pond, there must be no other birds. Since ducks are a kind of bird, their presence at the pond would mean you would see them as well as swans. Therefore, there cannot be any ducks at the pond in order to only see swans.

Claim 2	All swans are white.
Answer	Assumption Not Made.
Explanation	The statement does not specify what color the swans have to be, only that swans have to be seen. Therefore, this assumption is not implied by the statement.

Claim 3	There will be swans at the pond today.
Answer	Assumption Made.
Explanation	This is an assumption made by the initial statement because in order to see swans at the pond, there must be swans at the pond.

5.3 Practice of Inferences

LEARNING ACTIVITY 5.5	
Duration	10 minutes
Objectives	Practicing inferences of the statement
Methodology to implement and develop	1. Review the 3 inferences of given statement (Section A.) 2. What do you think of those inferences? Are they true or not? 3. See the answers for the explanations (Section B.)

Template – Practice of Inferences

A. Statement

- Scientific studies have discovered a link between chewing gum and better performance when it comes to tests. Researchers believe that this is because the act of chewing gum correlates with heightened activity in the hippocampus - the region of the brain which handles memory. When activity in the hippocampus is increased, it appears as though the ability to recall memories is strengthened.

Inference 1	Chewing gum causes heightened activity in the hippocampus.
Inference 2	There is a correlation between chewing gum and better recollection of memories.

B. Answers

Inference 1	Chewing gum causes heightened activity in the hippocampus.
Answer	Insufficient data to say whether it is true or false.
Explanation	This is tricky because the passage states that there is a correlation between chewing gum and heightened activity in the hippocampus. However, correlation is not the same as causation, which is what this inference is stating. Therefore, we cannot infer either way whether this claim is true or false.

Inference 2	There is a correlation between chewing gum and better recollection of memories.
Answer	Definitely True.
Explanation	This is true because the passage states that chewing gum correlates with heightened activity in the hippocampus. The passage also implies that when the hippocampus is

	more active, the ability to recall memories is strengthened. Therefore, we can accept that there is a correlation between chewing gum and better recollection of memory (but not necessarily any causal link).

5.4 Practice of Deduction

LEARNING ACTIVITY 5.5	
Duration	10 minutes
Objectives	Making proper deductions to given statement
Methodology to implement and develop	1. Review the 3 deduction of given statement (Section A.) 2. What do you think of those deductions? Do they follow the statement correctly? 3. See the answers for the explanations (Section B.)

Template – Practice of Deduction

A. Statement

- Some objects with four wheels are cars. All cars possess a steering wheel. This object has four wheels but no steering wheel. Therefore:

Deduction 1	This object is a car.
Deduction 2	This object is not a car.
Deduction 3	This object is a bicycle

B. Answers

Deduction 1	This object is a car.
Answer	Conclusion Does Not Follow.
Explanation	Premise 1 states that only "some" objects with four wheels are cars. In addition, since this object has no steering wheel, it does not meet the criteria "all cars having steering wheels."

Deduction 2	This object is not a car.
Answer	Conclusion Follows.
Explanation	This deduction follows because this object does not meet the standard criteria necessary to be a car (i.e. it does not possess a steering wheel). Therefore, we can be certain that it is not a car.

Deduction 3	This object is a bicycle
Answer	Conclusion Does Not Follow.
Explanation	This cannot be a bicycle since they have only 2 wheels. Even if the bicycle had stabilisers attached, this does not necessarily follow from the premises.

6 Closure – Takeaway

Becoming a Critical Thinker in all aspects of your life should be one of your goals! Next time when you need to make a decision, how about start using the following template?

1. IDENTIFY THE PROBLEM:

DEFINE THE CONTEXT OF THE PROBLEM	EXPLORE POSSIBLE SOLUTIONS OR STRATEGIES	ACT ON BEST SOLUTION
2. Is it solvable, can you solve it alone or need help:	3. What are the implications, facts, and consequences:	4. What are the evidences and facts for the best solution:
LOOK BACK AND LEARN		
5. What has been learned:		