



**Technical University of Crete**  
**Master in Technology and Innovation Management**  
**Master Thesis**

**Innovative and unique capabilities for efficient remote teaching utilizing modern technologies**  
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"In learning, you will teach, and in teaching, you will learn."

*Phil Collins*

*This Master's Thesis is dedicated to my  
family and those who support,  
guide and believe in me.*

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# Curriculum Vitae



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# Abstract

This Master's Thesis objective initially provides an overview of today's learning theories and teaching methods. It will highlight the revolution distance learning brought to education by presenting the advantages of online learning. Moreover, it will provide distance learning market insights and trends, thus giving a holistic approach to learning today and future trends. Finally, we will showcase one of the primary industry concerns, IP management issues.

Keywords: Remote learning, Online learning, teaching methods, eLearning software

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## Abbreviation List

- ❖ STEM: Science, Technology, Engineering, Mathematics
- ❖ PBL: Problem-based learning
- ❖ OECD: Organization for Economic Co-operation and Development
- ❖ PISA: Program for International Student Assessment
- ❖ AI: Artificial Intelligence
- ❖ LMS: Learning Management System
- ❖ K12: Students from elementary, middle or junior high school and high school
- ❖ MOOC: Massive Open Online Course
- ❖ CMS: Content Management System
- ❖ LCMS: Learning Content Management System
- ❖ SCORM: Sharable Content Object Reference Model
- ❖ LXP: Learning Experience Platform
- ❖ VLE: Virtual Learning Environment
- ❖ API: Application Programming Interface
- ❖ HR: Human Resources
- ❖ TML: Talent Management Systems
- ❖ CRM: Customer Relationship Management
- ❖ SSO: Single Sign On
- ❖ B2C: Business to customer
- ❖ B2B: Business to business

# Introduction

This Master's thesis aims to give a clear insight *into the different remote teaching educational technologies, combinations and standard practices used today in the industry while highlighting the advantages of remote teaching*. Moreover, it focuses on Intellectual Property issues regarding remote teaching material and gives an insight into the growth rate of eLearning as an industry today.

Specifically, the first chapter will demonstrate the different learning theories and teaching methods while looking at the shift in the educational goals set today, leading to different practices compared to the past.

The second chapter will present a brief history of remote teaching while highlighting the revolution caused in learning today by the emergence of new educational technologies. It will categorize this technology based on its use and showcase some of the widely spread software used by organizations and academic institutions today. Finally, it will highlight the advantages of utilizing modern technologies in remote teaching.

The third chapter will present one of the most debated issues in the online learning industry today, Intellectual property and management issues, along with standard practices followed worldwide.

The fourth chapter will present the industry's growth rate along with industry opportunities and ways of launching a remote learning course.

Lastly, the final fifth chapter will present our conclusions and proposals for further studies and research on the subject.



# **Chapter 1. Learning Theories & Teaching Methods – From Education 1.0 to Education 4.0**

According to the Cambridge dictionary, "Learning is the process of understanding something by studying it or experience". However, learning is quite a different procedure for everyone. Factors affecting learning vary and can be classified into two main categories, internal and external.

Fundamental external factors include learning methods, pedagogical approaches, environmental influences and infrastructure. While on the other hand, essential internal factors include personal interests, motivation, intelligence and learning styles.

A carefully designed lesson plan can play a significant role in learning success since it can affect the internal and external factors mentioned above. Designing a lesson plan and adhering to it can be effective and practical, thus enriching the learning experience since learning is an interactive procedure.

Assessing different learning methods, approaches, and factors is a difficult-to-quantify procedure. At the same time, there is a plethora of theories of learning (dated back to the Plato era), each leading to different teaching methods.

Over the last decades, a considerable number of studies have been conducted to identify, categorize, verify and improve the learning process.

In fact, since the 1900s, intensive and constructive studies of how humans acquire knowledge have been made by universities, teachers, researchers, professors, and psychologists who have tried to identify, categorize, verify and improve our knowledge and understanding of how we learn.

This chapter will introduce some of the primary factors affecting learning.

# 1.1 Learning Theories

## ➤ Behaviorist Learning Theory

Behaviourism is one of the first modern schools of thought. Behavioural learning theories emphasize interactions (stimuli) caused to a person from the environment. Behaviourists have based their different theories on Wilhelm Wundt, "father of experimental psychology", who studied the human mind from an outside-in perspective, leading to objective measurements like reaction times and attention spans. His line of reasoning can be easily traced to the first theories of behaviourism (Feder, 2022a) that evolved in the late 1800s and in the early 1900s.

### ➤ Among the paramount ones are:

- ✓ Ivan Pavlov's classical conditioning basis is to produce an unconscious reflex response to a stimulus and then associate this response to another stimulus.
- ✓ Edward Thorndike's laws of effect and exercise. The law of effect states that behavioural responses which cause a satisfying result are more likely to be established. In contrast, the law of exercise states that behaviour is established through repetitive connections of stimulus and responses (Britannica, 2022).
- ✓ John B. Watson's methodological behaviourism. Watson's theory shifted to focus on observable behaviour and ways of controlling this behaviour.
- ✓ Burrhus Frederic Skinner's radical behaviourism and operant conditioning. Skinner's theory led to the principle of positive/negative reinforcements and positive/negative punishments and was densely influenced by Thorndike's laws. With his theory, Skinner claimed that consequences of behaviour could increase the chances of triggering a particular behaviour. Skinner divided behaviour into two types: respondent, an automatic behaviour based on human reflexes, and operant, a behaviour triggered by consciousness. He believed that the behaviour's consequences determine the chance of the behaviour's repetition (Cherry, 2022).



*Figure 1 Operant Conditioning Chamber or Skinner Box. Skinner's experiments on animals, held at Harvard University, verified his theory of reward and punishment mechanisms. (Bdoo8, Wikipedia)*

“Skinner box” by Bdoo8 is licensed under CC BY SA 3.0

### ➤ Cognitive learning theory

Jean Piaget founded cognitive learning theory in 1936. As the name suggests, Piaget's theory focuses on cognition which, according to Britannica.com, is "all conscious and unconscious processes by which knowledge is accumulated, such as perceiving, recognizing, conceiving and reasoning" (The Editors of Encyclopedia Britannica, 2022). Piaget's theory is implemented by breaking into simple basic units called schemas. As defined by Piaget, a schema is "a cohesive, repeatable action sequence possessing component actions that are tightly interconnected and governed by a core meaning" (Piaget, 1952, p. 7). This way, knowledge is organized in units via a schema, the basic building block of intelligent behaviour (The rTMS CENTRE, 2019).

To form a schema, Piaget indicates a four-step process which includes: assimilation, which is the cognitive process of associating previous and new knowledge, disequilibrium which is the disturbance caused when the newly acquired information is different from existing knowledge or schemas, accommodation which is the activity of resolving disequilibrium and result in creating a new schema and equilibrium which is the final step in the process, occurring when the person is capable of using the schemas describe what they understand (tutor2u, 2019).

Today, cognitive theory plays a vital role in education at all levels because it accepts the diversity of a person due to different experiences and previous knowledge. Moreover, it is used in many businesses and e-learning through self-paced program strategies and subject knowledge surveys (Feder, 2022b).

### ➤ Constructivism Theories

Strongly deriving from cognitive theory, constructivism combines both logical processes in learning (cognitive) and emotional characteristics of the learner, like beliefs and experience. Constructive theories include different strategies during the learning of a new subject. Principles include that knowledge is constructed, learning is contextual, an operational procedure and a social activity, while motivation is a key to learning. Constructivism can be divided into three categories, each following a different approach. Specifically, one constructivism type is Cognitive constructivism, which is based on Piaget's theory, thus focusing on connecting prior to new knowledge and adjusting their intelligence for better accommodation. Another type is social constructivism, developed by Lev Vygotsky, focusing on collaboration, peer-to-peer interaction, learning, and influence. Lastly, radical constructivism formed by Glasersfeld in 1974 gives a very different optic, supporting that knowledge is conceived and not uncovered.

Constructivism is e-learning friendly considering the approach due to the small numbers of students used in constructivist classrooms, interactive learning and student-centred approaches (Western Governors University, 2020a).

## ➤ Humanism Theory

Humanism as a learning theory relies heavily on free will, the capability of achieving the best if the environment supports the learner and that every person is fundamentally good. Focusing mainly on emotions and considering that humans are complex puts humanism as a theory to be quite the opposite compared to behaviourism. Abraham Maslow first expressed these principles in 1943. In his paper "A Theory of Human Motivation", in which he also introduced his hierarchy of needs, stating that people need to fulfil basic needs before moving to more advanced ones (Maslow, 1943; Crain, 2009; Duchesne et al., 2013; Veugelers, 2011; Drew, 2022). Carl Rogers, with his papers, supported humanism in education, highlighting the need for personal growth, the importance of freedom to learn, unconditional positive regard, and the need for teachers should act as facilitators instead of authority figures. Additionally, Roger believed in the intrinsic motivation of a person, which can be a dominant force if carefully cultured (Rogers, as cited in Schunk, 2012, p. 355; Drew, 2022).

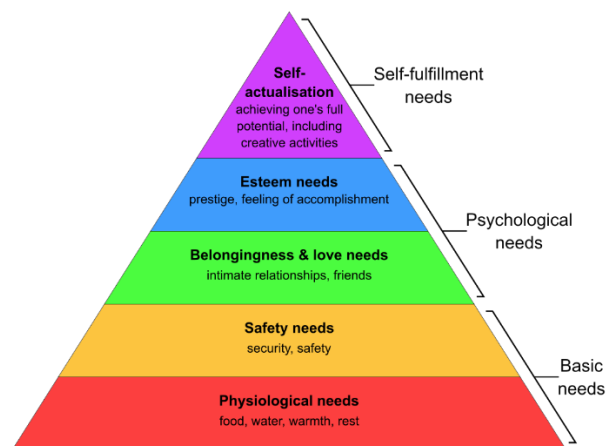


Figure 2 Maslow's Hierarchy of Needs, Source, Wikipedia

“Maslow's Hierarchy of Needs” by Androidmarsexpress is licensed under CC BY SA 4.0

It is widely accepted that humanism as a theory is holistic, considering all aspects of the learner. Its informal in-class proposed structure can restrict its use in certain teaching subjects, students' ages or even students without intrinsic desires for the subject taught (Drew, 2022).

➤ Connectivism

Connectivism is the newest among the major learning theories. George Siemens and Stephen Downes introduced them as a theory in 2004 and 2005. Connectivism promotes collaboration and diversity through discussion, decision-making and problem-solving. In this theory, learning students are considered nodes and can be linked to other objects like books, other persons, or sources of information. Learning occurs when links are formed between objects. It is obvious that with connectivism, social aspects and machine-based learning are essential for acquiring new knowledge. At the same time, both Downes and Siemens acknowledge the critical role of technology in today's learning procedure (Western Governors University, 2021c).

## 1.2 Teaching Methods

Learning theories give us understanding of how we learn and are indirectly applied in class via teaching methods. Teaching methods today can vary significantly based on the subject taught, the age of learners, student numbers and other factors.

Deciding which teaching methods apply best to a classroom can be challenging since learning is an interactive procedure with the learner playing a significant role in the process.

Today, there are many different teaching methods, but all can be classified into two major categories according to their teaching approach, teacher or student oriented. Below is a listing of today's practical teaching strategies, starting from teacher-oriented to more student-oriented methods (Karen L. Smith Faculty Center for Teaching and Learning, n.d.).

### ❖ Lecture – Showing/Telling

As the name suggests, the lecture teaching method is based on a direct approach reinforced by research. The lecturer connects the learning material and the learner by assisting without limiting learners to a passive role. Characteristics of this approach include independent practice, guided practice, demonstrations of a subject's approach and solution examples.

### ❖ Interactive Lecture

In interactive lectures, the techniques and methodologies are almost identical to lectures. The difference is the more collaborative approach of this method, implemented by using pooling or similar technology so that the lecturer takes feedback on performance and easiness of scalability.

### ❖ Flipped Classroom

As the name indicates, flipped classroom strategy is based on providing the educational content to the learner before the class. This content is usually provided online and in different formats and forms. The instructor holds a more advisory role in this teaching method, while extra caution should be given in preparing the educational content.

### ❖ Socratic Questioning

Named after the Greek philosopher Socrates, this method focuses on triggering the learner's critical thinking by carefully drafting questions while the instructor deliberately pretends ignorance.

#### ❖ Discussion-Based learning

This method promotes structured, goal-oriented discussion to showcase, test and apply newly acquired knowledge while improving this knowledge through collaborative learning and different points of view. Rubrics can be used as assisting tools for evaluation, held by a group of learners in rotating order.

#### ❖ Case-based learning

This method promotes learning through the use of simple or complex validated cases. The one-to-many format is widely used alongside polling technologies, while the process should include plenary sessions.

#### ❖ Collaborative learning

In collaborative learning, students are assigned in pairs or teams, and each can hold a specific role in group assignments or projects. This method is activity-oriented, STEM friendly and can assist weaker students.

#### ❖ Inquiry-based learning

With this strategy, the instructor aims at more self-directive approaches and critical-thinking development. Learners acquire more profound knowledge on the subject through enquiries and, to a lesser extent, the instructor's participation. This methodology shifts the responsibility for completing the tasks set to the learner. Standard practices used in this method include scenarios and worksheets. Emphasis should be given to the original learner's knowledge of the subject.

#### ❖ Problem-based learning

PBL can be quite a challenging method for implementation. Analogous to the case study method but with an intentional lack of guidance from the instructor aims to challenge learners by causing a deliberate struggle and leading to radical uncertainty. Group or pair structures can be used.

#### ❖ Project-based learning

A Problem-based look alike technique with a shift toward creating project deliverables. It promotes learner engagement and long-term learning, while peer-to-peer evaluation is often used (Karen L. Smith Faculty Center for Teaching and Learning, n.d.). Caution should be given so that the learner gives the same level of attention to academic content and creative production.

## 1.3 4Cs in Education – Skills of 21<sup>st</sup> Century

4Cs in education was proposed during the early 2000s by the US Ministry of Education, Apple, Microsoft, organizations and educational experts. Emerging new technologies, lifelong learning, and the demand for new skills led to re-evaluating the skillsets needed for the new century. Today, they are commonly accepted by many educational institutions.

The 4Cs in education include:

### ➤ Critical Thinking

The ability to think, analyze, evaluate and apply creative solutions. Aims to develop logical and constructive thinking in students through group work, brainstorming and decision-making.

### ➤ Communication.

Another skill essential to the 21<sup>st</sup> century is communication. Expressing ideas and demonstrating solutions and lines of thought are crucial in today's world. The ability to listen and communicate effectively via different forms of media in order to achieve the goals set is essential in problem-solving and collaboration.

### ➤ Collaboration

Learning to collaborate in the 21<sup>st</sup> century is an essential skill that needs to be cultivated during school years. Today, many jobs require team working, networking skills, and collective intelligence. importance of collaboration is depicted in classrooms in learner-centred teaching methods with teamwork projects, cooperative learning, peer-to-peer feedback, and digital collaboration.

### ➤ Creativity and Innovation

Creativity and innovation are of high importance today, commonly accepted as two of the most needing skills for a person. Today, many educational institutions try to cultivate these skills in their learners, while the importance of these skills can be easily understood in various assessments like OECD'S PISA test. Creativity and innovation promote entrepreneurship education, STEM education, design thinking and turning ideas into solutions.



## 1.4 From Education 1.0 to Education 4.0

Educators have recently been involved in changing the pedagogic approaches, teaching methods, tools, and lesson goals. Evaluation of how we learn has changed our approach, while structured studies and reports gave us powerful insights, evaluating, to an extent, how we learn.

This structural change can be noticed with the shift from Education 1.0 to today's education 4.0.

- ❖ In education, 1.0 students held a passive role, with the teacher being an authoritarian—a teacher-centred approach with a transmitter and a recipient.
- ❖ In education 2.0, limited use of technology, mainly as a tool, and collaborative approaches, signalled a change to a more student-centred approach.
- ❖ With education 3.0, students gained even more control through more active engagement in learning, greater control and the use of technology with a much more collaborative approach.
- ❖ Education 4.0 refers to today's approach, with AI, VR, and AR starting to play a significant role in learning. In addition, personalized and adaptive learning concepts play a significant role in the learning procedure.

# Chapter 2. Remote Learning

## ➤ A Brief History of Remote Teaching

Contrary to common belief, remote teaching origins in the 19<sup>th</sup> century via mail correspondence courses. The main reasons were economic, distance issues, and the need for teachers and instructors, especially in rural areas. Later on, radio and television educational programs were introduced in the 1920s and 1930s. In comparison, during the 1970s, new technologies like computers and the Internet gained ground and came into the service of remote teaching. A pioneering university was the University of Phoenix, one of the first institutions that offered online lessons, while in 1989, it launched utterly online bachelor's and master's degrees to the public. Today, remote learning is almost exclusively based on the Internet, thus commonly also referred to as e-learning and online learning, and is widely adopted in all educational levels and corporate training.

## 2.1 Types of remote learning lessons.

Various educational lessons are offered remotely, depending on the learning objectives. These lessons can be classified upon the co-existence of learner and instructor in a class simultaneously. Based on this, distance online learning is divided into synchronous and asynchronous. As the names suggest, asynchronous e-learning includes, among others, self-paced lessons, pre-recorded videos, and discussion boards. In contrast, synchronous lessons include virtual lectures, live webinars and generally simultaneous presence of the learner and instructor.

The most common lesson types used today are:

### ➤ Live Virtual training via video conferencing

Synchronous. Like in a traditional class, live virtual training involves presentations, iconic whiteboards and collective information sharing. The difference lies between the use of tools that can be used online in contrast to a whiteboard.

The instructor can use interactive books, embed interactive quizzes, and split learners into different rooms for collaborative studying or project-based learning.

Moreover, lesson recordings can be shared with students for later studies and revision purposes. This type of remote learning lesson is widely used today in corporate learning or seminar-type lessons named webinars.

Educational software type often used in this type of lesson: Video Conference tools.

➤ Interactive Tutorials

Both synchronous and asynchronous. Lessons include quizzes and other interactive elements like simulations, whiteboards, recordings, 3d books and generally all the educational software available today, aiming to make lessons more engaging.

While interactive tutorials aim to be user-friendly and easy for the user to engage with all the activities provided, course design, goals, learning path and educational software must be carefully chosen and implemented by the instructor to make the lessons efficient and effective.

Due to the variety of software tools and the combination of synchronous and unsynchronous remote teaching practices, interactive tutorials are widely used today, especially when the curriculum is extensive.

Educational software types often used in this lesson: All educational software types. LMSs, LXPs, or LCMSs educational platforms and software can be used to integrate other types of educational software and present the educational content in different formats.

➤ Video recordings

Unsynchronous. A great tool, widely used today in k-12 education, colleges, online degrees and corporate learning. With recordings, the learner can learn at their own pace, while this type of remote lesson offers revisions, interaction with branching narratives, plot creating and microlearning.

Specifically, video recordings are relatively easy to create compared to other remote lesson types. With video recordings, a complex topic can be fractured into small parts (microlearning), allowing the learner to revise specific parts at any time. Moreover, it can offer visualization compared to typical text formats while adding a personal experience to the learner.

Educational software is often used in this lesson: Video conferencing and video editing tools can be used to record the videos for this type of lesson.

➤ Massive open online courses -MOOCs

MOOCs are a widespread online type of lesson and can include all the tools and activities used in remote learning. They are offered by individuals, organizations and universities and can be paid or free. They are usually offered asynchronously, but synchronous methods can be used too.

MOOCs usually aim to broaden knowledge around a specific topic, build new skills or upskill. Mainly addressing adults, MOOCs are usually more corporate or academically oriented lessons.

Today there is a wide variety of MOOC lessons offered remotely with many variations on software and structure used. Commonly MOOCs have a starting or ending date and are self-paced, while some offer credits or certifications upon completion.

Educational software types often used in this lesson: All educational software types. LMSs, LXPs, or LCMSs educational platforms and software can be used as a basis. MOOCs are most commonly offered via the unsynchronous method.

➤ Gamification

Both asynchronous and synchronous. Game design and mechanics are used in this type of online learning in order to make the content and educational procedure more interactive and entertaining. Game-like environments, challenges, competitions, badges, awards and rewards can be used to apply this type of learning.

Educational software type often used in this type of lesson: There are many different types of educational software used for different extend and purposes of gamification today. Typical LMSs can use simple gamification aspects like badges, rewards and leaderboards, while platforms like Kahoot<sup>1</sup> can turn interactive quizzes into a game-like experience. Finally, gamification platforms and game engines are widely used to offer gamified learning experiences through avatars and simulations.

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<sup>1</sup> <https://kahoot.com/schools-u/> Kahoot gaming platform

## 2.2 eLearning software

### LMSs

Offering capabilities of creating, delivering and managing courses made LMSs very popular among k12 educational institutions, colleges, universities and corporate learning. LMS platforms are the backbone of a well-structured online course.

- ✓ Key features include
- ✓ interactive quizzes,
- ✓ various assignment types,
- ✓ SCORM integration,
- ✓ add-on editors, wikis, forums,
- ✓ chat,
- ✓ 3D books integration,
- ✓ peer-to-peer assessments,
- ✓ analytics
- ✓ and reports,
- ✓ progress tracking and valuable insights.

#### Characteristic Cases

##### ➤ Blackboard Learn: [Link](#)

One of the best well-known LMSs, Blackboard Learn, includes:

- ✓ course content management,
- ✓ communication and collaboration tools,
- ✓ assessment and grading,
- ✓ analytics

While it is:

- ✓ mobile-friendly and
- ✓ offers integration options with SSO login.

##### ➤ Google Classroom: [Link](#)

Economical, easy-to-use LMS offered by Google, Classroom offers many of the characteristics of an LMS, like:

- ✓ communication tools,
- ✓ assignment management,
- ✓ integration with other Google apps,
- ✓ content management,
- ✓ analytics and reporting for tracking performance.

## CMSs

CM systems are used for managing and organizing different types of educational media content. CM systems can be used as independent software or integrated into LMS platforms. Among the key features offered are

- ✓ media management,
- ✓ analytics and engagement reports,
- ✓ content organization and
- ✓ authoring tools.

### Characteristic Case

- WordPress: [Link](#)

Started as an open-source blogging tool, WordPress today is one of the most famous online website creation platforms. At the same time, its CMS's features are ideal for assignments, blogging and collaboration.

## LCMS

LCMS are a combination of LMS and CMS. Often, LCMSs are also referred and simply as LMSs.

### Characteristic Case

- Edapp: [Link](#)

Key features include:

- ✓ SCORM-compliant authoring tool
- ✓ Quizzes
- ✓ Gamification features
- ✓ Course library

## LXPs

LXPs are a more corporate-oriented type of LMS. Focusing more on engagement, personalization and increased interaction than LCMs and LMs, LXPs offer content recommendations to the learner while focusing on micro-learning and gamification.

LXPs are:

- ✓ More learner-driven than LMS,
- ✓ focusing on UX and UI to give responsiveness and integration
- ✓ compatible with HRs, CRMs and HTML
- ✓ corporate training-oriented
- ✓ more responsive and mobile-friendly compared to an LMS.

## Characteristic Cases

### ➤ Docebo: Link

An AI-powered LXP with automation and gamification features. Docebo's powerful AI offers the learners personalized content based on previous training, skills and interests alongside powerful dynamic reports.

### Udemy Business: Link

Among the most famous LXPs, Udemy business offers state-of-the-art design and technology with learning path scenarios, detailed analytics and integrations.

## VLEs

VLEs focus more on collaboration and communication tools and learning approaches, including chats, emails, forums and video conferencing, along with the rest of the features of an LMS.

### ➤ Moodle: Link

One of the most famous VLEs, often referred to, and as LMS, Moodle combines all the features of an LMS with CMS capabilities, including

- ✓ personalized learning,
- ✓ integration with video conference tools,
- ✓ math editors,
- ✓ plugins,
- ✓ easy customization.
- ✓ 3d book integration
- ✓ Rubric
- ✓ SCORM packages

## Video Conference tools

As the name suggests, video conferencing tools are software used in synchronous classroom environments for real-time collaboration, screen sharing, and video recording. At the same time, many of them include polls and breakout rooms.

## Characteristic Cases

### ➤ Blackboard Collaborate: Link

Key features of this widely spread video conference tool include:

- ✓ a whiteboard,
- ✓ screen sharing,
- ✓ breakout rooms,
- ✓ polls and quizzes,
- ✓ integration with LMS and
- ✓ a mobile app.
- ✓ Moreover, captioning and recording support along with cloud drives integration.

➤ Zoom: Link & Google Meet: Link

These video-conferencing apps gained much ground compared to the competition during the covid19 pandemic. Offering similar features with Blackboard collaborate is considered among the most usable VC used today, with Google meet offering impressively large viewer numbers and good stability during the connections.

## STEM

STEM software is not a mere distance learning software category but should be mentioned due to the wide use of this type of software in distance learning. STEMs offer

- ✓ interactive simulations,
- ✓ bringing real-world scenarios online through visualizations.

Moreover, many STEM software offer

- ✓ virtual lab capabilities helping students to apply their skills, do experiments and measurements and collaborate with peers.
- ✓ AI to personalize each student's learning path.

### Characteristic Case

➤ GeoGebra: Link

A powerful free-to-use STEM software focused on but not limited to, mathematics and algebra. Widely spread among the teachers and students with a vibrant community that supports knowledge sharing through thousands of experiments available to all its users.

## Gamification Tools

As the name suggests, gamification software aims to add interaction and fun to the learning process. Gamification tools today can have vast differences from one another, but standard key features include:

- ✓ Visualization



- ✓ Graphics design
- ✓ Avatars, Characters, Cartoons or badges
- ✓ Collaborative tools
- ✓ Progress reports
- ✓ Leaderboards and score track

#### Characteristic case

- Classcraft: [Link](#)

A widely used educational software offering avatars, levelling and upgrading characters, leaderboards, collaborative tools, personalized learning quests, gamified classroom management, and integration with other educational software, among other features.

- Kahoot: [Link](#)

A game-based learning software with a robust educator community. Student assessment turns into fun through peer-to-peer competitive quizzes and awards.

## 2.3 eLearning Trends

Industry trends today focus on the following technologies:

### ❖ Automation / AI / Machine Learning

Developing and implementing AI and machine learning is one of the primary goals for online learning software companies today. Automating tasks and processes is crucial in today's significant data era of online learning. Instructors and organizations are interested in valuable insights instead of raw data and learner progress reports. Towards this direction, progress has been made in the latest years, and the use of this type of technology has already emerged in some software by implementing basic concepts and adding another arrow in the quiver.

Specifically, with the use of these technologies, remote learning industry organizations and experts expect:

Automation / Artificial Intelligence and Machine Learning aim at:

- ✓ Improved student engagement
- ✓ Adaptive learning

### ❖ Virtual and Augmented reality

Enabling virtual and augmented reality in online learning is a short-medium goal for industry leaders. Augmented reality provides the capabilities of:

- ✓ inlaying online learning content to the real world,
- ✓ make learning more interactive, thus, more efficient.
- ✓ Emerging 3d objects in the real world, enhancing microlearning.

On the other hand, virtual reality offers to

- ✓ create a highly interactive experience, combined with 3d graphics and the real world, leading to better absorbance of new knowledge.
- ✓ Learning by doing approach.
- ✓ Gamification techniques.

## 2.4 Advantages and Disadvantages of Remote Learning

Summarizing previous chapters, we can perceive the advantages remote teaching offers today:

- ✓ Powerful insights on tracking learner's progress: In remote learning with appropriate software, instructors, organizations and institutions can have valuable, graphical automated and personalized insights.
- ✓ Valuable tools in making the lesson more learner-oriented: Quizzes, gamification, 3d books and any interactive activity and content format make remote teaching more learner-oriented than traditional in-classroom lectures. Moreover, with educational software like LMSs and asynchronous remote teaching methods, the learning experience is self-paced, thus more learner-oriented.
- ✓ Increased interaction: Many remote teaching techniques and software offer interaction between the content and the learner. Personalized learning paths in e-books, gamification, polls and quizzes are only some of the tools an instructor can use in remote learning compared to less or non-interactive notebooks, books and more time-consuming in-class assignments and tests. A report from the Research Institute of America showcased the increased retention rates in remote learning to be as high as 25%-60% compared to 8-10% in traditional classrooms.
- ✓ Time effective: Remote learning is more time efficient due to the lack of transportation needs, while with self-paced techniques, each learner can proceed with the content at their own will, focusing this way on the aspects he wants to revise or simply completing the tasks at his own time. A Brandon-Hall<sup>2</sup> study showcased that eLearning lessons can save around 40-60% of the time compared to traditional in-classroom ones.
- ✓ Cost-effective: Most corporate, academic, and MOOC programs are much more affordable when implemented via remote learning methods. Mainly due to the reduced cost of infrastructures, combined with a higher number of participants enrollment and the lack of additional expenses by the learner (transportation, printing).
- ✓ Flipped Classroom: Flipped classroom and project-based teaching methods are gaining popularity nowadays, providing educational material to the learner

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<sup>2</sup> <https://www.brandonhall.com/> Brandon Hall's

before the online, face-to-face interaction with the instructor. After that, the teacher holds a more guiding and observant role while learners are involved in experiments, debates and presentations. Again, remote's learning technology and interactive educational content are ideal for this type of learning.

- ✓ **Project-based methods:** Project-based learning involves concepts like critical thinking, collaboration, research and highly engaging lessons. All these concepts are easier implemented via educational technology and, more specifically, through breakout rooms, technology, and peer-to-peer assessments.
- ✓ **Adaptive and Personalized Learning:** Each person learns differently. Different attention spans, prior knowledge, talent, interests or even the learner's mood cause the need for additional guidance and teaching methods. With remote learning, adaptive and personalized learning is much easier to implement into the learning procedure with interactive educational content leading to different educational paths. Moreover, progress reports can highlight the needs of each learner and address them accordingly.
- ✓ **Microlearning:** Lesson planning and instructional design techniques combined with the use of educational software like video recording tools, LMSs and visualization tools can break down complex topics and present them in a much more well-structured and diverse way (audio, visuals, and interactive material), resulting in a much more efficient level of understanding by the learner.
- ✓ **Easier and more effective studying for the learner:** Studying is a vital process in learning. Leads a learner from understanding to knowing a subject. Studying and practising with remote learning can be more effective and time-efficient due to the plethora of study material and the advantages of an interactive content format.
- ✓ **Experimenting with virtual labs software and gamification:** STEM lessons become more efficient with project-based learning, visualization and experimenting with the newly acquired knowledge. The lack of infrastructure in a traditional classroom, high student numbers per class, and the ability to experiment at any time with remote learning make online learning ideal for this type of lesson.
- ✓ **Greater use of Edu 4.0 approaches:** As presented in the first chapter, Edu 4.0 approaches include concepts like adaptive learning, which are much easier to be used in remote learning via AI and educational software.

- ✓ Skills enhancement: Building new skills or upskilling is a constantly enlarging learning industry segment. Practical approaches and self-paced learning are needed for more efficient learning results, and remote learning tools, educational content structure and philosophy are ideal for this learning objective.
- ✓ Elimination of geographic boundaries: Remote learning eliminates geographic boundaries, allowing the learner to choose between an immense option of educational programs tailored to his personal needs.

On the other hand, there are several disadvantages derived from the remote learning method, including:

- ✓ Demand for self-discipline: Learner-oriented approaches used extensively in remote learning can often lead to having some of the learners stay behind. A high level of self-discipline or collaborative techniques should be included for remote learning to be efficient for all learners.
- ✓ Lack of structure and software used: Remote learning is much more demanding regarding the instructional design of a lesson, thus making planning much more time-consuming and vital. The variety of content formats, software and techniques involved need a more detailed structure and design from the instructor, often leading to poor learning results when this issue needs to be adequately addressed.
- ✓ Lack of expertise: An educator should be trained to implement the proper techniques, methods, tools and class management.
- ✓ Social-Distancing: Remote learning, especially in K12 education, can lead to isolation due to lacking personal touch with peers.

Author's point of view:

- ❖ In most cases, remote learning is the ideal way of learning regarding corporate learning, MOOCs, webinars and academic lessons. This assumption can be derived from the learner's needs and the variety of tools and methods available today in remote learning.
- ❖ In K12 education, especially at younger ages, traditional learning cannot be substituted due to the importance of social aspects and the need for more teacher-centred approaches.

- ❖ On the contrary, STEM and project-based lessons can successfully be implemented in K12 education through remote learning with careful planning and implementation.
- ❖ Remote learning has offered the opportunity for many learners around the world to learn and self-improve. Less cost, time and geographical reasons are the critical reasons which make remote learning more equality oriented.
- ❖ Most of the remote teaching advantages derive from the proper use of educational tools and careful segmentation and creation of educational content. A remote learning lesson should be meticulously planned and managed.
- ❖ The advance of technology today will continue to increase and establish remote's learning advantages in the upcoming years.

## **2.5 Lesson Planning & Instructional Design in Remote Teaching**

- Lesson planning refers to the learning objectives, assessments, measurements and progress included in a detailed lesson-by-lesson plan.
- Instructional design is the holistic procedure of content, methods, and educational needs design, including a program's or course's overall learning goals.

Lesson planning was always important in the efficiency of the learning procedure. With lesson planning:

- ✓ Ensuring learning objectives becomes easy
- ✓ Effectiveness and efficiency are easier measured
- ✓ Students with special needs participate on equal terms having greater access to the learning procedure
- ✓ Engagement and motivation are easier to achieve

While with Instructional Design:

- ✓ Overall objectives are set
- ✓ Teaching methods and approaches are planned
- ✓ Implementation and evaluation are defined

Importance of instructional design and lesson planning in remote learning

Instructional design and lesson planning in remote teaching can be more challenging compared to traditional due to the following:

- ✓ The higher level of learner-centred approach
  - ✓ The personalized and adaptive learning demand
  - ✓ The broad and carefully planned use of educational technology in order to make use of the advantages that it can offer
  - ✓ The creation of interactive media, multimedia and activities
  - ✓ The need to provide autonomy to the learner but with guidance
  - ✓ The need to make use of the reporting tools and powerful insight that educational technology offers to the instructor or institution
- 
- ❖ Academic institutions and instructors widely accept that planning and creating a distance learning course requires much more time and resources than a traditional one.
  - ❖ The growing importance of lesson planning and instructional design has led to the emergence of a new profession, the instructional designer. Significantly boosted by the extensive use and growth rate of remote teaching today, the United States Department of Labor's Bureau of Labor Statistics forecasts a 13% job growth in the already widely-spread instructional design profession.

# Chapter 3. Intellectual property in remote learning

## Intellectual Property Definition

### Intellectual Property:

- ❖ Refers to creations like inventions, symbols, names, images and designs.
- ❖ Patents, copyrights, trademarks, legal rights and trade secrets protect it,
- ❖ Gives control of use and distribution to creators or owners.

## 3.1 Intellectual Property in Remote learning

Intellectual property in remote learning can be extra challenging for organizations, institutions, professors, teachers and content creators. A significant reason is the different formats and number of active parts in the equation. Remote learning material involves a significant number of professionals involved in its creation. Instructional designers, professors, teachers, institutions, and learners must agree on a clear Ownership and user agreement. Many discussions and debates took place around this topic, focusing on private and public content and what educational material can be used among organizations and institutions (Renner, 2015).

- ❖ Copyrights in eLearning – Universities, Colleges and Academic Institutions
  - Copyright refers to the legal protection of material, recordings, video, software and original works of authorship. Since most of these formats are used in remote learning, copyright is vital for online learning material. Reproducing, displaying and distributing content for eLearning courses is forbidden without permission.
  - Historically, institutions and educational organizations do not claim rights to coursework material like books, notes and syllabi. In contrast, in cases they do, the Statement of Principle on Academic Freedom and Tenure gives them the right to alter and modify this material under the academic freedom principle (Renner, 2016).
  - Distance learning has challenged this status since coursework content can now take different media forms, with inventive elements at times, which are easily sharable through the Internet (Renner, 2016).
  - In order to avoid concerns about ownership rights: clear agreements should take place prior to the development of the educational content



and especially in terms of the creation of derivative work, recognition, updating, ownership and sharing (Renner, 2016).

#### ❖ Copyrights in eLearning

- Clear user agreements should be distributed to learners and users regarding educational content offered in eLearning platforms, stating intellectual property ownership.
- Assignments and license procedures should be followed. Assignment refers to the ownership change, while licenses include permission or, in the case of an exclusive license, sole permission of use for a certain period (Mehrpooyan & Razavi, 2014).

As proposed by Good Practice Guidance for senior managers report of the Working Group and Higher Education Council for England (Working Group, Hefce, 2003), a copyright agreement should include aspects of -but not be limited to:

- ✓ Performer's rights in case of video footage of lectures
- ✓ Agreement on IPR issues when the academic person or team created the learning material leaves the institution
- ✓ Explicit reference of ownership rights in the employment agreement between the institution and the instructor, even if, by default, the creator does not own the IPR rights of created content made during employment.
- ✓ In the case of students' participation in content creation, a similar-to-the-staff contract should be signed without the student being forced to, while a fair share should be given to the student in case of commercial exploitation.
- ✓ In case of an Institution decides not to commercialize the material produced and the creators wish to, Institutions should allow the rights reversion. In contrast, the creators should grant the institutions a royalty-free license for the university's users.
- ✓ In the case of collaborative projects, sharing of rewards and apparent IPR issues should be addressed. Especially in the case of international collaborations recommendation for legal advice is proposed (Working Group, 2003)

#### ❖ Trademarks in eLearning

Trademarks in eLearning are as crucial as in other industries. They allow companies to protect their trademarks like names, logos, mottos, course names or platform names from the competition, helping them build a distinguished brand name. Restrictions on specific names or logos apply, while the procedure of trademarking can be complex in some cases.

#### ❖ Patents in eLearning

A patent, as a form of an exclusive license protecting an invention or a process in eLearning, can be used for interactive learning software, platforms, simulations and educational games. At the same time, it can be costly and time-consuming. It is a rare procedure in the industry due to specific criteria that must be met for educational software to be eligible for patent approval.

#### Author's point of view

Today, different and newly invented media formats of remote learning content, increasing collaborative and team-created material and the constant need to update the educational content produced to be up-to-date raise intellectual property issues that are hard to address after the release of content. Moreover, every intellectual property is unique and uniquely made. Thus, standardized procedures cannot be regulated. Industry experts, designers, instructors, and teachers should raise awareness of the topic to mitigate the negative consequences and avoid possible friction between the involved parts. Authorities and officials should develop standardized good practices and instructions to provide the much-needed guidelines regarding IP issues in remote learning, offering a certain level of automation in the process.

# Chapter 4. eLearning as an industry: Market size & Growth rate

## 4.1 Remote Learning as an industry

- Remote learning as an industry dates back to the establishment of the Open University in Britain in 1970.
- By 2001 in the US alone, more than 40 billion dollars were spent on distance learning corporate programs by Fortune 500 companies (Stock McIsaac & Nirmalani Gunawardena, 2001).
- The evolution of new technologies during the 90s and 00s boosted the industry's growth rate, with academic institutions and companies starting to shift focus on remote learning due to time and cost-effective reasons and geographical boundaries elimination.
- During the 00s to 10s growth rate of eLearning skyrocketed, and new technologies eliminated geographical restrictions.
- During the 10s to 20s, new educational technologies, Internet coverage and upgrade in matters of speed and geographical coverage assisted in further development in many more areas of the world while corporate learning and completely online courses and programs multiplied. Primarily due to the COVID-19 pandemic, distance learning's growth rates exceeded all market predictions.

## 4.2 Types of companies in the industry

Today, when referring to the distance learning industry, many types of organizations and companies are involved. Specifically, there are:

- ✓ Schools and academic institutions offer entirely online programs.
- ✓ Learning management system providers are companies developing, selling or offering the software platform for free (Moodle).
- ✓ Corporate learning providers are companies developing online learning programs for businesses.
- ✓ Online course providers are companies that create online courses and offer them to a client or the public and generally have both a b2c and b2b approach.
- ✓ Edtech companies provide learning apps and software.
- ✓ Video Conferencing companies provide educational software tailored for synchronous learning and training.
- ✓ E-textbook providers who sell digital textbooks and educational content
- ✓ Instructional designers whose purpose is to develop educational content and strategies used in a course for an institution or organization
- ✓ Freelance tutors.

Companies and websites offering marketing assistance or paid memberships to freelance tutors and instructional designers for acquiring customers are separate from the eLearning industry, even if their net income is strongly affiliated with eLearning.

## 4.3 Growth Rate and Projections

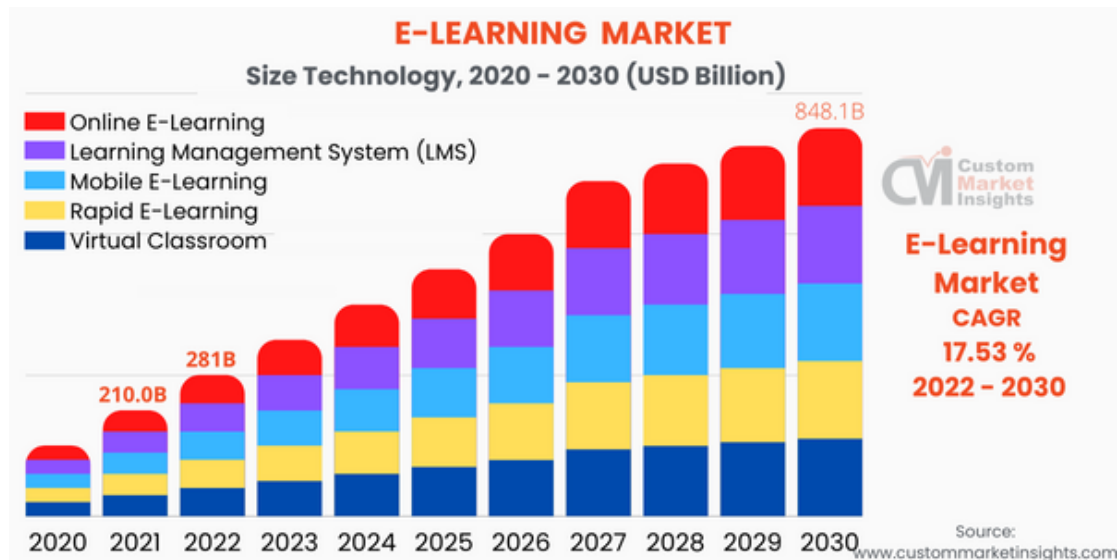


Figure 3 e-Learning Market (custommarketinsights.com, n.d.)

Source [custommarketinsights.com](http://custommarketinsights.com)

Critical insights can be extracted from the Custommarketinsights.com report, including:

- The eLearning market was estimated at 210 billion dollars in 2021, while today is estimated at 281 billion dollars (custommarketinsights, 2021).
- Projection to reach 848.1 billion by 2030, generating almost three times more than today in only seven years.
- On growth rate is at 17.53%
- Content-related overpowering service submarkets and margins are projected to increase 2030 by 38.59%.
- Validation that Europe is currently the largest market.
- Asia- Pacific is the fastest-growing market.
- LMSs are a leading technology in software types used today and are expected to expand further share in the market industry by up to 22.59%.

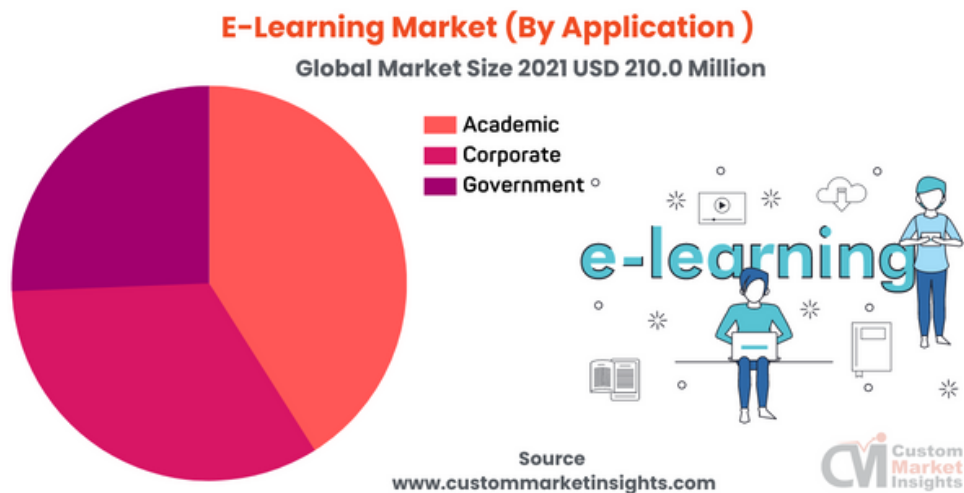


Figure 4 (custommarketingsights.com, n.d.)

Source [custommarketingsights.com](http://custommarketingsights.com)

- In terms of market segmentation by type, Academic services (including k-12) are expected to surpass government and corporate services and hold 34.78% of the market up to 2031.

## 4.4 Causes behind numbers

eLearning's impressive growth rates can be justified considering the following:

- ✓ It is time effective: In today's fast-paced world, time-saving is a determining factor in choosing a distance learning course, degree or MOOC. Moreover, studying in a self-paced is critical for many learners.
- ✓ Geographical reasons: People from rural areas or even big cities can attend classes from all over the world, in the subject they like, from the institutions they want.
- ✓ Method-efficiency: new technologies and educational tools provide quality learning.
- ✓ IoT, VR, AR, Big Data: 21<sup>st</sup> society is technology-oriented, and today's many leading technologies are or will be used extensively in remote learning, triggering a boost to the industry.
- ✓ Marketing: Many institutions, learning companies and instructors have shifted their focus to creating and promoting online lessons to acquire customers worldwide.
- ✓ Corporate Training: Companies prefer online programs due to lower costs and qualitative learning results.
- ✓ COVID19.

- ✓ Lifelong learning: Nowadays, many people choose and need to acquire new skills, upskill or proceed with higher-level studies.
- ✓ Generation change. The younger generations are technologically prolific.
- ✓ LMSs dominance shows the trend for well-structured lessons with high levels of integrations with other software, thus providing more holistic solutions.

# Chapter 5. Conclusion & Proposal for Further Research

## 5.1 Master's Thesis Conclusion:

Title: "Innovative and Unique Capabilities of Remote Teaching Utilizing Modern Technologies"

This study aimed to highlight the unique capabilities offered in remote teaching, focusing on the current state-of-the-art technologies. The study aimed to identify current and future educational technologies and methods. In addition, the present study examined how the combination of different learning theories, teaching methods and types of distance learning software can boost today's learner's experience and improve teaching. Good practices in IP management issues were also showcased, while future industry trends were presented regarding educational practices, technologies, and market growth.

### Conclusions derived from the study include:

- ✓ Technology's growth has boosted remote's learning effectiveness and efficiency. With new technologies emerging and involving, remote teaching is projected to dominate the future in learning.
- ✓ Qualitative advantages give the edge to eLearning compared to traditional learning in a vast category of today's education. Some characteristic cases are post-secondary and corporate segments, upskilling, webinars and MOOCs.
- ✓ Today's learning methods and approaches extensively focus on concepts like interaction, visualization, self-paced learning, gamification and adaptive learning. Remote learning overcomes traditional in-class learning in all of them with the proper use of educational technology.
- ✓ The intellectual Property issue is and will continue to be an essential aspect. The market's expansion will lead to a growing number of educational content created and offered to the public, while new technologies will bring different educational material formats.



### Author's point of view:

Remote teaching has caused a revolution in learning. Implementing new educational methods and approaches plays and will continue to play a significant role in improving our efficiency in teaching and learning.

Emerging educational technologies and tools will continue to boost eLearning acceptance and use among learners, teachers, companies, schools and academic institutions, increasing the industry's net and user numbers.

New insights into how we learn, adaptive learning and technologies like AI, AR, and VR will further enhance the learning experience and qualitative results.

K12's education traditional in-classroom method should and probably will not be replaced by remote learning, at least in the upcoming years. Though educational technology and remote teaching features should be included in the process, specific subjects could be offered via the remote method, especially lacking infrastructure. For example, a STEM lesson taught via a book or notes in a traditional classroom to higher k12 students more likely needs more efficiency compared to a remote learning teaching approach with micro-learning, project and research methods and STEM software use and approaches.

As proposed in the third chapter, IP issues should be addressed via awareness and guidelines offered by official institutions and organizations.

Finally, remote learning's global availability continues to provide opportunities to everyone, while the reduced cost of many types of lessons offers and will continue to offer equality in education.

## **5.2 Proposal for Further research**

1. Conduct in-depth interviews with industry leaders and experts to gather insights on the market's future.
2. Evaluate the effectiveness of a well-structured distance learning course in a Greek university compared to a traditional class using a representative sample of students.

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