In-Service training Programme

Creative and critical thinking

LUOVA

USING ONLINE ESCAPE ROOMS TO
BUILD CREATIVE THINKING SKILLS

Introduction and aims

In this training program you will learn about the creative and critical thinking as well as:
• What is the difference between creative and critical thinking;
• Which techniques and tools to use for both;
• What is challenge based learning;
• How to evaluate (web) sources;

Each topic is discussed in a separate unit, which covers all the necessary theory about it. The aim of it is to give you a profound base to build on and discover different views on the subject.

Apart from the main part of the theory, there is a reflection and a summary of the module to revise the information represented.

Then, if you wish, you will find practical exercises to consolidate the information and test your knowledge.

Key Learning content

Creative thinking

What is creativity? By Cambridge dictionary creativity is the ability to produce or use original and unusual ideas. **Creativity** is defined as the **creation of something new**.

However, creative thinking is a **cognitive process** or the realisation of ideas that changes our relationship with the world. Often, however, creative thoughts or **ideas are not something completely new**, but rather finding **new connections between existing concepts**. It makes many of us think creatively. Not all of us may come up with the next great invention, but if we are given the most basic freedom, we can analyse the activities we perform on a daily basis and find ways to do them better.

It is essential for creative thinking to **create an environment that provides an opportunity for spontaneity** and **rewards it**. In addition, the processes that enable evaluation, innovation and putting creative thinking into practice are important in fostering a sustainable creative environment. This **environment encourages effective ideas**.

Teresa Amabile is an expert in the field of creativity and innovation. She believes that within every individual, creativity is a function of three components: expertise, creative-thinking skills, and motivation.
• **Expertise Component** - knowledge, expertise, and access to relevant information
• **Creative Thinking Skills Component** - capacity to think outside the box and put existing ideas together in a new combination
• **Motivational Component** - need or passion to be creative.
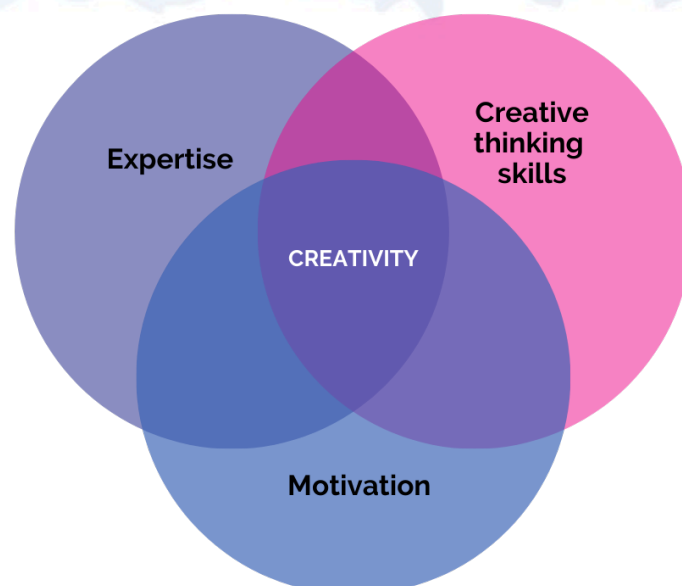
There is another **way to look at creativity** (Harris, 1998):

ABILITY

ATTITUDE

PROCESS
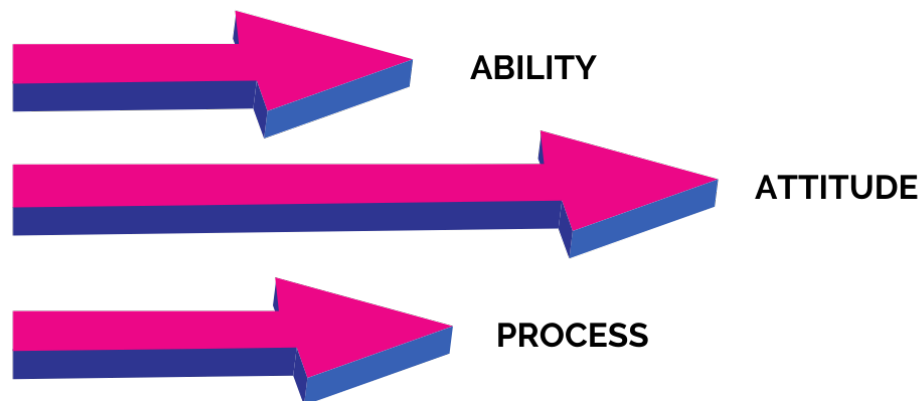
• Ability
A simple definition is the ability of creativity to imagine or invent something new. As we will see below, creativity is not only the ability to create something completely new, but the ability to generate new ideas by combining, modifying or reapplying existing ideas. Some creative ideas are surprising and ingenious, while others are simple, good and practical ideas that no one has thought of yet.

Believe it or not, everyone has important creative abilities. See how creative children are. In adults, creativity is very often suppressed by education, but it still exists and can be revived. Usually creativity takes only commitment and time.

• Attitude
Creativity is also an attitude: the ability to accept change and innovation, the desire to play with ideas and possibilities, the flexibility of perspective, the habit of using kindness, when looking for ways to improve it. For example, we socialise to accept only a small number of permitted or normal things, such as chocolate-covered strawberries. The creative person notices that there are other possibilities, such as peanut butter and banana sandwiches or chocolate-coated prunes.

• Process
Creative people work resiliently to improve ideas and solutions, gradually making changes and finalising their work. Contrary to the mythology surrounding creativity, very few creative works of excellence are produced in a flash or in rapid madness. The stories of companies that had to take away an invention from the creator to market it are much closer to the truth, as the they would have constantly improved and changed, always trying to make it a little better.

CREATIVE METHODS

Several methods have been identified for producing creative results. Here are the five classic ones (Harris, 1998):

EVOLUTION

SYNTHESIS

REVOLUTION

REAPPLICATION

CHANGE
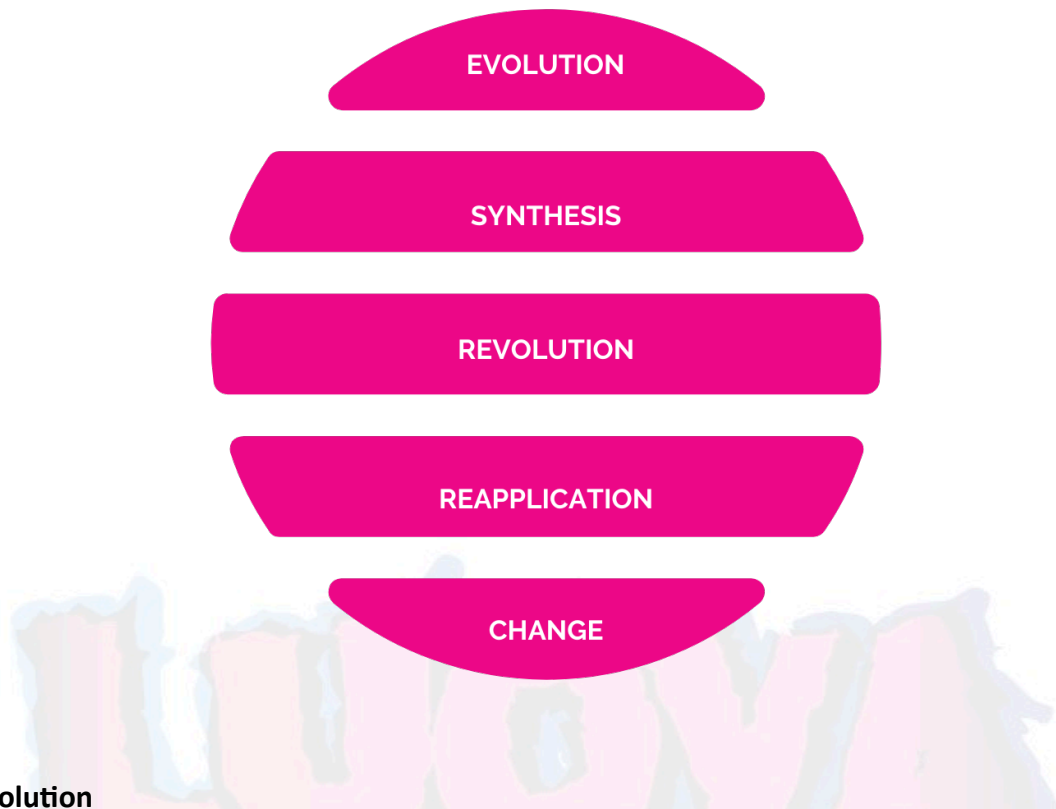
• Evolution

It is a progressive improvement method. New ideas come from other ideas, new solutions from previous ones, which are slightly better than old ones. Many of the very complex things we enjoy today have evolved during a period of constant growth. By doing something a little better here, a little better there, it will gradually become something much better - even completely different from the original.

The evolutionary method of creativity also reminds us of this critical principle: each problem solved can be solved even better. Creative thinkers disagree with the idea that once a problem is resolved, it can be forgotten, or with the understanding that "if it is not broken, do not fix it." The philosophy of the creative thinker is that "there is nothing like insignificant improvement".

• Synthesis

This method combines two or more existing ideas into a third new idea. The combination of magazine ideas and audio tapes gives you a magazine idea you can listen to - useful for people who are blind or commuting.

• Revolution

Sometimes the best new idea is a completely different and noticeable change from the previous ones. Although the philosophy of evolutionary improvement may ask the teacher, "How can I improve my lessons?" the revolutionary idea could be: "Why not stop giving lectures and ask students to help each other, to work in a team or to report?"

• Reapplication

Look at something old new. Go beyond the labels. Eliminate prejudices, expectations and assumptions and find out how to reapply something. A creative person can go to the trash and see the art in an old transmission machine. He paints it and puts it in the living room. Another creative person might see in the same transmission the necessary gears for a multi-speed hot walker for his horse. He hooks it to some poles and a motor and puts it in his corral. The key is to see beyond an earlier or advertised app for an idea, solution, or thing, and see what other app is possible.

• Changing Direction

Many eye-catching breakthroughs occur when the focus is moved from one problem angle to another. This is sometimes called a creative insight.

The goal is to solve the problem, not to implement a specific solution. If one solution does not work, go to another. It is not a commitment in a certain way, but a certain objective. Fixing the path can sometimes be a problem for those who don't understand it; they take too much on a path that does not work and only causes frustration.

MENTAL BLOCKS TO CREATIVE THINKING AND PROBLEM SOLVING

What are the mental blocks we create ourselves which which prevent us from making the most of our creativity and thus solving problems Harris, 1998):
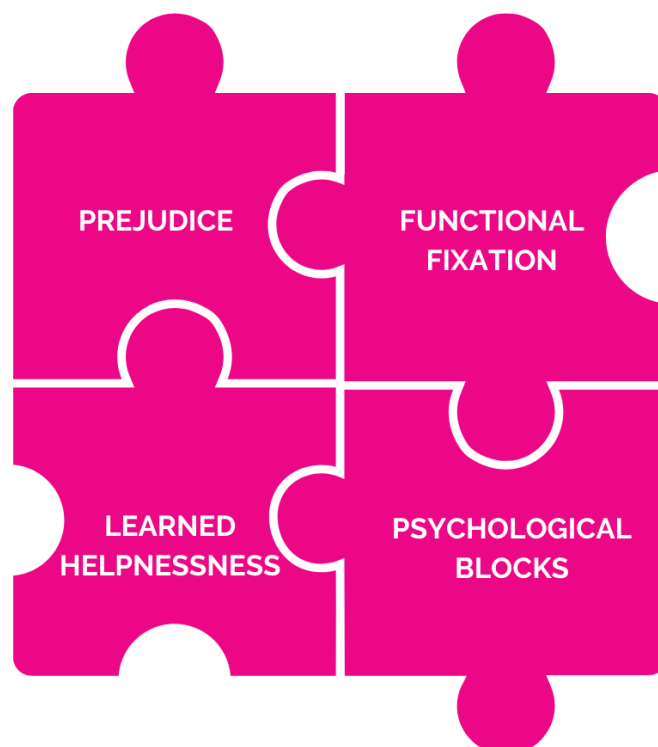
• **Prejudice**

The older we get, the more ideas there are about things. These biases often prevent us from seeing beyond what we already know or believe is possible. They will not allow us to accept change and progress.

• **Functional fixation**

Sometimes we only see an object by name, not by what it can do. We therefore only consider the mop as a floor cleaning device and do not think that it could be useful for cleaning the cobweb from the ceiling, washing the car, doing aerobic exercises, opening or closing the door, etc.

• **Learned helplessness**

It's like you don't have the tools, the knowledge, the equipment, and the ability to do something, so you cannot give it a try. We are trained to hope that almost everyone will rely on other people. We think small and we limit ourselves. But you can communicate with the world. If you need information, there are libraries, bookstores, friends, teachers and of course the Internet.

• **Psychological blocks**

Some solutions are not considered or rejected simply because our reaction to them is negative. Psychological blockages prevent you from doing something just because it doesn't sound good or right, which is ridiculous. Overcoming these blockages can be very useful.

Critical thinking

What is critical thinking? By Cambridge Dictionary it is the **process of thinking carefully about a subject or idea, without allowing feelings or opinions to affect you**.

David Hitchcock states that critical thinking is a **widely accepted educational goal**. Adopting it for educational purposes is recommended to respect student autonomy and prepare them for success in life.

Critical thinking is becoming more and more important in the contemporary world, as we are all faced with different kind of **information from various information sources**, which might not all be equally reliable. Critical thinking helps us to **understand and analyse information more thoroughly**.

This three-stage model will help generate questions to **understand**, **analyse**, and **evaluate** something (Library, n.d.).
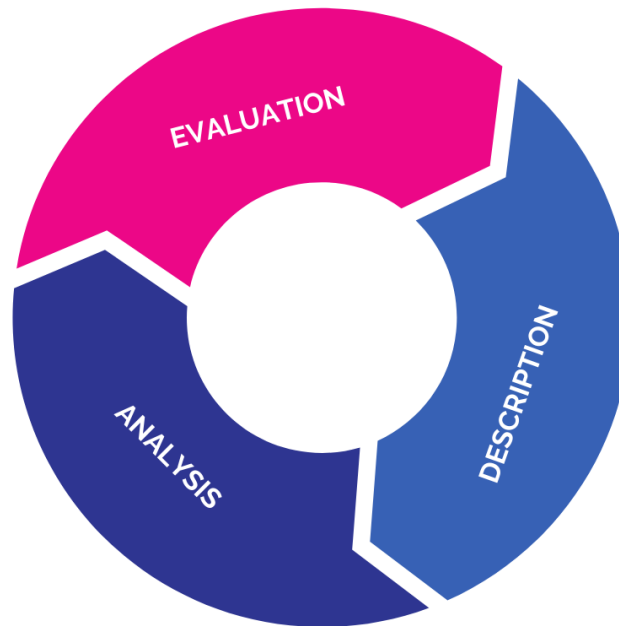
Description

Starting with the description stage, you ask questions such as: What? Where? Why? and Who? These help you establish the background and context.

Example

Journal article	Problem
- Who wrote this? - What is it about? - When was it written? - What is the aim of the article?	- What is the problem about? - Who does it involve or affect? - When and where is it happening?

These types of questions lead to descriptive answers. While the ability to describe something is important for actually developing our understanding and communicating critically, we need to go beyond these types of problems. This will take you to the analysis phase.

Analysis

Here you will ask questions such as: How? Why? and What if? These help you to examine methods and processes, reasons and causes, and the alternative options.

Example

Journal article	Problem
- How was research conducted? - Why are these theories discussed? - What are alternative methods and theories?	- What are contributing factors to the problem? - Might one factor impact another? - What if one factor is removed or altered?

Asking these questions will help you divide something into parts and consider the relationship between the parts and each part as a whole. This process will help you develop more analytical responses and deeper thinking.

Evaluation
Finally, you come to the evaluation stage, where you will ask 'so what?' and 'what next?' questions to make judgments and consider the relevance; implications; significance and value of something.

Example

Always
- What do I think about this?
- How is the relevant to me?
- How does this compare to the other research I have read?

Making such judgments will lead you to reasonable conclusions, solutions, or recommendations.

Critical vs creative thinking
Much of the way of thinking in formal education emphasises **analytical skills** - it teaches students to understand statements, to follow or create a logical argument, to find the answer, to eliminate bad ways and focus on the right one. However, there is another type of thinking - **creative** - that focuses on exploring ideas, generating opportunities, instead of looking for the right answers for many.
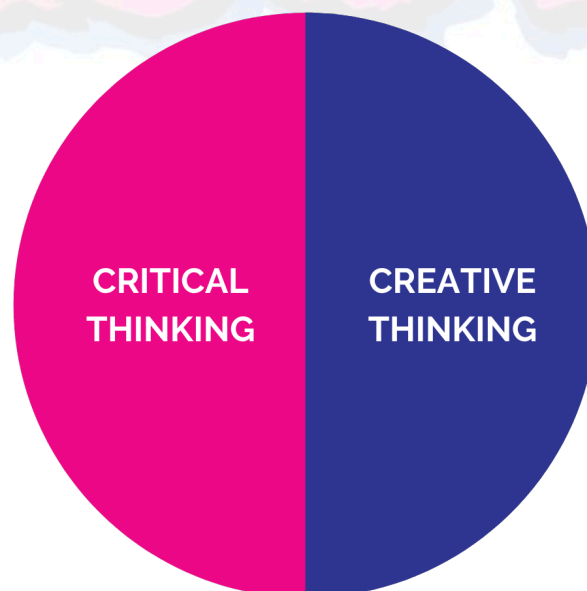
These two ways of thinking are crucial for a successful professional life, but the latter tends to be overlooked until graduation. We can distinguish these two types of thinking (Harris, 1998):

Critical thinking	Creative thinking
analytic	generative
convergent	divergent
vertical	lateral
probability	possibility
judgement	suspended judgment
focused	diffuse
objective	subjective
the answer	an answer
left brain	right brain
verbal	visual
reasoning	novelty
yes but	yes and
solution path	solution paths

In activities such as **problem solving**, both ways of thinking are important to us. First, we need to **analyse the problem**; then we have to **create possible solutions**; then we have to **choose** and **implement the best solution**; and finally, we need to **assess the effectiveness of the solution**.

As you can see, this process alternates between two types of thinking - **critical and creative**. In practice, the two modes of thinking work together most of the time and are not really independent of each other.

Creative and critical thinking techniques and tools

It can be difficult for creatives to come up with new ideas every day. Fortunately, there are several **techniques you can apply to replicate your creativity**. Below are several creative problem-solving techniques that can be used (Gardiner, 2013).
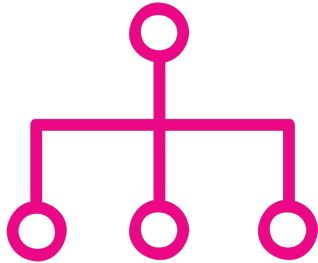
Mind mapping

The key to mind mapping (or brainstorming or spider diagrams) is to consider each idea that emerges. Do not neglect anything, as far-fetched as it may seem. Save the critical selection process for later. Generate as many ideas as possible; the more you come up with, the more likely you are to find this golden idea.

The checklist

If you have ever played a "Why?" game with a child, then you know exactly what I am talking about. As we get older, we tend to stop asking so many questions. We accept a lot more because it was explained to us earlier. Perhaps that is why adults are stereotypically perceived as having very little imagination.

The checklist technique can help you. It is basically a list of questions that you need to ask yourself before you start working. Six universal questions that can be asked:

Why? Where? When? Who? What? How?
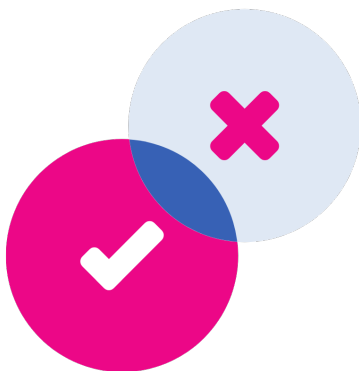
Random word generator

Just choose two random words and try to connect your idea in the most imaginative way possible. The real fun part is how you decide to find words. You can use a web generator; or you can browse the dictionary.

Mood board

A mood board- like a collage- is a collection of images, fonts, icon colors, etc. that represent a specific theme or style. Mood boards are also known as inspiration boards and are commonly used in design projects.
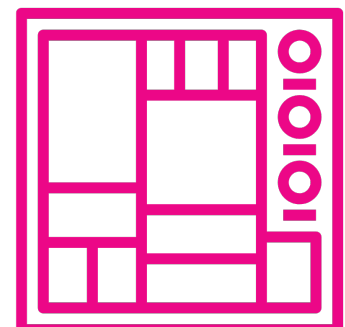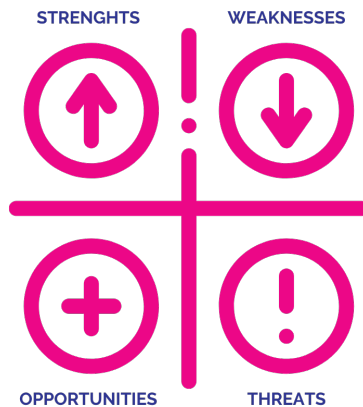
SWOT analysis

SWOT stands for strengths, weaknesses, opportunities and threats. In business planning, SWOT analysis is applied in different situations; in competitor analysis, situation analysis, strategic planning, personal evaluation, etc.

It can be used to identify effective innovative opportunities, mitigate threats using strengths, etc.

STRENGHTS   WEAKNESSES

OPPORTUNITIES   THREATS

Challenge-based learning

Challenge-based learning (CBL) provides **an effective and efficient learning framework** while meeting **real-world challenges**. The framework encourages collaboration to identify **big ideas**, ask **thoughtful questions** and identify, explore and solve **challenges**. CBL helps learners acquire **in-depth knowledge of the subjects** and **develop the skills** necessary to succeed in a constantly changing world ('Challenge Based Learning Welcome - Take Action. Make a Difference.', 2020).

This framework is divided into three phases: **Engage**, **Investigate**, and **Act**; with each step containing activities that prepare for the next (Barney, 2019):

ENGAGE

- big idea
- essential question
- challenge

INVESTIGATE

- guiding question
- guiding activities
- analysis

ACT

- solution
- implementation
- evaluation

Step 1 - ENGAGE

This learning environment begins with a **great idea**, a broad concept that can be explored in many ways.

It is then clarified by an **important question**. This should be a question that can identify the important aspects of a good idea, creating a better scope for the whole learning process.

Based on research to answer an important question, a **challenge** is proposed to find answers to real world problems. The challenges are immediate and exploitable.

Example:

Big Idea: Health
Essential Question: What is a healthy lifestyle? s
Challenge: Be healthy!

STEP 2 - INVESTIGATE

Guiding questions will be created for the next part of the process, indicating what needs to be learned to turn the challenge into a real solution.

These questions emerge throughout the experience and are answered through **guiding activities and resources**, which can be any method or tool available.

Further **analysis** of the lessons learned from the guides will provide a basis for the final definition of the solutions.
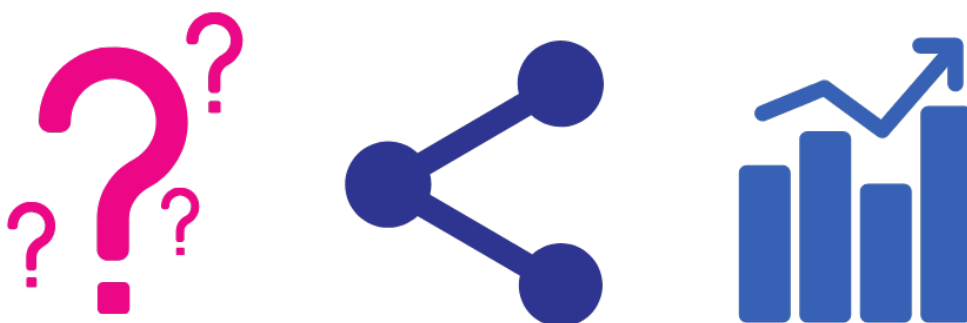
Example:

For example, if the Challenge is "Be healthy", Guiding Questions might include:

What does it mean to be healthy? What is the biology of health? What factors influence health? What are the major health issues in the world, my community, and my family? What is the role of nutrition? What is the role of exercise? What is the role of genetics? At this stage the more questions, the better.

Resources and activities might include interviews with physicians, research using online databases and participation in an online course about nutrition.

An example conclusion from the Health Challenge might be that the most important aspects of being healthy include nutrition and diet are dependent on access to certain types of food.

STEP 3 - ACT

The final step in the framework is the generation of a **solution concept**, which results from the completing the research phase. Using the design cycle, prototypes and tests are carried out to refine and shape the concept.

The solutions can then be **implemented** in a real environment with an authentic audience, depending on the time and resources available.

The process ends with an **assessment**, which provides an opportunity to make changes, see the effectiveness of the solution and deepen the knowledge acquired.

Evaluating sources

Evaluating sources of information is an **important part of the research process**. Not all information is **reliable** or **true**, and not all information is **suitable** for your article or project. Print and Internet sources vary widely in terms of **authority**, **accuracy**, **objectivity**, **currency** and **coverage**. Users should be able to critically assess the suitability of each type of information source before relying on it.

Evaluate the information ('Research Guides: Module 6: Evaluating Sources: Why Is It Important To Evaluate Sources?', n.d.):
• To find the most **relevant** information for your subject and task
• To ensure the **quality** and **reliability** of research
• To find **expert** opinions, views and research on your topic
• To remove **unreliable**, **biased**, **outdated**, and / or **incorrect** information

AAOCC (Authority, Accuracy, Objectivity, Currency, and Coverage) ('Evaluating Information Resources', n.d.)

Authority

Who is the author or creator and what are their credentials? Are there references to author's education, other publications, professional affiliation or experience? Make sure to distinguish between the author of the information and, if it is separate, the person who published it.

In the case of online documents from committees, organisations, businesses or government agencies (not individuals), similar questions should be asked regarding the mandate of these bodies. Be sure to determine whether the information provided by social organs is likely to be objective, factual and carefully studied, or whether it is biased according to the specific objectives of these organs or the causes, movements or programs they support.

Accuracy

Accuracy is obviously paramount when researching any subject that deals with real things and events. Data and information should be based on observations, measurements, analyses, interpretations and conclusions. In the arts and humanities, where imagination is the main creative force, precision is always important in recording the names, dates and places where creative work, ideas and opinions come from.

In all cases, all information must be verifiable.

• Are the conclusions based on actual studies or data that can be verified from other sources?
• Are scientific research methods explained in a reproducible way?
• Are the sources of information listed in the concluding / closing notes, bibliographies or reference lists?
• How reliable are the sources cited?

High-quality writing, including correct formatting, grammar, spelling and punctuation, can improve the appearance of accuracy and build readers' confidence in the accuracy and reliability of an online document. However, creating a professional looking website is easy. This is a good start, but not enough evidence to conclude that the information provided is accurate. Also use other criteria.

Objectivity

Authors often have their own agenda, such as selling products, or influencing legislation. There is probably no absolute objectivity on which everyone can agree. When using an information source, you must decide whether the information is objective enough for your purpose or whether it is biased. Of course, a very biased presentation can also be included in the research if this prejudice is described and compared to other points of view or interpretations.

• Is the source related to advertising or fundraising? This financial support may distort the scope of the publication.
• Does the author offer more than one perspective?
• Does writing use inflammatory or biased language?
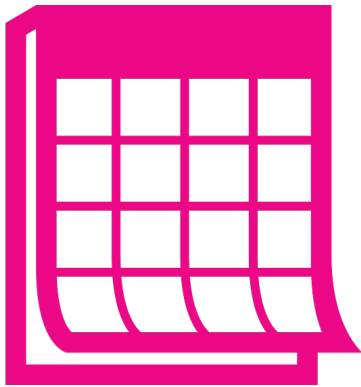
Currency

Ask yourself whether or not the timeliness of the information affects its usefulness.

The date of the material should be indicated to some extent, as in the "last updated" statement at the end of many web documents. Please note that the website's last update date may differ from the content date. This can mean checking three dates, the date the page was last updated or published on the web, the date of publication, and the date of surveys or statistics used.

Coverage

Decide if the information source covers the topic adequately. The documents may cover only part of the topic and you will need more resources to understand them better.

Consider how to compare the coverage of one source with the coverage of other sources.

Look for a statement describing the purpose or coverage of the source and determine if the information is complete enough to meet your needs.

Does the source of information leave questions unanswered (ask the five W's and a H to check: who, what, when, where, why and how)?

Reflection and transfer

This module was developed as a way to understand more thoroughly about creative and critical thinking and how they can be used in real life to improve your problem solving skills and be able to evaluate sources accordingly.

Most people involved in learning and development are aware that reflection and feedback are essential components of adult learning. To ensure you have attained the knowledge shared in the previous sections, please take time to reflect. For that take a paper and draw a table such as the one below. If you are unable to use paper and pen, use your computer or a phone.

What I have learned	What I still want to know

Assessment

Assessment 1

Statements

The purpose of this activity is to encourage participants to use their critical thinking skills. Thinking critically means employing analytical skills, viewing things with a broader perspective, and considering all possible options. Critical thinkers know NOT to take things at face value. They realise that there is a difference between appearance and reality and can easily detect these differences.

FACTUAL STATEMENTS	There are many kinds of computers. Coffee is one of the major exports of Puerto Rico. Library records show that more non-fiction books have been borrowed this year than last year. A bad case of measles could cause blindness. My mother gets mad if I wear dirty socks for a week. Students who cut class usually get called to the office. Football is a popular sport in the Americas. My mother told me that my bedroom is a mess. Maria is a Mexican American. I spent $100 today."
STATEMENTS OF PERSONAL TASTE	I prefer to use an apple computer. I like chocolate candy but I hate chocolate cake. My favorite author is John Smith. Don't sneeze on me- hate to catch a cold. I'd like to go barefoot all summer. I would like to cut math class. I enjoy playing dominos. I like rap music. I like Italian food. As far as I'm concerned. $4.00 an hour is a low wage.
VALUE JUDGEMENTS	Computers should be built to last. People with bad taste should get fashion advice. You shouldn't believe everything you read. All children ought to be vaccinated against serious diseases. Beto is the best swimming teacher at the pool. It's important to attend church regularly. It's better to be involved in a game than sit watching. Students should develop good work habits. It's wrong to accuse a person without very good reasons. It's wrong to spend more money than you earn.

Script

Setting: The Girard dining room at dinner time.
Characters: Elena Martinez, age 18, and Martin, her 12 year-old brother.

ELENA: Eat your dinner. You're wasting food. Think of all the starving children in other countries.
MARTIN: But I'm not starving and I'm not wasting food. Listen, I could be well fed and healthy with only half the food I get.
ELENA: Prove it. Go on – show me statistics for growing kids.
MARTIN: O.K., but I read about it in a magazine at school. We don't have any books about nutrition around the house.
ELENA: So eat your dinner. Mom knows best.
MARTIN: Not on this she doesn't. You said I was wasting food. I say Mom is wasting it by giving me more than I need. I don't need this much to each – especially not in the summer when I'm lying around and not using much energy.
ELENA: If you can't prove what you're saying, stop talking and start eating.

Points for Discussion

What kind of arguments are Elena and Martin having?
ANSWER: Argument over facts – how much food kids need to stay healthy.

Even though they are arguing about facts, each of them had stated an opinion. What are the opinions?
ANSWER: Elena says Martin is wasting good food, and that his mother knows best. Martin says he's not wasting food; it's his mother who is wasting food.

What if Martin located facts to show that growing children need less food than he is asked to eat? Would these facts prove that Martin's opinion is correct? Why can't opinions ever be proved true or false?

Elena and Martin could not settle their factual argument because the facts were in books and magazines that were at school. Can you think of other kinds of factual arguments that would be hard to settle?
ANSWER: When different books or other sources state contradictory facts, or when a fact has not yet been established and must be tested, For example: —I can swim faster than you can.

Assessment 2

Brainstorming
Choose one of the following problems for a brainstorming session. Generate at least 35 ideas for solving the problem. Then distill this list into at least three practical, effective ideas.

1. A new snack food
2. How to keep rowdy children quiet on a school bus
3. How to get more tourists into the United States
4. How compatible people can meet each other for romance
5. How to reduce hospital costs
6. How to reduce airport congestion and delays
7. A name for a new laundry detergent
8. How to keep your car keys safe at the beach
9. A new toy
10. A new electronic consumer product

Assessment 3

What-If
A major block to creativity for many of us is the mind's fierce grasp on reality. This very factor that keeps us sane also keeps us from thinking beyond what we know to be true. What-iffing is a tool for releasing the mind, for delivering us from being blocked by reality.

In its simplest form, what-iffing involves describing an imagined action or solution and then examining the probable associated facts, consequences, or events. Instead of quickly saying, "That sounds dumb," or "That would never work," and leaving our criticism vague, we trace as exactly as our reasonable minds can generate the specific implications or consequences of the newly imagined fact.

As I said, too often we simply stop thinking altogether when something contrary to fact comes across our minds or else we think about it in the most illogical and impractical way. When we ask, "What if the sky were green?" the response we tend to get, either from others or from ourselves, is, "Well, the sky isn't green, so why think about it?" But if nothing else, thinking about it is good practice at logical thinking.

In more practical terms, though, thinking about what does not exist is about the only way we have of eventually making it exist. In other words, the first step to implementing a new reality is to imagine it.

Notice when you mention a "what if" to your friends, their reaction will probably be to laugh and change the subject, or to laugh and suggest one funny consequence. There is little attempt to trace probable consequences thoroughly, to outline a full set of associated realities. By not doing so, we are in danger of cutting off many new ideas.

Choose one of the questions below and then trace the reasonable and logical consequences that would follow. You might be sure to think of both good and bad (and perhaps indifferent) consequences. List or describe (in a sentence or two each) at least ten consequences.

What if anyone could set up as a doctor?
What if each home could run the television only one hour a day?
What if a citizen could serve only one term in one office during a lifetime?
What if gasoline grew on trees and was a renewable resource?
What if exams and grades were abolished in college?
What if our pets could talk?
What if we never had to sleep?
What if we could read other people's minds (and they could read ours)?
What if all marriages were automatically cancelled by the state every three years?
What if everybody looked almost exactly alike?
What if clocks and watches didn't exist and daylight lasted six months?

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