D3D Entrepreneurship

Co-funded by the European Union

3D ENTREPRENEURSHIP

PR1: 3D LEARNING CURRICULUM FOR ENTREPRENEURSHIP

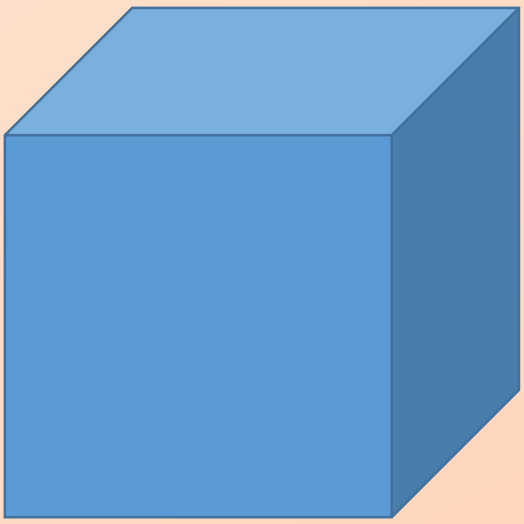

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Table of Contents

➢ INTRODUCTION

About 3D Entrepreneurship

As a fundamentally social function, education must not only instill values, impart knowledge, foster the development of abilities, and educate people; it also must generate and maintain knowledge through the design and implementation of novel learning and teaching modalities and the development of tools that meet the needs of students. However, the most crucial responsibility of education is to create and maintain knowledge. It must be able to adapt to the ongoing societal changes brought by a constantly changing world.

Teaching and learning in the digital era are the main topics of this year's annual Education and Training Monitor. Along with the changes brought on by the pandemic-related catastrophe, it has become more apparent how pervasive digital technologies are in daily life and how urgently individuals need to improve their fundamental and digital skills.

The labor market has seen a significant upheaval, with entrepreneurship and digitalization playing major roles. Key topics for the labor market include the adoption of digitalization across all business sectors and the introduction of cutting-edge technologies, goods, and/or services. It's crucial that educational programs are developed to assist adults in learning or obtaining the necessary abilities to stay up with this shift. The project seeks to advance entrepreneurial transversal capabilities and sow the seeds for new job creation, which will help up-skilling paths and high-quality learning opportunities for people. To do this, the implementation of the Project will offer educational entrepreneurial training that emphasizes 3D learning and gamification techniques.

About 3D Entrepreneurship Curriculum

The creation of the curriculum seeks to provide adult learners with limited opportunities and poor skill levels with entrepreneurial fundamental knowledge. 3D technologies aim to introduce adult students to entrepreneurial principles and opportunities that can benefit their personal and professional development (such

as Virtual Reality, Augmented Reality, Animation, 3D Modeling, and Printing). According to the 2014–2015 PIAAC survey, about 25% of European adults are classified as "low-skilled" because they lack or have underdeveloped reading, writing, numeracy, and digital abilities, all of which are necessary to succeed in the job market. The use of 3D technology in education can help students better understand abstract, more difficult-to-understand subjects.

➢ DESCRIPTION

The learning manual is developed to support **online learning sessions**. The training program will comprise X hours of learning. It consists of two parts:

1. ENTREPRENEUR KEY COMPETENCIES, which is composed of 9 modules:
   a. - Decision-making
   b. - Confidence
   c. - Stress management
   d. - Problem-solving
   e. - Team working
   f. - Time management
   g. - Innovation and creativity
   h.- Design thinking
   i. - Lean startup

2. 3D TECHNOLOGY APPLIED TO ENTREPRENEUR TRAINING, composed of 3 modules:
   a. 3D Modeling and Printing
   b. Virtual Reality
   c. Augmented Reality

Each partner of 3D Entrepreneurship project will be responsible for specific modules:

PARTNER	MODULE	HOURS
CLICTIC	Decision making	3h
CLICTIC	Confidence	3h
CLICTIC	Stress management	3h
ADAMOB	Problem solving	3h
ADAMOB	Teamworking	3h
ADAMOB	Time management	3h
STEPP	Innovation and Creativity	3h
STEPP	Design thinking	3h
STEPP	Lean startup	3h
EMPHASYS	3D Modelling and printing	3h
EMPHASYS	Virtual Reality	3h
EMPHASYS	Augmented Reality	3h

Learners will be provided with the following didactic material:

- Cases studies
- Learning outcomes
- References for further reading
- Evaluation exercises

➢ CONTENTS AND TOPICS

The core of the 3D Entrepreneurship project is curriculum development, which will outline the subjects that must be covered in order to increase the target groups' competencies and the services they will provide at the project's conclusion.

The learning process must incorporate fresh discoveries since the world is constantly changing. Creative teaching methods and strategies (such gamification or blended learning) are continually being developed to enhance learning.

The modules of the curriculum[1] are distinguished by the presence of theoretical ideas and practical instruments that aid both trainers and students. The Curriculum will be composed of the following modules:

TITLE	CONTENT
a. ENTREPRENEUR KEY COMPETENCES	
1. DECISION MAKING	• Decision-making definition • Identify the problem • The decision-making process' steps • Elements of the decision-making process • Decision-making models • Decision-making tools

[1] According to the Educative Open Resource principles, this curriculum will be offered online and for free on the 3D Entrepreneurship project website: https://www.3denterpreneurship.eu/

2. CONFIDENCE	• Defining your 21 Century skills • Strengthening your self-esteem • How to communicate effectively with others • Facing failure in a constructive way • How games help to build self-confidence
3. STRESS MANAGEMENT	• Importance of emotions • Identifying our emotions • Managing our emotions through action • Nature and causes of stress • Approaches to stress management
4. PROBLEM-SOLVING	• Identify the problem • Implement and assess the solution • Computational thinking approach • Computational thinking to solve a problem

5. TEAM WORKING	• Characteristics of effective teams • Different types of teams • Skills to manage a team work • Strategies to solve teamwork problems • Collaboration tools for teams (Ex.Slack, WebEx, Trello, etc)
6. TIME MANAGEMENT	• Plan your time • Task prioritization • Productive and unproductive work • Eisenhower matrix • Time management tools
7. INNOVATION & CREATIVITY	• Principle of Creativity • The evolution of human creativity • Digital tools for creativity • Innovative business models • Value proposition
8. DESIGN THINKING	• What is design thinking?

	• Essence of design thinking (different stages) • Design thinking in action (understanding the users, co-creation…) • Design thinking tools and software
9. LEAN START-UP	• First steps to create a company • Business model (Canva Business Model, etc) • Competitive analysis • Lean Analytics methodology • Customer development methodology
b. 3D TECHNOLOGIES APPLIED TO ENTREPRENEUR TRAINING	
10. 3D MODELING & PRINTING	• Introduction • Modeling programs • The modeling tools • How a 3D printer works and what can I do

	• 3D Software: Tinkercard
11. VIRTUAL REALITY	• Introduction to VR • Applications of VR • Interaction in VR • Setup of a VR environment in Unity
12. AUGMENTED REALITY	• Introduction to AR (differences AR and VR…) • Application of AR (f.e: AR for business; AR for education; AR for gaming) • VR apps (description, free / for a fee, compatibility, etc) • Setting up an AR application in Unity

➢ LEARNERS

In the project's training, participants are divided into two groups: Group 1: We define adult trainers as specialists who work in the fields of lifelong learning, general adult education, or vocational adult education. The target categories also include persons with demonstrated experience or a background in ongoing

education and training, social welfare, social workers, and special assistant staff. Staff from organizations dedicated to the end target group, such as unemployment agencies, chambers of business, and/or social work institutions, will also be urged to engage and actively get involved at different stages of the project. Adults with poor skill levels and low qualifications, those who have not had access to formal education or suitable training to advance their personal and professional growth, and those who have worked primarily, if not exclusively, low-qualification positions and whose work conditions are usually not favorable (low income/wage, short-term-contract or no-contract jobs, unemployed for long periods); those facing disadvantageous life circumstances or have fewer opportunities (socio-economic, geographical, physical); who make part of a minority or marginalized groups (religious or ethnic). Selection criteria: -Motivation -Educational background -Professional/work experience -Professional goals and near-future work plans -People with fewer opportunities -Interest in entrepreneurship - Interest in ICT and 3D technologies.

➢ OBJECTIVES

The **main objectives** of the curriculum are:

- ✓ Increase the theoretical and practical knowledge of the main creative innovative methodologies of teaching and learning
- ✓ Increase the autonomy of students in their career development
- ✓ Use effectively the methodological and digital competences to engage people in isolated conditions
- ✓ To empower people with low digital skills
- ✓ Teach the acquired competences to others colleagues.
- ✓ To deal with psychological problems derived from stress.
- ✓ To provide digital tools that facilitate tasks to be done in the work environment.

➢ METHODOLOGY

Elements important for the design of the methodology that will be taken care of are: Learning styles; Gamification; Technology ICT tools; Transversal skills and ways to develop them. The methodology will be active, flexible, learner-oriented and will explore how to increase motivation and engagement with technological support. It is focusing on how we will reach the goals and aims of the curriculum. pilot education Both low-skilled adults and adult trainers are involved in this training. Both groups will interact with one another, present needs and best practices related to the adult education industry. In addition to learning about ICT tools and processes, they will also learn about entrepreneurship.

The main goal of this methodology is to effectively address entrepreneurship-related topics in 3D learning and innovation. The project's motivation came from its importance for the growth of business, digital, and social skills. The approach will be created as an Open Educational Resource (OER), a freely available, openly licensed document or material that may be used for both research and teaching, learning, and assessment. As a result of the openness movement, it is the dominant trend in the open and remote learning area. Accordingly, the methodology hopes to assist thousands of adult educators in their teaching efforts, give them the tools they need, and motivate both them and their students to complete the entire training to be able to ensure its success. Through the use of a unique Methodology Readiness Level (MRL) system, the project has been modified to a particular methodology to aid in the creation of training materials.

➢ LEARNING RESULTS

1. Participants will be introduced to the 3D Entrepreneurship project goals and comprehend the potential of the new opportunities that occur throughout the economy as a result of technological advancements after completing this training program.

2. Students will be equipped with the necessary skills, knowledge, and attitudes needed for industry 4.0 and the future demands of the market

3. Students will take responsibility for their own learning and career development.

4. Students will be empowered to be actively involved in socioeconomic transformation and to be capable of creating new jobs and opportunities.

5. Students will be aware of entrepreneurship principles and opportunities that can favor their personal and professional development; through the implementation of 3D.

➢ ASSESSMENT

It is important to evaluate the training course using multiple methods to comprehensively understand its effectiveness. Evaluations will be done both during and after the course to gather feedback and measure the long-term impact of the training. It will be applied four types of evaluation:

Reaction evaluation: To assess how learners react to the training course. It will collect feedback from learners through surveys, focus groups, or interviews to gauge their satisfaction with the course content, delivery, and materials.

Learning evaluation: To measure the extent to which learners have acquired the knowledge, skills, and attitudes that the training course was intended to teach. Learning evaluation will be done through a final assessment task.

Behavior evaluation: To measure how learners will apply what they have learned in the training course to their work or other areas of their lives. It will be done through observations or interviews that measure the learners' ability to transfer their learning to real-world situations.

Results evaluation: To measure the impact of the training course on the organization or community. It will be done through surveys, interviews, or other

data collection methods that measure the learners' impact on organizational goals, performance, or customer satisfaction.

MODULE 1

DECISION MAKING

❖ Introduction

We frequently assume that making decisions is an easy procedure. Decisions are rarely clear-cut; instead, they are often complicated, unclear, and subtle.

Why do we choose to do certain things and not others? Why are certain decisions simpler to make than others?

The process of making decisions is crucial to the entrepreneurial journey. Without the proper frame of mind, you can miss an opportunity to make a decision that will make or break your company. You have to choose new things every day as an entrepreneur. You must make decisions and work out issues. You will, in a nutshell, decide everything. Understanding the decision-making process and the reasons why good decisions are so difficult to make will help you make decisions more successfully.

In both your personal and professional life, you probably face decision-making challenges every day, from choosing what to wear to work and what to eat for breakfast to the difficult choices your job forces you to make on a regular basis. More difficult decisions are made by certain persons than by others.

For instance, a worker at a manufacturing facility can choose the dimension of the hole he has to drill in the processed part. The plant manager will make choices regarding the plant's shift schedule, the provision of the required equipment and raw materials, the quality of the produced goods, etc. The production manager will make decisions regarding the coordination of the activities between various factories, stock levels, needed resources, etc. The senior manager will decide on the company's objectives and tactics, as well as its vision, mission, and overall course. The complexity of the decisions you must make will rise as you ascend the organizational ladder.

❖ Decision-making definition

Decision-making is part of the problem-solving process where you must choose between alternatives. Decisions are choices or selections from a wide range of options. That thing could be a different course of action, approach, or solution. So, choosing amongst options is the process of making a decision. It can entail deciding on new business tools, entering new markets, selecting your marketing strategies, or determining whether to go on your entrepreneurial path alone or with a partner.

❖ Identify the problem

Finding the root of the issue is the first step in problema-solving. Even if you think you know, you should double-check. It can be simple to focus on symptoms rather than causes at times. You use a logical approach to identifying the issue. The queries that you may put forth include:

- Is this a standalone issue or a sign of something more serious?
- What details do I require?
- What methods have we already attempted to solve this issue?
- What am I (or have others) seen?
- What was I (or anyone else) doing when the issue arose?

Finding the causes of issues at their core in order to find the best remedies is known as root cause analysis (RCA). RCA bases its premise on the idea that systematic prevention and root-cause analysis yield superior results than spot-treating symptoms and putting out flames. To find the underlying reasons of an occurrence or trend, root cause analysis can be carried out using a variety of ideas, techniques, and methodologies. Beyond simple cause and effect, RCA can identify the processes or systems that failed or initially sparked a problem.

The 5 Whys method was created in the 1930s by Sakichi Toyoda, a Japanese manufacturer, inventor, and the founder of Toyota Industries. It gained popularity in the 1970s, and Toyota continues to use it to address issues today.

This tradition is upheld by the 5 Whys technique, which works best when the answers are provided by someone with first-hand knowledge of the process or issue in question.

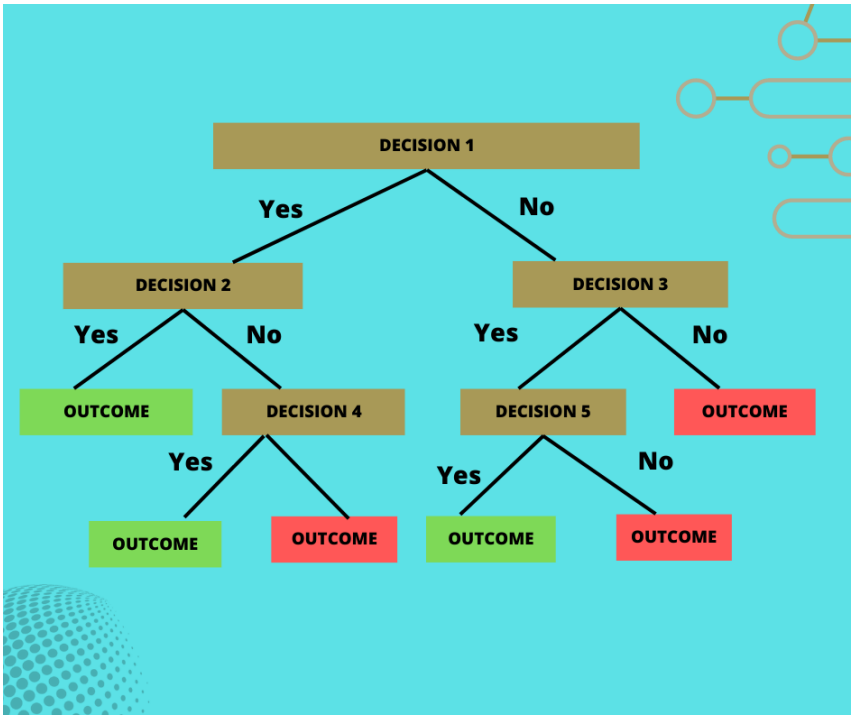
The process is remarkably straightforward: whenever an issue arises, you ask "Why" five times to get to the bottom of it. Then, when a remedy emerges, you put it into action to stop the problem from happening again.

❖ The decision-making process's steps

Analyzing alternate alternatives comes first. The **decision matrix** and **decision tree** are the most popular tools for evaluating and ranking alternatives out of all the available tools. The best or optimal solution is chosen in the second step. The chosen solution must next be put into action. The final step in this process is to determine if everything is in order or whether you need to make adjustments to the solutions you have chosen.

Decision matrix: is a table of values organized into rows and columns that enables analysts to systematically recognize, examine, and evaluate the effectiveness of links between sets of values and data. A decision matrix's components display choices made in accordance with a particular criterion. The matrix is helpful for examining vast quantities of choice elements and determining the relative relevance of each item by weighing them according to importance.

Decision tree: is a very specific type of probability tree that enables you to make a decision about some kind of process.



❖ Elements of the decision-making process

Numerous factors must be taken into account while making a decision. The decision-making process becomes more complicated as there are more factors involved. Peter Drucker, one of the influencer thinkers on management, has presented 6 elements of decision-making:

1. **Situation** denotes the situation, circumstance, or justification for which a choice must be made. This might also be referred to as problem identification or problem justification. The decision-making process is further facilitated by
   a thorough understanding of the circumstance. It explains the basis for making decisions. This involves the collection of information, circumstances, and elements present at the moment the decision is formed. Example: a Company wants to export its products.

2. **The objective** is the second component of decision-making. This comprises the anticipated outcome, final result, or desired result of the decision. Managers must be explicit about what is required of them in the scenario after fully understanding it. Multiple ways may be used in a context, and the situation's needs dictate the decision-making goal. Example: There must be a reason to export. Managers have to be clear in mind, what are the goals of exporting their products.

3. The term "**alternative**" refers to what is a possibility. All potential options are being taken into account. There may be several ways to achieve the desired goal. Such a wide range of options could have certain characteristics and could affect the cause in various ways. We take into account all of the potential options in this step to aid in decision-making. Example: Export has several considerations; which country/countries, taxes, etc.

4. The decision's potential outcomes are referred to as the ramifications. These are the potential results and **consequences** of the choice. Before making a decision, it is vital to calculate the effects of all the alternatives. There is no going back once the decision has been made. Example: the cost of the activity, new staff to be hired, etc.

5. The conclusion of the options under consideration is the decision. It is what will occur as a result of the **decisions** made. After weighing all the options, this was decided to be the best choice. The option with the highest advantages and lowest costs will be chosen. Examples: to export to countries with less costs on taxes.

6. This is the last step in the decision-making process. **Implementation** refers to carrying out chosen decisions. The effectiveness of the decision as well as its influence are included in this component. Managers post, assess, and report the choice in this step. Example: managers consider the countries where it is profitable to export, taking into account costs, logistics, etc.

❖ Decision making models

A sound decision-making paradigm is applicable to more than simply people. It applies to any circumstance where there are several choices.

How do you choose which remedy to apply? Most companies begin by developing a plan. But how can you decide which alternatives to use when there are so many options available? You can organize your options using three general decision-making models.

- *RATIONAL DECISION MAKING PROBLEM*

Most people will base their decisions more on feeling than on reason. This is so because feelings are so much simpler to comprehend and respond to. But it's crucial to use rationality when making judgments and to make sure you don't overlook anything that can benefit your group or business.

It's not always simple to choose wisely. It's challenging to eliminate bias when faced with a decision between two possibilities. But if you take a step back and weigh all the available information, you may still choose wisely.

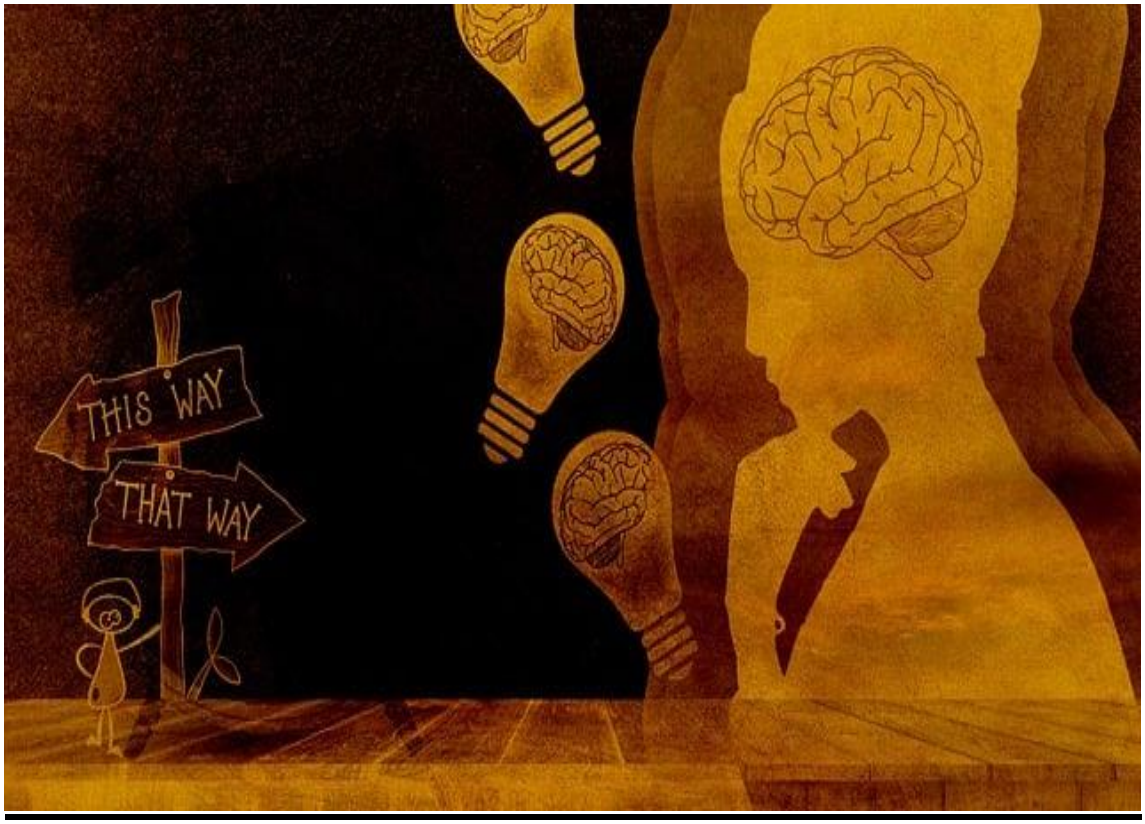
- *CREATIVE DECISION MAKING MODEL*

A wonderful technique to come up with solutions to issues is to use the creative decision-making paradigm. The "no-thought" strategy gets its name from the fact that you don't actively think about how to solve an issue; instead, you allow your subconscious mind to take care of it. When you do this, you may spend more time coming up with creative answers and less time questioning if you are acting appropriately.

The logical decision-making model can be replaced by creative decision-making. It's a helpful tool for business owners and executives who need to make decisions quickly without having the time to carefully consider all of their options. The ability to unwind and concentrate on your creative process makes it a terrific technique to brainstorm answers to issues.

- *INTUITIVE DECISION MAKING MODELS*

Decision-making models called intuitive decisions rely on gut feelings. For this model to develop strong instincts, prior experience and pattern recognition are required. Decision-makers who have dealt with many comparable challenges before frequently employ intuitive models.



❖ Decision-making tools

The decision-making tools assist you in outlining all of the potential alternatives to your choice, their costs, and their success or failure probabilities. Through the simplification of the decision-making process and the creation of a diagram, these applications offer a practical means of arriving at the best decision.

Here is a list of **some tools** that can help you when **making a decision**:

Lucidchart is a tool for creating a decision-making diagram. Diagrams for decision-making allow you to map out the choice you have made. It is one of the finest ways for making decisions since it enables you to predict future actions based on the results and dangers. This graphic can be used to plan team strategy

Protagonist is designed to improve a company's collaborative skills around decision-making and prioritization. It gives individuals and teams a framework for making more informed decisions and for setting their own priorities more quickly and effectively. This program for making decisions seems like a project management tool and was obviously designed with making hard judgments in mind (e.g., hiring an employee or buying a car).

Decision crafting (Android) / Definitive choice (iOS). Sorting through all the potential benefits and drawbacks can occasionally be the most difficult part of making a decision. This kind of tool can best assist you in organizing your thoughts when you are unable to consider several aspects impartially.

You can add as many options and criteria as you like, and then you may rate each of those elements with a number. The software will perform the calculations when you're ready and present a choice based on your ratings.

❖ Conclusion

A decision-maker is someone who can consider a situation, consider many solutions, and assess the advantages and disadvantages of each alternative. The quicker you can choose wisely in a hostile atmosphere, the better. Your firm will succeed or fail based on your capacity for swift decision-making. Because of this, developing your decision-making skills will help you become a better leader, worker, and business owner.

So, what exactly happens during the decision-making process? Simply put, you must properly state your inquiry before gathering and analyzing the data.

Even while it may appear to be a straightforward process, it is actually highly complicated because every choice is accompanied by a variety of factors and limitations, each of which has a unique impact on the final result. Understanding every outcome is crucial because if you simply think about a few options, you won't be able to seize any opportunities you might otherwise pass up.

It's common to think of the decision-making process as a set of guidelines, protocols, and practices that people or organizations must adhere to in order to reach a decision. The outcome of decision-making is influenced by a number of factors, including the decision's complexity, the stakes at risk, the degree of uncertainty, etc.

❖ Final Assessment task

Title of the activity	**Decision matrix**
Aim of the activity	To use a tool to make a decision based on analysis
Material required	Laptop, Computer
Time required	25 min
Format	Word, excel
Description of the activity	**1. Identify the alternatives** Decision matrixes are a very useful tool for deciding which is the best option among a range of similar alternatives. Before creating the matrix, identify the options you need to decide between. For example, let's say your team is launching a new brand campaign next summer. You need to decide which vendor you will work with to create the videos and other visual materials for the design. At this point, you've identified three design agencies, but they all have their advantages and disadvantages. **2.Identifies important considerations to take into accoun**t. The second step in creating a decision matrix is to identify the important considerations that affect our decision. This set of criteria helps to make the best decisions and avoid subjectivity. Continuing with the example, your team has decided that the most important criteria affecting the selection of a design agency are: cost, experience, communication, and reviews from past clients. **3. Create your decision matrix** A decision matrix is a grid with which you can compare various options taking into account important considerations.

	You have to choose between three agencies and evaluate costs, experience, communication and customer reviews. To elaborate your matrix you can use any tool or create it in Excel. **4. Complete your decision matrix:** Rates each consideration according to a predetermined scale. If there is not a very large variation among the options, use a scale of 1 to 3, with 3 being the best option. For more options, it uses a scale of 1 to 5, with 5 being the best option. This is where the advantages of the decision matrix really start to shine. For example, let's say you have to decide between three agencies and you have four important criteria, but you don't have a decision matrix. Here's a summary of the advantages and disadvantages of each agency: *Agency A* is really inexpensive but not very experienced. The reviews it has received from its clients and the communication seems to be average. *Agency B* is not very cheap, but it is not the most expensive either. We can say that it is quite experienced and has excellent customer reviews, but its communication so far has been somewhat poor. *Agency C* is the most expensive, but it is also the most experienced. Their communication so far has been average and customer reviews are quite good. These three descriptions are relatively similar. It is difficult to decide which one is better based on such short paragraphs as these, particularly because each agency has its advantages and disadvantages. Here's how the three agencies with their four considerations would look in a decision matrix with a range of 1 to 5, with 5 being the best choice **5.Add weighting** Sometimes, some considerations are more important than others. In such a case, use a decision matrix to help identify which is the best option. To continue with the example, imagine that you can't go over budget at all, so cost is a critical

	factor in your decision-making process. Client reviews are also important, as they provide an idea of how effective each agency may have been before. To add weighting to each agency in the decision matrix, assign a number (1 to 3 or 1 to 5, depending on how many options you have) to the considerations. Then, during the decision-making process, you will multiply the weighting factor of each consideration by its value. **6. Multiplies weighted scores** Once you have applied your rating scale and assigned a weighting to each aspect, multiply that weighting factor by the value assigned in the table. In this way, you ensure that the most important considerations are given more weight, which will ultimately help you choose the best agency. **7.Calculate the total score** Now that you have multiplied the weighted rating, add up all the considerations for each agency. At this point, you should have a clear, numbers-based answer as to which decision is the best choice. *Hint*: Agency 2 should have the highest score despite not being the cheapest. Reason from the decision matrix why it is the most suitable *Tips*: You can read or see the resources to get more information about decision matrix

❖ Further reading and resources

8 Steps in the decision-making process	https://online.hbs.edu/blog/post/decision-making-process
Before You Decide: 3 Steps To Better Decision Making	https://www.youtube.com/watch?v=d7Jnmi2BkS8
Critical Thinking - Proven Strategies To Improve Decision-Making Skills	https://www.youtube.com/watch?v=0dmS0NQ5V98
Management Decision-Making Models - Explained	https://thebusinessprofessor.com/en_US/management-leadership-organizational-behavior/management-approaches-to-decision-making
The power of decision-making	https://www.youtube.com/watch?v=542qgGgL1s4
Decision-making models	https://hr.mit.edu/learning-topics/teams/articles/models
13 Decision-Making Techniques and Tools for Business	https://creately.com/blog/strategy-and-planning/decision-making-techniques-tools/
11 Best Decision Maker Apps for Android & iOS	https://freeappsforme.com/decision-maker-apps/

MODULE 2

CONFIDENCE

❖ Introduction

The ability to handle conflict more effectively, communicate more effectively, be happier at work, better accept criticism, and become a better manager or leader are all benefits of confidence in the workplace.

Confidence is vitally essential in business. Entrepreneurs with confidence are, by definition, successful business owners. You need self-assurance to launch a firm, to trust in your goods and services, and to know that your strategic choices are sound.

A lack of confidence can make or kill your business in some specific situations. Let's push you out of your comfort zone and examine how giving yourself self-confidence helps your business.

It is an understatement to suggest that your **mental wellness** is important. Being an entrepreneur is difficult because of payroll, employee disagreements, supply chain concerns, inflation, and taxes. Self-doubt is already a big load, and when it's added to all the other mental strains an entrepreneur has to deal with, it can be utterly devastating.

Entrepreneurs who have confidence in their skills, judgment, and business health can **handle pressure** with ease. Your ability to remain upbeat in the face of adversity is crucial to your long-term success.

Being a business owner also entails **being a leader**. Your employees' performance and perception of you will be influenced by your confidence or lack thereof. Your employees will respect you more and be more confident in you as an employer if you are more self-assured.

Lack of confidence among business owners frequently prevents them from taking critical risks, like investing in new equipment, and companies that never take on new challenges never thrive. Strategic planning and analysis can also increase your confidence even if you're not sure about a choice.

There will be instances when you fall short. Despite your best efforts, you cannot anticipate the future. Negative effects can be from a market downturn, a poorly chosen investment, or even something minor as a shipping delay. Failure can be easily personalized. to absorb it and allow it to prevent you from expanding your business. The best course of action is to **learn from your errors** instead.

Entrepreneurs with confidence can swiftly transform failures into opportunities for growth and learning. The truth is that failure may be a very effective teaching tool. To recognize the opportunity it gives, all that is needed is a cool head.

❖ Defining your 21 Century skills

Becoming an entrepreneur in the twenty-first century is a difficult and rewarding challenge. This is due to the fact that the world is expanding and changing at such a rapid rate that an entrepreneur needs **creative problem-solving abilities** to stay ahead of their rivals. Entrepreneurs in the twenty-first century need to be extremely flexible and organized. A 21st-century entrepreneur must therefore continually think and plan. Creating and maintaining efficient company planning is one approach to achieve this. Also, a successful entrepreneur should be able to **lead** others well and possess outstanding **communication abilities**.

Here below you can find some necessary skills a entrepreneur should have:

- **Numbers Comprehension**

A successful businessperson must have a solid understanding of statistics and numbers. They must comprehend the company's future and be able to predict it. They are able to plan, coordinate, and manage their enterprises thanks to this talent. A successful businessperson must also be financially stable, able to absorb financial losses, and able to safeguard the company's assets.

- **Problem solving**

Another crucial quality that successful entrepreneurs have is the capacity to think creatively and solve problems. Their likelihood of finding solutions rises with improved problem analysis and evaluation. Also, those who solve problems think in very original ways. They are capable of developing original concepts and solutions to issues. Entrepreneurs should have a strong aptitude for solving problems and should not be hesitant to try new things. They develop their creativity and critical thinking abilities as a result.

- **Ability to influence**

An entrepreneur needs to have a strong grasp of persuasive communication skills in order to lead a business or enterprise. Due of their skill, they are in high demand from employers, workers, and clients. They become one of the most influential individuals at work as a result. A fluent speaker who possesses good interpersonal and management abilities is likewise in high demand.

- **Communication skills**

Entrepreneurs must also be able to interact well with coworkers and subordinates because effective verbal and interpersonal communication is a crucial skill for an entrepreneur. They ought to be confidently able to express their ideas in writing. Interpersonal communications are also improved by strong critical thinking abilities. They must possess the capacity to reason logically and sensibly about matters pertaining to their enterprises.

- **Organization**

An additional quality of a great entrepreneur is organizational ability. In my experience, business owners are typically the most well-organized people in any group. They should always have a well-thought-out organizational structure that is put into place.

- **Flexibility**

A great entrepreneur must also have the willingness to take risks and be adaptable. An entrepreneur must have the capacity to adapt to shifting conditions in order to succeed. They must be able to effectively manage their time in order to be flexible. Each entrepreneur who hopes to succeed must be able to successfully manage their time. As a result, they are able to work on the best company idea at the proper time.

- **Possessing global vision**

Entrepreneurial abilities are more important than ever in a culture that has become more global and globalized. The importance of international trade must be understood, but so must the strengths and weaknesses of every nation. So, if their business operates in this sector, they need to establish strong contacts with other nations. This entails being aware of cultural variances and figuring out how to complement cultural customs and policies.

- **Valuing work team**

Another essential vital skill for a 21st-century entrepreneur is the capacity to collaborate with others. An effective business is run by a successful team. Entrepreneurs may meet their clients' requirements by working together. Also, it enables people to learn more about the goods and services offered by other businesses. As a result, they must collaborate well with both their coworkers and managers

- **Exhibiting a strong work ethic**

Entrepreneurship demands commitment and effort. The enterprises with the entrepreneur as their primary staff will be the most successful in the twenty-first century. This individual should be dedicated, diligent, and hardworking. Practically speaking, they must be physically capable of standing for extended periods of time. It should be easy and stress-free for this person to complete assignments. An excellent entrepreneur consistently keeps their promises due to their strong work ethic.

There are a few essential abilities that good businesspeople have. So, as individuals advance in their jobs, they should be open to learning new skills, and they should do so whenever they encounter challenges or opportunities in their line of work. They ought to hone their leadership abilities since effective leadership is essential to the success of an organization. Confidence is paramount to acquire new skills when people have to tackle obstacles or when they have to take advantage of opportunities.

❖ Strengthening your self-esteem

Your perception of yourself, or your self-esteem, is how you feel about yourself. Everybody experiences periods of feeling down or having trouble believing in oneself. But, if this persists over time, it may cause concerns, such as mental health problems like sadness or anxiety. These issues can also be indicated by some of the signs of poor self-esteem.

Self-esteem is sometimes referred to as one's inner voice (or self-dialogue), which is the voice that determines whether or not you are competent to do or accomplish a task. Self-esteem truly refers to how we view ourselves, as well as how we think of ourselves and our abilities.

Individuals who have high self-esteem typically have an optimistic outlook on life. They become considerably more resilient as a result and are more equipped to handle the ups and downs of life. But, people with low self-esteem are frequently considerably harsher on themselves. They have a tougher time recovering from obstacles and failures. This might cause individuals to steer clear of trying circumstances. Nevertheless, because they feel worse about themselves as a result, that may actually lower their self-esteem even more.

There are several methods you can use to raise your self-esteem.

1. Recognize and contest your limiting beliefs

The first stage is to recognize and then confront your self-defeating ideas.Keep an eye on how you think about yourself. You might think, "I'm not smart enough to do it," or "I have no friends," for instance. When you do, look for proof that refutes those claims. Put down both the claim and the supporting information, then keep referring to it to serve as a constant reminder that your self-defeating beliefs are unfounded.

2. Highlight Your Best Qualities

Also, it's a good idea to list your accomplishments and flattering remarks from others or positive aspects of yourself.

3. Create wholesome connections and stay away from poisonous ones.

You'll undoubtedly discover that some individuals—and relationships—make you feel better than others. Try to stay away from somebody who makes you feel horrible about yourself. Develop connections with individuals who uplift you, and stay away from connections with those who bring you down.

4. Take a Pause for Yourself

You don't have to be flawless all the time. Even having positive self-esteem is not required all the time. Self-esteem fluctuates from circumstance to circumstance, day to day, even hour to hour. Among friends and coworkers, some people feel at ease and upbeat, but uncomfortable and reserved around strangers. Some may suffer socially even when they feel completely in control of themselves at work (or vice versa).

5. Learn to Say No and Become More Assertive

It might be challenging for those who have low self-esteem to defend themselves or refuse requests from others. Because they don't like to turn people away, this implies that they could become overworked at home or at work. Unfortunately, this could make stress worse and harder to control. So, practicing assertiveness

might aid in raising your self-esteem. Acting as though you believe in yourself can occasionally help you feel more confident.

6. Boost Your Physical Well-being

Being in good physical and mental health makes it much simpler to feel good about ourselves. Consider increasing your exercise, eating healthy, and sleeping sufficiently. Making time for relaxation and doing what you want to do rather than what someone else wants of you is also a good idea. You could discover that making small adjustments like this might significantly alter your viewpoint.

7. Meet challenges head-on

Individuals with poor self-esteem frequently shy away from demanding and hard situations. Taking on a challenge might be a good approach to boost self-confidence. This doesn't imply you have to do everything yourself; getting help when you need it might be part of the challenge. However, you should be willing to try things that you know won't be easy. You prove to yourself that you can succeed by doing well. Your self-esteem will increase as a result of this because it challenges your limiting beliefs.

Celebrate when you feel well or accomplish something positive, but don't berate yourself if you periodically revert to negative thought patterns. Simply get back up and make an effort to think more kindly. After this becomes second nature, you'll notice a subtle improvement in your self-esteem.

❖ How to communicate effectively with others

By communications at work, we mean those communications you have around the ins and outs of the job. Knowing when and how to communicate effectively can help you reduce miscommunication, increase team happiness, strengthen collaboration and build trust. Teams that know how to communicate effectively about work are better prepared to deal with difficult situations. But developing good communication habits takes time and effort.

Communications at work can occur face-to-face, in writing, through a video conferencing platform or in a group meeting. They can also occur in real time or asynchronously, something that happens when you communicate at work with a recorded video, by email or on a platform such as a project management tool. Here are some examples of communications at work:

- Team meetings
- Individual evaluation sessions
- Receipt of information
- Communications about the status or progress of a project
- Collaboration with other departments' tasks
- Non-verbal communications

❖ Elements of good communication

Now that you know what types of communications can be included in work communications, how can you begin to improve them? There are some clear principles of communications that you can apply regardless of the type of communication involved. In particular, good communication:

Aim for clarity. Beyond whether it's a Slack message, composing an email or giving some feedback on the fly, aim to communicate your message clearly.

Aim to resolve conflicts, not create them. The reason you are communicating is to solve a problem or encourage effective collaboration on a project or task. Good communication at work may be about resolving obstacles or it may be about giving an opinion. Make sure the goal is always to improve the current situation. Communication goes both ways. Every communicative situation at work is an information exchange, even if the person is only communicating nonverbally.

1. Know where to communicate and on what topics.

Communication happens in many different ways - face-to-face, by email, through instant messaging and on work management platforms. To be as effective as possible, make sure you follow instructions on how to communicate and send messages about the right things to the right place. Sometimes, if you know where to communicate, you're already halfway there. The company may have many different tools for communications, which can make it difficult to know which tool is most appropriate for a particular question or comment. Do you need to communicate in real time or is it okay to send an asynchronous message? If you're not sure, ask a team member or manager where you should send different types of messages. It's very important that everyone is aligned. Some ways of communication, among others, can be:

- ★ Slack
- ★ Zoom
- ★ Skype
- ★ Gmail

2. Develop collaboration skills

Collaboration is the foundation of effective teamwork. In order to develop strong team collaboration skills, you must practice open and honest communications. This does not necessarily mean that you must always agree with everything. Knowing how to disagree and working to resolve those differences is also a central part of collaboration.

3. Talk face-to-face whenever possible

Perhaps one of the most used and effective ways to avoid misunderstandings in communications is to talk face-to-face. If your team works virtually, video conferencing also works. Face-to-face communications are particularly important if you know a conversation is going to be tough. It can be very difficult to communicate tone through writing. Ideally, the other person should see your facial expressions and body language. If your team works remotely or decentralized, it may also be better to communicate by phone rather than by video conference. The fatigue of video conferencing is real and can make collaboration and communications particularly difficult for remote teams. Communicating by phone reduces some of the visual strain while still allowing you to hear the voice and tone of the other team member.

4. Pay attention to your body language and tone of voice.

Communication is not only about what you say, but also how you say it. Make sure you don't fold your arms or show disinterest. Many times, body language has nothing to do with the current situation; you may be tired or stressed about something going on in your personal life. But your team members, who may not know the context, may see your reactions and assume you are angry or upset about something. Particularly in the case of tougher conversations, try to relax your body language and facial expressions to avoid conveying any unintended signals.

5. Prioritize two-way communications

Listening is just as important as talking when it comes to communications at work. Part of being a collaborative team member has to do with listening to other people's ideas rather than just trying to impose your opinion.

❖ 5. Facing failure in a constructive way

You could encounter failure at work occasionally, therefore it's critical to develop the abilities to deal with and go through these obstacles. Even though failure can seem like a bad thing to go through, it can also be a chance for improvement. Finding constructive ways to accept setbacks and move on after them can be aided by learning about failure and creating coping mechanisms.

❖ Why is it crucial to handle failure?

To avoid having a bad emotional impact on yourself or others in the long run, such as wrath, embarrassment, or anxiety, it's crucial to deal with failure. These feelings can have an impact on interactions and choices, making it difficult to move past setbacks and achieve success. Try to change your attitude after failing in order to prevent repeating the same mistakes and to realize that while failures do occur, they do not define you. You can more effectively process your sentiments and get past them if you take the time to recognize and accept failure and any associated emotions.

❖ Dealing with failure

To acknowledge, accept, and deal with failure, take the following nine steps:

1. Recognize your emotions

As they might be uncomfortable, failure-related emotions are frequently avoided; yet, it's crucial to learn how to acknowledge them. Give yourself permission to acknowledge and name your emotions. If you are feeling disappointed or angry, try to figure out why you are feeling that way and what you can take away from it.

2. Identify illogical assumptions

It's normal to feel more down after failing, but it's crucial to remember that these sentiments and ideas might not be true. Consider your accomplishments as a strategy for overcoming these ideas. Create a list of accomplishments, no matter how minor, and refer to it whenever you feel dread creeping in or before starting the next activity.

3. Do not require clearance

Our desire to win others' praise frequently causes us to exaggerate even minor failures. It's critical to keep in mind that your objectives are unique to you even if you feel as though you haven't lived up to expectations. Instead of concentrating your efforts on exceeding someone else's expectations, concentrate on your own specific future ambitions.

4. Acknowledge of responsibility

Failure might be the result of a slip-up, poor planning, or inaccurate calculations. Recognize your responsibility and take steps to stop further errors. Accepting your mistakes and attempting to better your methods and abilities are both aspects of taking responsibility. You demonstrate your accountability and desire to learn from errors by devoting time to reviewing mistakes and making adjustments to avoid them in the future.

5. Avoid personalizing it

Failure in business, in your profession, or in your personal life is a setback but doesn't define who you are. It's important to keep failures distinct from personal statements because it's simple to link them together. Keep in mind that failure does not define who you are. Notwithstanding any mistakes you may have committed, you possess other talents, attributes, and accomplishments. Making a list of your basic principles and what your goals mean to you may be helpful in inspiring yourself to try again.

6. Use negative emotions for good.

Strive to channel your bad feelings into the drive needed to discover a solution. Consider what you could have done differently and then create a plan of action. While it's vital to acknowledge your feelings following a setback, think about how you might use those feelings to recommit to your objectives. Create a structured review plan for your routines and procedures so you can pinpoint where the error or failure occurred. After determining the cause, come up with remedies to avoid such errors in the future.

7. Develop coping mechanisms for stress

To assist lessen tension and worry, use coping mechanisms like deep breathing, taking a long walk, phoning a friend, or spending time with your pet. Clarity and perspective can come through taking care of yourself and lowering your stress levels. Make it a practice to monitor your stress levels all day long. Use your stress-reduction techniques to take a break if you start to feel overwhelmed.

8. Boost self-esteem

Failure can impact self-esteem and might elicit doubts about your ability or value. Reduce the negative impact on self-esteem by remembering that you're likely to have other opportunities in the future. Shift your attention to a hobby or low-stakes activity that you enjoy. Participating in activities that you enjoy and feel confident doing can be a great way to improve your self-esteem.

9. Seek assistance

You can process failures and overcome them with the aid of outside assistance. A friend or coworker could acknowledge your emotions or provide an example of failure that minimizes the severity of your own. Relatives and friends might provide support or just a place for you to voice your concerns. It helps to express your thoughts and feelings to trusted people in order to better comprehend them, lessen their impact on you, and come up with solutions. As you ask for and provide support from others, it can also strengthen your relationships with them.

❖ How games help to build self-confidence

Can playing video games boost one's self-esteem? Absolutely. Computer games that are specifically made to assist people improve their self-acceptance have been developed and tested by researchers from the psychology department at McGill University in a study that is a first of its kind.

The McGill team concluded after reviewing previous research on self-esteem that people's experiences of insecurity are mostly based on concerns about whether they will be liked, accepted, and appreciated by their peers and significant others.

Studies have also demonstrated that specific patterns of thinking have a significant impact on one's sense of self-worth. Self-critical opinions about one's traits and performance, as well as an expectation that others would reject one, are causes of self-esteem problems. Those with greater levels of security, in contrast, have a variety of automatic cognitive processes that provide them self-assurance and protect them from worrying about the prospect of social rejection.

"Negative thought processes naturally and frequently arise unconsciously for persons with low self-esteem, according to Baldwin, which causes them to selectively focus their attention on mistakes and rejections. " The answer? Individuals who "automatically" have negative personal outlooks need to train their minds to think positively and develop greater self-acceptance. The McGill team set out to undertake experimental research in order to create specially created computer games as therapies that could aid people in feeling more comfortable.

With enough practice, the McGill team has shown that even those with low self-esteem may create constructive thought patterns that could help them gradually increase their sense of security and self-confidence.

❖ Conclusion

Self-assurance is essential for business owners. It's dangerous to launch your own company, and it can be challenging to maintain motivation when things aren't going well. But self-assured people have the fortitude to persevere in the face of adversity. They understand that failures are inevitable along the path and that taking chances is one of the best strategies to succeed in business. In fact, they view failure as a chance to improve and learn. They are able to maintain their focus and persevere over obstacles thanks to their inner strength. Also, having self-confidence might help you network and create more beneficial business ties (and in life) Self-confidence can be challenging for entrepreneurs who are extremely sensitive, thus it's especially important for them to develop their confidence in a method that suits them.

❖ Final Assessment task

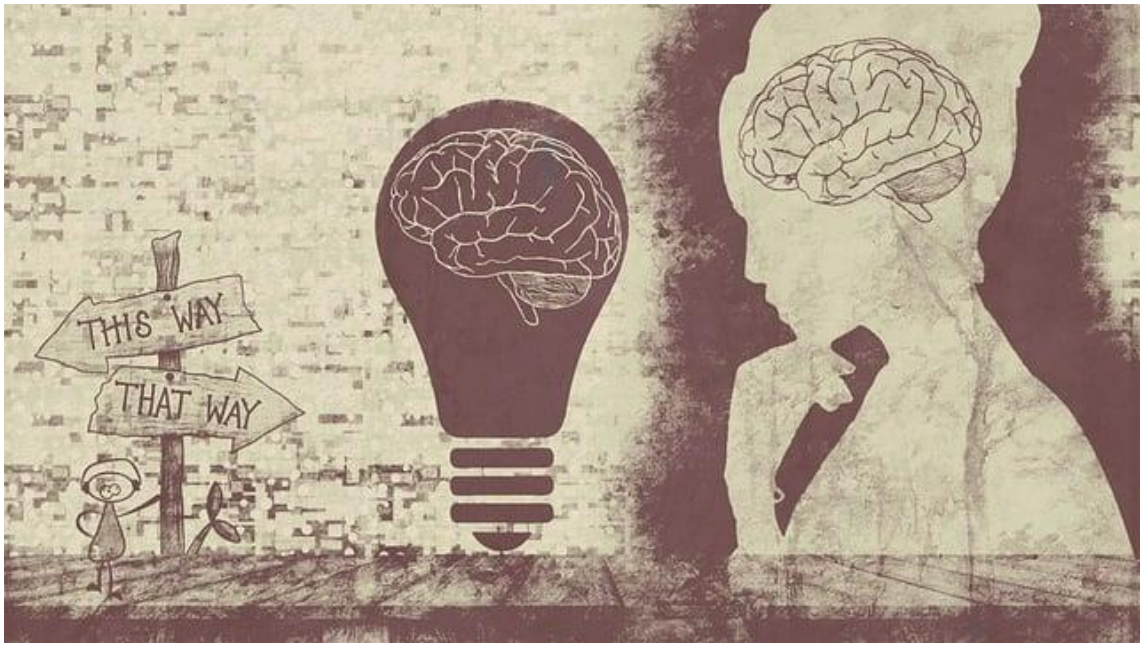
Title of the activity	**Vision Board**
Aim of the activity	To develop self-esteem and confidence
Material required	Computer
Time required	40 min
Format	PDF, JPG, PNG, others
Description of the activity	You will create a vision board as a poster on Canva or Powerpoint Steps: 1. Focus on your future goals (work, personal life, etc) 2. Select images and words that represent that goal 3. Begin to complete with the images/ words your poster 4. Reflection on your steps to achieve your future goals taking into consideration the content of the module

❖ 9. Further reading and resources

Why do entrepreneurs need confidence?	https://lisajeffs.com/why-do-entrepreneurs-need-confidence/
What are 21 Century skills?	https://www.aeseducation.com/blog/what-are-21st-century-skills
Why Confidence Is The Secret To Great Leaders At Work & Home	Why Confidence Is The Secret To Great Leaders At Work & Home | Dr. Karyn Gordon | TEDxRyersonU
Skills everyone needs to succeed in the 21 Century	Skills Everyone Needs To Succeed In The 21st Century
12 Benefits of self-esteem	https://www.indeed.com/career-advice/career-development/benefits-of-self-esteem
How To Build Self-Esteem - The Triple Column Technique (CBT)	How To Build Self-Esteem - The Triple Column Technique (CBT)
Strategies from learning from failure	https://hbr.org/2011/04/strategies-for-learning-from-failure
7 Self-Esteem Apps to Give Your Confidence a Daily Boost	https://www.happierhuman.com/self-esteem-apps/

MODULE 3

STRESS MANAGEMENT



❖ Introduction

Stress management refers to a set of techniques, skills, and strategies that can be used to cope with and reduce the negative effects of stress on our physical, mental, and emotional well-being. Stress is a natural response of our body to external or internal challenges and demands, but chronic and excessive stress can lead to a range of health problems, such as anxiety, depression, high blood pressure, and heart disease.

Effective stress management involves a combination of different approaches, such as practicing relaxation techniques (e.g., deep breathing, meditation, yoga), engaging in physical activity, improving time management skills, setting realistic goals, improving communication skills, seeking social support, and making healthy lifestyle choices (e.g., eating a balanced diet, getting enough sleep, avoiding alcohol and tobacco). By learning and applying these strategies, individuals can better manage their stress levels, improve their overall well-being, and enhance their ability to cope with life's challenges.

Stress management is a critical component of any successful business strategy. High levels of stress in the workplace can lead to decreased productivity, increased absenteeism, high turnover rates, and decreased employee morale. Therefore, it is essential for businesses to prioritize stress management in their workplace.

Finally, it is essential for businesses to ensure that their employees have a healthy work-life balance. This can include providing flexible work schedules, allowing remote work, and promoting paid time off. By prioritizing stress management in the workplace, businesses can create a positive and productive work environment that benefits both employees and the organization as a whole.

❖ Importance of emotions

Emotions play a crucial role in our lives and have a significant impact on our thoughts, behaviors, and overall well-being. Here are some of the reasons why emotions are important:

- Communicating our needs and desires: Emotions allow us to communicate our needs and desires to others, helping us build and maintain relationships. For example, expressing love and affection can help deepen romantic relationships, while expressing frustration can help address problems in a work environment.
- Providing motivation: Emotions can motivate us to take action and achieve our goals. For instance, feeling excited about a new job opportunity can provide the motivation to pursue that opportunity and put in the necessary effort to succeed.
- Guiding decision-making: Emotions can also guide our decision-making by providing important information about our preferences and values. For example, feeling guilty can indicate that we have violated a moral principle, while feeling happy can indicate that we are satisfied with our choices.
- Coping with challenges: Emotions can help us cope with challenging situations by providing a sense of comfort and support. For instance, feeling comforted by a friend or loved one during a difficult time can help alleviate stress and improve our mood.
- Enhancing creativity: Emotions can also enhance our creativity by providing inspiration and new perspectives. For example, feeling inspired by a powerful piece of music or art can lead to new creative ideas.

In summary, emotions are an essential part of our human experience and play a vital role in our lives. They help us communicate, motivate, guide our decisions, cope with challenges, and enhance our creativity.

❖ Identifying our emotions

Identifying our emotions in a business setting is essential for effective communication, decision-making, and stress management. Here are some steps to identify our emotions in a business context:

- Recognize physical sensations: Emotions often manifest as physical sensations in our bodies, such as tension in our shoulders, a knot in our stomach, or a racing heart. Paying attention to these physical sensations can help us identify the emotions we are experiencing.
- Name the emotion: Once we have recognized physical sensations, we can try to identify the emotion we are feeling. For example, if we feel a tightness in our chest and an increased heart rate, we may be experiencing anxiety or stress.
- Consider the cause: Understanding the cause of our emotions can help us manage them effectively. For example, if we are feeling angry, identifying the source of that anger can help us address the issue and find a resolution.
- Reflect on the impact: It is also important to reflect on the impact of our emotions on our thoughts, behaviors, and interactions with others. For example, feeling frustrated or impatient can lead to impulsive decisions or communication that may not be effective.
- Communicate effectively: Once we have identified our emotions, we can communicate them effectively to others. Using "I" statements and expressing our emotions in a calm and constructive manner can help prevent misunderstandings and build stronger relationships.

By identifying our emotions in a business context, we can improve our communication, decision-making, and stress management skills, leading to greater success and satisfaction in our work.

❖ Managing our emotions through action

Managing our emotions through action is an effective way to cope with and regulate our emotions. Here are some strategies to manage our emotions through action:

- Exercise: Physical exercise is an excellent way to release tension and reduce stress. It can also help us regulate our emotions by releasing endorphins, which are natural mood-boosters.
- Engage in a hobby: Engaging in a favorite hobby, such as reading, playing music, or painting, can be an effective way to relax and reduce stress. It can also provide a sense of accomplishment and satisfaction that can help regulate our emotions.
- Take a break: Sometimes, taking a break from a stressful situation can help us calm down and gain perspective. This can be as simple as taking a walk outside or stepping away from our work for a few minutes.
- Practice mindfulness: Mindfulness practices, such as meditation or deep breathing exercises, can help us regulate our emotions by focusing our attention on the present moment and reducing distracting thoughts.
- Seek support: Talking to a trusted friend or colleague can be an effective way to manage our emotions. It can provide a sense of validation and support, helping us feel more grounded and less overwhelmed.

By taking action to manage our emotions, we can reduce stress, improve our mood, and make better decisions in our personal and professional lives.

❖ Nature and causes of stress

Stress is a natural response to the demands of daily life, and it can come from a variety of sources. Here are some of the nature and causes of stress:

Environmental factors: Environmental factors, such as noise, pollution, or extreme weather conditions, can cause stress. For example, living near a busy road or airport can create constant noise, leading to chronic stress.

Physical factors: Physical factors, such as illness, injury, or lack of sleep, can also cause stress. For example, chronic pain or a lack of restful sleep can lead to feelings of exhaustion and irritability.

Life events: Major life events, such as a job loss, divorce, or the death of a loved one, can cause significant stress. These events often require significant adjustment and can disrupt daily routines and relationships.

Work-related stress: Work-related stress is common and can arise from factors such as heavy workload, tight deadlines, poor management, or difficult colleagues. It can lead to feelings of overwhelm, burnout, and a decreased sense of job satisfaction.

Financial stress: Financial stress can arise from debt, job loss, or other financial difficulties. It can cause feelings of anxiety, uncertainty, and helplessness.

Social stress: Social stress can arise from conflicts in relationships, social isolation, or discrimination. It can lead to feelings of rejection, loneliness, and a decreased sense of belonging.

In summary, stress is a natural response to the demands of daily life, and it can come from various sources such as environmental, physical, life events, work-related, financial, and social stressors. Understanding the nature and causes of stress can help us identify potential stressors and develop effective strategies for managing stress.

Work-related stress is a common form of stress that can have negative impacts on both an individual's physical and mental health, as well as their job performance. Here are some of the nature and causes of work stress:

Workload: One of the most common causes of work stress is a heavy workload. This can occur when there are too many tasks to complete in a given time frame

or when an individual is responsible for tasks outside of their usual responsibilities.

Deadlines: Tight deadlines can cause significant stress, especially when there is a high expectation of meeting those deadlines. This can lead to feelings of pressure, anxiety, and even panic.

Job insecurity: Fear of job loss or uncertainty about job security can cause stress. This can be especially true during economic downturns, company restructuring, or downsizing.

Lack of control: A lack of control over work tasks or work environment can lead to feelings of helplessness, frustration, and stress.

Poor relationships with colleagues or managers: Difficulties in relationships with colleagues or managers can cause stress. This can include conflicts, lack of communication, and interpersonal tensions.

Work-life balance: A lack of balance between work and personal life can cause stress. This can occur when work demands take up too much time or when an individual struggles to switch off from work outside of work hours.

Poor work environment: A poor work environment, including issues such as poor lighting, uncomfortable temperatures, or excessive noise, can cause stress.

❖ Approaches to stress management

One effective approach to stress management in business is to implement a wellness program. Wellness programs can include activities such as exercise classes, mindfulness training, and healthy eating initiatives. These programs can help employees develop healthy habits that reduce stress and promote overall well-being.

There are several approaches to stress management that can help individuals reduce and cope with stress. Here are some of the most effective approaches to stress management:

- Cognitive-behavioral therapy (CBT): CBT is a therapeutic approach that helps individuals identify and challenge negative thought patterns and behaviors that contribute to stress. CBT techniques can include relaxation training, problem-solving strategies, and cognitive restructuring.
- Mindfulness-based stress reduction (MBSR): MBSR is a mindfulness-based approach to stress reduction that involves the practice of mindfulness meditation and gentle movement. It aims to help individuals develop a greater awareness of their thoughts and emotions, and to develop skills to cope with stress more effectively.
- Time management: Effective time management can help individuals better prioritize their tasks and reduce feelings of overwhelm. This can involve techniques such as creating to-do lists, breaking tasks into smaller steps, and setting realistic deadlines.
- Create a list of the chores you need to complete and prioritise them by completing them in order of importance. Do the most important tasks first. This facilitates a more enjoyable completion of the work.
- Increase the number of breaks you take from your work. Working nonstop without a break leads to monotony, boredom, and stress. Hence, taking breaks during the day helps us unwind, break up routine, and lower our stress levels. It is advisable to get up from the desk, walk around for a while, then continue working.
- Assume accountability for others' actions — Management is all about getting things done by others. It is important to master the skill of assigning tasks to others. The significant amount of stress can be reduced if the duty is appropriately assigned to the capable individuals in the organisation.
- Get more sleep; stress can also be brought on by insufficient sleep. In order to wake up the next day feeling rested and ready to work, one should

get adequate sleep. Getting enough sleep boosts energy levels and concentration abilities.

- Create strong workplace relationships. Any relationship needs trust, respect, understanding, and compassion. Coworkers must work together to accomplish a shared objective. Nonetheless, they frequently give their jobs all of their attention while paying little attention to how they treat one another. A positive work environment will reduce stress. To strengthen relationships with coworkers, one should spend less time with them.
- Employ effective communication because it's crucial for reducing conflict. It is best to communicate in the recipient's language. He must to have strong verbal and nonverbal communication skills. He should also pay attention to the posture, tone of voice, and gestures of his coworkers.

Stress is a common problem that can have negative effects on both physical and mental health. However, there are several effective approaches to stress management that can help individuals reduce and cope with stress. These approaches include cognitive-behavioral therapy, mindfulness-based stress reduction, exercise, relaxation techniques, time management, and social support. By identifying the causes of stress and adopting effective stress management strategies, individuals can improve their overall well-being and reduce the negative effects of stress. It is important to remember that stress management is a personal process, and what works for one person may not work for another. Therefore, individuals should choose the approach that works best for them and continue to practice stress management techniques regularly to maintain their well-being.

❖ Conclusion

In summary, work-related stress can arise from various factors such as workload, deadlines, job insecurity, lack of control, poor relationships with colleagues or managers, work-life balance, and a poor work environment. Understanding the nature and causes of work stress can help individuals and organizations identify potential stressors and develop effective strategies to manage work-related stress.

It is also important to address the root causes of your stress and make necessary changes in your life. This may involve seeking professional help, such as counseling or therapy.

Remember, managing stress is a lifelong process, and it requires ongoing effort and commitment. With the right tools and mindset, however, you can effectively manage your stress and live a healthier, happier life.

❖ Final Assessment task

Title of the activity	**Worksheet for coping with stress**
Aim of the activity	To provide tools/exercises to approach stress management
Material required	Computer
Time required	30 min
Format	Word, Jpg, Pdf, PowerPoint
Description of the activity	You are the manager of a Company and some of your employees are stressed because of the workload. Steps: 1. You have to prepare one worksheet with different approaches and exercises to relieve the stress level of the staff 2. Make a presentation of the three worksheets in PowerPoint, Canva or similar. *Tips:* Example of a simple worksheet based on the Mindfulness approach: https://positive.b-cdn.net/wp-content/uploads/The-Five-Senses-Worksheet.pdf You can include videos or motivated photos in your worksheet

❖ Further reading and resources

Design of Digital Workplace Stress-Reduction Intervention Systems: Effects of Intervention Type and Timing	https://dl.acm.org/doi/fullHtml/10.1145/3491102.3502027
7 Digital Tools to Reduce Stress and Anxiety at Home	https://eddinscounseling.com/7-digital-tools-to-reduce-stress-and-anxiety/
Managing Stress - Brainsmart	https://www.youtube.com/watch?v=hnpQrMqDoqE
Coping with Anxiety Through Virtual Reality	https://www.youtube.com/watch?v=7SDjmRTergU
12 Ways Managers Can Reduce Employee Stress and Burnout	https://www.michiganstateuniversityonline.com/resources/leadership/12-ways-managers-can-reduce-employee-stress-and-burnout/
Holistic Approach to Stress Management	https://www.youtube.com/watch?v=gIA3q2y5K1M
12 Best Exercises to Ease Stress and Anxiety	https://health.usnews.com/health-care/patient-advice/articles/best-exercises-to-ease-stress-and-anxiety
How to control emotion and influence behavior	https://www.youtube.com/watch?v=MOQcSzkKfbs

MODULE 4

Problem Based Learning (PBL)

❖ Introduction

"Problem-based learning develops positive attitudes, interpersonal skills, problem-solving and lifelong learning skills, knowledge retention. "
– Prince, 2004

No organization escapes that, internally, may generate different types of problems. Perhaps the most important thing in an organization is not to not generate them, but to have the capacity to solve them once they are present.
This makes organizations grow stronger, gain stability and security, and not live praying to luck forever.

Through the years, organizations have developed an ingrained culture that solved all their problems in a very uniform and particular way. Normative answers were used for the resolution of all problems, and this gave a sense of "standardization" in the organization. This systematization and standardization of problem-solving leads to multiple errors in daily tasks: it becomes normal to confuse symptoms with problems, to neglect aspects necessary to solve a specific situation, to apply the same solution to all problems or to understand that there is only one solution for a particular problem.

The feeling of this standardizing culture gives rise to the sensation of having a problem-solving manual that applies in all cases in exactly the same way, regardless of their origin, their causes, etc. This "standardization" when solving problems in an organization gives rise to a vicious circle that does not allow for learning in the process and improvement in the problem-solving procedure in the entity.

This is why the PBL (Problem Based Learning) methodology works and develops the competencies that an organization needs for problem solving, allowing to solve a particular problem in a personalized way (this would be enough to apply

this methodology and demonstrate its efficiency), but it is also a methodology that allows creating, acquiring and transferring new knowledge and capabilities.

Therefore, in order to learn to solve problems in an effective way, adapting the solution to the needs of the organizations, it is necessary to understand the problems differently, learning from the process and developing the skills needed to work on divergent thinking, a key aspect of this whole process.

❖ What Is PBL?

Problem-Based Learning (PBL) has its origins in 1965 by John Evans, dean of the School of Medicine at McMaster University in Ontario, Canada. This dean wanted his students to deliberate on the various aspects that can influence disease and health and changed the way he taught. Instead of continuing to teach his master classes, he turned his classroom into a large research center, where students worked in groups, researching together based on real-life assumptions. Students had to investigate, experiment, and contribute their critical thinking, identify their knowledge gaps and try to fill them, as well as learn to work in groups. The dean really had a guiding role in the process.

The Problem Based Learning (PBL) is an active methodology where an open problem is introduced, and people learn by investigating and solving the problem, working with inspirational material, data, or any resource we can use. They must provide a solution and they are the ones who must detect the needs for each specific case.

If it's transferred this methodology to the professional environment, the advantages do not stop growing. Its application is an important tool for learning and professional development. Here we work on real problems in real

environments, which will provide workers with the necessary skills to be able to provide an appropriate solution for each situation.

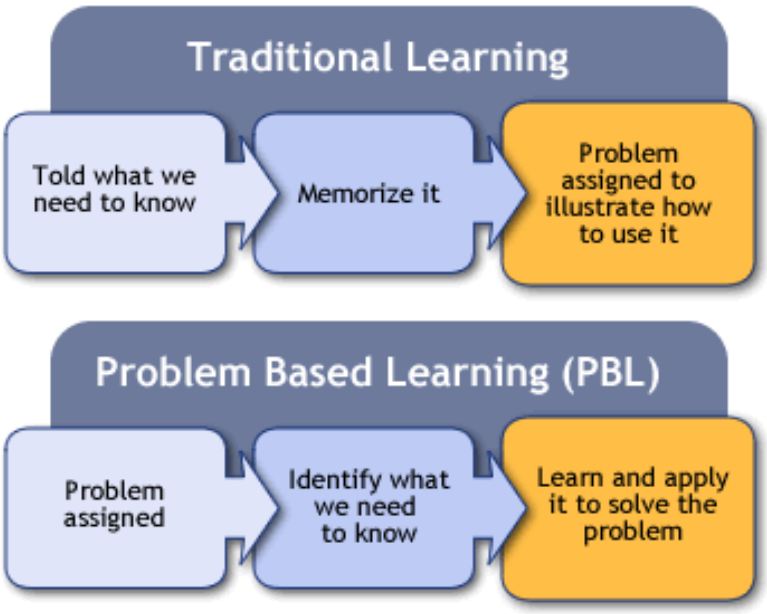
Consequently, PBL deliberately emphasizes analytical skills and a real understanding of what is being investigated, discovered, and implemented. The PBL process does not focus on problem solving with a defined solution but allows the development of other desirable skills and competencies. This includes knowledge acquisition, enhanced group collaboration and communication.

The process allows students to develop skills used for their future practice. It enhances critical evaluation, literature analysis and fosters continuous learning in a team environment.

These conditions must take place in a didactic environment where there is the possibility of understanding problems in a new and different way. It is necessary to break with the traditional way of identifying and understanding problems to position oneself with other strengths for their resolution.

For this reason, and based on the above, this PBL method was born, which defines a series of phases or moments for problem solving. All these phases are related to the objectives we are seeking and therefore it is essential to broaden their understanding of the problem, generate different options for resolution and analyze which path will lead us to our goal.

The objective of PBL is to create intelligent, open organizations with the capacity to experiment. This is the only way to achieve the proposed objectives and goals, learning from experience and questioning it.



❖ Benefits of PBL Implementation

As it was already mentioned in the previous section, Problem-Based Learning (PBL) is an active methodology that places the individual at the center of learning so that he/she is able to solve certain challenges or problems autonomously. This process will make it possible for the people who participate in this methodology to develop competencies, skills and attitudes that are necessary to be able to face real-life problems and situations. Likewise, another of the advantages mentioned is that PBL provides individuals with the ability to construct and apply knowledge effectively, which will begin to have meaning and to be applied from a critical and analysis-based sense.

With PBL, it is the individual himself who must identify the causes and needs, put resources and strategies into operation, and on the basis of the above find the answer to the problem. The role of the teacher (in the case of the school) or the

superiors (in the case of companies) is that of guide, driver or support to guide the process to success.

Problem-Based Learning is presented as a methodology with numerous advantages, both educationally and professionally. These are some of them:

1. **It allows for meaningful learning.** This term coined by Ausubel explains that meaningful learning implies that "true knowledge can only be born when the new contents have a meaning in the light of the knowledge already possessed “What do they mean by this? That the new learning that we present has to connect with the previous learning that we already have in order to have a meaning. If this exists, a new learning will be produced that will modify our initial knowledge. PBL encourages relating new information with that already possessed, since in order to solve the problem all data and causes must be analyzed, new knowledge and experiences must be incorporated to those previously assimilated, and therefore both must be modified and reconstructed in an interrelated manner.

2. **It is very flexible.** In the educational world, it allows to organize and structure the kind of activities and contents you want, on any topic, from different multidisciplinary approaches and in the environment or context that most interests you. In the business world, it allows to face different types of problems, with different people involved from different disciplines and to adapt to any context where they occur.

3. **Promotes autonomy.** PBL is based on the importance of autonomy, learning to learn and active learning (learning by doing). The person who follows this methodology will have the freedom and the necessary tools/strategies to personally build his/her resolution process, and therefore his/her learning process. We have already pointed out that PBL

improves the capacity for decision making, the capacity for analysis, the detection of needs, and because of all of the above, it is easy to understand that autonomy, responsibility and independence are developed.

4. **It is motivating and entertaining.** The learning environment is produced in a very practical way, through a real situation, being a challenge for the individuals. Especially in the educational approach, where the student is motivated by this circumstance. In the case of a professional environment, giving employees responsibilities and making them partakers of the problem, being part of the solution motivates them to participate in these processes, sets goals and creates expectations.

5. **Prepares for the future and improves professional skills.** Since this methodology enhances the capabilities and skills to analyze, identify, develop critical knowledge and solve the problems proposed, they can be either simulated or applied in real situations. This will allow students to further develop skills that will help them in their future life, both at school and at work. In the case of the business world, it will improve their professional competencies by developing all these skills, and make them more qualified employees.

   We recall that, among other aspects, PBL develops creativity, adaptability to change, logical reasoning, critical thinking and responsibility. If, in addition to this, PBL can be done in a team, other skills such as respect for the other's ideas, deference, communication, and cooperative and collaborative work will also be worked on.

6. **Exercises digital competences.** Both in the educational and business environment, if we apply this methodology in an online format, or work with different ICT tools, we are working with individuals on digital competence. ICT will be used for solving problems, handling computers or tablets,

programs or applications, information search techniques, analysis and data management will be developed.

❖ The five steps to apply PBL

The first thing we have to do before trying to solve a problem is to ask ourselves: what is a problem? According to Cambridge Dictionary, it is " *a situation, person, or thing that needs attention and needs to be dealt with or solved...*". Based on previous definition, it can be understood that within any entity or organization, or throughout the life of any person, there are many types of problems: problems in the organization, problems in the processes, problems in the results, in the instruments, problems of structure, of training, of information, problems of motivation or competences, relationship or emotional problems.

The main point of the PBL methodology is to find out "what to do" and not just focus on working on the "how to do". Problem-solving ability is a priority skill in strategic management in the educational field, because it focuses on figuring out what to do about these problems, and that requires managing a process. Problem solving actually focuses on addressing 3 major challenges:

- understanding the problem,
- the creation of a resolution or intervention strategy
- the achievement of improvement or solution to the problem.

In order to give an adequate response to the challenges described above, the PBL methodology is organized in 5 stages which, although presented in a linear fashion, do not necessarily follow this order in all cases. In many occasions we go back to a previous step, we go forward and backward several times... in order

to achieve greater precision and decision. Therefore, we can say that it is a global method, not a linear one.

- **Step 1: Problem identification**

In the educational and formative environment, in this first stage, it will be the teacher who will present the problem and expose it, giving the information he/she believes necessary to initiate this methodology. This gives freedom to include any kind of content that interests within the teaching-learning process.

In the business or life environment, the problem is given, so it will be known by everyone, and the problem itself will mark the course of the process.

Since this is the first step, it is extremely important and decisive for the correct development of the following phases. At this first stage, it is necessary to carry out an exhaustive analysis of the initial information in order to differentiate and determine which data are fundamental, which should be discarded or those to be taken into account too much, too little or not at all.

Therefore, in this first phase, it is necessary to define and delimit what the problem is, why it is occurring, what or who is generating it and what are the possible variables that are playing a role.

In this data collection phase, the following questions should be answered:

- **Who?** - those involved and affected by the problem (causers and affected, if any).
- **What?** - a detailed description of the problem
- **Where?** - the place where the events happened
- **When?** - the time and duration in which the events took place
- **why?** - the causes and consequences of the problem
- **How?** - in what way the problem happened.

After answering all these questions, as widely as possible, you will be able to better visualize the situation to be solved, analyze it much more objective and design an action plan more adapted to reality.

To assist in this process, a rubric similar to the one presented here can be developed and used, which should be adapted to the needs that arise:

	Where does it exist?	Where does it not exist?
Who?	Who and how many people are involved? Who is affected by this problem (directly and indirectly)?	

	What are the characteristics of the affected population?	Are there people in the same context who are not affected by the problem?
What?	In what aspects is it affecting? Is it a problem of results, processes...?	In what aspects does it not manifest itself?
Where?	Which department is affected? Does it affect all offices? Does it affect everyone equally?	Are there any departments or other offices where the same department is not affected?
When?	Is this a recent situation? Has it been a recent or long-standing situation?	When is this not the case?
Why?	What are the probable causes of the problem?	Why is this not happening in this case?

	What consequences is it having on the organization?	
How?	In what form or in what way has it happened?	

This stage will serve to gather information, search for all the necessary data and be able to get organized. Surveys, percentages, or checklists can be used to help gather all the necessary information.

It is interesting, at the end of this stage, to prepare a brief report that is as precise as possible and that clarifies all the data collected.

- ## Step 2: Quantify and clarify the problem

This second phase is based on clearly defining the problem and, above all, delimiting it. With all the data obtained in the previous phase, we should now be in a position to deepen our logical and well-founded understanding of the problem, elaborate a satisfactory and well-founded explanation of its causes, and thus establish a first image of the real problem and how to manage the solution strategy.

Explaining the problem and what has caused it will involve conceptually organizing all the information we have gathered in the first phase.

This is why, as mentioned earlier, the first phase is so important since it will serve as the basis for all the others.

In this second phase we will focus on the following:

- objectives must be established, answering the question "What needs to be done?" In order to answer this question, we must identify all potential sources of the problem and select the most relevant causes.

- the tools to be used must be established, answering the question: how can this be done? At this point we can use different activities to answer this question:
    - o brainstorming among everyone
    - o makes a list of 20 or more causes
    - o work with the Ishikawa Diagram (or Fishbone Diagram)

This phase will give rise to an explanatory model that constitutes the first premise for deciding on an intervention strategy.

- **Step 3: Response and hypothesis formulation**

The most important feature of this step is creativity. We cannot lose sight of the two previous phases, but it is at this point that the creative competencies and the

creation of working environments that will allow working in groups to achieve a high level of creativity will be developed.

The main goal of this step is to find possible and feasible alternatives to solve the problem proposed at the beginning. It is important that we do not propose a large number of possible alternatives, since this would slow down the process and delay a lot in this step. We must be concrete and concise.

In order to move forward by taking this step, all participants must be involved through their:

- **personal skills:** expression of innovative and novel ideas, alternative methods, creative activities...
- **interpersonal skills:** teamwork, argumentation, constructive criticism, sharing, agreements...

In this phase we will do the next:

- Propose the solutions that seem most appropriate to us. How can we do this?
    - Through creative brainstorming
    - Using the "Ideal System
    - The SWOT/FODA matrix can be used.

Moving from concrete and punctual actions to organized and planned strategies. We can use the following tools:

    - Combining immediate actions with long-term actions
    - Using the pairwise aggregation matrix

At this point a research process will also be carried out. Each of the proposals should be investigated and explored and given a percentage value, to find out which of the proposed solutions should be most effective.

- **Step 4. Presentation and implementation of solutions. Choosing the best solution**

This step could be said to be divided into two distinct moments. The first moment implies that, with the analysis of each strategy in the previous phase, it must now be decided which of the solutions is the best. This moment involves a process of decision making and accountability.

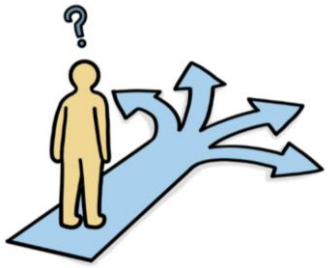
Based on this, the second moment will be reached, which will involve presenting the solution strategy and implementing it, in order to achieve the best possible solution.

When we talk about presenting and implementing solutions, we are really designing an intervention process. It is in this phase where decision making will be fundamental, so this competence is reinforced in all the actions that we carry out at this time.

At this stage, therefore, we must:

- Make a decision as to the best strategy / solution.
- Establish actions, deadlines and resources, how will we do it?
  By differentiating the 3 aspects:
  - Decisions will be made as to the most appropriate actions to be taken.
  - Decisions will be made regarding the implementation time for each action.
    Decisions will be made regarding the resources to be used.

- Divide work into roles and delegate responsibilities, by:
    - Define the competencies required in each of the team members, according to the tasks/actions to be performed by each of them.
    - To constitute the appropriate teams, balancing the characteristics, competencies, abilities, and skills, as well as the weaknesses of each one of them.



It is after this process that the proposed solutions have been progressively enriched through a process of discussion and analysis. It is now that we can forge a strategy, which is nothing more than a set of actions. Rather than proposing a solution, what is proposed is a set of chained solutions that give rise to the strategy to be carried out.

The creation of strategies requires creativity and the development of skills linked to innovation, imagination and the capacity for reasoning and expression.

Problem solving requires that these solutions are communicated (written, verbal, visual...), so it will be important in this phase the leadership skills of the team members, the ability to motivate and inspire for the proposed transformation.

As you can see, this is a fundamental stage, where decision making leads the process. It is important to be decisive and at the same time cautious. Finding the balance will be the key to success in this phase.

- **Step 5: Implementation and Assessment**

The implementation phase allows the planned solution to be put into practice through PBL. This will allow us to check whether the possible solution we have proposed really works in a real working environment.

Therefore, it goes hand in hand with evaluation since implementation allows us to carry out a continuous evaluation of the intervention process and/or the designed product.

The evaluation is defined as an assessment of knowledge, attitudes, and performance of a person or service. From this simple definition, we can understand that evaluation is a systematic process that identifies, collects and treats data, with the objective of first assessing them and based on this assessment, making decisions (García Ramos, 1989).

The evaluation process is precisely one of the great challenges of the PBL methodology. It would be very interesting that the evaluation of this methodology does not only consider the final result, but it is very important to know how to evaluate the process.

Considering that all evaluation must be continuous, throughout the whole process, it is necessary to evaluate both the process itself and the skills and abilities that have been developed along the way. Therefore, two aspects are evaluated in this phase:

1. The results of the most feasible solution, and whether based on them the solution is possible and logical.
2. The results of the feasibility of the PBL process, the learning achieved, and the competencies developed.

The evaluation must be designed by each evaluator, but always taking into account certain aspects common to all processes:

Evaluation should be continuous, i.e.: there should be an initial evaluation (to know the starting point), a process evaluation (which will give us information throughout the process and allow the necessary adjustments) and a final evaluation (to recognize the objectives achieved in all senses).

- The evaluation must be quantitative, but above all qualitative. For them the most appropriate instruments will be the precision rubrics.
- The evaluation should be: self-evaluation, heteroevaluation, co-evaluation, metaevaluation... and any other that we consider relevant. As evaluation procedures and instruments, we can use the following (always adapted to our needs):
    - **Procedures:** direct and systematic observation, revision, correction, discussions...
    - **Instruments:** tests, rubrics, checklists, observation diaries, worksheets, checklists, concept maps, recordings, portfolios...

We recall that in terms of procedures and, above all, evaluation instruments, the use of ICTs as a tool to facilitate the evaluation process becomes relevant.

It is important not to forget that a multitude of different assessment tools and instruments should always be used, combining different procedures and instruments.

❖ Final Assessment task

Title of the activity	**Houston, we have a problem**
Aim of the activity	— Develop critical thinking — Engage the individual in a challenge, in an enthusiastic way — Assess knowledge of the phases of PBL — Developing divergent, effective and creative thinking — Encouraging working models with active methodologies
Material required	Paper, pen, Internet access
Time required	2 hours
Format	Face-to-face, blended and online
Description of the activity	We will divide the activity into different phases. Previously, the individuals will have access to all the material on PBL presented in this dossier. – In the first phase, the individuals are presented with the case to be studied, i.e., the problem to be solved, in written form. The problem presented is a common case in companies: a written complaint from a very annoyed customer, whose intention is to denounce the entity for its poor management and poor product/service quality. Moreover, in this case, the customer is right, so it has been a mistake

	that has occurred internally in the company. – For each particular case, it can be customized based on the scope of work (other examples of activities would be the appearance of a pest in the workplace, or the flooding of the offices, or a fire in the warehouse of a product company, for example). – They should study the case, work through and analyze the scenario in which the problem occurs, identify what they know about the case, and bring into play all the knowledge they have about complaint resolution. – The individual should make a list of all the information needed to solve the problem. – Hypotheses will be proposed based on the data provided in the first part. The information gathered is analyzed and options and possibilities for solving the problem are sought. The most viable option will be chosen, explaining the reasons that have led to choose that solution. An important aspect in the development of the assumption will be to see if the individual follows the steps that have been explained in the PBA, that he/she has divergent thinking, and that he/she solves the problem in a dynamic way and taking into account all the variables.

❖ Further reading and resources

Book	Bridges, E. M. (1992). *Problem Based Learning*. Eric/CEM
Book	Garmendia, M., Guisasola, G. y Sierra E. (2009). *Teaching Part Visualization: An Approach Based on Problem Solving Strategy Knowledge*. International Journal of Engineering Education 25(6), 1205-1211.
Book	Savery, J. R. (2006). *Overview of problem-based learning: Definitions and distinctions*. Interdisciplinary Journal of Problem-based Learning, 1(1), 3.
Web Site	Página web del Gobierno Canario, de información sobre ABP https://www3.gobiernodecanarias.org/medusa/ecoescuela/pedagotic/aprendizaje-basado-proyectos/
Web Site	Enlaces a sitios Web Útiles Sobre El Aprendizaje Basado En Problemas https://www.encyclopedia.com/education/applied-and-social-sciences-magazines/useful-web-sites-problem-based-learning

MODULE 5

TEAM WORKING

❖ Introduction

"*It is a carefully designed system of interactions that organizes and induces reciprocal influence among team members.*"

Johnson & Johnson (1998)

This definition dates back to the 1960s, when brothers David and Roger Johnson, two professors at the Minnesota University (United States), began to investigate and reflect on whether individual learning was beneficial for individuals. They were responsible for defining cooperative learning.

Teamwork, then, implies a work that brings together 5 essential elements: positive interdependence, individual responsibility, motor interaction, social skills and group procedure.

We cannot overlook a phrase from Marcos Ordiales, who defines teamwork as *"promoting the development of a relationship between group members that encourages help, equal participation, the individual responsibility of each participant, the processing of the result by the group and the development of interpersonal skills related to encouraging, asking for help, offering explanations, seeking understanding, debating, solving problems or criticizing ideas without criticizing individuals".*

So, without leaving aside individual learning, which is so essential in many educational processes, the emphasis in this module is placed on team learning. Teamwork, contrary to what it may seem, has been in European educational systems for a few years, and we can say that in recent years it has experienced a great visualization and popularity due to the pedagogical changes that have occurred in education in Europe and worldwide.

❖ What is Teamwork?

If we start from a technical definition, Teamwork is a task that is carried out by a group of members who have a common objective.

Teams are created to contribute knowledge, share information, criteria, and to achieve a common goal through the tasks performed by each member. The aim to be achieved when working in a team is to join efforts and skills, maximize these, and reduce the time of execution of tasks.

The greater the understanding and cohesion among all team members, the better results will be obtained with the implementation of their work.

In the words of Olga Manso, early childhood education teacher and co-author of the manual "Cooperar para crecer. El Aprendizaje Cooperativo en infantil", when we talk about Teamwork *"Individuals work together because they need each other to complete the task and reach a common goal"*. Therefore, the goal is not only the end product but the process to make everyone a better learner.

Since the sixties, when Teamwork began to be discussed, it has been studied how this way of learning influences the process of growth and maturation of individuals.

• Characteristics

The main characteristics of Work Teams that really work, in the words of Rosario Peiró (for economipedia.com), are:

- **Share objectives:** all team members must be clear about what teamwork is intended to achieve, so it is essential to clearly define our goals.
- **Willingness to cooperate**: If a member is not clear that cooperation is essential for the success of the teamwork, then there may be problems. Each member must carry out his or her work, and maximize his or her tasks, but must also be aware of the others and show interest in helping them if necessary.
- **Positive visualization of the objectives:** It is necessary to have a positive mind, visualize success and try to achieve it. Different and varied opinions are welcome, but the ideal is to specify a path to be followed by all members of the team and to follow it with a view to achieving the desired success.
- **Fluid communication:** It is important to emphasize this concept since the ability to communicate openly will be indispensable for good performance. Expressing opinions, evaluations, questions, doubts and any type of issue will be welcome for the general welfare.
- **Skill sharing:** This will add value to the work being done. If someone is good at something and another member needs help on it, sharing information and help on it will enhance the value of the team.
- **Recognition among participating members:** Appreciating the work of fellow members is highly motivating, and a reward for continuing to carry out tasks successfully.

- **The leader's example:** A work team can be captained by a leader, but it must always be someone who stimulates, motivates and helps at all times.
- **Enhancing ideas and creativity**: Encouraging the creation of ideas and the implementation of creative techniques is essential and will also help to solve problems that arise during development.

❖ Benefits of its implementation

We should know that teamwork brings benefits to the company in many aspects. Hence, when working efficiently as a team, many variables that affect the company are affected in a very positive way.

These include the following:

- **It creates energetic teams:** when a work team radiates positive energy, teams function much better, with better relationships among its members, where they give the best of themselves. Contributions are richer and members give their best. This methodology teaches each individual person to understand how individual energies must be combined to create great teams.
- **The language used in this methodology is always positive**, so it focuses on the strengths, emphasizing the positive aspects to be improved and potentiating. This means that everything that is discussed is focused on improving the team and bringing the process to a successful conclusion.
- **The potential and strengths, as well as the weaknesses of each individual in the team are made clear**. The characteristics of each individual and what he/she brings to the team are clear. In this way, the creation of balanced teams is appropriate, allows to solve the problems encountered and enhance performance.
- **improves communication and coordination**: language and visual models are an important part of this approach. They make it easier and faster for people to coordinate their efforts directly, solve problems and achieve results.
- **It allows for multiple levels and multiple uses:** it can be used with personal development programs, with both new and established teams, and within management and leadership programs. The conceptual framework, language and visual models provide a set of practical tools with various levels of information and guidance that can be referred to again and again.
- **It provides a very clear and sharp perspective of teamwork** and the advantages of working together to achieve results. Improves the school/work environment by promoting social relationships between individuals and their school/work relationship. This results in increased motivation and commitment, as well as empowerment.

- **The circle of communication is widened, and it flows in all directions**. There will be fewer conflicts of interest, as everyone is pursuing the same objective. There will also be greater acceptance of the decisions made, as there is consensus. Increased understanding of the perspectives of other team members. This methodology creates synergies between students/employees, promoting the development of interpersonal relationships.
- **Multidisciplinary teams make their members feedback a very extensive and diverse knowledge**. Shared knowledge and information management means more learning.
- **Awakens the leadership and soft skills of team members**. It also facilitates the implementation of new ideas. Gives a greater chance to showcase individual strengths.
- **There are more points of view, so there are fewer risks**. Additionally, it provides a sense of security to those people who are more insecure.

❖ Types of Teamwork

When it comes to group learning, as Moncho Terol (2021) comments, "*the terms cooperative and collaborative learning are often used interchangeably. This is not surprising, given that both are methods commonly used in group activities aimed at achieving a common goal. However, there are fundamental differences that must be understood in order to get the most out of them.*

While in collaborative learning individuals organize their efforts among themselves, in cooperative learning they are divided into groups and the mediator assigns specific functions to each member of the group".

Both terms are often confused: cooperative learning and collaborative learning, but there are many differences between them. They also have great similarities, since both are group work methodologies and their objective is to share knowledge.

Broadly speaking, and as explained on the lucaedu.com website, cooperative and collaborative learning are made up of different tasks and activities. Through them, the aim is for each member of the team to discover new knowledge and find the tools to transform it. This is achieved through the construction of conceptual networks created in a small group, where all individuals have active participation. Both terms are part of the constructivist approach.

In both cooperative and collaborative learning, the goal is to encourage the implementation of such knowledge. In addition, of course, to the generation of shared and meaningful learning experiences.

It is safe to say that both types of learning change the idea of teaching and individualistic work. There is no place here for "self-employment" or "self-study", much less for leaving aside one's fellow students or co-workers.

- **Collaborative learning**

One of the universities that has studied this type of methodologies in depth is the Universidad Panamericana, which tells us that:

Collaborative learning is the educational approach that, through groups, seeks to improve learning by working together. Groups of two or more members work together to solve problems, complete tasks or learn new concepts.

This approach actively engages individuals to process and synthesize information and concepts, instead of merely memorizing facts and figures. People work together on projects, where they must collaborate as a group to understand the concepts presented to them.

By defending their positions, formulating ideas, listening to different points of view and articulating their own, individuals will gain a more complete understanding as a group than as individuals.

Collaborative learning can happen among equals or in larger groups. Peer-to-peer learning, or peer instruction, is a type of collaborative learning that involves individuals working in pairs or small groups to discuss concepts or find solutions to different problems.

Much like the idea that two or three heads are better than one, educational researchers have found that, through peer instruction, individuals teach each other to clarify misunderstandings and clear up misconceptions.

Research shows that educational experiences that are active, social, contextual, playful and guided, to some extent, by individuals lead to deeper learning. The benefits of collaborative learning include:

- Development of higher-level thinking, oral communication, self-management and leadership skills.
- Improved interaction between individuals and educational/business institution.
- Increased formative retention, self-esteem and accountability.
- Exposure to understanding diverse perspectives.
- Preparation for real-life social and work situations.

Considerations for applying collaborative learning

- Establish clear expectations for individuals.
- Set ground rules for participation and contribution.
- Plan each stage of group work.
- Carefully explain to individuals how groups or peer discussion will work and how it will be graded.
- Help individuals develop the skills they will need to succeed by applying team-building exercises or introducing self-reflection techniques.
- Assume responsibility (each team member).

- Incorporate self-assessment and peer evaluation so that group members consider their own and each other's contributions.

The most effective learning takes place when individuals actively participate in a project. As we move toward a more collaborative world, the principles and personality traits acquired through education and peer-to-peer engagement have become more important than ever.

A collaborative approach does not mean that everyone will progress at the same speed. It is expected that the brightest individuals will also be inclined to lead the others. And they will benefit from a stronger network of group support and direction.

In a world of work that increasingly thrives on a collaborative culture, the time has come to start applying collaborative learning.

- **Cooperative learning**

As the European University Miguel de Cervantes tells us, cooperative learning is a methodology based on splitting a number of people into small groups for the single purpose of working together in a coordinated way to help each other, adopting a sense of belonging to that group. Learning is not unidirectional but bidirectional. That is to say, it takes into account what individuals think, their concerns and motivations.

Some characteristics of this methodology are:

- Mixed and heterogeneous groups (members of different levels, profiles or specialization are mixed).
- Each member of the group contributes his or her knowledge and applies his or her skills so that everyone can work as a team, helping each other. One will not achieve his or her objective until the rest of the team achieves it.

These are some of the benefits of this methodology for individuals and organizations that engage in it:

- By having the support of the rest of the group, individuals feel more motivated to solve challenges/problems.
- Development of positive attitudes such as commitment and proactivity.
- The quality of the activities is higher than if they were done individually.
- Concepts are mastered more fluently, and this implies the acquisition of more knowledge.
- Social development also benefits the emotional and personal development of the individual.

Cooperative learning methodology

After explaining what cooperative learning is, these are some of the elements on which its methodology is based:

1. Establishment of organized groups

Depending on the space available, small groups are organized and can be classified in this typology: basic groups, made up of 4 people, heterogeneous and permanent; sporadic groups, heterogeneous and homogeneous teams with no limit to the number of people; and expert groups, similar to basic groups, where an individual takes the lead to explain something to the rest of the team.

2. The planning

In every team there must be rules to abide by. In addition, everyone must assume a role (someone who coordinates, who is the spokesperson, who is responsible for the material, etc.).

On the other hand, the team must keep track of the work and when the result is positive, it is time to celebrate the achievement of these objectives. This will undoubtedly serve to make the group stronger.

3. The Group Responsability

In previous sections it was explained that success does not depend on a single member of the team, but on everyone. Here it is necessary a commitment on the part of each one to fulfill the objectives of the group.

4. Interpersonal Skills and dynamics

There is only one way to achieve success and that is to help the partner, with respect. And for this, sometimes it will be necessary to motivate him and solve doubts, in case there are any. The results are achieved thanks to the contribution and effort of everyone.

On the other hand, each member of the team will develop interpersonal skills to communicate with their teammates, organize, resolve conflicts and make decisions.

5. Evaluation and self-evaluation

Individuals will have to jointly analyze what they lack to achieve their objectives and whether the relationship among all is respectful and transparent.

In terms of evaluation, a very practical one is the use of evaluation rubrics. In addition to being used by the school / organization or company, these can be used by the teams to rate their performance.

In order to better understand the differences between these two types of teamwork, you will find the following comparative table:

	COLLABORATIVE LEARNING	**COOPERATIVE LEARNING**
Participation	Analysis and discussion of what has been taught.	It is established by the person in charge of the activity
Tasks and roles	Teaching process and decision making determined by students.	Tasks are assigned to each member of the group by the person in charge.
Use of ICT	Team members are free to choose what and how to use ICT to support learning.	It is the person in charge who decides when it is appropriate to integrate it.

Preparation	Less preparation is required. Members' creativity in structuring the activity is encouraged.	Clearer and more forceful rules and parameters are established.

In the words of Moncho Terol: there is no answer as to which is the best method between cooperative and collaborative learning. It all depends on the learning objectives to be achieved. According to Veldman and Kostons, while cooperative learning is considered more appropriate for foundational knowledge, collaborative learning is considered more appropriate for learning non-foundational higher order knowledge.

In simple words, foundational knowledge is defined as the basic knowledge represented by socially justified beliefs. For example, spelling and grammar. On the other hand, non-foundational knowledge is defined as knowledge obtained through reasoning and critical questioning.

Consequently, the authors state, individuals learn fundamental concepts and improve interpersonal relationships through cooperative learning activities. And, subsequently, they expand their critical thinking through collaborative activities. At the end of the day, cooperative and collaborative learning are excellent methods for group teaching.

- **Team Building**

Team Building is defined as a group dynamic, widely used in the Human Resources Departments of companies. They are dynamics (events and activities outside the office) that allow to take the work team beyond the office, to bring positions closer, to get to know each other better and to create a more dynamic environment among the members. It allows a different relationship to the one that takes place in the office and gives the opportunity for people from the same company to carry out a joint activity that allows them to live new experiences among themselves and relate to their colleagues outside the office.

In recent years it has been seen that this type of dynamics is very important in the organization of a company, being aware that the employees of a company are first and foremost, people. The Team Building aims to get "happy" workers, but at the same time it has an impact on building professionals fulfilled at all personal and experiential levels.

In the words of E^{n} Escuela de Negocios, the advantages, and benefits of Team Building include:

- Improving productivity
- Strengthen team spirit and help in teamwork.
- Increasing empathy among employees
- Helping to achieve business objectives and professional and personal development.
- Increasing motivation and positive attitude
- Promote healthy competitiveness and a desire to excel
- Learning to delegate responsibilities
- Increase resistance to stress
- Increasing the ability to identify strengths and weaknesses and make decisions accordingly
- Reinforce the company's brand image.

E^{n} also gives us examples of activities to promote Team Building.:

Outdoor Teambuilding

- Working with a business coach: coaches are experts in identifying the weaknesses of a team, and through games and different activities, they work on the particularities of the team, encourage communication and the acquisition of responsibilities. They enable participants to experience new experiences, overcome weaknesses as a team and ultimately emerge stronger.
- Outdoor Training: What could be more team-oriented than sport? Outdoor training is aimed at small groups, to perform physical activity through games and exercises while working on leadership, decision-making, teamwork, communication, as well as self-improvement... In addition, numerous studies show that physical contact helps to create emotional bonds with the other person, working side by side, reinforces it. The ideal would be to do it outdoors since the offer is more extensive: fort building, survival activities, orienteering, hiking, even water activities.

- Volunteering: Corporate Social Responsibility is widespread in companies, but normally, the solidarity contribution is made by the company in general or by the managers who participate in different activities. It is important that the ethical commitment that a company makes to an organization extends to its employees. Attending volunteer activities, in which as a group they must help people at risk of exclusion, with disabilities, or more disadvantaged, makes employees improve their communication skills. Here the options are numerous as there are many groups that require help, the best thing to do is to select the one that best identifies with the values of the organization and the one that the organization can best help.

Many leisure and tourism companies, aware of the increase in corporate activities, have incorporated teambuilding among their services: the 'escape room' has become popular in recent years, through the game teams develop logic and have to work together against the clock (something not unlike what sometimes happens in the working day, but here with a playful addition). Another example is the wineries, wine tourism is a booming sector and winery managers have seen in the organizations another client. Their services include wine tastings, going to the grape harvest for a day or activities in the vineyards, among others.

Team Building dynamics within the company

- Retrospective days: team meetings beyond exclusive project or client meetings. At least once a month, bring together the entire team, all departments and general management for a retrospective evaluation of the group's work. Asking yourself, "What are we doing right, what are we doing wrong, what do we need to reinforce," helps to improve communication. It is important that there is a climate of trust between employees and managers so that the former can make proposals and, most importantly, feel listened to.

- Create a space for disconnection: leave a space in the office reserved for employees (other than the kitchen), with a couple of armchairs, a vending machine or coffee machine, a pleasant place where they can go to sit down and disconnect for a few minutes. A meeting place for colleagues. It is not meant as a "waste of time" but as a mental break for employees and a way for them to interact with each other.

- Let birthdays and holidays be celebrated: If the company is small, you can set aside half an hour to celebrate certain dates: a birthday, a promotion, a work success, to get together and share a snack, some sweets, a drink... Marking

those days on the calendar, celebrating good news together helps to be together even in bad times.

As we have seen there are infinite possibilities and methods to work Team Building in your company. It is simply a matter of evaluating which one best suits the needs of the team. With these dynamics you learn to face difficulties, break down barriers and above all to give meaning to the word team.

❖ Working Group Selection Criteria

The Rey Juan Carlos University has written a number of articles on the teamwork methodology, and makes it clear that, in groups of young people, the person responsible for the activity/methodology is the one who deliberately establishes the work teams, so that the distribution of roles and skills and abilities, as well as specialization, is equitable.

When the teams are made up of adults, and in blended or online learning, we tend not to be so firmly attached to this premise, since the work is more autonomous within the teams.

Regarding this, Johnson & Johnson (1999) state that there are three group modalities in cooperative learning:

- **Informal groups** ranging from a few minutes to an hour.
- **Formal groups** for tasks that last from one hour to several weeks
- **Cooperative-based groups** that operate over long periods of time or on a permanent basis.

In online or blended learning, formal groups are usually created, since they are the ones that adjust to the time availability we have. There are two steps that govern the formation of the teams: on the one hand, the creation of the teams, and on the other hand, the number of members.

Creation and dynamization of teams

If we already know the individuals that make up the work teams, we can personally establish the components that will form each team. Otherwise, we can resort to forming the groups randomly, or we can have the individuals themselves create their own teams. Choosing one or the other will depend on what we consider important.

In the scenario where the company's objective is for individuals to become accustomed to working with anyone, regardless of whether they know each other or not, we will choose to create groups randomly. In this case, it is advisable for the practice to have a low-medium conceptual complexity, since the aim is for the individuals to be able to organize the work, contribute the best of themselves and complete the task successfully. If the work is too complicated, it is more likely that they will end up dividing it up, so that they will not be able to enhance their social skills.

On the other hand, if we want individuals to organize themselves, we will give them the freedom to create their own teams. In this case, we must consider one premise, and that is that in the online or blended learning modality there is much more diversity than in face-to-face teaching. By giving them the freedom to create groups, we are giving them a great opportunity to establish their first intergroup relationships.

Having an online space, such as a forum in a virtual classroom, is a good way to make presentations and to detect possible affinities between colleagues. There are several dynamics that are used in the dynamization of face-to-face teams, which can be applied to blended learning. Depending on the formality/informality that we want to adopt, we can opt for one of the following options, for a mixture of both, or for determining the questions to be answered freely.Si queremos otorgar un carácter formal, los individuos comenzarán a presentarse indicando su nombre, lugar de residencia, estudios previos, profesión, etc.

If we also want to add an informal and casual touch, we can ask questions such as favorite food, a childhood memory, the choice of a superpower, etc.

In this way, we are opening up a wide range of possibilities for them to get to know each other and identify with which colleagues they might feel more comfortable working as a team. We can also open a discussion or debate forum in which they can give their opinion, in order to indicate similarities in the way of thinking. In this case, it is advisable to limit the number of words so that it does not become tiresome to read all the contributions. A good limit is the length of a tweet, 140 characters. Once the way in which the teams are to be created has been determined, it is time to establish the number of components.

Team sizes

The size of the teams is determined by the nature of the activity to be carried out and the objectives to be achieved.

Before making the decision, it is important to keep in mind that the smaller the group, the easier it will be to reach agreements, but the less diversity of skills and abilities to share and learn there will be.

It is usually recommended that the number of members should be between two and four, although experience shows that in groups of adults, five people is also optimal. If we work with several teams at the same time, it is advisable that the teams are formed by the same number of people.

Each working group will choose the option with which it feels most comfortable. If we do not have much experience in cooperative learning, it may be preferable to determine a fixed number of members per team, as it provides greater security. As expertise is acquired, different combinations can be tried out.

The group task in Virtual Classroom

We already have the task designed and we have decided what kind of groups we are going to create. But how do we manage it in the virtual classroom? We see it in a series of very simple steps to follow.

- **Creating groups in Moodle**. There is the option to create groups automatically or manually. This will allow them to work together in the virtual space.
- **Check that each team member's profile shows which group he/she belongs to.** This step is important to avoid errors.
- **Add the mailbox for the activity.** In all e-learning platforms there is an option to upload assignments. In this case it will give the option to upload the tasks to the corresponding group.
- **Warn team members that it is sufficient for one member to submit the assignment,** as the program assigns the submission and grading to all components.

Communication channels

The virtual classroom provides us with a very valuable tool, especially when it comes to getting to know the members of the team, since through the forums we read the information, they provide to form the working groups. With the email tool we are in constant contact with them to be in touch with them to be able to notify any circumstance in a general way. Likewise, thanks to the videoconference sessions, we communicate with team members verbally and visually, which greatly facilitates the resolution of doubts and clarification of content.

But there are also other channels for communicating with team members, and also for them to communicate with each other.

If we want to communicate in a more social way, exchanging interesting news, work progress or application resources, a good tool is Facebook or Instagram.

Creating a private group facilitates the exchange of this information, as it is more accessible and direct. In addition, the group can be established for an indefinite period of time, so that successive years can benefit from the publications, materials and information in it.

If the cooperative learning activities are related to current situations, it can be proposed to create or use a Twitter hashtag, and comment on how they are developing their work, or relevant information they find.

Another way to show progress in their activity is through blog entries, for example. WhatsApp groups and Skype videoconferences can also be used to communicate in a direct and effective way.

To exchange and store files, they can turn to platforms such as Dropbox, One Drive or Google Drive.

- **Teams evaluation**

One of the characteristics of CA is that the evaluation must be identical for all team members. This makes sense because in CA all team members work to achieve common success, so the amount of work of each individual cannot be measured.

It is important, as in any evaluation, that the members know in advance what the criteria or items that will guide their evaluation are going to be, since this way they can better focus the task and acquire a complete learning. For this reason, when designing and presenting the activity to the individuals, the evaluation criteria should also be indicated.

Assessment of a group in Moodle is no different from evaluating an individual assignment, the process to follow is the same. In addition, it gives you the possibility to directly apply the same grade to all members. Hence, it is not

necessary for all members to submit the assignment, but only one representative from each team.As well as the evaluation of the activity itself, there are several ways for the team to evaluate themselves and their teammates, in terms of the development of the task. This aspect is important when we apply CA in online or blended actions, since we are not present while the team members develop the work, and therefore, we cannot know to what extent each individual contributes.

The following are some of the social skills that are valued when conducting CA practices: active listening, respect, humor, leadership, help and collaboration, and empathy. At the end of the activity, each team can be asked to submit an evaluation table, similar to the one in the figure, showing whether the contribution of each team member has helped the team to function well.

❖ Conclusion

Working actively with other people in the same environment is one of the methodologies that are naturally created from the synergies of the relationship with others. It is inevitable to coexist in an entity or company without ever having formed a work team with the people living together: for decision making, for the accomplishment of a task, for the resolution of problems?

Therefore, this methodology comes naturally to all human entities made up of interacting individuals. Knowing how to interpret them, work them consciously and develop different capabilities and skills through their implementation, becomes an essential task for the good work of the entities in their daily life.

The capacity for teamwork and the harmonization of work groups in a company is one of the fundamental skills for the benefit of the organizational culture of an entity, whatever its nature. From here are born communication skills, empathy, mutual respect, positive leadership, and quality in decision making.

❖ Final Assessment task

Title of the activity	**The ferryman**
Aim of the activity	– Developing decision making – Developing empathy – Reaching group agreements – Developing creativity – Fostering group feeling – Respecting other people's opinions
Material required	Internet access
Time required	45 minutes
Format	Face-to-face, blended, online
Description of the activity	The dynamics will be carried out in 2 phases: 1st phase: we present the situation in which we find ourselves. The participants are judges of the case, and therefore, they must write down all the necessary information to be able to make a decision to the dilemma that is presented. The situation is as follows: *"A young wife, little attended by a husband too busy with his business, allows herself to be seduced and goes to spend the night at her lover's house, located on the other side of the river.* *At dawn the next day, to return home before the return of her husband, who was on a trip, she has to cross a small bridge, but a madman, making threatening gestures, blocks her way. She runs to a man who is a boatman, she gets in, but the boatman asks her for the money for the ticket. The*

	poor woman has nothing and no matter how much she begs and pleads, the boatman refuses to pass her unless she pays in advance. *So she returns to her lover's house and asks him for money, but he refuses without further explanation.* *At once, she remembers that a friend lives on the same shore and goes to visit him. He has a platonic love for her, even though she has never reciprocated. She tells him everything and asks him for the money, but he also refuses: she has let him down by such light behavior.* *She tries again to go to the ferryman, but in vain. Then, in desperation, she decides to cross the bridge. The madman kills her."* The question to be answered by each of the participants (it can also be done in groups) is: Of the six characters (wife, husband, lover, madman, ferryman, friend) which one do you consider to be most to blame for the woman's death? If you work individually, you will have to come up with a common answer among all the participants. If you work in teams, you will have to reach an agreement in each of the teams. The second phase will consist of the following exercise: Each participant will have a role (wife, husband, lover, madman, boatman, friend). If we have more than one participant with the same role, they will form a group. We will try to make sure that the participant's role is the character that he/she believes to be the most guilty.

	Each participant (or group) will have to defend his innocence and, as before, come back to an agreement among all to declare the guilty. We will see if the answer is the same as in the first phase or different.

❖ Further reading and resources

Book	Agarwal, R. (2003) *Teamwork in the netcentric organization,* *in* International Handbook of Organizational Teamwork and Cooperative Working (eds M.A. West, D. Tjosvold and K.G. Smith), John Wiley & Sons, Ltd, Chichester, pp. 443–462.
Web Side	¿Qué es el aprendizaje colaborativo y cuáles son sus beneficios? Universidad Panamericana: up.edu.mx https://blog.up.edu.mx/prepaup/femenil/que-es-el-aprendizaje-colaborativo-y-cuales-son-sus-beneficios

MODULE 6

TIME MANAGEMENT

❖ Introduction

It is for this reason that it is essential to have a clear vision of all the tasks that we are going to have to perform in each period of time. We must set objectives and goals, in the short-medium-long term, establishing priorities. And to do this, to establish priorities, implies that, personally and as a group, we must make decisions, make a fundamental choice in your day-to-day work, which will mark your efficiency and professionalism.

Some people will make to-do lists, others will have task prioritization tools. Others will prefer to cover everything in the minimum time possible, others will organize tasks in an agenda, ... and, as if that were not enough, among all the work to be done, we cannot forget something that is difficult to maintain over time: delegating tasks.

As we can see, all the aspects mentioned above interfere in something fundamental in our daily personal, educational, and work life: productivity.

Time Management is a tool for productivity, even if a priori it is a complex challenge. It becomes a universal rule, applicable at all educational and work levels, fundamental for life management in general. And this, after all, is where good time management comes into play.

❖ What is Time Management?

As Telefónica, one of the large companies that are committed to time management as the basis for their business organization, tells us: Lean Time Management -or Lean Management- is nothing more than eliminating the tasks that cause the greatest loss of time and effort along with those that do not generate value for the company to focus on those that do.

Also known as "lean management", it is based on the Just in Time (JIT) system and its main objective is to increase value and decrease effort. This work methodology can be applied within any company, regardless of the sector in which it operates.

The idea that must be internalized is that working better is not the same as working longer, but focusing on the tasks that are more productive for the company and eliminating those that generate a greater waste of time and to which a great effort is devoted. In this way, productivity is increased in the worker's work routine.

Despite what many may think, it is not necessary a radical change to implement it. If you think about what really takes you the most time in your work, you will probably realize that they are small and very repetitive tasks that if you eliminate them will not mean a big change in your routine, but they will save you a lot of time. The difficulty of implementing this model lies in overcoming inertia that the worker has strongly rooted in his routine.

But which actions take up the most time and generate the most effort? Let's see, below, which actions take up the most time (ordered from most to least):

- Reading and answering e-mails.
- Face-to-face meetings or phone calls.
- Surfing the Internet.

- Traveling.
- Dealing with and solving technology-related problems.

Looking at the tasks to which you spend the most time, it would be advisable that the first activity of the day is to differentiate the urgent from the important. Normally, the first thing you do when you get to the office is to go through your inbox and answer emails. If you detect a dissatisfied customer or identify a problem, you quickly put everything you had planned for that day on the back burner to give priority to resolving the issue (colloquially known as "putting out fires"). Therein lies part of the problem, in the fact of not knowing how to identify what really requires immediate intervention because it is important, from what is not so important, but still needs your attention.

Another key point to keep in mind is that the natural tendency is always to start with the least complex activities, those that you consider smaller and take less time; when the advisable thing to do is precisely the opposite, to start with the most important tasks since, with total certainty, they will be the ones that provide the greatest value to the organization.

With regard to meetings, very often meetings are held, either in person or via phone calls, which are not necessary to deal with issues that could be handled in an alternative and much more efficient way (e.g. by email).

Just to give you a fact about this, it is estimated that in the USA one third of meetings are unproductive and that they generate losses of 37 billion euros per year for companies. This is also a way of wasting money, although at first glance it is not so easy to identify. Keep in mind that the time you spend attending a meeting or answering a call could be spent on something else that would bring much more value to the organization.

❖ Benefits of its implementation

Although we could mention countless advantages of implementing this methodology, Sodexo cites some of the most important ones, which could be

- *Being more productive and efficient:* proper time management allows us to achieve more with less effort. When we learn to manage our own time, our ability to concentrate improves. And greater focus generates greater efficiency. Managing time allows us to accomplish tasks more quickly and to make the workday more effective and better utilized.
- *Achieve goals in less time:* we all need to achieve different objectives to feel satisfied at work, but without understanding the importance of time management, these objectives could remain on hold indefinitely. The time we need to accomplish daily challenges and tasks already exists; we just need to know how to manage it properly to achieve our daily challenges in an agile and efficient way.

- *Gain an enhanced professional reputation:* time management is the key to success, as it allows us to become aware of our life and take control of it, instead of following the flow of others'. Time management helps us to advance in our profession through the most sensible decisions and with a vision focused on what we really want to achieve in our professional development.
- *Suffer less stress:* if we do not manage our time, it is easy to end up feeling overwhelmed, pressured, scattered and lacking in concentration. When that happens, it can be difficult to determine how long it will take to complete a task. Once we learn to manage our time, stress and anxiety levels decrease significantly at work and we feel more energized to tackle our daily tasks. An efficient workflow will allow us to develop new skills to perform our work efficiently.
- *Improve decision making ability:* Proper time management is related to the ability to make better decisions. When you are pressed for time and must make a decision, you are more likely to jump to conclusions without considering all options. Through effective time management, it is possible to eliminate the pressure of feeling that you do not have enough time and, from calmness, to properly weigh each option before you.
- *Increase self-confidence:* time management improves self-confidence. Seeing that we meet our daily projects, goals and tasks gives us satisfaction. Seeing that we meet deadlines and exceed expectations is a highly motivating factor. Conversely, not doing so and fighting against time to keep up leads to burnout.
- *Avoid procrastination:* Self-discipline is a very valuable skill in the work environment. If we manage our time properly, we leave no room for procrastination of tasks and responsibilities. The better we manage our time, the more self-discipline we will have and the easier it will be to achieve our goals.

- *Improved quality of life:* After considering the amount of time we spend sleeping, working, eating, going to work and taking care of personal hygiene, there are approximately four hours a day left to devote to the things we do for pleasure. Proper time management will allow us to have more opportunities to enjoy our hobbies, play sports, spend time with family or get together with friends. This quality time is priceless and very important for our physical and emotional well-being. Everyone needs time to relax, enjoy and rest. Good time management skills help us to find those moments of relaxation.

❖ How can this methodology be implemented?

Time is the most important resource we have and hence the importance of proper management to generate the greatest possible value for the company. Lean Management, following what Telefónica tells us in its methodological development of this method, identifies 4 basic processes to make a more optimal management of time:

- **Identify the tasks that consume the most time and do not generate value.** Often, we don't question how the work is done, we just do it, assuming that this is the best way to tackle it. It is good to take perspective and analyze whether there are better solutions that require fewer resources.
- **Eliminate them.** All those personal actions or procedural steps that involve a waste of time, money or effort, i.e., that do not add value. We must exclude them.
- **Check results and practice adjustments.** Testing, collecting data on the performance of the changes and looking for continuous improvements is basic.
- **Continuing to measure** and adjust is the only way to achieve excellence.

On the other hand, you have to take into consideration the two main actors involved in this management process, which are: customers and employees. In the first place, in order to identify what brings value to the company and what does not, you must think about customer

The customer considers that the company is providing value when they perceive that the quality of the services it provides is high in comparison with their cost. For this reason, you must always keep in mind what the customer wants and the quickest and cheapest way to provide it.

On the other hand, workers must be involved in the Lean Time Management process. The person who has more capacity to improve a process is, without a doubt, the one who carries it out. At the same time, workers are freed up to perform tasks of greater value to the company, i.e., they manage their working day better.

Lean Time Management is a work methodology that, once implemented, never comes to an end. You always have to be working to improve the resources that are allocated to perform daily work and thus achieve excellence. In short, any task that saves time and effort will benefit the organization and, in short, this is the basis of this method, which is becoming increasingly fashionable in companies.

❖ Time Management Principles

The Lean Management system establishes four basic stages for **time optimization:**

1. **Identify activities that consume resources and do not add value:** when making changes, the first step is always to review, at a personal level, the actions we routinely perform and, at an organizational level, each step of all the established processes. Often, we don't question how the work is done, we just do it, taking for granted that this is the best way to tackle it. It's good to get perspective.
2. **Eliminate them:** after this analysis, we will certainly detect personal actions or procedural steps that involve a waste of time (unnecessary steps, duplication of work, errors...), money or effort, i.e. that do not add value. We must systematically exclude them from all our practices.
3. **Check results and make adjustments:** after detecting the actions that do not add value and eliminating them, we must monitor the results and establish comparisons with respect to the initial stage. Sometimes, what should work well does not work well; it cannot be assumed that an improvement works simply because theoretically it should. Testing, collecting data on the performance of the changes and seeking continuous improvement is essential.
4. **Measure and adjust periodically:** the only way to continuously improve is to repeat the first three steps systematically and regularly to readjust processes "just in time" (which we could translate non-literally as "adapted to the moment"). The environment is changing, which requires processes to adapt quickly to these changes and to be continuously readjusted.

In the lean methodology or "lean management" process, two key players are key: customers and employees. On the one hand, to discern what adds value to the company and what does not, the customer must be kept in mind. Value creation

occurs when the quality of the services received by consumers is perceived as high in comparison with their cost. What do customers want? How can we offer them better, faster, cheaper?

On the other hand, people must be empowered to become involved in the Lean Methodology process. The best person to improve a process is the person who carries it out. At the same time, improving processes frees up time for workers to take on higher value work.

Continuous improvement is, like excellence, the philosophy that must guide our daily work, not a goal in itself. Therefore, Lean methodology is a method that, once implemented, must always be in force, it has no end.

Peter Drucker, in his book "The Effective Executive" summarizes some of the best recommendations for becoming a time management expert. Among those that produce the greatest benefits are:

1. Dedicate time to planning and organization: this is the best investment in time that can be made and the main pillar of time management. To carry out a good plan, it is necessary to focus on preferences and responsibilities, analyzing each task to be done and assessing its degree of urgency and importance. In this way, you can try to find out the value that its achievement holds and the consequences that its results can produce. For greater effectiveness, each person must organize in his or her own way and not following an imposed system.

2. **Set goals:** in other words, set specific, measurable, realistic and achievable objectives. These goals give a sense of direction and, at the same time, serve as a motivating factor.

3. **Prioritize:** based on the 80 - 20 rule, which states that 80 percent of the reward comes from 20 percent of the effort. The trick to prioritizing is to isolate and identify that valuable 20 percent and once identified, prioritize the time to concentrate your effort on those elements, as they bring the most value.

4. **Create to-do lists**: and combine it with a calendar or schedule to gain control.

5**. Ser flexible:** planificar un porcentaje de tiempo extra que se pueda dedicar a emergencias, interrupciones e incluso distracciones, de esta forma se pueden resolver los asuntos inesperados a su debido momento y sin que afecten a la planificación.

6. **Take into account biorhythms when planning:** time management cannot be generalized since the individual factor and subjectivity are involved in its essence. For this reason, each person, when planning his or her daily schedule, will have to distribute tasks according to self-knowledge that allows him or her to discern the best time to carry out tasks that require great concentration or the time that will be used for more systematic and routine activities. Knowing when the best time is and planning to use that time of day to carry out priority tasks is effective time management.

7. **Learn to delegate:** to optimize time management, eliminate trivial tasks or tasks that do not have any long-term consequences.

8. **Evitar el perfeccionismo**: en algunas culturas orientales se considera que tan solo los dioses son capaces de producir algo perfecto. En el ámbito laboral no se deben cometer errores a propósito para "no ofender a los dioses tratando de crear algo perfecto" pero sí que es interesante el no prestar tanta atención a los detalles innecesarios, ya que este tipo de actitudes constituyen una forma de dilación.

9. **Divide tasks:** to carry out this recommendation of **good time management**, the "Swiss cheese" method, described by Alan Lakein, can be put into practice. This way of approaching tasks consists of dividing each activity into several smaller ones that help to avoid procrastination. If it is not possible to divide the task, its execution can be approached in limited time intervals, after each of which a break can be taken or a change of activity can be made.

10**. Reward yourself**: always celebrate the achievement of your goals, even when they are small successes. In this way, the necessary balance is maintained, and creativity is increased, multiplying the effectiveness of time management.


EFFICIENCY
GOALS
PROJECT
EXERCISING
TOOLS
PRODUCTIVITY
SCHEDULING
SCOPE
TIME
MANAGE
SPECIFIC
PROCESS
MANAGEMENT
SYSTEM
PLANNING
ACTIVITIES
ACCOMPLISHING
CONSCIOUS
SKILLS
TASKS
TECHNIQUES
PRIORITIES
METHOD
CONTROL
EFFECTIVENESS

❖ Conclusion

Time management and organisation of time is conducive to productivity in a company and in our own personal lives. In this way we can have conscious control of our time management and the delegation of tasks.

The 24 hours in a day can be made more productive if the ability to manage them is actively and consciously worked on, managing priorities. This is an important task, as it improves productivity and enhances the quality of personal life.

The fact that the day does not control you, and therefore you are the one who controls what you do 24 hours a day, will make you feel much better, be much more productive and increase your motivation. The activity you do, in a structured and organised way, will multiply significantly.

We must be aware that we cannot buy time and that, obviously, we will never have all the time we want to do everything we want to do. That is why this module is so fundamental, because there is nothing more important for an entrepreneur, worker and/or individual in his personal life than to manage his time well.

❖ Final Assessment task

Title of the activity	**Multiplying time**
Aim of the activity	Recognising the use of the working day Improving productivity Developing time management skills Improving work schedule management Differentiate urgent, important, unimportant, unimportant, not important at all Recognising one's own productivity stages
Material required	Calendar and pencil
Time required	1 hour
Format	Face-to-face, blended and online
Description of the activity	Each participant will be given 3 sheets of paper, each sheet will have 24 squares in reference to the 24 hours of the day. On the first page the participant should fill in the routine activities of their day. On the second page, he/she will collect everything he/she does during the non-productive time at work. On the third page, after adding the information from the two previous pages, you will see the space left empty. This will be the productive time. In this first moment, we will be able to analyse this information, to make a list where we indicate what can be reduced or eliminated to increase the productive time. We will create a much more productive daily agenda for our work.

	In a second moment, in the proposed calendar, we will indicate in each hour of the day the level of energy in which we are. We will put a score from 1 to 10. Based on this information, we will redo our calendar again, trying to adjust our moments of greater energy to the activities that require it, thus making better use of our time.

❖ Further reading and resources

Web Side	Julia Martins (2022). *18 consejos, estrategias y soluciones rápidas de gestión del tiempo para lograr trabajos excelentes.* https://asana.com/es/resources/time-management-tips
Book	Manzini, Marc (2003). *Time Management*. Ed. McGraw-Hill.

MODULE 7

INNOVATION AND CREATIVITY

❖ Introduction

The first step for an entrepreneur is to have a new, different, and creative idea. Something that is not yet created in the market, or if it already exists has a differentiating and unique feature. We think of something that the customer needs but that the market does not offer yet. For a company to be born, this first idea is needed.

As we can see, therefore, two important aspects are needed in this creation phase: innovation and creativity. Without both aspects, the new company would not be generated.

While creativity is the skill that needs the mental process, innovation is the implementation of creativity, i.e., the productive process.

Creativity and innovation are the first competitive window of a company, and therefore it is an added value to it that is essential to consider in the processes of products or services.

All company employees and entrepreneurs must work on the skills of the future: creativity and innovation. Today it is already a quality to succeed in the business world. In our brain we have the keys to the creative secret, so let's develop it.

The company that bets on these values will grow exponentially and the one that does not give importance to them will have an unpromising future.

❖ What is creativity and why is it necessary?

Although there are several authors with different definitions, we can define Creativity as the ability to produce something new. Through creativity we create something new that results in something original. Creativity is really a fundamental characteristic for any professional.

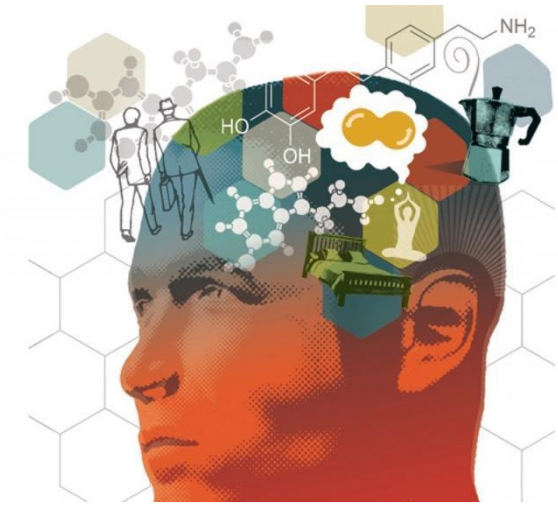
According to Hernandez, (1999) "the set of aptitudes linked to the personality of the human being that allow him, from a previous information, and by means of a series of internal processes (cognitive), in which this information is transformed, the solution of problems with originality and efficiency".

Creativity basically consists of establishing new connections between existing ideas. But for this type of connections to occur, there must be certain dynamics related to creative thinking.

If we move into the business field, we can define it as the ability to generate ideas and design new products/services to achieve the objectives on which we are working.

Several techniques can be used to develop creativity. These are presented below:

- Brainstorming
- Verbal checklist
- Image stimulation
- Mental mapping



❖ What is innovation and why is it necessary?

The RAE (Royal Spanish Academy) defines innovation as "the creation or modification of a product, and its introduction to a market". Innovation implies applying new ideas, new products or concepts, generating new services with the intention of making them more useful and increasing productivity.

If we define innovation in business innovation, we can define it as the creation or modification of business models, processes, organization, products, or marketing to make a product/service more efficient and achieve a better position in the market.

Being innovative is one of the most sought-after qualities in the CVs of workers since it is a highly valued quality.

To be more innovative you must:

- Be more observant.

- Be up to date in the field of interest.
- Be in continuous movement, look for alternative options.
- Look at problems from a more global perspective, with distance, it will help to find more options.
- Be a very curious person for everything, ask and inquire, look for information, etc.
- Not to be afraid of new things and to think more freely.

❖ Creative and innovative methodologies that it is important to be aware of

Creativity and innovation are two very important and valued aspects in people within a company, as well as in other fundamental areas of daily life.

We have developed several innovative and creative methodologies to promote and work on entrepreneurship such as:

- Problem Based Learning (PBL)
- Desing Thinking
- Team Working
- Time Management

- Lean Startup

But we can mention many others, which we can take into account in this field of work, such as:

1. **Blue Ocean Strategy by W. Chan Kim and Renée Maubpurgne**

   It is a methodology to innovate, to identify and develop innovation strategies. It arises from the doctoral thesis of its authors and encourages us to look for a pure blue ocean, where no one else exists. This will surely be the place where a great, new, virgin business opportunity can be found.

   The 4 basic principles of this strategy are:

   - Create new creative consumer spaces.
   - Focus on the idea and not on the numbers.
   - Go beyond existing demand, trying to maximize the Blue Ocean
   - Ensure the viability of the proposal and the model, in order to minimize risks and maximize opportunities and benefits.

   This methodology invites us to forget about the competition that sails with us in the Red Ocean, and to look for new business niches in an unexplored Blue Ocean.

2. Forth Innovation Method por Gijs van Wulfen

Forth are the letters of the 5 words that make up the method: Full steam ahead, Observe & learn, Raise ideas, Test ideas and Homecoming.

Gijs van Wulfen, a reference in innovation and influencer, came up with this methodology to innovate in the company, which consists of minimizing the difficulties that companies encounter when they start to innovate.

It combines Design Thinking, the real world of business and creativity.

It lasts 20 weeks and consists of 5 stages:

- **Full steam ahead:** Build a committed team, map out an innovation focus and identify promising opportunities.
- **Observe and learn**: Explore trends, past opportunities, technology and customer feedback. Choosing the most promising opportunities and customer insights.
- **Raise Ideas:** After generating hundreds of ideas and further narrowing them down to about thirty ideas, twelve new innovative product, service or business model concepts are developed in a two-day session. Subsequently, work is done on these concepts to concretize them.
- **Test ideas:** Contrasting the concepts through qualitative research with a target group to improve them. Selection of the 3-5 best ones to be developed as cases in the next phase.

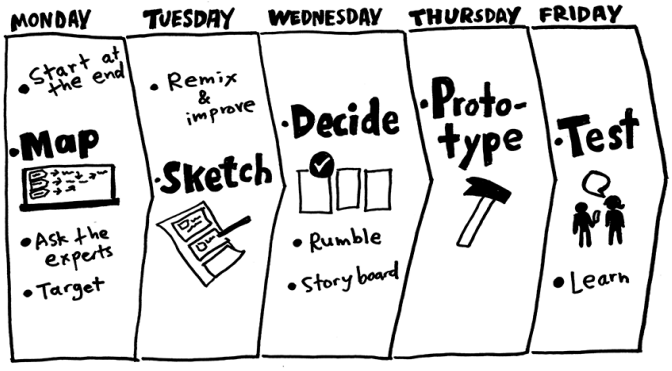
- **Homecoming**: Work the 3-5 best new concepts as new projects. Develop a mini business plan for each concept. Present to management for decision making for future development in their innovation process.

(Sdli. Innovation Society)

3. Design Sprint

It is a methodology developed by Google to evaluate solutions or prototypes with users. It is a format that allows this process to be done very quickly and with very little cost, being able to have as much feedbacks as possible.

It was created by Jake Knapp, John Zeratsky and Braden Kowitz and has a duration of 5 days, where it follows the following phases:



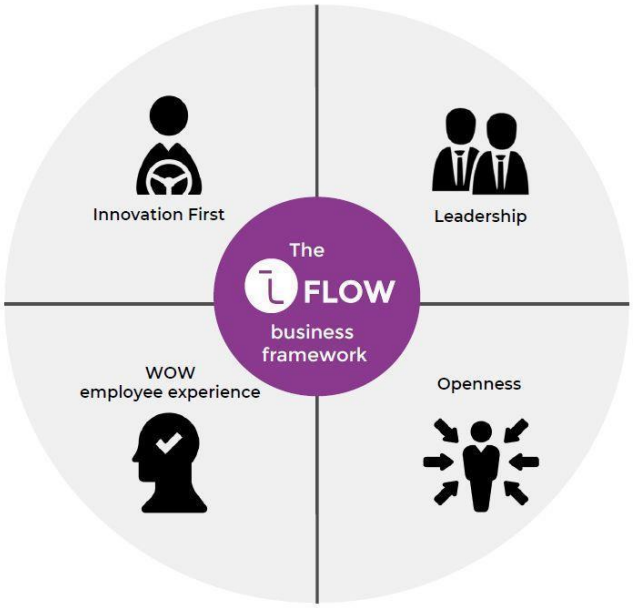
The Design Sprint methodology is used by companies such as Airbnb, Netflix, Lego... to innovate better and faster.

4. I-Flow Framework

We find it very interesting to quote here the article in Society of Innovation, by Joan Ras, Economist, with a Master in Applied Economics from the UPF, which develops this method:

Joan Ras understands SDLI's iFlow method as the answer to a VUCA world. This is a concept created by the American Ministry of Defense that describes the environment in which we have to play, i.e. a Volatile, Uncertainty, Complexity and Ambiguity world. Thus, it tells us that the VUCA world places us in an environment of permanent crisis. He reminds us that the word crisis has its Greek origin in "change", being this change permanent and in constant acceleration.

Joan therefore emphasizes that organizations must be prepared to live in a world that is more VUCA than ever and have the ability to adapt quickly to change. What is needed is a flexible organization, capable of dealing with change.



Organizations must be clear that innovation must be a priority and therefore will be the tool for change. Four scales are worked out to put innovation at the center of the business model:

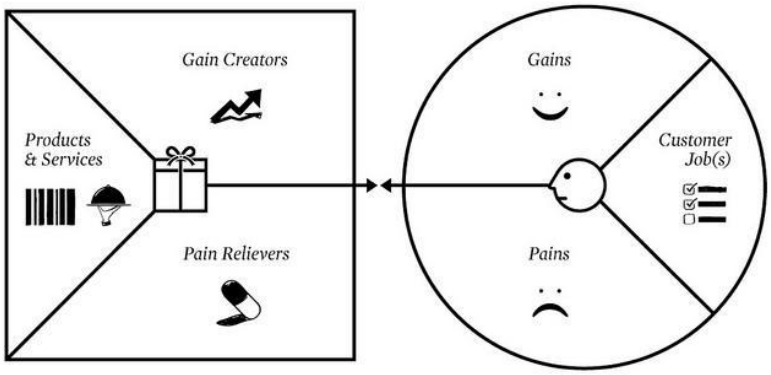
- Agility in the face of change
- Participative innovation, where the employee and the client are the center of attention.
- Experimentation capacity, betting on risk culture.
- Innovative commitment

❖ Tools to apply in the innovation process

Continuing with the articles developed by sdli Innovation Society, we can cite some of the tools that will be very useful to apply during the innovation and creativity process:

1. **Pains & Gains:**

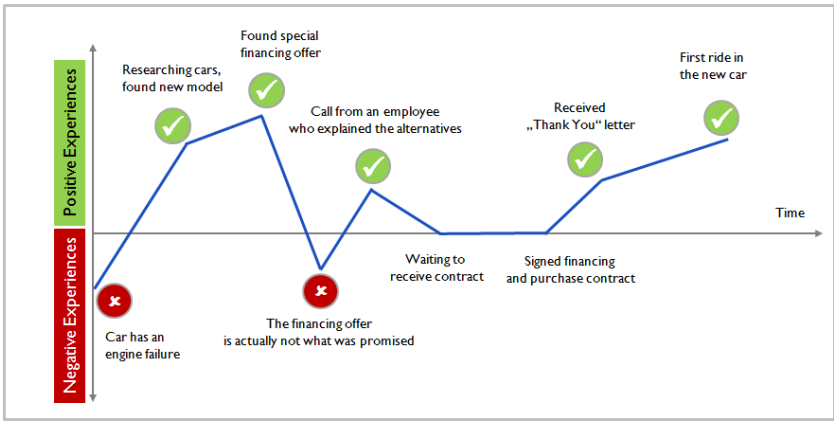
   It is a customer analysis technique developed by innovation consultant Alex Osterwalder. It serves as a preliminary step to work on the Business Model Canvas. It studies the type of customer we are targeting and allows us to subsequently develop a value proposition tailored to their needs.



2. **Customer Journey Map**

   Ignasi Clos defines this tool as "a zoom in of the Pains & Gains", in particular of the "Tasks" section. The tasks are placed chronologically on a map, and thus it is possible to visualize the strengths and weaknesses of the current solutions to the problem to be solved:

Customer Journey Example: Car Purchase



The idea is to put the tasks in chronological form, and to identify in a more visual way what are the positive and negative points of your process.

3. **The 5 why's:**

It allows to find the origin of the customer's need or problem. The cause of the problem. If the cause is solved, the problem is solved.

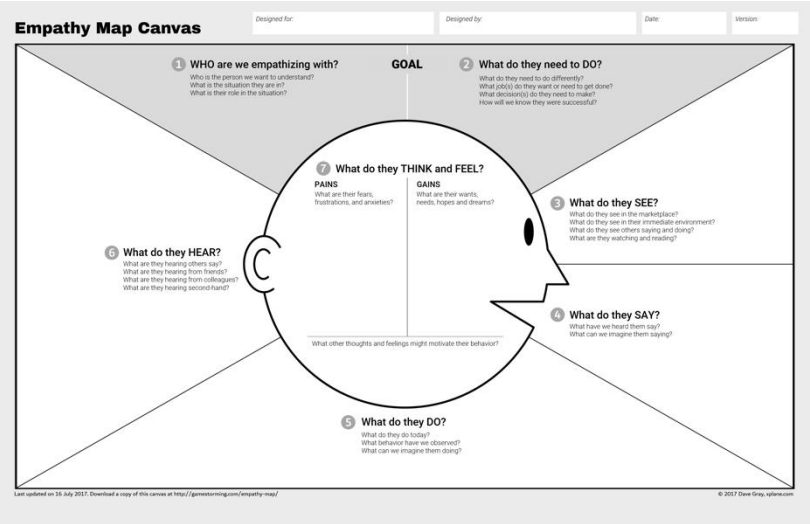
You can see the following example provided by Toyota of the benefit derived from the use of this simple tool in one of its factories:

1. **"Why did the robot stop?"**
   The circuit has overloaded, causing a fuse to blow.
2. **"Why is the circuit overloaded?"**
   There was insufficient lubrication on the bearings, so they locked up.
3. **"Why was there insufficient lubrication on the bearings?"**
   The oil pump on the robot is not circulating sufficient oil.
4. **"Why is the pump not circulating sufficient oil?"**
   The pump intake is clogged with metal shavings.
5. **"Why is the intake clogged with metal shavings?"**
   Because there is no filter on the pump.

Xavier Olba comments on other very interesting ones:

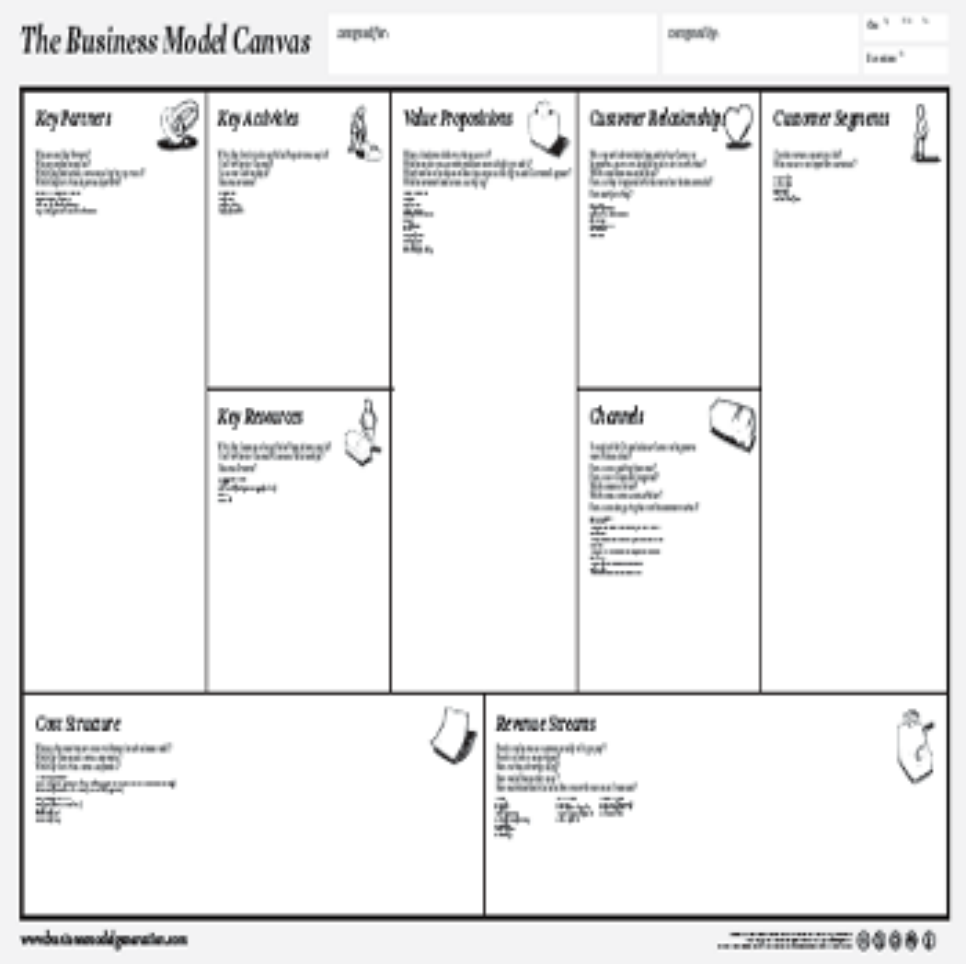
4. Empathy Map:

This tool is used to define a target customer profile and try to find out what he/she is like, what he/she thinks, what he/she says, what he/she looks at or listens to about the subject that links him/her to the company. It goes deeper into the target customer, and it will be possible to determine the needs that are not covered, the obstacles and turn these into challenges to solve them.



5. The Business Model Canvas

A well-known model today, it is essential when thinking about future business creation. It can also be used to evaluate how the value proposition is created, captured, and offered to the customer. Through this tool, the value chain should be analyzed at each stage, from the proposal, the revenue channels, the strengths, and weaknesses:



6. WeCubbing

This is a co-creation tool to innovate with customers. As Clàudia Pardo tells us, “Having the opportunity to count on the collaboration of external talent to identify and solve market challenges is an increasingly widespread practice. The joint creation of market solutions between internal collaborators and external agents increases the probability of success in the implementation of innovative solutions".Se trata de un Programa de aproximadamente 40 horas durante las cuales los equipos multidisciplinary teams (composed of internal and external professionals with diverse profiles, including experts, engineers or economists), through innovation methodologies (based on *design thinking*), are trained and

qualified to develop new projects that respond to the challenges they face in their professional practice.

The program covers 6 phases that are fundamental to the development of these innovative solutions:

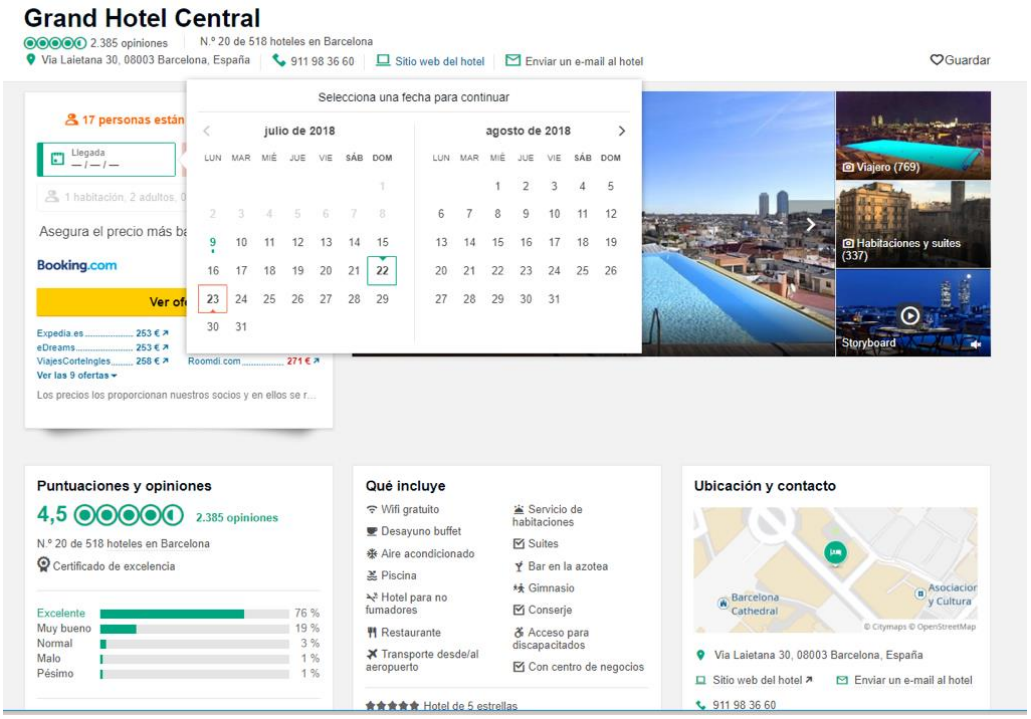
- First, **the challenge or opportunity** to be solved is identified.
- In the second phase, the **challenge is reformulated and understood in all its areas**. It is not possible to have creative and disruptive ideas without having all the information about the challenge to be solved. As Albert Einstein said, "*If I had one hour to solve a problem, I would spend 55 minutes to understand the problem and I would surely solve it in 5 minutes*".
- La The third phase is that of **creativity.** It is about implementing the art of having ideas, i.e., through multiple methodologies we try to have as many ideas as possible to solve the challenge. At the end of this phase, we must select the idea/s that provide the most value (those that provide the most benefits, are viable, allow us to differentiate ourselves from the competition and make the target users fall in love with them).
- The fourth phase is the **prototyping** phase. Here we must transform the selected idea/s into a product/service as real as possible in order to validate it with users.
- The fifth phase, **define** the *business case* **for the project**. That is, we make the key decisions to see how we can ensure that our solution is adopted by the market.
- In the sixth phase, we work on **the project's communication plan** (a fundamental element for its success). We believe in the motto "Without good communication, we will hardly reach our *target*". For this, we not only work on the content of the presentation but also on the form and staging, with the aim of making a clear and efficient communication so that it can be bought by our company, investors, or the market itself.

Co-creation examples:

- *Munich's MyWay,* the Catalan company allows users to design their own footwear.

- *LegoCreator by Lego* launches design contests for its customers to develop new Lego prototypes and, the most voted by the rest of the users, Lego produces and markets them.

TripAdvisor has become one of the main sources of information to select the hotel where to spend the vacations. To develop content, the platform uses co-creation between the hotel and the users who have stayed and share their experience.



❖ Success stories

EAE Business School tells us about several examples of successful companies through Innovation and Creativity:

1. IKEA: the customer first and foremost

Since its beginnings, IKEA, one of Europe's leading retailers, has been committed to the shopping experience in its department stores and has always been very clear that the road to success goes through where its customers are. IKEA Ibérica's deputy general manager, Gonzalo Antoñanzas, says that "past successes do not guarantee future successes", so "it is necessary to innovate and try to get closer and closer to the customer".

IKEA is based on a cocktail that consists of "people + values + innovation", always trying to create a better everyday life for the majority of people. In this sense, the digital environment has changed the way we consume. "Now, people have stopped buying products. They want to buy brands, they need to know what is behind each company," explains Antoñazas.

In this sense, IKEA has always set itself the goal of making customers fall in love, allowing them to make their dreams come true. At all stages of their lives, from when they move out on their own, start a life as a couple, when they have children, or when they are on their own again.

2. Starbucks, the brand everyone loves

The company has become one of the examples that everyone looks to when they want to become a successful company, but what are the keys to Starbucks' success? Undoubtedly, it is its brand values, which they take care of in every detail. In fact, Starbucks takes care of everything: from the way the baristas serve the customers to the exact pressure of the coffee machine.

In addition, all the coffee shops are located in the "VIP" areas of the cities and in the busiest areas. The aroma of coffee permeates beyond the doors of the premises, attracting passers-by. Even their cups are fundamental for customers, who have turned them into an almost cult element. For all these reasons, Starbucks has become a lovemark and consumers feel it as their own.

2. INDITEX, the revolution of the classical

Inditex's evolution corroborates what the Spanish group has been able to do during all these years: revolutionize one of the most traditional sectors of activity in the economy, the textile sector. The paradigm of the Galician company thus breaks with a widespread and totally erroneous conviction that tends to make innovation coincide only with the generation of new services in themselves.

Inditex is an example of innovation through procedures, although, as in most cases, the company combines innovative proposals at different levels.

Alberto Gimeno, professor in the Department of Strategy and General Management at Esade, says that "it is common to confuse innovation with R&D" but, in reality, "it is more related to heuristics: to thinking about the world in a different way". In other words, "it has to do with taking advantage of opportunities, available technology and talent".

❖ Conclusion

Several authors and examples of very successful companies make clear the importance of continuous innovation in companies. This innovation, as we have seen, does not occur if there is no prior creative process on the part of the members of a team.

For all these reasons, different concepts should be brought together:

- Teamwork

- Entrepreneurship

- Creativity

- Innovation

- Idea

- Risk

All these words will resonate in the ears of those people who have started a business without being clear about what they were really doing, without assuring their success and risking their investment to a great extent.
The School of Entrepreneurship endorses the phrase: "he who does not risk, does not win", but clearly indicates that he who risks, must always risk with a plan and a market strategy, seasoned by the "different" and "groundbreaking" idea, the new thing that comes to the market, what everyone wants. That will be the secret of a company's success.

❖ Final Assessment task

Title of the activity	**The synesthesia game**
Aim of the activity	— Developing creativity within the company — Develop divergent thinking — To work on the expression of emotions — Improve communication skills, by different ways — Evaluate the ability to express oneself
Material required	Minimum of 5 participants.
Time required	45 minutes
Format	Semi-presential and face-to-face.
Description of the activity	The first thing we will do is to present to the participants (or they will choose among themselves) a topic that is a matter of concern in the organization/company/school (it will depend on the characteristics of the individuals and/or the group). Among the issues of concern may be: the distribution of tasks, the lack of punctuality of workers/students, the unbearable amount of work, the lack of time to reconcile .... The players are divided into 5 or 5 groups. Each individual or group is randomly assigned one of the 5 senses: sight, hearing, taste, smell and touch. Each group is given 2-3 minutes to interpret the topic from their sense. Each group should describe how they perceive it (for example: the interface tastes orange).

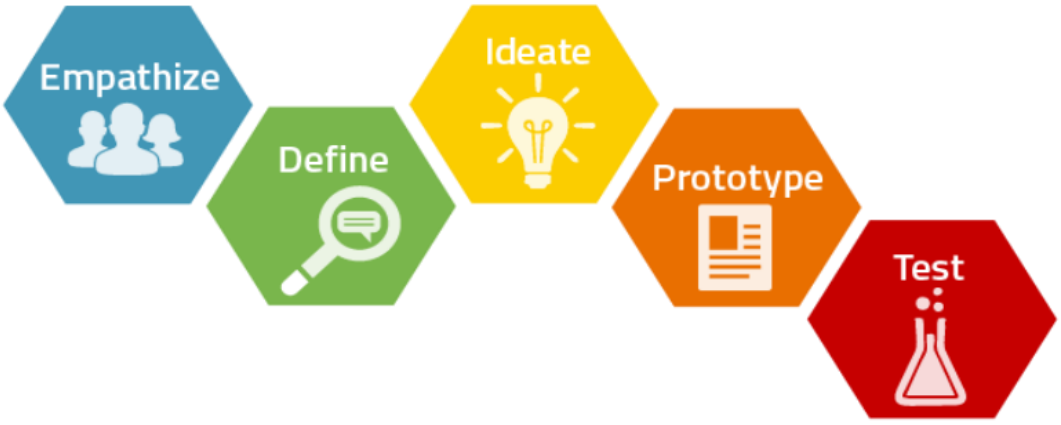
	Once all the sensations produced by the problem have been expressed, we can describe the situation in a very visceral way. It is then that we can discover aspects of an idea or a product that have been overlooked or lead to new aspects. Therefore, at the end of the presentation of each of the individuals/groups and its meaning, a Brainstorming will be done to generate new product/service ideas, changes or new sensations that we can apply to our company/product/service.

❖ Further reading and resources

Book	Creatividad S.S. Cómo llevar la inspiración hasta el infinito y más allá. Ed Catmull. Editorial Conecta.
Book	Innovation and Entrepreneurship, Peter Drucker.
Book	Diseñar el cambio. Tim Brown
Book	Originales. Adam Grant. Editorial Paidós.
website	La metodología Sprint en 5 días: https://www.sociedaddelainnovacion.es/la-metodologia-sprint-en-5-dias/
website	El método iFlow de SDLI: https://www.sociedaddelainnovacion.es/metodo-iflow/
website	6 metodologías para definir los retos de innovación de tu organización: https://www.sociedaddelainnovacion.es/metodologias-retos-innovacion/
website	5 herramientas esenciales para identificar las necesidades de tus clientes: https://www.sociedaddelainnovacion.es/5-herramientas-necesidades-clientes/

MODULE 8

DESIGN THINKING



❖ Introduction

If we talk about the beginnings of Design Thinking, we cannot go back many years, since it is a relatively recent methodology. The first data we have on the beginning of this concept date back to 1960, or perhaps a few years earlier, when the method began to be discussed in the field of industrial design.

It will be a little later, around the seventies, when the application of these methodologies in the field of design and architecture begins to be heard in the United States.

The architect and inventor Richard Buckminster Fuller was one of the precursors and great advocates of Design Thinking, being very active in the creation of methodologies where possible solutions to real problems were designed and evaluated. At the same time, in Scandinavia, work began in companies through cooperative design groups.

And it is at this moment when Design Thinking takes off as a problem-solving methodology, already in the 70's and 80's, with the appearance of new relevant names such as Herbert A. Simon, Victor Papanek or Horst Rittel. Important concepts such as innovation, creativity and multidisciplinary began to be heard.

But it was not until the 1990s that this methodology began to be definitively established and became known worldwide. Different companies (led mainly by IDEO) were born with a new concept of work: innovation. Large companies began to join this new way of thinking and working, such as Apple, which with Design Thinking began to redesign many of its products.

Once this methodology was already established in many large companies, in 2005, Stanford University included it in its curriculum, becoming part of the official syllabus. In this particular case, IDEO's own CEO, Tim Brown, is in charge of teaching the classes. It will be precisely Tim Brown who will publish, years later, one of the most important books on Design Thinking: "Change By Design".

It is, from the moment, already considered a work and educational methodology, which is applied and studied in numerous university careers and even put into practice in an educational way in other educational stages. It is also, at present, a business methodology followed by many renowned companies.

❖ What is Design Thinking?

Design Thinking can be defined, very quickly, as "thinking by designing, in an innovative and creative way". It is a work methodology that is divided and organized in different phases. It is actively applied as a work tool in companies, and at a didactic level it is used as a methodology in schools, institutes, and universities. One of its main characteristics is that it focuses its methodology on the promotion of innovation, and in the case of companies, it allows to work in an effective and very successful way because it allows to generate very interesting benefits in the design of solutions, which makes companies obtain many and better results. It always works with multidisciplinary teams, contributing in a very rich way to the work groups.

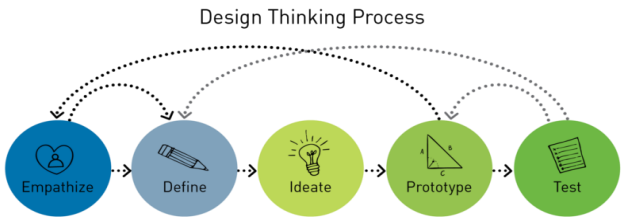
Design Thinking is an innovative methodology that focuses on people and multidisciplinary teams, which allows problem solving through a process of observing challenges, detecting needs and providing possible solutions. It is a methodology that uses creative creation to find solutions, and therefore it is always innovative, as we have said.

- ## Characteristics

The Design Thinking methodology is developed following a process in which these 5 differential characteristics are highlighted:

- **Empathy** as a central aspect in the search for the solution. It will be very important in this process to understand the problems, needs and wishes of the user who is involved in the solution we want to find. It is very important, therefore, the process of communication and empathy to find the most adapted and viable solution possible.
- **Multidisciplinary work,** since working in a team, with different characteristics, skills and abilities, enhances the ability of individuals to contribute uniqueness, creativity and differentiation.
- **Prototyping,** since it will be essential to provide a clear and realistic idea to put it into practice, before generating all the products. This process is very important, because we must identify failures, mistakes and look for solutions along the way, always focused on improvement.
- **Relaxed and playful environment:** working in an environment of trust in the generation of ideas encourages creativity and freedom of creation. The purpose is that the team feels comfortable and enjoys the process, developing to the maximum the potential and strengths of each one.

  During the process, techniques with a great **visual and plastic content are developed**. Because working creatively and analytically results in innovative yet feasible solutions.



❖ Benefits of its implementation

Looking at the challenges imposed, the needs of each of the parties, the message to convey and the best way to reach a solution, **Design Thinking** is presented as an innovative and creative method to think a way out from a different approach. In recent years this concept has been introduced in the world of business, markets, and education.

The advantages as a methodology are described below:

1. It allows focusing the work/methodology on the individual, who participates in a practical and active way. Here the students/workers in a team are the protagonists who have their own voice and at the same time make the protagonists responsible for their own work and for the work in the team.

2. This methodology works on important aspects such as innovation, creativity, collaboration, empathy, divergent thinking, logical thinking and trial-and-error learning.

3. This methodology gives security to people, specifying their role within the team, and giving security in the resolution of the problem, always with the support of the team.

4. This methodology pursues a collaborative and cooperative method, where everyone works towards the achievement of the same objectives.

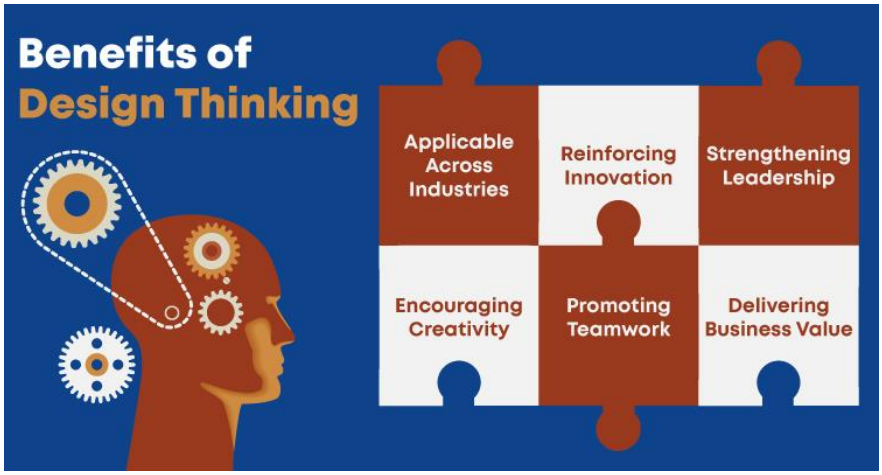
5. People, with this methodology, become people who seek innovative, alternative and creative solutions, thus developing problem-solving skills.

6. Since we work with multidisciplinary teams, we develop empathy, observation and understanding of the capabilities, competencies and skills of ourselves and others.

7. They will develop a problem-solving mentality, constantly analyzing the different variables to arrive at the best solution.

8. By having many of the tasks assigned cooperatively and collaboratively, each individual will be responsible for a part of the process.

9. They develop a greater degree of empathy and humility, starting from their own effort to learn to value that of others and increase their curiosity to learn more and to know the world.



❖ Phases of the process

As we have already mentioned, this methodology implies a process, where we differentiate stages or phases. Although there are other options, here are the 5 main phases of any Design Thinking methodology:

1. **Empathize:** this is the first stage of the process, one of the most important, since it is the basis for the development of the subsequent process. It is at this moment when we have to define the user archetype we have to address, clearly characterizing and defining its characteristics.

   Subsequently, we must establish clear, concise and well expressed objectives, where we all know what we want to achieve. The research objectives will allow us to make decisions about the data and information collection techniques we need and, therefore, will use.

   Therefore, this phase is a priority because we must identify what the user wants? Or if it is a problem created in the company, what do we want to achieve?
   Techniques typical of the Empathize phase are the in-depth interview, observation, self-assessment and the Focus Group, among others.

2. **Define:** This will be the second stage of the process, once we are clear about our objectives. In this stage we must organize all the information gathered

previously to identify all the areas of opportunity from which we can offer relevant solutions to the desires and needs of the user/problem.

The most common technique in this part of the process is Clustering or Saturate and Group, which consists firstly in dumping the information we have collected in post its. Secondly, in the grouping of those post its according to their content. And third and last, in finding a sentence that synthesizes the information in each of the groups. The synthesis sentence, which you must construct with a self-explanatory sentence containing a subject and a predicate, will be the one that will give rise to the challenge. The challenge is formulated through a question and always begins with the construction: "how could we do to" + synthesis sentence.

3. **Idea Ideate:** Once we are clear about the challenge, we must move on to the next phase, which will be about designing a creative and innovative solution. Here, creation is particularly important, as it will be the driving force behind our work.

This is why this phase is called ideation, where we try to offer as many ideas as possible that can respond to the challenge / answer the problem presented.

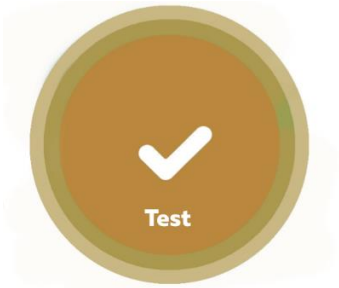
One of the most used techniques is "Brainstorming", where we give free rein to our creativity, proposing possible alternatives. There are other tools to perform this step, and we can use all those that we believe necessary and most appropriate for each moment, as long as they seek the largest possible number of ideas.

4. **Prototyping**: of all the ideas generated in the previous phase, it is time to make decisions about them and select those that are most appropriate. Once we have a list of selected solutions, we must prototype them. This prototyping phase is characterized by being a phase where the solutions or product prototypes become real, so we make tangible the ideas we had in our heads.

   If we are talking about solutions to a business problem, personal or this type of problem, we can propose it to the rest of the people involved. In the case of a product, we can show our prototype to the customer/company. So, the next step will be to have a feedback to check how to readjust this solution/prototype, to know if it is adequate or not... We remember that prototypes are not definitive, and therefore must be done quickly and in the

case of products, cheaply. There are many ways of prototyping, such as the proof of concept, the Storyboard, or the physical mockup.

5. **Validation or test.** It is time to know if our solution/prototype is valid or not, so we must put into practice the answer found. Feedback is very important in this phase and therefore we must collect interactions to be able to make an improved version of our solution.



As mentioned above, the process has to go through all the phases at least once. However, we can feel free to go back to one of them if we feel it is important to do so. As long as it does not paralyze us or slow down the process too much.

❖ The Design Thinking Process Facilitator

A Design Thinking process has a clear objective, which is to generate a solution within a specific framework. Given its versatility and ability to quickly put ideas into action, it can be used by any group of people who want to face a challenge.

When teams have already worked with this methodology and have experience, the role of facilitator can be carried out by any person in the working group. But when there is no previous experience working with this methodology, the process is a little more complex.

A facilitator is at the service of the group. Trying to help it get the best out of its components through the methodology. The facilitator's role is not the same as that of an active participant in the working group. His function is to get the most out of the group, helping it in the moments when it can become stuck. It is important to underline that the facilitator's role is not to choose which idea is the best of the proposed ones. Nor is it to define the focus of action. Their task is to make it possible for the group to investigate, to work with enthusiasm and with all five senses. So that, from understanding and inspiration, they can generate powerful solutions that will later be prototyped.

A very typical process in companies that want to generate innovation is to get out of the building. Change the work environment to change the perspective as well. See the problem from "outside" the company and be aware of how the problem looks from another point of view. Solutions can then be much more objective.

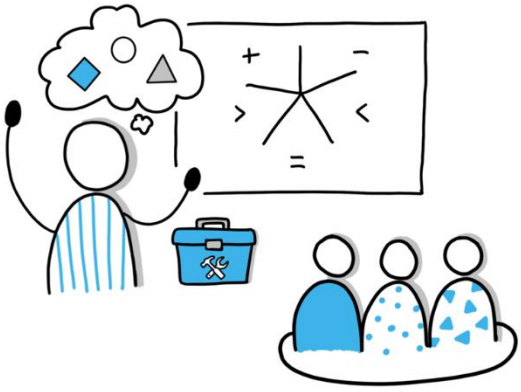
- **Some characteristics of a good facilitator**

Facilitating a Design Thinking session is not easy. It is necessary to generate a lot of confidence in the group. And to have the skills to enhance it. The characteristics of a good facilitator are, among others, the following:

- **Listening ability and empathy:** the good facilitator must know the capabilities and skills of each member of the group. He/she must know how to listen and see what is happening in the development of the process and act accordingly. He/she must establish work rhythms and facilitate an environment conducive to creativity.

- **Detachment from their own opinions:** The facilitator's job is not to give solutions. Nor is it to make a clear choice in favor of one or the other within the group. His job is to empower the group and create the conditions for it to work better. Giving one's own opinions contributes precisely to the opposite. On the one hand, because it biases those of the participants. And on the other hand, because it can generate insecurities among the members of the working group, nullifying their initiative.

- **Friendliness and willingness:** Design Thinking sessions can be complex and demanding, but also fun. The facilitator's job is to help create a good working environment. It is also the facilitator's job to make all participants feel heard and important. That is why it is essential to be attentive and involved. As a reference that reassures and generates confidence in the group so that they can let go and give their best.



❖ Conclusion

Through this "walk" through the Design Thinking methodology, we highlight this methodology inspired by the practical and creative resolution of business issues to improve results in organizations or companies.

Based on the phases of which it is composed, we see how it combines different processes (empathy, creativity, rationality, divergent thinking ...) that allow individuals to develop capacity, skills, and fundamental competencies to be competitive in today's market.

It is important to highlight, in this final reflection, that this methodology can be applied to any field that requires a creative approach, and that it has been used by companies with great professional success, making it essential in project development processes.

The inclusion of Design Thinking in the entities has allowed the inclusion of concepts such as emotional intelligence, that companies worry about the motivation of their employees, that they begin to work innovation and creativity, and allows a plausible improvement in the management of people and team leadership.

We cannot forget, in addition to the above, that Design Thinking puts the customer at the center of the process, so that the recipients of products/services will see their needs and desires covered through this methodology, which manages to personalize, humanize, and differentiate companies and entities.

❖ Final Assessment task

Title of the activity	**The Toast**
Aim of the activity	– Comprender las distintas fases del Design Thinking – Desarrollar la creatividad – Desarrollar un pensamiento divergente – Analizar las necesidades del mercado
Material required	Drawing and writing materials
Time required	1 hour and 30 minutes
Format	Online, blended and face-to-face
Description of the activity	The activity is organized in the following steps: 1. The first thing we are going to do is think about what we had for breakfast. If we have had toast for breakfast, great, if not we can imagine it. Therefore, what we will do is to draw the process to elaborate our breakfast toast. Now that we have drawn the process, we will see that we have only made the drawing of 1 single piece of toast, as a single thought. And we will realize that we do not have a divergent or different thought, surely. The most common thing will be that we all draw practically the same thing. 2. The second thing we will do is to deconstruct the toast, and we will draw the

elements that constitute it (bread, heat, condiments). You will make 3 columns:

a. in the first column we will indicate 10 alternatives to the bread we have used to make the toast (croissant, sponge cake, doughnut, ...)
b. in the second column 10 alternative heat sources (frying pan, hot car hood, lighter...)
c. and finally, 10 alternative seasonings (all kinds of food, spices, ...).

3. We propose to go back to the second phase of Design Thinking and look at niche market options (easier toast, lighter toast, children's toast...). Based on this information analysis we can propose options.

4. Finally, we design toast prototypes that, based on the information gathered, we have a chance of success in the market.

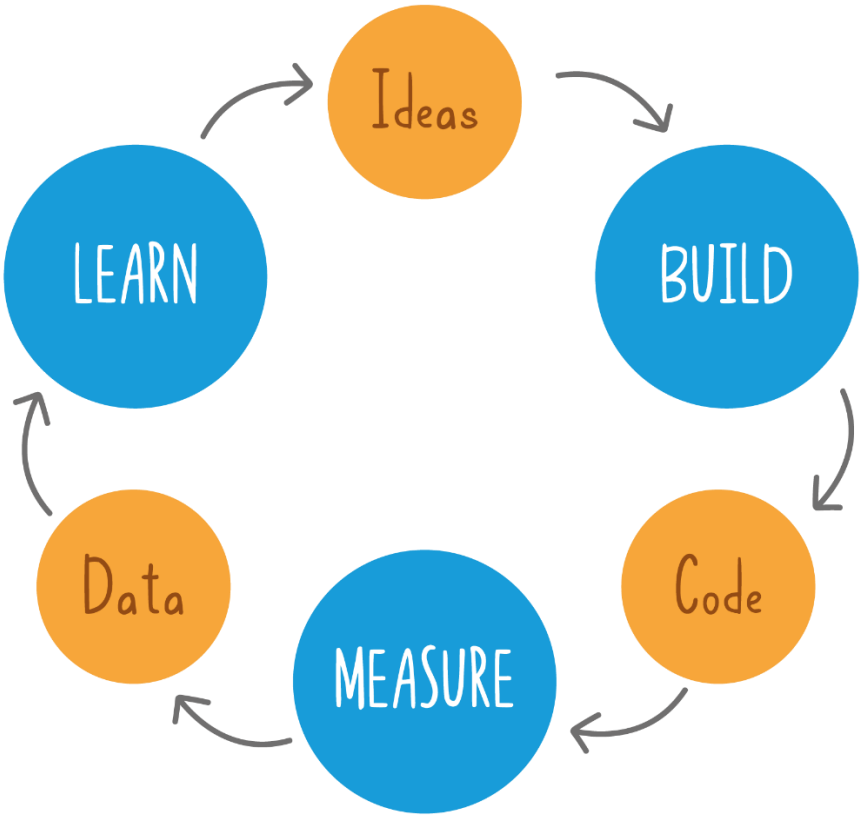
5. We explain the whole process and justify our final product.

❖ Further reading and resources

Book	Tim Brown (2009). *Change By Design: How Design Thinking Transforms Organizations and Inspires*. Ed. HarpersBusiness.
Book	Michael Lewrick, Patrick Link and Larry Leifer (2018). *The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Business and Ecosystems*. Ed. Wiley.
Guide	Alyssa Gallagher and Kami Thordarson (2020). *Design Thinking in Play: An Action Guide for Educators*. Ed. ASCD.

MODULE 9

LEAN STARTUP



❖ Introduction

Learn Startup originated in the 80's in the field of automotive manufacturers, with the aim of making their production more efficient. The original concept started with Steve Blank, entrepreneur and mentor at Silicon Valley, who began to develop a work methodology based on the needs or desires of customers (Customer Development).

It was in 2011 when an American entrepreneur, Eric Ries (student and disciple of Steve Blank) begins to use the term Lean Startup for the first time in a more international way, through his blog and his book "The Lean Startup". He creates this methodology based on the oldest theories of Toyota's Lean Manufacturing. Precisely Taiichi Ohno, an engineer of the brand, developed this philosophy in the 80s, based on the theories of Lean Manufacturing.

From this moment on, the use of the term is globalized, applying it to any business sector, and expanding rapidly.

This methodology is characterized because it focuses on production processes, always taking into account the changes and needs demanded by consumers during the production process and maturation of the product or service. Another of its objectives was the elimination of costs in the production chain.

Therefore, the Lean methodology seeks to carry out a process that allows enriching the value chain and eliminating all those processes that increase the cost value and that are unnecessary.

It is a method that aims to improve efficiency and resource optimization.

At the same time that this method allows avoiding cost overruns, it also allows adapting the product or service to the needs of customers, which means that companies that followed this method were highly accepted.

Ries, with the publication of his book "The Lean Startup", has turned the Lean Startup methodology into a new movement that is revolutionizing the way of devising, producing and launching new products and services to the market.

❖ What is Lean Startup?

If we define the term separately, to "Lean" we can take a meaning of ability to give personal value to a product, and to the word "Startup" we can give the meaning of starting a possible "different" business. So, if we put both concepts together, we find a textual meaning where Lean Startup means "startup of a new customized business".

Lean Startup is the rigorous application of the scientific method to the process of bringing an idea to market. The methodology focuses on building the product, measuring consumer response, and learning to decide whether to continue product development or pivot. This cycle is known as the feedback loop.

Lean Startup is a methodology designed to develop new businesses that want to launch a new product to the market. It helps to undertake in an agile way and increases the chances of success of a business by providing the best practices to innovate.

The pillars of this methodology are basically 3: creation and construction of the product, measurement of consumer response and learning and decision on the future of the product. As we can see, the Lean Startup methodology is to apply the scientific method to the process of bringing an idea to market.

Entrepreneurs use this method to use their resources as efficiently as possible. In this way, they manage risks and look for a system in which there is a deep vision of the customer and a quick interaction. There must be a feedback relationship with the customer, which allows the product/service to be adapted to the customer's needs and desires.

According to Economipedia, within lean startup, we distinguish 3 techniques:

- **Customer development**

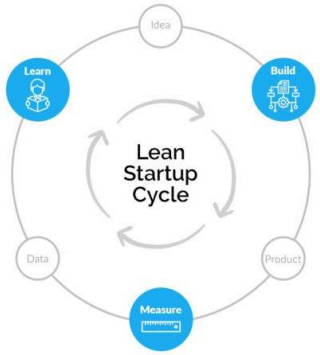
  We check whether our product meets the customer's needs. To do this, we go out to the street and ask those who would be our potential customers, we show them the product, they try it and give us their sincerest and constructive opinions. In this way, the final product is built, always with the focus on the customer.

- **Lean business model (Canvas)**

  It consists of visualizing and designing a dynamic and visual business model, captured on a canvas called Canvas model by A. Osterwalder. It is divided into grids, each one dedicated to a fundamental aspect of the business model: value proposition, revenues, expenses, acquisition channels, among others. In these grids, ideas are continuously added and removed until a final version is achieved.

- **Agile or scrum techniques**

  It consists of a set of dynamic and fast communication techniques to propose ideas, improvements and to configure the final project in a work team. For example, project management software can be used to organize tasks or short and concise meetings to evaluate the previous day's work and the work to be done that day.



❖ Benefits of its implementation

The main advantages of this method are:

- ✓ **Speed:** reduces the time to launch a product or service, through prototypes (not final and closed products).
- ✓ **Eliminates risks:** there is no need to invest a large amount of money at the beginning of the project, mainly due to the constant evaluation with market validation.
- ✓ **Useful effort:** all the efforts made to launch the prototype are useful for the development of the product/service, here there are no useless processes that do not add value.
- ✓ **Meets expectations and needs** by being adapted to the needs and desires of customers, this first minimum prototype satisfies the customer, which provides an important value of success.
- ✓ **Structure the ideas**: by applying a scientific method, with specified phases, the process is carried out step by step with empirical data.
- ✓ **Increases the success of the product/service:** being a prototype created based on the needs and desires of the customer.

❖ Application of the methodology

The Lean Startup method is applied through three steps, which we defined earlier as the main fundamentals: build, measure and learn. These in turn can be divided into sub-phases. They allow to be in constant movement by testing the created product with customers and, once the results have been analyzed, to build again.

1. Visualize and Build

- Where do we want to go?

First of all, it is necessary to be continuously interacting with customers and observe, for this we can use a variety of tools, such as:

To analyze behaviors and have a data base: Google Analytics, cohorts, models, server data, etc.

To have qualitative sources: comments, suggestions, interviews, testing, etc.

Expert observations: the opinion of an expert or experienced person helps to have data.

In this initial phase, the idea must be translated into a material product. Although it is essential to obtain objective data, since the product has not yet been created, and sometimes it is not known what specific characteristics it should have, companies include those characteristics they consider to be a priority.

The result obtained is a minimum viable product (MPV) or prototype with basic functions that can be used to study customer reaction. Thus, with the data collected, it will be possible to refine the article and find out which public will be interested in it.

In order for the product/service we propose to be viable, we must not forget to take into account other aspects, such as calculating the potential benefits in the event that the approach is successful. It is also essential to estimate the costs of the product.

2. Directing and Measuring

- Continue or shift?

The important thing in this step is to be able to know if the prototype works, if it needs to be adapted or discarded. To do this, we must have the right measurement tools and gather all the information about the product and consumers.

There are so-called 'pirate metrics' from which the response of the minimum viable product is collected. These 'pirate metrics' are:

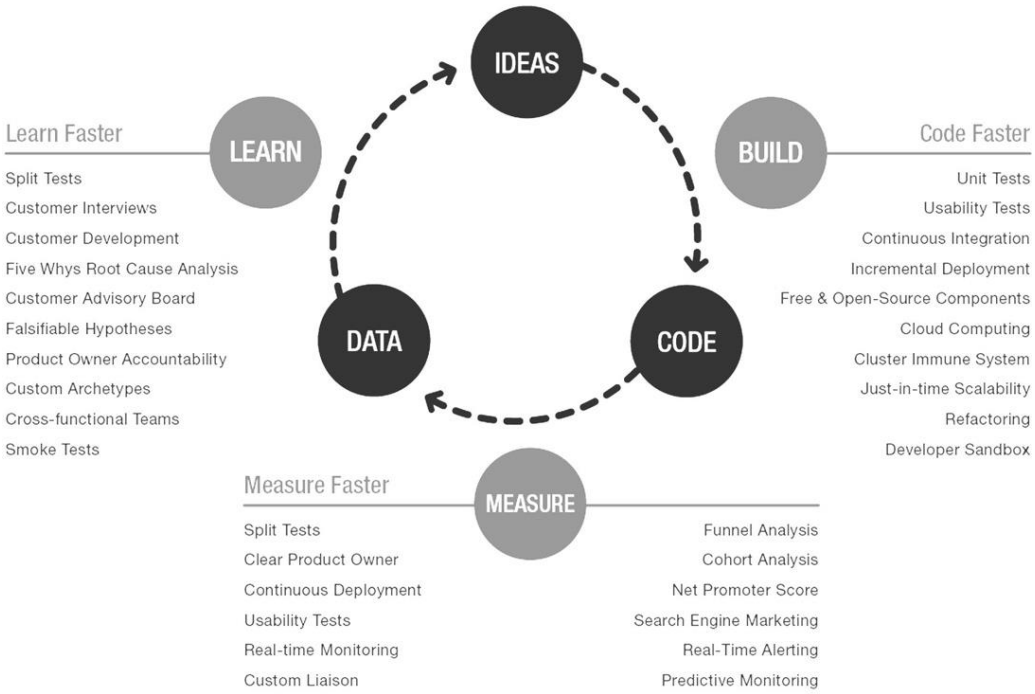
- ✓ Acquisition: gaining a new customer.
- ✓ Activation: the new customer registers and uses the product.
- ✓ Retention: the customer uses it again.
- ✓ Referral: customer shares the product with friends.
- ✓ Revenue: the customer pays for your product.

3. Accelerate and generate learning

Once you have the learning and information about the product you have created, it is time to decide what to do. It is time to decide whether to continue product development or to pivot. It is time to "learn".

If the product is viable, the company learns from the results gathered throughout the process. From here the cycle starts again to develop the final product. It is built knowing what potential customers need and the opinions of stakeholders, people directly or indirectly related to the project.

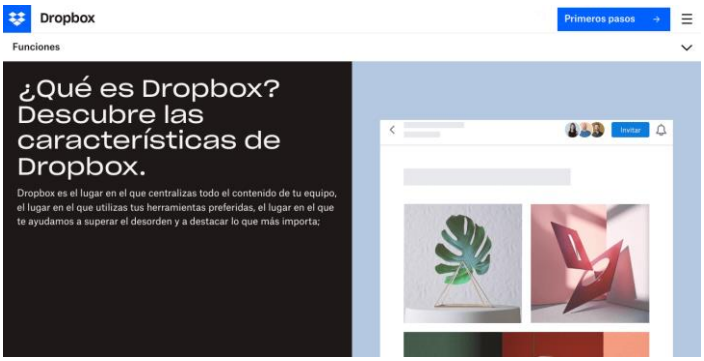
The effectiveness of the Lean Startup method means that not only start-ups apply it to their creation processes, but also consolidated companies, such as Telefónica or Repsol, have been incorporating it into their innovation processes for more than five years in order to curb failures.



❖ Examples of successful method application

In the blog of blog.hubspot.es they give us examples of the application of the Lean Startup methodology and explain its success.

1. Dropbox



Dropbox Image

Dropbox is a file sharing service that has applied the Lean Startup method, which started as a minimum viable product through a 3-minute transmission, whose purpose was to show consumers the functions of the tool and all that it was able to do.

By conducting these tests, Dropbox was able to confirm whether users understood how the tool worked and, at the same time, verify whether there would be sufficient demand for the product.

The trial was completely successful, and Dropbox started its launch on the right foot, as users who were able to watch the 3-minute video were delighted with what the application had to offer and joined the waiting list to be the first to acquire the benefits of the tool.

However, the company was not only able to confirm that its product would be successful, but also (as one of the objectives of the Lean Startup) considered the feedback received from users to improve the product and perfect it for consumers.

2. Slack

Slack image

Did you ever imagine that the famous instant messaging service Slack's initial goal was to become an online game? That's right! And its business model was based on users' subscription to a game.

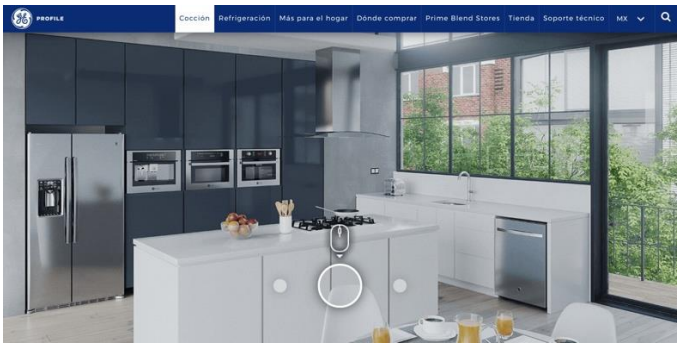
Its name was Glitch and unfortunately it had a very short life, as it was launched in 2011 and went back to beta just a year later. However, this gave way to the emergence of something even more attractive: Tiny Speck, a communication tool that decided to be tested internally and later in different offices in the United States and Canada so that external users could use it and provide feedback.

These comments not only provided enough feedback for it to be optimized into what we now know as Slack, but they also discovered that it could be very functional for large teams.

Following this, they decided to release a version of Slack for more complex workgroups and receive feedback from these to continue updating and improving the messaging tool accordingly.

Slack currently has more than 8 million users and has different plans for companies of various sizes and needs.

3. General Electric



GE image

This company has been working hand in hand with the creator of the Lean Startup method, Eric Ries, by testing product prototypes with consumers and then improving them based on the feedback obtained.

In some reports shared by the same company, they have highlighted that a single product, for example, a new refrigerator model, can go through more than 18 iterations. All of them supported by valuable data that customers shared, and that

General Electric took into account to optimize its product before launching it to the market.

Currently, all General Electric employees receive training on the Lean Startup methodology, as it is part of their product development process, regardless of its size: from a small light bulb to huge household appliances. This aspect has allowed them to be competitive in the market.

4. Buffer

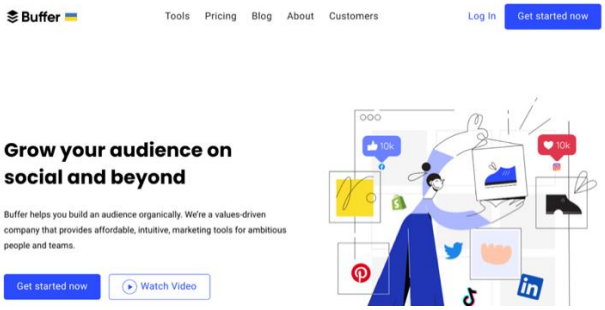


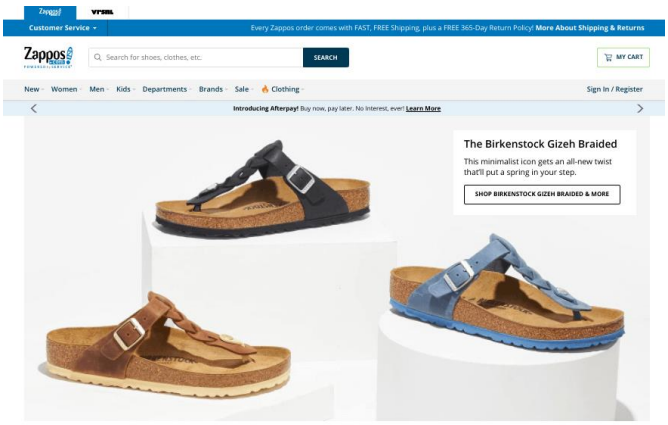
Image of Buffer

The social media content management platform started as a minimum viable product, as its founder, Joel Gascoigne, wanted to know if this tool would really be successful.

To do this, they created a landing page with a CTA that took users to see the plans and prices of the tool. In this way, they were able to determine if the demand for the application was sufficient to launch it on the market. In addition, thanks to this strategy they were able to develop a reliable and valuable user base.

Today Buffer is still one of the most successful applications and it is curious to think that it was tested under the Lean Startup method, but thanks to this they were able to take advantage of the interests of consumers to optimize its functionalities and become what they are now.

5. Zappos



Zappos images

By 1999, Zappos founder Nick Swinmurn wasn't sure about launching his brand online, because one question kept him awake at night: are customers really ready to buy shoes online?

While online shopping is becoming more and more common these days, this footwear retailer wasn't quite convinced about taking the plunge. Fortunately, they decided to test their hypothesis through the development of a minimum viable product.

The process was as follows: Nick Swinmurn took professional photographs of his inventory and posted it on a very basic website. If he received an order, he would then go to the physical store and purchase the footwear and ship it to customers directly. Swinmurn ran this test for long enough to prove that there was enough demand for this business to become really profitable.

Now you know what the Lean Startup method is and how you can implement it in case you have a business venture, and you are not sure if it will be successful. Remember that there are many ideas, products and services that can afford a more traditional model, but if you consider that this methodology is what you are looking for to test your product, go ahead!

❖ Conclusion

In the words of Pablo Pomar:

"The basic idea of the method is to test your products with real customers as soon as possible. With the aim of not spending time and money on developing features or functionalities that, although they may seem great to us, are not so important for the market. One of the differences between the Lean Startup method and other formulas is that it says that learning must be scientific, i.e. make hypotheses and try to validate them with experiments. The basis of the method is to use the Create - Measure - Learn feedback loop as fast as you can and make several iterations until you find the right product for your business.

The Lean Startup method invites you to fail a lot and fail early. To test your hypotheses in a scientific way. And that you don't measure vain indicators but the most important keys to your business. It's an ideal method to get your new ideas off the ground at a good pace and with success. So get creative.

This is how simple and complex at the same time is this method, which makes it possible to create great companies with tight budgets. The last few years have generated large and important start-ups, which have really succeeded in the market.

One important point to note: it is necessary to keep innovating and to be constant in the adaptation of the company, otherwise it will soon fall into oblivion.

In any case, this method is a reference methodology for all those entrepreneurs who want to succeed and lose the least amount of time and money in the process.

❖ Final Assessment task

Title of the activity	**Creativity and entrepreneurship**
Aim of the activity	✓ Develop creativity and entrepreneurial innovation ✓ Evaluate the knowledge acquired on entrepreneurship methods ✓ Analyse the steps in the creation of start-ups ✓ To assess adaptability
Material required	Cards, paper, pencil
Time required	45 minutes
Format	Face-to-face, blended, online
Description of the activity	Two groups of cards will be presented: 1 group with cards with the names of 10 objects, animals or things written on them. In the 2nd group, the cards will have the names of 10 feelings written on them. We randomly choose 1 card from each group. With the two cards we must, following the phases or steps of one of the creative and innovative methods, create a company that responds to the needs of these cards. We have to create a product (group 1 card) that responds to the needs of the group 2 card. We must indicate: ➢ What our product is, explain what we produce and why we have related it to the two cards we have been given at random. To what extent does the product meet the requirements of these cards? ➢ What is our target audience, who is it aimed

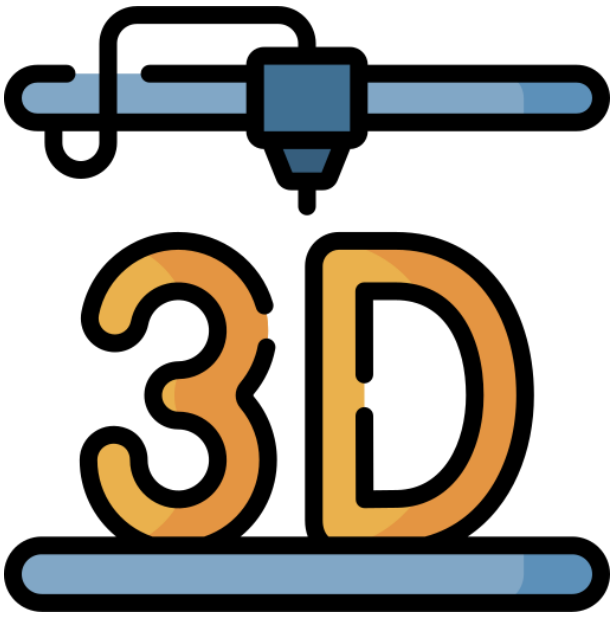
	at and why do we think it is the most appropriate audience? ➢ What is our logo, representative of the product or service we market? ➢ Our sales phrase to the public, with an impact that allows it to be easily remembered and identify the product or service we offer ➢ What our price is and why. ➢ The more creative and innovative it is, the higher the evaluation score will be.

❖ Further reading and resources

Web Side-Book	*The Lean Startup*. Eric Ries. https://ia601206.us.archive.org/31/items/TheLeanStartupErickRies/The%20Lean%20Startup%20-%20Erick%20Ries.pdf
Book	Chris Guillebeau (2013). *$100 startup*. Ed. Anaya Multimedia.
Book-Manual	Steve Blank and Bob Dorf (2020). *The startup owner´s manual*. Ed. John Wiley & Sons Inc.

MODULE 10

3D MODELING AND PRINTING

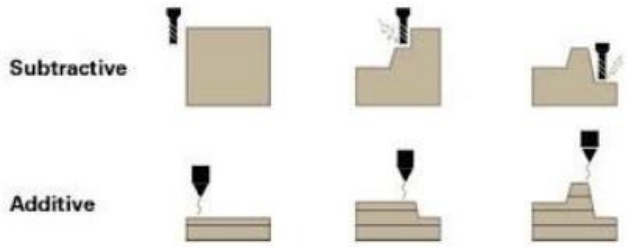


❖ Introduction

Additive manufacturing, also known as 3D printing, is the technique of creating three-dimensional solid items from a computer file.

What is Additive Manufacturing?

- 3D printing is the opposite of subtractive manufacturing which is cutting out / hollowing out a piece of metal or plastic with for instance a milling machine
- When compared to traditional production methods, 3D printing allows you to create complicated shapes with less material



What is 3D modeling

3D modeling is the process of creating a three-dimensional digital representation of an object or a scene using specialized software. It involves using various tools and techniques to create a 3D model that accurately represents the shape, texture, and details of a real-world object or scene. 3D modeling is used in a variety of industries, such as product design, architecture, film, and video game development, to create realistic and detailed visual representations of their concepts.

What is 3D printing?

3D printing, on the other hand, is the process of creating a physical object from a digital 3D model. It involves using a 3D printer, which is a specialized machine that reads the digital 3D model and creates a physical object by adding successive layers of material, such as plastic, metal, or ceramic. The 3D printer reads the digital model and follows the instructions to create the physical object, layer by layer.

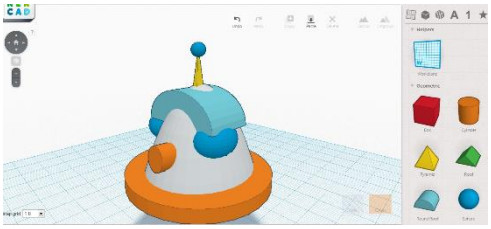
In summary, 3D modeling is the process of creating a digital 3D representation of an object, while 3D printing is the process of creating a physical object from a digital 3D model. Together, these technologies offer a powerful solution for creating and manufacturing complex and intricate objects, from prototypes to final products.

How does 3D printing work?

- 3D printing works by generating a physical three-dimensional object from a computer model in a 3D CAD (Computer Aided Design) file.
- An object is scanned - or an existing model of an object is used (usually an STL file) - and then processed by a piece of software, which is called a "slicer".
- The slicer breaks down the model into a series of thin, 2-dimensional layers and generates a file with G-code instructions specific to the 3D printer.
- Finally, the 3D Printer prints the object by following the G-code instructions.

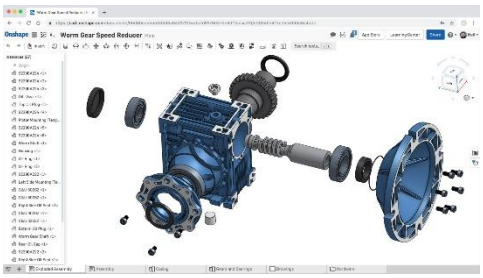
❖ 3D Modeling tools

Tinkercad, Fusion 360, and OnShape are some of the most popular 3D modeling programs, each with its own unique features and strengths.



- Tinkercad is a free program that is easy to use and geared towards beginners and educators.

- In contrast, Fusion 360 is professional-grade software that is used for product design and engineering. It offers advanced features such as parametric modeling and assembly modeling.



- Onshape is a cloud-based program designed for collaboration and teamwork, with real-time collaboration and data management features.

All three programs have their own unique features and are suited for different applications. Tinkercad is suitable for beginners, while Fusion 360 and OnShape are more advanced and geared toward professional design and engineering work.

❖ Functions and uses of 3D printers

The primary function of a 3D printer is to produce three-dimensional objects by adding successive layers of material, such as plastic or metal until the final object is complete.

The uses of 3D printers are diverse and constantly expanding, but here are some of the most common applications:

1. Prototyping: 3D printers are commonly used in **product design** and development to create prototypes and test new product concepts.

2. Manufacturing: 3D printing is increasingly being used in small-scale manufacturing to produce **custom parts and components** on demand, without the need for expensive molds or tooling.

3. Medical Applications: 3D printing has a wide range of applications in the medical field, including producing **prosthetics**, **implants**, and **surgical tools**.

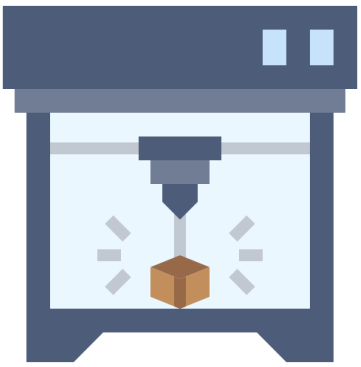
4. Education: 3D printing is increasingly being used in schools and universities to teach students about **design**, **engineering**, and **manufacturing**.

5. Art and Design: 3D printing allows artists and designers to create unique and **intricate objects** that would be difficult or impossible to produce using traditional manufacturing techniques.

6. Architecture and Construction: 3D printing is being used to create scale models of **buildings** and produce customized **building components** and decorative features.

Other areas that 3D printing involved:

- Aerospace
- Food
- Music
- Fashion
- Transportation



Overall, 3D printing offers a versatile and flexible manufacturing solution that is being used in an increasingly wide range of applications across industries.

How 3D Printing is creating new Jobs

- Growing numbers of people are now becoming involved in 3D printing – becoming **researchers**, **designers** and **engineers**. Additive manufacturing is becoming increasingly important around the world, and more and more uses for 3D printing are being identified.
- The number of jobs related to additive manufacturing skills **increased** in the first half of the past decade. It means industrial engineers, software developers, designers, and mechanical engineers are in demand

❖ Environmental impact of 3D printing

- **Reduced manufacturing waste**: Additive manufacturing processes allow us to optimize raw materials because we use only **the amount we need** to build a product.

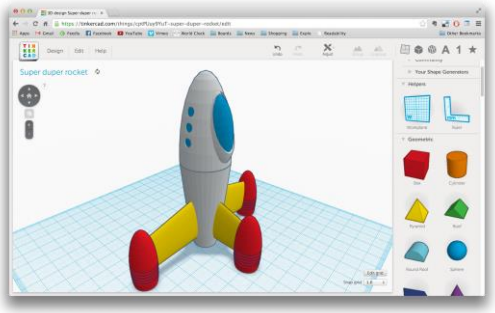
- **Lower carbon footprint**: 3D printing does not rely on complex manufacturing and assembly supply chains, it facilitates localized production and **reduces the need to transport goods** manufactured in third countries.

- **Supports the circular economy**: Firstly, it is becoming increasingly popular to manufacture printing filaments from **recycled materials**. Secondly, consumers will be able to repair broken products by **self-manufacturing spare parts** on home printers or at 3D printing centers.

❖ 3D Printing

The 3D printing process

1. CAD Model:



The first basic requirement of any 3D printing process is a CAD (Computer-aided Design) Model. It is the 3D design for the product you want to print. This model can be developed from various software (Fusion360, Tinkercad, OnShape, etc.) but the final output has to be in a machine-readable format, mainly STEP, **STL** & OBJ but a few other formats are also used.

2. Slicing:

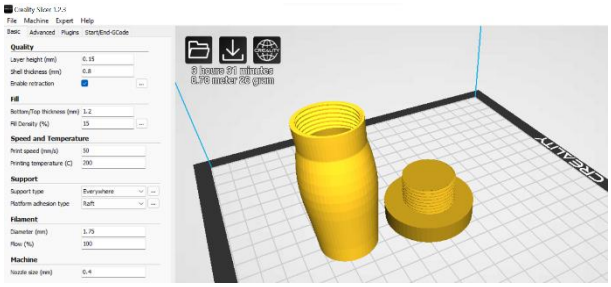
The designed model is now to be loaded into slicing software.

The slicing software or Slicer literally slices the 3D model into **multiple layers** depending on the specifications you provide.

These slices (also called layers) are then **deposited** one above the other during the actual printing process.

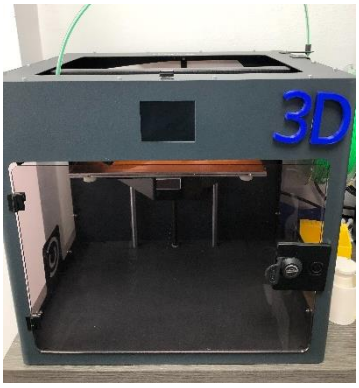
The slicer **converts** the design into **coordinates** which the printer understands and the material is deposited as per the coordinates.

The output of this slicer is in the form of a text file with a file extension being '.**gcode**'

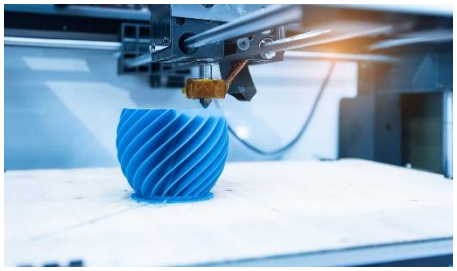


3. Setting up the Machine:

The part can be printed through various 3D printing technologies and depending on the final application of the part, the appropriate technology & material is chosen and the machine is set up. After choosing the 3D printer and the material, the .gcode from the slicer must be transferred to the 3D printer through an SD card or a USB.



4. 3D Printing:

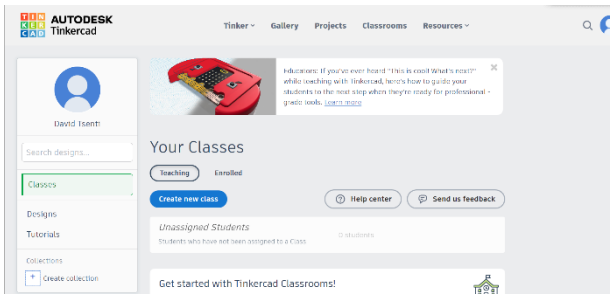


The next step is to simply 3D print the model. The .gcode file is loaded into the printer and the printing starts. The printer will print the object as per the print parameters set in the slicer. These settings can be modified for every single print. The printing time depends on different factors and can vary from minutes to hours to even days.

❖ 3D Design

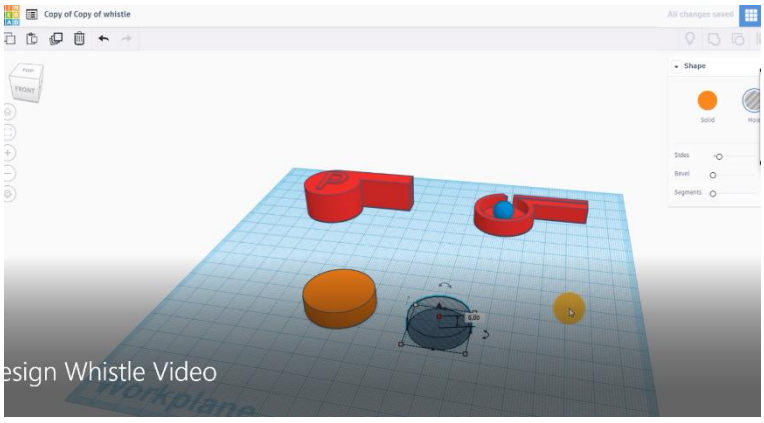
3D Design: Whistle

We are now going to follow a tutorial to design and 3D print a whistle using Tinkercad software! Use this website: https://www.tinkercad.com/

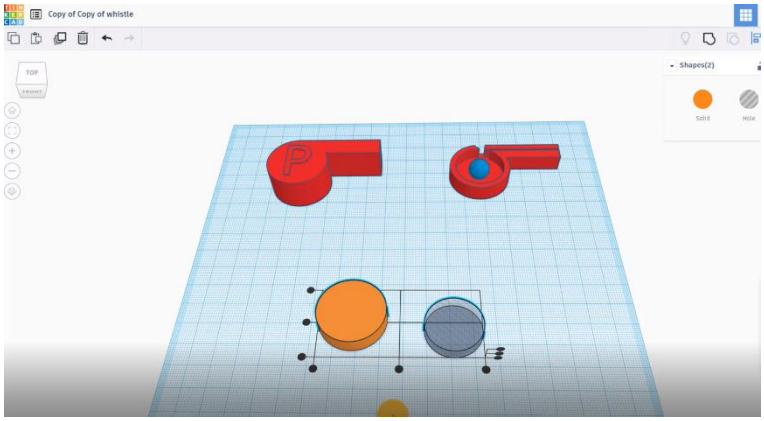


Step-by-step design:

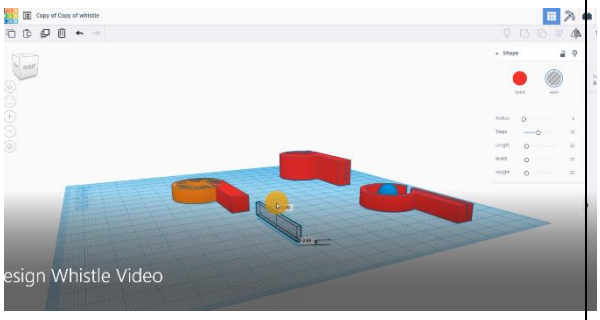
- Open Tinkercad, invite class
- Create a new design
- Select Cylinder
    - Change width to 30 x 30
    - Change the height to 8
    - Change sides to max



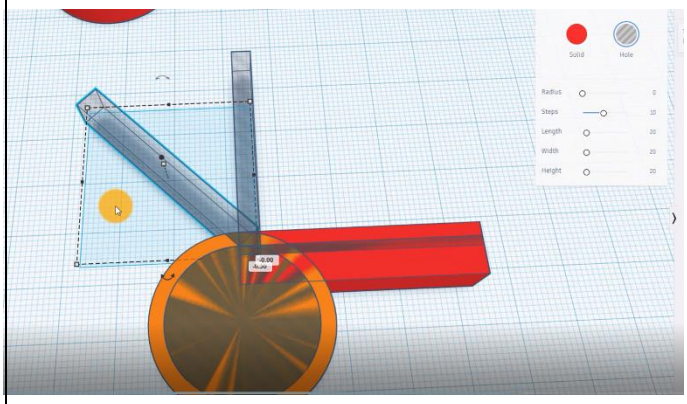
- Select the empty cylinder
    - Change the width to 25 x 25
    - Change the height to 6
    - Change sides to max
- Select both and click Align
    - Click on bullets in the center
    - Click on the top bullet to flip



- Select box
    - Change the width to 41 x 9
    - Change the height to 8
- Connect the box to the top-center cylinder
- Duplicate the box and make it as a hole
    - Change it to 1.5 x 6

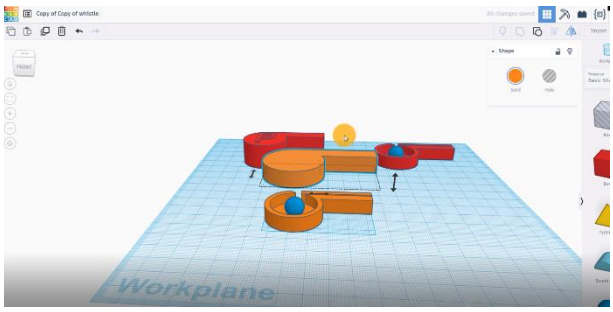


- Move it 2cm up
- Move it inside the box
- Duplicate the empty box
- Change to 3.5



- Rotate it 90 degrees
- Move it at the top of the other empty box
- Duplicate another one and rotate it 45 degrees
- Move it next to the other empty box
- Change snap grid to 0.5

- Select everything and press group
- Select a sphere, change every part to 10
- Move it to the center and drag it down by 1
- Duplicate the whistle
- Select flip and click the vertical arrows
- Connect the 2 pieces
- Select them and click on group



❖ Final Assessment task

Title of the activity	**3D printing**
Aim of the activity	To know about 3D printing design and printing
Material required	TinkerCad Software, PC
Time required	1 didactic period
Format	Hands on activity
Description of the activity	The students should create the whistle by using the instructions above.

Test

1. 3D printing uses additive manufacturing

   YES

   NO

2. The slicer can generate STL file

   YES

   NO

3. 3D printing technology can create more job opportunities for researchers

   YES

   NO

4. A 3D printer can print a house without the interaction of a human

   YES

   NO

5. A 3D printer can print real meat

   YES

   NO

❖ Further reading and resources

site	https://en.wikipedia.org/wiki/3D_printing
video	https://youtu.be/vL2KoMNzGTo
site	https://www.pcmag.com/news/3d-printing-what-you-need-to-know

MODULE 11

VIRTUAL REALITY

❖ Introduction

Virtual Reality Definition:

"Virtual reality is a simulated experience that can be similar to or completely different from the real world. Applications of virtual reality include entertainment, education and business."

What is Virtual Reality?

Virtual reality (VR) is a technology that creates a simulated environment using computer-generated graphics and sensory input devices such as head-mounted displays, hand controllers, and motion sensors. The user can interact with the simulated environment, creating an immersive experience that feels like being physically present in a different location. VR has a wide range of applications across various fields, from entertainment to healthcare to education.

VR applications

Entertainment

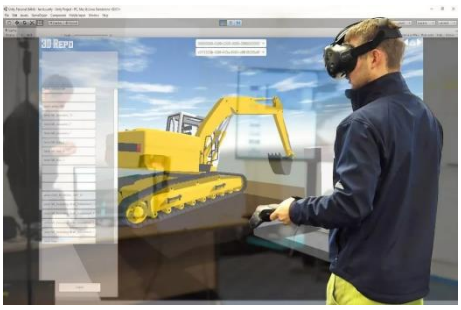
The entertainment industry has been quick to embrace VR technology, with applications ranging from video games to immersive cinema experiences. VR allows users to experience games and movies in a completely new way, putting them right in the middle of the action.

Education and Training

VR is being increasingly used in education and training. In the medical field, VR is used to simulate surgical procedures, allowing medical students to practice without the risk of harming real patients. In addition, VR

is used in driver training programs to simulate driving conditions and prepare drivers for hazardous situations.

Architecture and Engineering



VR is also used in architecture and engineering to visualize and design structures. With VR, architects and engineers can create immersive models of their designs and walk through them to get a better sense of how they will look and function in the real world. This helps identify potential issues and allows for changes to be made before construction begins.

Therapy and Rehabilitation

VR is being used in healthcare to treat a wide range of conditions, from phobias to post-traumatic stress disorder (PTSD) to chronic pain. For example, VR can be used to simulate exposure therapy, where patients are gradually exposed to their fears in a safe and controlled environment. VR can also be used in physical therapy to help patients regain strength and mobility after an injury or surgery.

In conclusion, VR has a wide range of applications across various fields, including entertainment, education, architecture and engineering, real estate, and healthcare. With advances in technology, VR is becoming more accessible and affordable, making it an increasingly important tool for businesses and organizations looking to enhance the user experience and improve outcomes.

❖ VR History

1960s: The first VR head-mounted display was created by Ivan Sutherland, a computer scientist who is often considered the father of computer graphics.

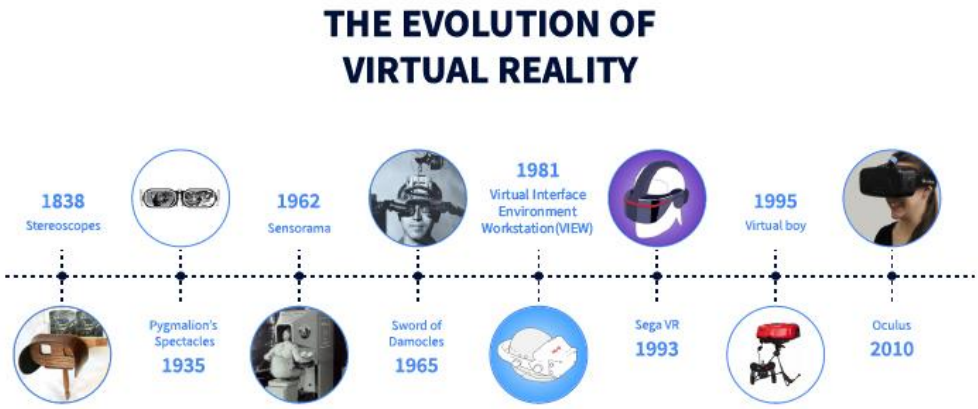
1970s-1980s: Advancements were made in VR technology, including the creation of VR gloves and haptic devices, but VR remained limited to research labs and academic settings.

1990s: VR began to gain wider attention and commercial potential. Sega released the Sega VR headset in 1991, and the first VR arcade, Virtuality, opened in London in 1992. Nintendo released the Virtual Boy in 1995, but it suffered from technical limitations and poor sales.

2000s: New advances in technology allowed for more immersive and interactive virtual experiences. VR began to be used in a variety of industries, from gaming and entertainment to education and healthcare.

2010s: VR technology continued to evolve, with the introduction of consumer VR headsets like the Oculus Rift in 2012 and the HTC Vive in 2016. VR also began to be used in new ways, such as for training and simulation in industries like aviation and military.

2020s: VR technology continued to improve and expand, with new advancements in hardware and software allowing for even more immersive and interactive virtual experiences. The COVID-19 pandemic also highlighted the potential of VR for remote collaboration, communication, and entertainment.



VR equipment

- Head Mounted Display - HMD with rotation tracking is the minimum requirement
- Additional tracked objects/controllers can be present

What are the best VR headsets in the market:

- Oculus Rift S
- Meta (Oculus) Quest 2
- HTC Vive Pro 2
- HP Reverb G2

- Playstation VR

❖ Virtual Reality Usage

Usage of Virtual Reality

Virtual reality (VR) is an advanced technology that enables users to experience different settings and situations through a headset and hand-held controllers. Despite its long existence, recent developments have made it more feasible and economical for educational purposes. Here are a few instances of how virtual reality can be employed in the classroom:

1. **Exploring Historical Sites**: Virtual reality provides students with the opportunity to experience historical sites firsthand and gain insight into what life was like in the past. This immersive experience enables students to visit places such as the pyramids of Egypt or ancient Rome, enhancing their understanding of history and culture.

2. **Virtual Field Trips:** Virtual reality technology enables educators to take their students on virtual field trips to locations that would normally be inaccessible. For instance, students can explore the Great Barrier Reef to learn about marine life or visit the Amazon rainforest to study biodiversity.

3. **Anatomy and Physiology:** Virtual reality has the potential to create an immersive experience for students to explore the human body, giving them a better understanding of the organs and systems and how they function.

4. **Science Experiments:** Using virtual reality can offer a safer and less expensive alternative to carrying out science experiments that would otherwise be too dangerous or costly. For instance, students can simulate a volcanic eruption or explore the solar system.

5. **Language Learning:** Virtual reality can help students practice language skills by immersing them in a language environment. For example, they can practice ordering food in a restaurant or buying tickets at a train station.

6. **Special Needs Education:** Virtual reality can be used to create a safe and comfortable environment for students with special needs. For example, virtual reality can be used to simulate a job interview or public speaking, helping students build confidence and skills.

VR sickness

- Body sensations **don't match** visual stimuli
- Sensitivity varies between people → **must test** with A LOT of people

- Science / biology is **unknown**
- **Trial and error** reveals what works and what doesn't

Known triggers of VR sickness

- Forcing rotation on the user's field of view
- Mismatch between real and virtual movement (acceleration)
- Low frames per second (FPS)
- Lag / slow response time to movement
- High field of view (FOV)

In general, virtual reality can deliver an engaging and immersive learning experience that can be uniquely created by teachers, which would not be possible through traditional classroom teaching. As technology advances, virtual reality is expected to become a more significant educational tool. This would enable teachers to create memorable and unconventional experiences for their students.

❖ Virtual Reality apps

There are several important apps for virtual reality (VR) that are used in various fields such as entertainment, education, business, and more. Here are some of the most important apps for VR:

Unity

Unity is a popular game engine that is widely used to develop VR applications, particularly in the gaming industry. Unity provides a wide range of tools and features for creating 3D environments, animations, and interactive experiences.

The engine supports a variety of VR devices and platforms, making it a versatile option for developers.

Tilt Brush

Tilt Brush is a VR painting and drawing app that allows users to create 3D art in a virtual space. The app provides a range of brushes, colors, and effects that can be used to create immersive artworks. Tilt Brush is often used in art installations and exhibits, as well as in creative industries such as advertising and animation.

Oculus Home

Oculus Home is a platform for accessing and downloading VR apps and games on Oculus VR devices. The app provides a user-friendly interface that allows users to browse and download content, as well as manage their VR library. Oculus Home also includes social features that allow users to connect with friends and join virtual communities.

Google Earth VR

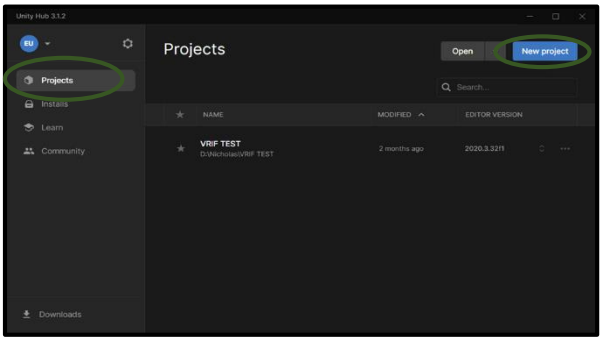
Google Earth VR is an app that allows users to explore the world in virtual reality. The app provides a 3D map of the entire planet that can be navigated using VR controllers. Users can zoom in and out, fly over famous landmarks, and explore remote areas. Google Earth VR is often used in education and tourism, as well as for personal exploration.

In conclusion, these are some of the most important VR apps used in various fields. From gaming to education to socializing, VR apps have revolutionized the way we interact with digital content and with each other in virtual space. As technology continues to advance, we can expect to see even more innovative VR apps that push the boundaries of what is possible in virtual reality.

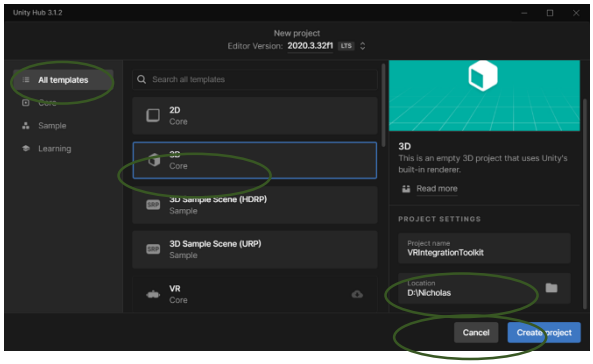
❖ Virtual reality in Unity

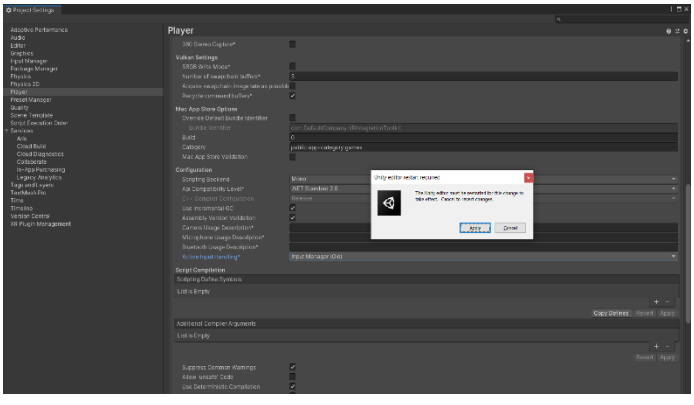
Setup of a VR environment in Unity

- Open Unity Hub
- Click on Projects
- Click on New project



- Click on All templates
- Click on 3D to create a 3D project
- Give it a Name
- Choose the location to store your new project



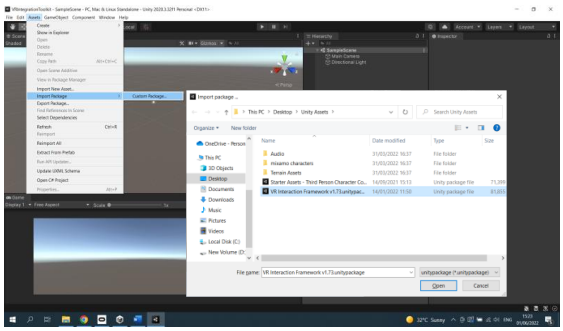


- Go to Edit->Project Settings
- Select Player
- At the Active Input Handling option select Input System Package(New)
- Click Apply and allow the Editor to restart

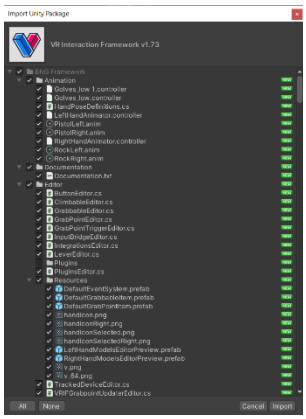
The VR Integration Framework

- There are various tools used for developing VR
- The VR Interaction Framework is a collection of scripts and prefabs to help you develop interactions in VR
- It is intended to make it easier for developers to create their own interactable objects and be productive quickly
- Find and **download** the VR Interaction Framework file

Importing the VR Integration Framework



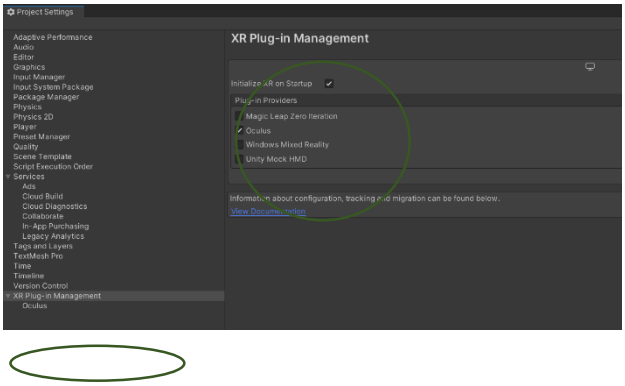
- To import the VRIF to our project:
- Go to Assets->Import Package-> Custom Package
- Find and select the VR Interaction Framework file



- Click Import and then install/upgrade
- This will take some time

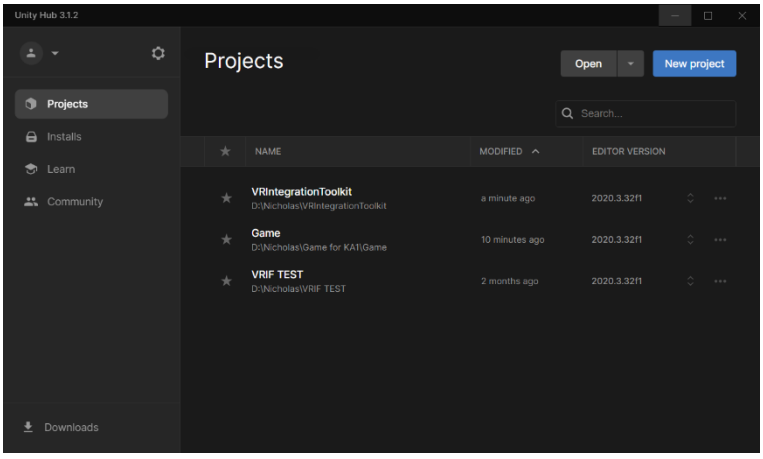
Before running the demo let's make sure our Project is set up to start in VR

- Go to Edit->Project Settings
- Navigate to XR Plug-in Management
- Make sure Initialize XR on Startup is selected
- Make sure Plug-in providers is set to **Oculus**



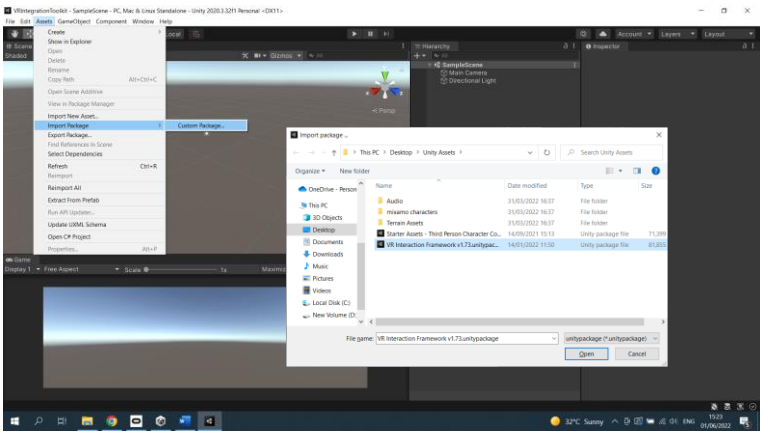
Make a 3D word, a Virtual word in Unity

- Open a 3D game in Unity

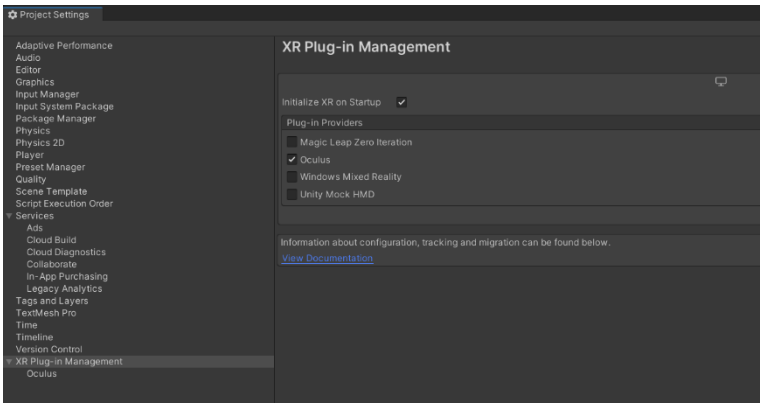


- Open the 3D game
- Go to Edit->Project Settings
- Select Player
- At the Active Input Handling option select both
- Click Apply and allow the Editor to restart

- Go to Assets->Import Package-> Custom Package
- Find and select the VR Interaction Framework file
- Click Import and then install/upgrade



- Go to Edit->Project Settings
- Navigate to XR Plug-in Management
- Make sure Initialize XR on Startup is selected
- Make sure Plug-in providers is set to Oculus



❖ Final Assessment task

Title of the activity	**Virtual Reality**
Aim of the activity	To familiarize with VR applications and potential
Material required	VR headset, PC, Unity software
Time required	4 didactic periods
Format	document
Description of the activity	The student will learn about Virtual Reality technology. The student should be able to use the VR headset to see games in Unity and answer 5 questions

Questions

- Is VR a technology that allows users to experience computer-generated environments in a more immersive way than traditional screens or displays?

  Yes / No

- Can VR be used in healthcare to simulate medical procedures or help patients cope with pain or anxiety?

  Yes / No

- Is VR only used for entertainment purposes, such as in gaming or virtual tours?

  Yes / No

- Can VR be used for remote collaboration and communication, allowing users to feel like they are in the same room even if they are in different locations?

  Yes / No

- We can use VR headset to see the environment on Unity?

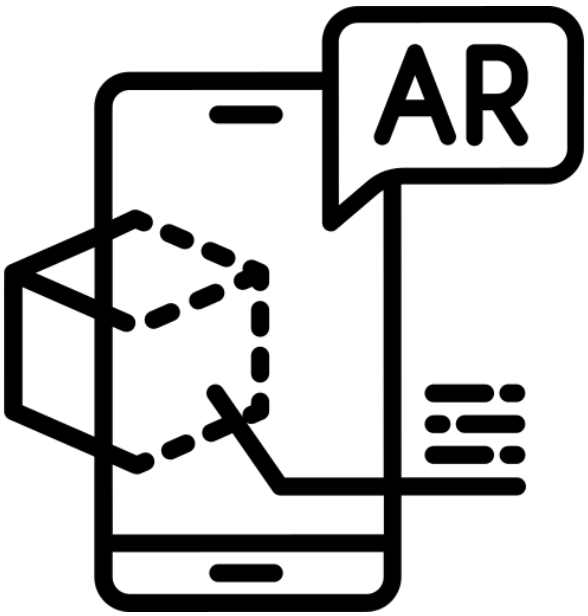
  Yes / No

❖ Further reading and resources

site	https://www.vrs.org.uk/virtual-reality/what-is-virtual-reality.html
site	https://www.lifewire.com/the-history-of-virtual-reality-3440504
site	https://www.vrs.org.uk/virtual-reality-applications/
site	https://www.techradar.com/news/the-future-of-virtual-reality
site	https://www.digitaltrends.com/virtual-reality/

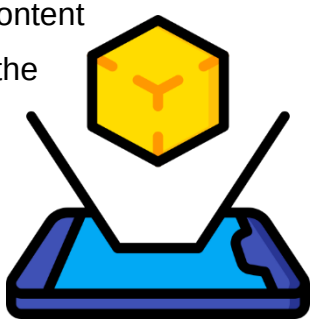
MODULE 12

AUGMENTED REALITY



❖ Introduction

What is Augmented Reality?



Augmented reality (AR) is a technology that overlays digital content in the real world, producing a **mixed** experience that blends the **physical** and **digital** worlds. This technology has become increasingly popular in recent years and is used in various fields, including gaming, entertainment, education, and business.

How it works?

To achieve this, AR technology employs cameras, sensors, and software to recognize real-world objects and settings and add digital content to them, such as text, images, videos, and 3D models. The outcome is an immersive experience that provides users with a better understanding of their surroundings or a new way to interact with them.

AR is a blend of the physical and digital worlds. It is achieved through the use of devices such as smartphones, tablets, smart glasses, or head-mounted displays that allow the user to see the real world and superimpose digital objects on it. AR technology has the potential to revolutionize the way we interact with the world around us. AR can be used in a variety of applications such as gaming, education, healthcare, and retail.

Differences between AR and VR

- One of the significant differences between AR and VR is the level of immersion. VR aims to create a **completely simulated** environment that users can interact with through a headset or other specialized equipment. AR, on the other hand, **blends** the virtual and real world, allowing users to interact with both simultaneously.

- Another significant difference is the level of user engagement. In VR, users are often fully immersed in a virtual environment, while in AR, users remain aware of their physical surroundings. AR experiences are usually less **intensive** than VR experiences, making them more accessible to a broader audience.

- In terms of hardware, VR usually requires **more** specialized equipment, such as headsets or motion trackers, to create a fully immersive environment. AR technology, on the other hand, is more accessible, with many AR experiences being available on **smartphones or tablets**.

- Finally, the applications of VR and AR technology are quite different. VR is often used in gaming, entertainment, and training simulations. AR, on the other hand, has a broader range of applications, such as education, healthcare, retail, and industrial training.

❖ Augmented Reality

AR is accessible to a vast audience and can be used with various devices, from smartphones and tablets to specialized AR headsets, making it a versatile technology that can be integrated into different industries.

For instance, in education, AR can be used to create interactive learning experiences by bringing historical events or scientific concepts to life. In retail, customers can preview products in their home setting using AR, facilitating their purchase decisions. In healthcare, AR can enhance medical training or provide virtual support during surgical procedures.

In conclusion, augmented reality is a technology that has the potential to revolutionize how we interact with the world around us. With continued technological advancements, we can expect to see even more innovative applications of AR in a range of industries.

Areas that uses AR

Augmented reality (AR) technology has many applications across various industries, including:

1. **Education**: AR is used to create immersive learning experiences for students by visualizing abstract concepts, recreating historical events, and enhancing scientific experiments.

2. **Gaming**: AR is utilized to create unique gameplay experiences, as seen in the popular game Pokemon Go, where players can catch Pokemon in the real world.

3. **Retail**: AR is used to provide customers with virtual try-on experiences for products like clothing and makeup. It is also used to give interactive product demonstrations and to show how products will look in real-world settings.

4. **Healthcare**: AR is used to improve medical training, provide virtual assistance during surgeries, and create simulations for medical procedures.

5. **Marketing**: AR is used to create interactive advertisements and virtual tours of products and services.

6. **Architecture and Design**: AR is used to develop virtual models of buildings and spaces, which allows architects and designers to visualize and modify designs before construction begins.

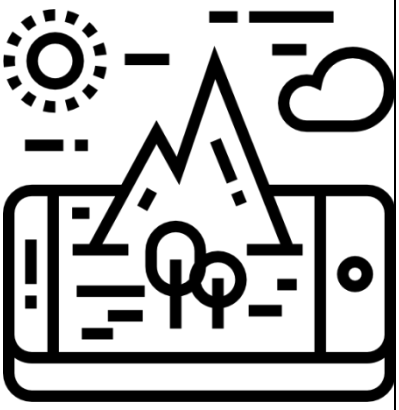
7. **Entertainment**: AR is used to create immersive experiences, such as interactive concerts and art installations.

In general, AR technology is applied to various industries to develop innovative and new experiences.

How to develop AR:

Developing an augmented reality (AR) application can be a complex process, but here are the general steps you can take:

1. **Define Your AR Goals**: The first step in developing an AR application is to define your goals. What do you want to achieve with your AR application? What type of experience do you want to create for your users?



2. **Choose a Development Platform**: There are many development platforms available for AR, such as Unity, ARKit, ARCore, Vuforia, and more. Choose a platform that suits your goals and is compatible with the device(s) you want to target.

3. **Create Your 3D Models**: You will need to create 3D models of the objects or environments you want to overlay with digital content. There are many tools available for creating 3D models, such as Blender, Maya, and SketchUp.

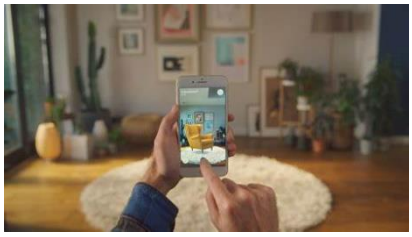
4. **Develop Your AR Application**: Using your chosen development platform, start building your AR application. This will involve creating a user interface, integrating your 3D models, and programming the AR functionality.

5. **Test Your AR Application**: Once your AR application is developed, it's important to test it thoroughly to ensure it works as expected. Test on multiple devices and environments to ensure compatibility and functionality.

AR apps

AR apps are applications that use augmented reality technology to provide an enhanced user experience by overlaying digital information in the real world. Here are some examples of popular AR apps, their description, and compatibility:

- Pokemon Go - This app allows users to catch Pokemon in the real world using their smartphones. The app is free and available for both iOS and Android devices.



- IKEA Place - This app enables users to see how furniture will look in their home before they buy it. The app is free and available for iOS devices.

- Snapchat - This app uses AR technology to add filters, lenses, and stickers to users' faces and surroundings. The app is free and available for both iOS and Android devices.

- Google Translate - This app uses AR technology to translate text in real-time using the camera of the smartphone. The app is free and available for both iOS and Android devices.

- Quiver - This app enables users to bring coloring pages to life using AR technology. The app is free and available for both iOS and Android devices.

- Holo - This app allows users to place 3D holograms in their environment using AR technology. The app is free and available for iOS and Android devices.

- AR MeasureKit - This app uses AR technology to measure objects in the real world. The app is available for a fee and compatible with iOS devices.

- AR Runner - This app uses AR technology to create a virtual running track. The app is available for a fee and compatible with iOS devices.

Overall, AR apps have a wide range of applications, from entertainment to education to industrial training. Many AR apps are available for free, while some

are available for a fee. Compatibility with different devices varies, so it's essential to check the requirements before downloading an AR app.

❖ Create AR Model

Setting up an AR application in Unity

Unity provides an AR development platform that allows developers to create AR experiences for a variety of devices, including smartphones, tablets, and smart glasses.

Unity's AR platform includes tools for creating AR applications, such as the Unity AR Foundation, which provides a set of features and APIs for developing AR experiences. This includes support for ARKit (iOS) and ARCore (Android).

The Unity AR Foundation includes components such as AR Camera, AR Session, AR Raycast, and AR Plane Manager that can be used to create AR applications. These components allow developers to capture real-world objects and overlay digital content on them.

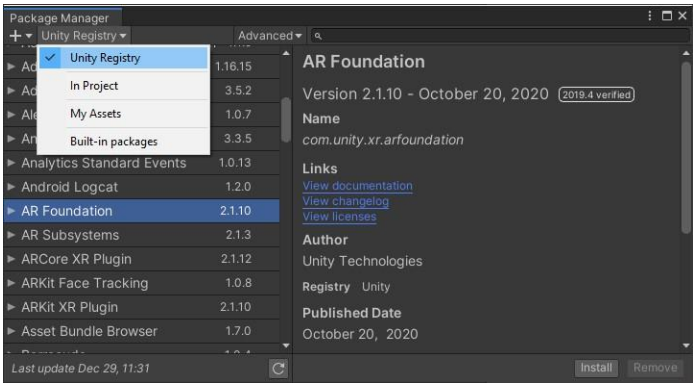
In addition to the AR Foundation, Unity also offers a range of AR plugins that can be integrated into AR applications. These plugins include Vuforia, ARToolKit and EasyAR among others.

Unity also offers a range of tutorials and resources to help developers get started with AR development. The Unity Learn platform provides a range of AR courses, tutorials, and sample projects to help developers learn how to create AR experiences using Unity.

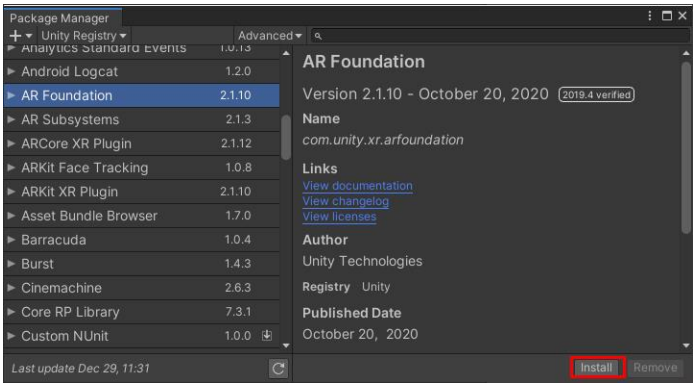
Overall, Unity provides a comprehensive AR development platform that enables developers to create AR applications for a range of devices. The platform includes a range of features, tools, and resources that make it easy to develop AR applications, making it a popular choice for AR development.

How to create an AR model in Unity

- Go to Window -> Package Manager
- Once the Package Manager window is open, ensure that you can see the packages in the Unity Registry

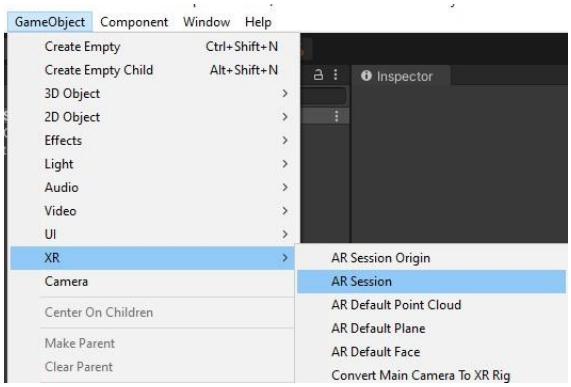


- Search for AR Foundation and click Install

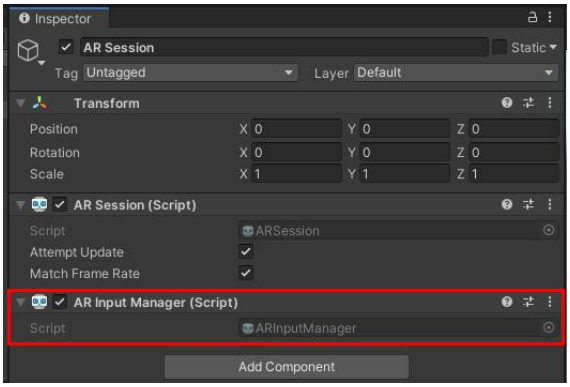


- Now we have the AR foundation package
- For this project, we will be using an Android device, so install the ARCore XR Plugin

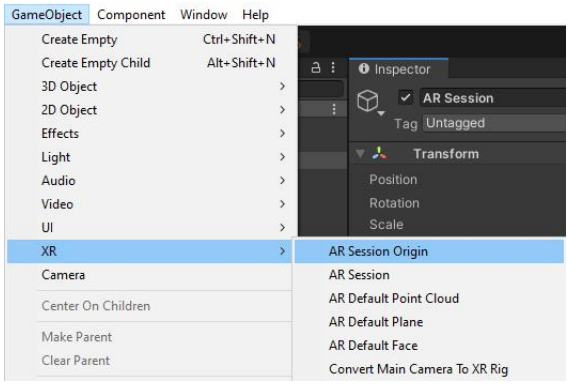
- Add the AR Session to your Scene by clicking GameObject > XR > AR Session



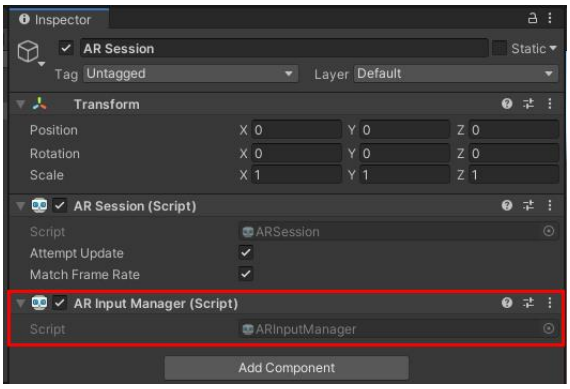
- If your AR session does not have an AR Input Manager, add it by clicking Add Component and searching for AR Input Manager. The AR Input Manager handles all of your scene input so you can interact with trackable objects, such as planes and features points



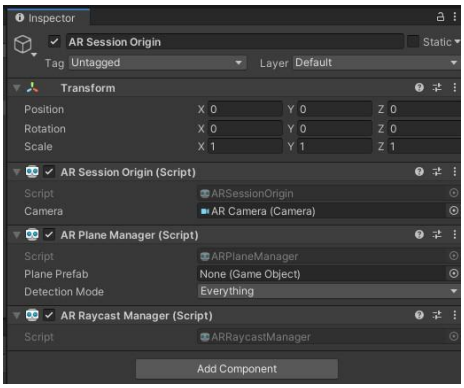
- Add the AR Session Origin GameObject to the Scene by clicking GameObject > XR > AR Seassion Origin



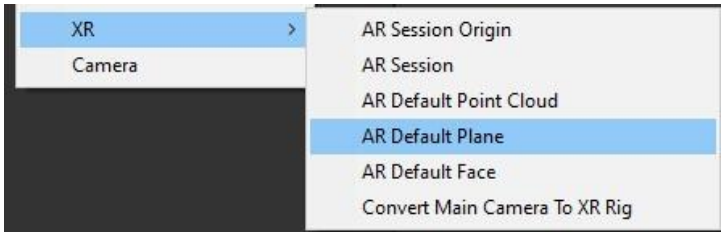
- In the AR Session Origin Inspector, make sure AR Camera is set as the reference in the AR Session Origin Camera parameter



- To enable plane detection in your AR Scene, add the AR Plane Manager to the AR Session Origin object
- Specify the AR Plane Manager to detect vertical and horizontal planes by adjusting its DetectionMode to Everything
- To interact with trackable features, add the AR Raycast Manager
- Your AR Session Origin object should look like the following



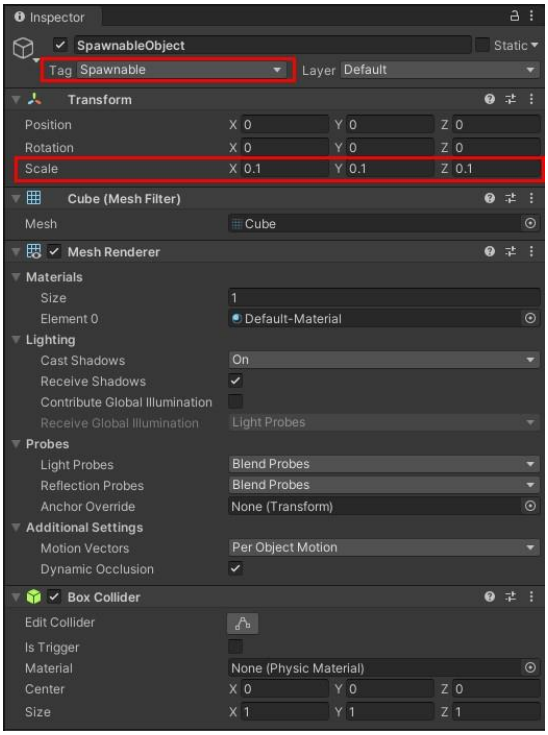
- We will need a plane Prefab so the AR Plane Manager script can display the location of the planes in our AR Scenes. In the Hierarchy, right-click and select XR > AR Default Plane



- Drag the new plane from the Hierarchy into the Project window to create a Prefab and delete it from the Hierarchy
- In the AR Plane Manager script, assign the AR Default Plane Prefab from the Project window to the Plane Prefab variable in the inspector

- We need an object to spawn in our Scene. Create a Cube and name it SpawnableObject
- Set the scale to 0.1, 0.1, 0.1

- Create a tag named Spawnable and assign it to SpawnableObject. You can use that tag in the future projects to tell when a ray hits one of these Prefabs
- Drag SpawnableObject from the Hierarchy into the Project window to create a Prefab and then delete SpawnableObject from the Hierarchy



- Create a C# script and name it SpawnableManager
- Create an Empty Game Object in your Scene and name it SpawnManager
- Assign the SpawnableManager script to your SpawnManager object
- Open the SpawnableManager script
- At the top add:

```
using UnityEngine.XR.ARFoundation;
```

```
[SerializeField]
ARRaycastManager m_RaycastManager;
List<ARRaycastHit> m_Hits = new List<ARRaycastHit>();
[SerializeField]
GameObject spawnablePrefab;

GameObject spawnedObject;
```

```
spawnedObject = null;
```

```
(Input.touchCount == 0)
 return;

(m_RaycastManager.Raycast(Input.GetTouch(0).position, m_Hits))

 if(Input.GetTouch(0).phase == TouchPhase.Began)
 {
     SpawnPrefab(m_Hits[0].pose.position);
 }
 else if(Input.GetTouch(0).phase == TouchPhase.Moved && spawnedObject
 {
     spawnedObject.transform.position = m_Hits[0].pose.position;
 }
 if(Input.GetTouch(0).phase == TouchPhase.Ended)
 {
     spawnedObject = null;
  }
```

```
private void SpawnPrefab(Vector3 spawnPosition)
{
    spawnedObject = Instantiate(spawnablePrefab, spawnPosition, Quaternion.identity);
}
```

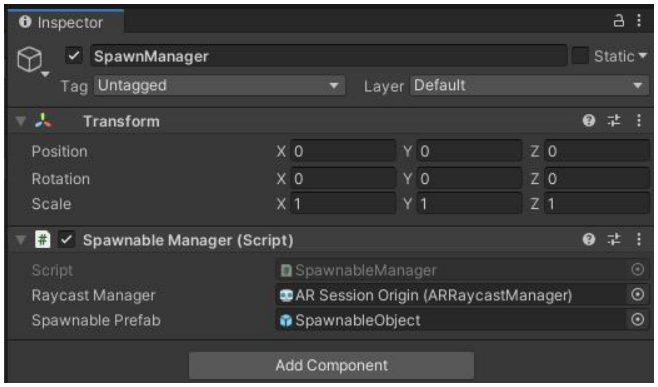
- This is the script

SpawnableManager.cs

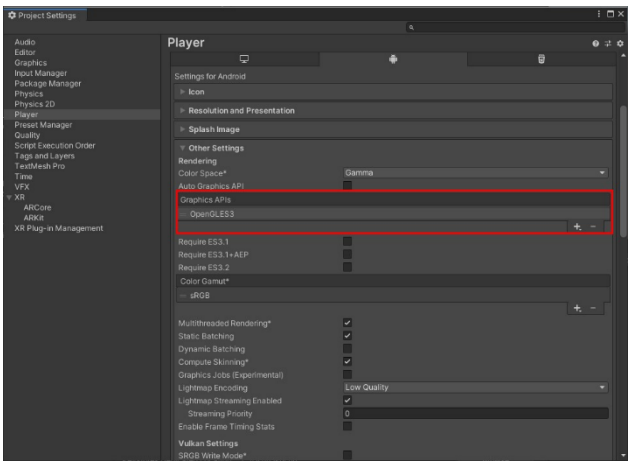
Assembly-CSharp | SpawnableManager | Update()

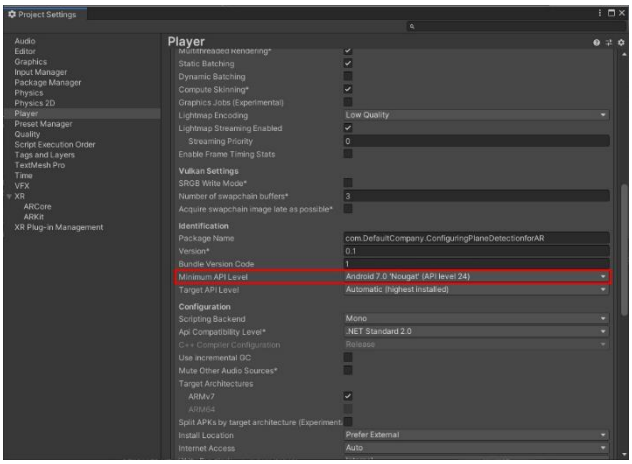
```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.XR.ARFoundation;

public class SpawnableManager : MonoBehaviour
{
    [SerializeField]
    ARRaycastManager m_RaycastManager;
    List<ARRaycastHit> m_Hits = new List<ARRaycastHit>();
    [SerializeField]
    GameObject spawnablePrefab;

    GameObject spawnedObject;

    // Start is called before the first frame update
    void Start()
    {
        spawnedObject = null;
    }

    // Update is called once per frame
    void Update()
    {
        if (Input.touchCount == 0)
            return;

        if (m_RaycastManager.Raycast(Input.GetTouch(0).position, m_Hits))
        {
            if(Input.GetTouch(0).phase == TouchPhase.Began)
            {
                SpawnPrefab(m_Hits[0].pose.position);
            }
            else if(Input.GetTouch(0).phase == TouchPhase.Moved && spawnedObject != null)
            {
                spawnedObject.transform.position = m_Hits[0].pose.position;
            }
            if(Input.GetTouch(0).phase == TouchPhase.Ended)
            {
                spawnedObject = null;
            }
        }
    }

    private void SpawnPrefab(Vector3 spawnPosition)
    {
        spawnedObject = Instantiate(spawnablePrefab, spawnPosition, Quaternion.identity);
    }
}

```

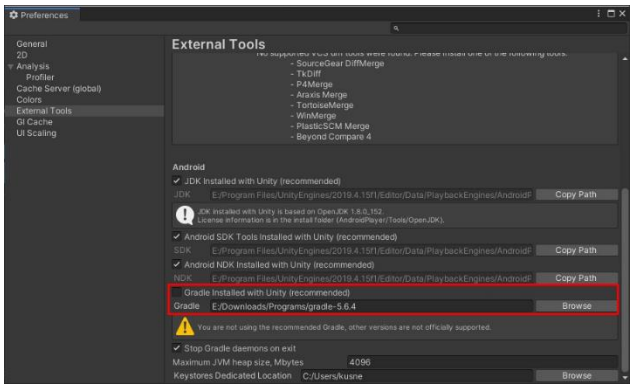
- In your SpawnableManger script on the SpawManager object, drag the AR Session Origin object from the Hierarchy into the Raycast Manager variable in the inspector
- Drag the SpawnableObject Prefab from the Project window into the Spawnable Prefab variable



- Configuring your build settings for Android
- Go to Edit > Project Settings > Player > Other settings and go to the Graphics APIs section, remove Vulkan API from the list







❖ Final Assessment task

Title of the activity	**Augmented reality**
Aim of the activity	To learn about AR
Material required	Unity, PC, android
Time required	4 didactic periods
Format	document
Description of the activity	Create their our AR game in Unity

❖ Further reading and resources

site	Wikipedia
site	Instantiating AR Models into a Virtual Scene - Unity Learn

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