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Learning Why to Learn

Definition of a Tool for Measuring Learning Motivation: Identifying Key Constructs and the Impact of Technology, Teaching Methods, and Course Organization on Learners



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Andrea Zilli Romanelli

Président du Jury :	**Madame Véronique CHANUT**
	Professeur, Université Paris Panthéon-Assas
Directeur de thèse :	**Monsieur Frank BOURNOIS**
	Professeur, Université Paris Panthéon-Assas
Co-Directeur de thèse :	**Monsieur Andrés DAVILA VALDIVIEZO**
	Professeur, ESCE, Psychologue
Rapporteurs :	**Madame Aline SCOUARNEC**
	Professeur, Université de Caen
	Monsieur Sébastien POINT
	Professeur, Université de Strasbourg
Suffragant :	**Madame Véronique CHANUT**
	Professeur, Université Paris Panthéon-Assas

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* * * *

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Résumé (1700 caractères) :

APPRENDRE POURQUOI APPRENDRE

Définition d'un outil de mesure de la motivation à l'apprentissage : Identification des concepts clés et impact de la technologie, des méthodes d'enseignement et de l'organisation des cours sur les apprenants

Dans un monde en constante évolution, l'apprentissage humain occupe une place centrale. La demande de nouvelles compétences nécessite une forte propension à apprendre. La motivation individuelle devient essentielle pour acquérir les compétences nécessaires sur le marché. Cette recherche vise à définir un système de mesure de la motivation individuelle à apprendre, utilisant diverses approches théoriques existantes et à vérifier si les construits théoriques avec des fonctions similaires performent de manière similaire pendant l'apprentissage. Enfin, elle examine si l'outil de mesure et la motivation sont affectés par différents niveaux d'utilisation de la technologie, des méthodes d'enseignement et de l'organisation des cours.

Sept théories sur la motivation à apprendre ont été identifiées, conduisant à 13 construits théoriques. Le système de mesure comprend 22 questions réparties en trois questionnaires à administrer au début, au milieu et à la fin d'un cours. La recherche a été menée dans une école de commerce en France et les 139 répondants étaient inscrits dans trois cours utilisant différentes approches pédagogiques : apprentissage actif, classe inversée et jeux éducatifs. L'analyse des données identifie les valeurs d'apprentissage, un état d'esprit de croissance et l'auto-efficacité comme des éléments clés soutenant la motivation. La validité de l'outil de mesure est prometteuse mais nécessite des améliorations dans le questionnaire de mi-parcours. Bien que l'utilisation de la technologie soit appréciée, elle n'est pas un facteur décisif ; une utilisation intensive de la technologie sans variation n'est pas valorisée par les étudiants.

Descripteurs :

Apprentissage, Motivation, Compétences, Théorie de l'apprentissage, Technologie éducative, Méthodes pédagogiques, Auto-efficacité, État d'esprit de croissance, Échelle de Likert, Analyse des données.

Title and Abstract (1700 characters):

LEARNING WHY TO LEARN

Definition of a Tool for Measuring Learning Motivation: Identifying Key Constructs and the Impact of Technology, Teaching Methods, and Course Organization on Learners.

In a constantly changing world, human learning takes center stage. The demand for new competencies requires a strong propensity to learn. Individual motivation becomes essential to acquire the necessary skills in the market. This research aims to define a system for measuring individual motivation to learn, using various existing theoretical approaches and to verify if theoretical constructs with similar functions perform similarly during learning. Finally, it examines whether the measurement tool and motivation are affected by different levels of technology use, teaching methods, and course organization.
Seven theories on learning motivation have been identified, leading to 13 theoretical constructs. The measurement system includes 22 questions distributed in three questionnaires administered at the beginning, middle, and end of a course. The research was conducted at a business school in France, and the 139 respondents were enrolled in three courses using different pedagogical approaches: active learning, flipped classroom, and educational games. Data analysis identifies learning values, a growth mindset, and self-efficacy as key elements supporting motivation. The validity of the measurement tool is promising but requires improvements in the mid-course questionnaire. Although technology use is appreciated, it is not a decisive factor; intensive use of technology without variation is not valued by students.

Keywords:
Learning, Motivation, Skills, Learning theory, Educational technology, Teaching methods, Self-efficacy, Growth mindset, Likert scale, Data analysis.

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Introduction

The subject of this research, Learning Why to Learn, has become increasingly relevant in a time of rapid and constant change. People at all career stages, from students to those approaching retirement, must be constantly learning new skills (reskilling) and refreshing their acquired skills (upskilling) to keep up with transformation and technological progress. In the years spent in Human Resources department and in Learning roles in large companies, I have had the opportunity to introduce new learning technologies, evaluate their validity, and sometimes be disappointed by them.

In the latter part of my career, as an entrepreneur, I had the chance to evaluate new technologies to engage participants in training courses. Additionally, as a teacher in a business school, I have firsthand experience with new pedagogical approaches that I had never used in the corporate world but would recommend adopting today.

The opportunity to perceive new needs and new teaching methods in companies, academia, and as a consultant has allowed me to evaluate the topic of learning in the 21st century from different perspectives.

The activity that least belongs to the cultural background of the author of this work is research. Transitioning from practice to the conception and scientific validation of a tool was not easy, but the learning journey was rich with satisfaction, difficulties, and, above all, learning.

In these introductory pages, I will outline the structure of the thesis, trying to explain the reasons behind this research and presenting the work, proceeding in the same order.

PART I: Context, challenges, and research question (chapters from 1 to 4)

During the years between the beginning and completion of this doctoral research, from 2020 to 2024, two events dramatically transformed our way of living, learning, and interacting with technology. First, the global health crisis from 2020 to 2021 (World Health Organization, 2020) abruptly introduced new forms of communication and learning, impacting individuals, institutions, and public and private organizations. Secondly, the launch of the Chat GPT platform (OpenAI, 2022) at the end of 2022 provided unprecedented access to the generative capabilities of artificial intelligence. Despite the limitations of this nascent technology, Chat GPT achieved unprecedented success and represents a turning point in information access and content generation.

These developments fit into the broader context of the 21st century, marked by rapid technological advancement and skill transformation. In an increasingly fast-paced world, individuals' adaptability is crucial (Friedman, 2017). This is evident in our daily lives as we strive to learn new technological solutions and services and in our professional lives, where new products, services, and platforms continually demand new skills.

The ability to adapt to a constantly changing environment requires continual updating of our skills, both technical and behavioral. In our private lives, failing to stay updated can limit our access to services, solutions, and the use of certain products. In our professional lives, however, the lack of continuous learning poses a serious risk of diminishing the worker's value, reducing their future employability, and potentially leading to job downgrading or even redundancy.

Lifelong learning (Delors, 2013) becomes a crucial aspect of organizational change and cultural mindset in the workplace. This urgency is further highlighted by the growing scarcity of updated skills (OECD, 2019), which, despite the efforts of academic institutions, still fails to bridge the gap between supply and demand.

To bridge this gap, we are witnessing significant investments from the business world (Cuckier, 2020). On one hand, there is a focus on accessing resources with market-ready skills, or "talents" (evident in the shift from "Recruitment" to "Talent Acquisition"). On the other hand, there is a push to update or overhaul the skills of existing employees within the company.

The world of learning is transforming in tandem with these changes (Pfeiffer, 2015). Digital distance learning has become a hallmark of the past two decades. The range of educational

offerings has expanded, learning environments have become mobile, and users have adapted their habits. Consequently, it is necessary to provide engaging content and learning pathways to align with a "learning experience" that captures the motivation and attention of learners.

In this context of high uncertainty and innovation, the health crisis marked a pivotal moment. Individuals, businesses, and academic institutions suddenly found themselves having to manage remotely all activities that had previously been conducted in person. The sudden shift to remote working was a forced and abrupt push to adopt behaviors and technologies, many of which had existed but were rarely or never used until that point. Consider videoconferencing, distance learning, and digital collaborative tools.

Another important consideration is the effectiveness of training interventions. In an environment that demands constant learning capabilities, there are mixed findings regarding the effectiveness of digital training courses. While there is a clear competitive advantage in terms of economic benefits—thanks to the low production costs and the ability to reach everyone quickly and remotely—alarming and contradictory data also emerge. Completion rates for distance learning courses are generally low, even when the quality of the content is high. It appears that, while digital learning is an efficient tool (Garrison & Kanuka, 2004) for training departments (considering production costs and delivery times), its effectiveness is less certain (Khalil & Ebner, 2014; Romero-Rodríguez et al., 2020).

What influences the effectiveness of learning today can be addressed both through classical definitions of effectiveness and through theories that consider how digital training is dependent on the attitude toward technology acceptance, as highlighted by theories like Technology Acceptance Model (Davis, 1989; Venkatesh & Bala, 2008) and Unified Theory of Acceptance and Use of Technology (Venkatesh et alii., 2003). Increasingly significant is the role of the individual in learning, not only as a recipient of skills but as an active participant in making learning choices and strategies.

Traditionally, learning has been associated with the term pedagogy, which emphasizes the centrality of the teacher in relation to the learner. However, the focus has shifted to the term andragogy, introduced by theories on adult learning (Knowles, 1975). The relationship with the instructor evolves, transforming them into a coach who aids and guides the choices of adult learners.

However, today, learning is available in many technological forms and through many channels accessible to almost everyone. Learners are beginning to see themselves as capable

of making the choices that best suit their needs without the need for a coach. In fact, they are becoming the coaches of their own choices, in what is known as the Heutagogy approach (Hase & Kenyon, 2000). This direction of autonomy and freedom of action aligns with all educational approaches under the 'DIY' (Do It Yourself) philosophy.

The centrality of the individual and their choices becomes essential in the face of such a wide and low-cost array of options. The results that an individual's motivation can sustain over time are one of the pillars of lifelong learning (Blaschke, 2021). This research fits within this context, exploring the question of why individuals invest their energies to learn. What drives someone to invest time and energy in learning? What sustains this drive for learning? To fully understand the scope of this research, it is important to make some semantic clarifications.

“Learning" and "to learn" have distinct meanings; "learning" as a noun refers to the process of acquiring knowledge or skills, while "to learn" as a verb describes the act of acquiring them. Understanding these differences is crucial for clarifying the research focus, which examines the individual's action of learning rather than the general process.

Understanding the difference between "why," "how," and "what" to learn is essential for effective education. The "what" to learn refers to the specific content, knowledge, or skills that one intends to acquire, such as learning to program in Python or studying Renaissance art history. The "how" to learn involves the methods and strategies used to acquire this knowledge, including instructional techniques, study methods, pedagogical approaches, and tools employed in the learning process. Examples include learning through online courses, participating in practical workshops, or using visual memorization techniques.

The "why" to learn, however, pertains to the motivations and purposes behind the desire to learn. It encompasses the reasons driving a person to acquire knowledge, which can range from personal, professional, social, or intellectual goals. Examples include learning to program to secure a better job, studying art history out of personal interest, or acquiring new skills to adapt to changes in the job market.

The "why" is considered the most critical among these elements for several reasons. It is closely tied to intrinsic motivation, which is a powerful force that sustains learning even when the content is challenging, or the process requires significant effort. When individuals have a clear understanding of why they are learning something, they are more motivated and engaged. Additionally, the "why" provides clear direction and purpose to learning, helping

to establish specific goals and maintain focus. Without a clear "why," the learning process can become disorganized and less effective.

Understanding the "why" also contributes to personal satisfaction and a sense of achievement. Knowing that one is learning to achieve a meaningful goal makes the entire process more rewarding, increasing perseverance and resilience in the face of difficulties. Furthermore, a strong "why" can help connect what is learned to practical, real-world applications, making learning more relevant and significant. When learners understand for which reason new knowledges or skills can be applied in their daily lives or professional settings, the learning becomes more meaningful.

In a rapidly evolving world, the "why" of learning helps individuals remain adaptable and open to growth. Awareness of the reasons for continuous learning encourages people to embrace new learning experiences and constantly develop their skills.

Therefore, the "why" of learning acts as the driving force behind the "what" and "how." Without a clear "why," the "what" and "how" can lose their significance and impact. Understanding and clearly articulating the "why" is thus essential for effective and meaningful learning.

In a lifelong learning context, it is not the single act of learning that truly matters. If that were the case, focusing on the "what" and the "how" would suffice. Instead, it involves a comprehensive approach that must change within the learner. It requires a genuine transformation of the individual's approach, sustained by the satisfaction of learning and the direction we wish to give to our learning journey.

Research Hypotheses to be Validated

This thesis, "Learning Why to Learn," is therefore a study on the motivation for learning. It explores the needs, as Maslow would put it, underlying human choices. What contributes most to an individual's motivation to learn? Science has provided many valid answers to this question, but typically, each answer has developed from a single perspective.

To delve deeper into this subject, we formulated three hypotheses. The first two aim to identify a tool to measure the motivation to learn and to identify the construct or constructs that most sustain it over time. The third hypothesis seeks to verify whether motivation varies when innovative technologies and teaching methods are used in the learning process.

Hypotheses are the following.

Hypothesis 1: *The creation of a tool for measuring learning motivation that utilizes different scientific approaches allows the identification of the constructs that most significantly contribute to learning motivation.*

Scientific literature has developed various theories on learning motivation, often treating them separately. Many studies have focused on individual theories or compared two approaches, but rarely considered a multi-faceted measurement of learning motivation. Notable exceptions include Deci and Ryan's Self-Determination Theory (SDT), which explores how intrinsic and extrinsic factors influence motivation by identifying three basic psychological needs: autonomy, competence, and relatedness. Similarly, Paul Pintrich's Motivational Self-Regulation Model integrates various motivational theories, offering a comprehensive view of how students regulate their motivation through cognitive, metacognitive, and behavioral processes. Combining these theories provides an ideal starting point for constructing a model to measure adult learning motivation, reflecting its complexity and multidimensionality.

To validate this hypothesis, we propose to construct a measurement system modeled on the different approaches that the literature has suggested regarding motivation to learn. This involves developing a tool that incorporates various theoretical frameworks on learning motivation. The aim is to validate or refute this hypothesis by evaluating the psychometric validity of the tool. This means assessing whether the tool accurately and reliably measures the constructs it is intended to measure and whether it can consistently identify the factors that most significantly support learning motivation over time.

Hypothesis 2: *Theoretical constructs on learning motivation that exhibit similar characteristics show the same performance during the learning process.*

This hypothesis posits that motivational constructs share commonalities across different scientific theories. Despite differing terminologies and approaches, there are cross-cutting elements, such as self-efficacy and the value attributed to learning, that are central to multiple theories. For instance, self-efficacy is key in both social learning theory and self-determination theory, while the value of learning is important in expectancy-value theory and self-determination theory. An integrated understanding of these constructs can provide a robust foundation for constructing a measurement model. Identifying and grouping these constructs into clusters that describe their nature and causal relationships with learning themes helps in understanding their impact on learning motivation.

Hypothesis 3: *Technology, teaching methods and organization influence learning motivation.*

This hypothesis introduces elements of the ongoing digital transformation, focusing on how technology and innovative teaching methods affect learning motivation. While previous hypotheses focused on learners' perceptions, beliefs, and goals, this hypothesis examines the external factors of technology and teaching methods and course organization. The digital transformation has significantly impacted education, making the learning experience more individualized and asynchronous. Technology can engage or isolate learners, and its effectiveness can vary depending on the phase of learning. Innovative teaching methods can create dynamics among participants, reverse traditional learning processes, and introduce diverse multimedia content. The study will survey students from a French Business School enrolled in courses using different teaching methods—flipped classroom, active learning, and business educational games—to verify whether perceptions of technology, teaching techniques influence motivational constructs. This analysis will provide insights into the impact of these external elements on learning motivation.

The first two hypotheses thus analyze the components of individual motivation. The first aims to identify and validate a measurement system capable of pinpointing the theoretical constructs that most influence learning. The second seeks to determine whether converging the results of these theoretical constructs into four clusters reveals similar motivational "performance," thereby identifying a "macro category" of constructs that is more significant than others.

The final hypothesis introduces an external element: the ways in which the organization and use of technology in the course influence the motivation to learn. This hypothesis addresses both the objective characteristics of each evaluated course and the learners' perceptions (their subjective evaluations). This final hypothesis paves the way for subsequent analyses. Just as we can analyze the characteristics of the studied course, we can also examine the variables of the learner (such as gender, age, social background, and school of origin). These elements are indispensable—consider the discussions in the first chapter about the extension of working life or the relationship between education and overpopulation—but for this thesis, a choice had to be made. Therefore, the variable analyzed, given the chosen research terrain, is not the characteristics of the learner but the specific elements of teaching.

It's important to note that selecting the teaching method rather than the learning method is not coincidental. The teaching method is an external element beyond the learner's control, whereas the learning method is part of how each individual learns.

As mentioned, in this research, we separate the "why" from the "how" and the "what." This separation is not because the other aspects are irrelevant but because we do not want to intersect different approaches at this stage. When considering "how" learning occurs, some observations regarding motivation are necessary. Theories that address the cognitive process (the "how") tend to include motivation within the process itself, viewing motivation as the fuel that powers the learning engine (the cognitive process). In contrast, theories focusing on motivation often do not delve into the "mechanics" of learning.

The same considerations and conclusions can be applied to the subject matter of learning. Are there motivational differences between learning hard skills and soft skills? There is extensive scientific literature on this topic (as well as on learning methods), but here, we also chose to keep the realm of "what" is learned separate from the "why" it is learned.

In summary, this research specifically targets the motivation behind learning rather than the methods or content of learning. By isolating the "why," we aim to provide a clearer understanding of the factors that drive individuals to engage in continuous learning, which is crucial for the broader context of lifelong learning.

This distinction highlights one of the anticipated benefits of this reflection: understanding what actions an organization must take to make learning content an individual need for the learner.

In this context, learners should not be invited to a training course simply because the topic is important for the organization. Instead, the invitation should ensure that the topic is perceived as relevant by the learner. This approach emphasizes the importance of aligning organizational training initiatives with the individual motivations and perceived needs of the learners, thereby enhancing engagement and the effectiveness of the learning process.

Part II Literature review, constructs identification and existing measurement systems (chapter from 5 to 7)

To address the topic of learning motivation, we initially identified the domains where it has been most extensively studied: education, psychology, cognitive sciences, and neuroscience.

However, it is important to acknowledge that this research does not have the expertise or tools necessary to deeply explore the fascinating field of neuroscience.

Once the context was outlined, seven theories were identified that, due to their scientific robustness and differing approaches, have addressed learning motivation. These theories have broad validation within the scientific community and do not primarily focus on learning methods, with the exception of the self-regulation theory, which describes the "organizational" aspects that regulate learning (including motivation).

The seven theories identified are:

- Self-Determination Theory (SDT): This theory focuses on intrinsic and extrinsic motivations and emphasizes the importance of autonomy, competence, and relatedness in fostering motivation (Deci & Ryan,1985).
- Effort-Value Theory: This theory (Eccles et al., 1983) suggests that motivation is determined by the expectation of success and the value placed on that success. It considers how learners perceive the importance and utility of the learning task.
- Goal Orientation Theory: This theory differentiates between mastery (learning) goals and performance goals, positing that the type of goal set by the learner significantly influences their motivation and engagement (Elliot & McGregor, 2001).
- Self-Efficacy Theory: Rooted in Bandura's work (1977), this theory focuses on the belief in one's ability to succeed in specific situations, which significantly influences motivation and perseverance.
- Self-Regulation Theory: This theory explores how learners manage their own learning processes (Zimmerman, 2000), including setting goals, monitoring progress, and maintaining motivation. It addresses the organizational aspects that regulate learning, including motivation.
- Mindset Theory: Developed by Carol Dweck (2006), this theory posits that individuals have either a fixed mindset (believing abilities are static) or a growth mindset (believing abilities can be developed). A growth mindset fosters resilience and a desire to learn.
- Interest Theory: This theory explores how personal interest in a subject can drive motivation (Hidi & Renninger, 2006). It suggests that when learners are interested in the content, they are more likely to engage deeply and persist in learning.

These theories were then compared to highlight convergences and divergences. The comparative analysis of the different theoretical approaches to motivation reveals that the literature has predominantly focused on comparative analyses between two, and rarely three, theories without attempting to present an overall view. With the exception of the breadth of the Self-Determination Theory and the work of Pintrich, most theoretical approaches are confined to a limited perspective.

To create a measurement system for motivation, the theoretical dimension is too broad, necessitating an analysis of the theoretical constructs that operationalize the examined theories (Cronbach & Meehl, 1955). From the description and comparison of the theories, 13 theoretical constructs were identified. These constructs were compared, and a model was built, as shown in Figure 1.

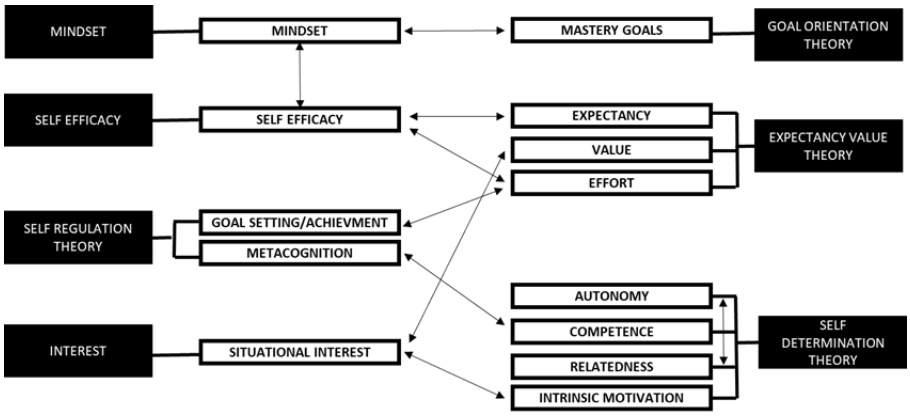


Figure 1 Motivation to Learn Constructs

During the modeling phase, the constructs will be linked to questions that assess their perception, thus defining a measurement tool. This is aimed at verifying Hypothesis 1.

In the second hypothesis, we posed the question of how to "unify" multiple constructs beyond their theoretical origins and identify themes where these constructs might converge. Four clusters were defined, focusing on: individual perception of learning, perception of content, the importance of individual self-determination, and control of learning.

The relevance of this exercise lies in identifying intervention areas that combine constructs demonstrating similar performance, whether positive or negative. The graphical representation of the clusters and their connection to the theoretical constructs is illustrated in the following Figure 2.

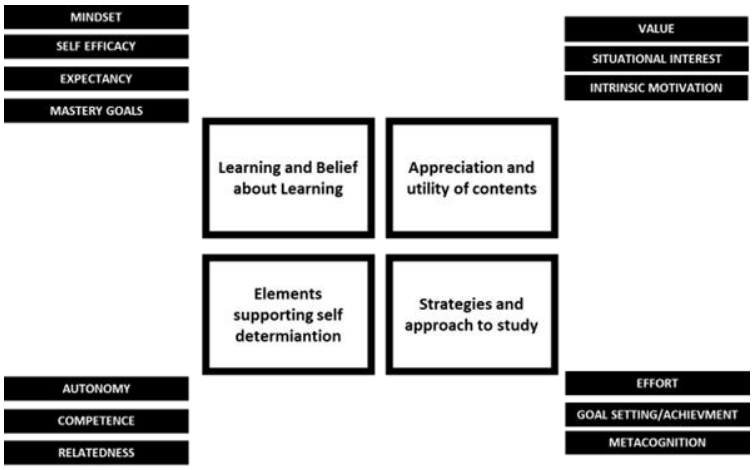


Figure 2 Constructs and Clusters

By grouping the constructs into these clusters, we aim to identify common themes and patterns that can inform practical strategies for enhancing motivation. This approach helps us understand how different aspects of learning motivation interact and influence each other (Pintrich, Smith, Garcia, & McKeachie, 1993), providing a more holistic view of the motivational landscape.

Part III: Research Terrain, Modeling, And Experimental Setting (Chapters 8 & 9)

Research Setting and Experimental Context

This research was initially intended to be validated within a company. However, unfortunate and sometimes unprofessional circumstances led to the abandonment of this plan. Nonetheless, the themes of learning motivation were investigated in a population of students engaged in their final courses before entering the workforce. The students involved in testing learning motivation are from a French business school, Iéseg, which has been regarded for years as one of the best institutions for business and management education in France.

Iéseg School of Management, a non-profit organization and member of Lille Catholic University, is recognized by the French state and holds prestigious triple accreditation (EQUIS, AACSB, AMBA). With over 7,000 students enrolled annually, Iéseg leads in France with its Grande École program and enjoys a strong international ranking.

The choice of a business school is closely related to management science, considering that many students enroll in these schools to pursue a professional career within companies.

Additionally, French business schools have programs that include internships with companies, allowing students to gain practical experience. Consequently, students studying business principles and practices finish their education with significant real-world experience.

Iéseg School of Management proved to be an excellent environment for testing the measurement tool. To address Hypothesis 3, which examines the impact of technology, teaching methods, and course organization on individual motivation to learn, three courses utilizing different teaching methods were identified. Each method is characterized by an innovative dimension, a high level of technological integration, and, given their novelty, detailed course organization.

The three courses identified are:

"Managing Learning," "Well-being and Work-life Balance," and "Master Business Game." These courses employ the following teaching methods: flipped classroom, active learning, and educational game.

The courses are conducted on the Paris campus, with the exception of "Well-being and Work-life Balance," which is offered in two classes, one in Paris and one on the Lille campus. A total of 139 final-year students were involved in the study.

The courses differ in terms of duration, whether the course is elective or mandatory, use of technology, and variation in teaching activities. These observable elements become valuable assets to verify whether the chosen measurement tool can capture these variations.

To measure these variations, three questions are drafted regarding students' perceptions of the technology used in the course, the teaching method, and the course organization. These three questions are posed twice: once in the middle of the course and again at the end, considering that at the beginning of the course, there is not enough information to make a content evaluation. Modeling

To construct a measurement questionnaire, a database was first created containing questions from the motivation measurement systems defined in each theory. A selection of 22 items (included in the appendix of this work) that measure 13 constructs using a 5-point Likert scale, which is the most commonly used scale in various motivation measurement tools, was made.

The questions were organized into three questionnaires to be administered at the beginning of the course, halfway through, and at the end. The image shown here indicates which constructs the questions in the three questionnaires refer to and to which cluster the responses for each construct belong. The rationale for organizing into three questionnaires is to verify the evolution of motivation over time.

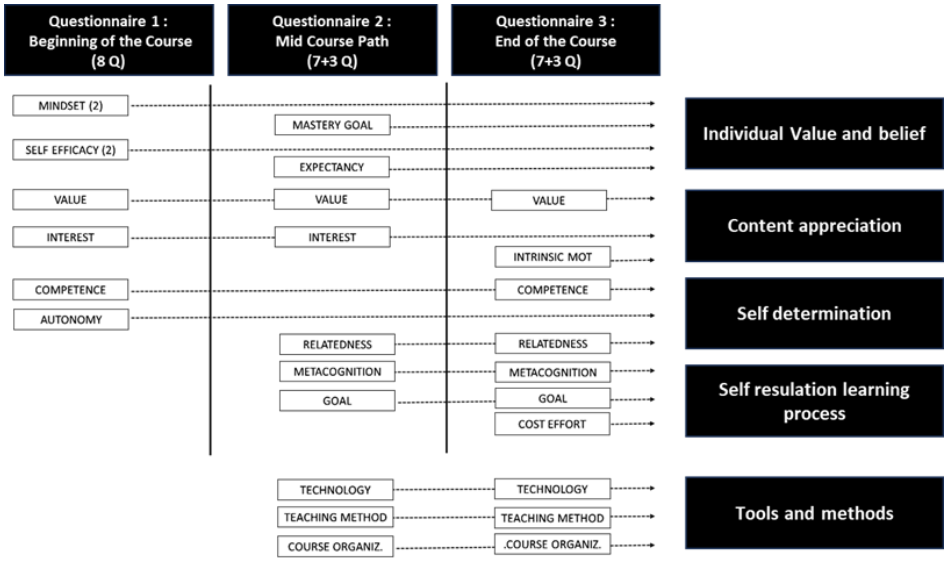


Figure 3 Graphical Representation of Questionnaires' structure

The three questions on technology, teaching methods, and course organization serve to validate Hypothesis 3 and are posed twice: once in the middle of the course and again at the end. This is because, at the beginning of the course, there is not enough information available to make a content evaluation.

The questionnaires were administered in class through an online survey to all students involved between January and May 2023.

Part IV Analysis of Results, Hypothesis Validation, Major Findings, and Conclusions (Chapters 10 to 12)

Demographic Analysis and Descriptive Statistics

The demographic analysis revealed significant differences in participation rates and the professional experience of respondents. Overall, the participation rate across all courses was

65.68%, with the Managing Learning course having the lowest initial response rate at 48.61%, the Master Game course achieving the highest at 94.12%, and the Well-being course maintaining a moderate rate around 68%. The distribution of respondents varied due to the structure and requirements of the courses, with the Master Game course having the most participants and the Managing Learning course having the fewest. Regarding professional experience, 96.4% of respondents had participated in internships, indicating considerable prior experience in the workforce.

The analysis of constructs and descriptive statistics provided insights into various aspects of learning motivation. The value construct showed consistent improvement, with higher perceptions at the end of the courses compared to the beginning. Autonomy, evaluated at the beginning of the courses, indicated that students in the Well-being course felt the course was their own choice, whereas Master Game participants felt less autonomy. Competence exhibited a symmetrical trend with a consistent 10% increase across all courses, indicating uniform growth in perceived knowledge.

Effort, measured at the end of the courses, received the lowest scores, especially in Managing Learning, suggesting high fatigue and low prioritization towards the end of the course. Expectancy, related to grade expectations, showed generally lower scores than self-efficacy, with Well-being achieving the highest score and Master Game the lowest.

Goal setting was more prevalent in Managing Learning, reflecting the need for greater attention to this aspect compared to Well-being and Master Game. Interest levels remained stable and showed a slight improvement from the beginning to the end of the courses. Intrinsic motivation, evaluated at the end, was highest in the Well-being course, indicating students' willingness to engage in similar future activities.

Mastery goal orientation, evaluated in the second questionnaire, remained high in Managing Learning, reflecting students' challenge-seeking behavior. Metacognition showed low scores in attention, especially in Well-being, but significantly improved in reflective strategy assessments. Mindset scores were high across all courses, indicating a positive attitude towards learning. Relatedness, or the importance of group work, scored highly in Master Game mid-course, underscoring the value of teamwork. Self-efficacy, reflecting confidence in abilities, was particularly high in Managing Learning, showing students' confidence in handling course challenges.

The correlation analysis highlighted significant relationships between various constructs. In the first questionnaire, autonomy showed a strong correlation with value and interest, indicating that the perception of choice positively impacts course interest and perceived value. Additionally, value and interest showed a moderate correlation, suggesting mutual influence. In the second questionnaire, interest and value maintained a moderate correlation, emphasizing the role of sustained interest in enhancing perceived value mid-course. The third questionnaire revealed a strong correlation between intrinsic motivation and competence, suggesting that perceived competence drives intrinsic motivation. Intrinsic motivation also showed moderate correlations with value, relatedness, goal, and metacognition, indicating that these factors collectively contribute to intrinsic motivation.

In conclusion, the study revealed that constructs related to individuals' beliefs about their ability to perform in the course, the belief in the usefulness of learning, and the willingness to study to acquire competence (rather than to excel among peers) are very present. Autonomy, competence, and relatedness are crucial for developing intrinsic motivation, while perceptions of interest and value are closely linked, influencing the overall learning experience. Understanding these dynamics is essential for designing effective educational strategies that enhance student motivation and learning outcomes.

Validation of the Three Hypotheses

Hypothesis 1: The creation of a tool to measure learning motivation using various scientific approaches allows for the identification of constructs that significantly contribute to learning motivation.

To validate this hypothesis, questionnaires using a 5-point Likert scale were administered at the beginning, middle, and end of the course. Statistical analyses, including descriptive statistics, exploratory and confirmatory factor analyses, reliability analysis (Cronbach's Alpha and McDonald's Omega), and structural equation modeling (SEM), were employed. The reliability of the constructs was confirmed, with most constructs showing good internal consistency. The dimensionality analysis validated that the questionnaires measured unidimensional constructs, indicating a common latent trait among items. Correlations between constructs such as Value, Interest, and Intrinsic Motivation were moderate to strong, confirming their relevance in measuring learning motivation. Thus, Hypothesis 1 was validated, although improvements in specific items were suggested to enhance reliability.

Hypothesis 2: Theoretical constructs on learning motivation that exhibit similar characteristics show the same performance during the learning process.

This hypothesis was tested by analyzing correlations between constructs at different stages of the course using Pearson's correlation coefficient. Constructs like Value and Interest showed consistent moderate correlations in both the initial and middle phases, suggesting parallel trends. The correlation between Autonomy and Competence indicated that perceiving the course as a choice and feeling competent are interrelated aspects influencing motivation. Intrinsic Motivation's strong correlation with competence highlighted that acquiring competence enhances intrinsic motivation. These findings validated Hypothesis 2, demonstrating parallel trends among similar motivational constructs.

Hypothesis 3: Technology and teaching methods influence learning motivation.

The impact of technology and teaching methods on learning motivation was analyzed by comparing motivation scores across three pedagogical approaches: active learning, flipped classroom, and educational game. Additionally, specific questions in the questionnaires assessed the perception of technology use. While technology was appreciated, it was not a decisive factor for motivation; students preferred varied technological approaches over intense, monotonous use. Teaching methods significantly influenced motivation, with active learning maintaining high levels of motivation, while flipped classroom and educational game showed significant variations. Courses incorporating a variety of pedagogical approaches maintained higher motivation levels. Hypothesis 3 was validated, indicating that technology should be varied, and teaching methods significantly impact motivation.

The validation of the three hypotheses through detailed data analysis and applied methodologies confirms that measuring learning motivation can be enhanced by identifying key constructs, recognizing the importance of students' initial perceptions, and varying pedagogical techniques and technology use. The results underline the importance of beliefs and the desire to learn as true drivers of motivation, emphasizing the preference for a wide variety of pedagogical approaches to maintain high attention and motivation.

Research limitations, further development and practical applications

The last chapter discusses the strengths and limitations of the research, identifying areas for future development and practical applications in management science. The internal validity

(attribution of results to examined variables) and external validity (generalizability of results) are evaluated to understand how representative and applicable the findings are.

Research Limitation

Sample Size and Composition: the study involved 139 final-year students from a French business school. The small and homogeneous sample limits the generalizability of results. Future research should use larger, more diverse samples to enhance the robustness and applicability of conclusions.

Contextual Limitations: the research was confined to a business school context, which may not fully capture learning motivation dynamics in other educational or industrial settings. Future studies should replicate the research in various contexts to confirm the results and include varied environments like Executive MBA programs.

Cultural Factors: the cultural context of primarily French business school students may influence responses and experiences with teaching methods and technologies. Cross-cultural studies are needed to understand how cultural factors impact learning motivation and the effectiveness of pedagogical approaches.

Self-Reported Data Bias: the data were collected through self-reported questionnaires, which can be subject to biases such as social desirability and memory recall errors. Future research should incorporate multiple methods, including observational data and interviews, to triangulate results and reduce bias.

Temporal Limitations: the study measured motivation at three points (beginning, middle, end of the course), which may not capture the complete fluctuations in motivation over time. Longitudinal studies are recommended to provide a more comprehensive understanding of how motivation evolves in response to educational interventions.

Future Developments

The research suggests several directions for future studies. Strengthening the current research involves enhancing scientific methods and broadening the analysis of individual learning motivation, technology acceptance, and teaching methods. New research directions could investigate differences in motivation for studying soft versus hard skills and examine the impact of learner characteristics (such as professional experience and age) on learning motivation. Specific areas for deepening include exploring motivation in different business models (public sector, manufacturing, services) and examining the continuous learning requirements in various professions.

Practical Applications

To increase learning motivation in academic and professional environments, it is essential to promote lifelong learning and encourage awareness of the need for continuous skill development.

Supporting a growth mindset through constructive feedback and emphasizing continuous learning as a journey is crucial. Additionally, addressing generation gaps by preparing older employees for change and involving them in reverse mentoring programs can help integrate new skills and maintain professional relevance.

Effective teaching methods should use varied pedagogies to maintain engagement and motivation. Adopting and calibrating technology in learning is vital, as incorporating multiple digital tools can enhance multisensory learning and keep attention levels high. Helping learners to learn involves providing tools and methods that facilitate learning processes, especially for older generations.

The role of the organization is critical in fostering a growth mindset as a cultural value. Leaders should explain the significance and purpose of training to motivate employees effectively. Continuous learning should be viewed as an integral part of every professional career, akin to a growth mindset, which emphasizes that skills acquisition is an ongoing journey. Organizations need to incorporate new pedagogies, technologies, and tools to facilitate cognitive processes and reinforce the importance of lifelong learning.

Conclusion

This research has highlighted the critical importance of understanding the "why" behind learning, especially in a world marked by rapid technological advancements and constant change. The study successfully validated the three hypotheses, demonstrating that a comprehensive measurement system can identify key motivational constructs, that these constructs exhibit similar performance across different learning contexts, and that innovative teaching methods and technologies significantly influence learning motivation. By emphasizing the individual's perception of relevance and aligning organizational training with these perceptions, we can foster a more engaged and motivated learning experience. This approach underscores the necessity for lifelong learning as an essential component of both personal and professional growth, ensuring adaptability and continuous development in an ever-evolving landscape.

PART I: CONTEXT, CHALLENGES AND RESEARCH QUESTION

1 DEMOGRAPHICS AND DIGITIZATION: IMPACT ON SKILLS AND EMPLOYABILITY

1.1 ACCELERATION IN THE 21ST CENTURY

In recent years, technology has moved ahead rapidly, straining our ability to adjust and remain up to date (Agarwal & Karahnna, 2020). Writers like Friedman (2017) have argued that the year 2007 marked the beginning of a period of difficulty effectively adjusting to the ever-increasing speed of technological progress.

There are various perspectives on the difficulty of adapting to technology. Those who have grown up with technology tend to understand it more easily than do those who have come to it later in life. As life expectancy increases, it is necessary to extend the working lifespan, so it is common for organizations to have generations with varying abilities to adjust to technology.

The labor market today has greatly changed, and companies feel the need to evaluate the potential of older workers, considering their ability to develop new abilities (reskilling) as well as their remaining years in the workforce (Potter et al., 2008).

Research conducted by Krugman (2021) and Tessema et al. (2022) confirms the need for people to develop both their skills and ability to adapt to an ever-changing work landscape.

This is an example of what is defined as *lifelong learning* (Delors, 2013): the understanding that learning is an ongoing process throughout our lives.

Lifelong learning is important to remain competitive in the job market, thereby providing financial stability in the future (Kungu & Machtmes, 2009). A lack of formal education is in fact the most prominent factor in societal disparity.

The projected demographic explosion leads to visible economic imbalances for all, with peoples migrating in search of different outcomes. However, overpopulation (especially concerning scarcity of resources) is mainly the result of a lack of education, especially in the female population (KC et al., 2008).

Therefore, skill development cannot be viewed from a singular perspective, be it academic, professional, or otherwise, but through an evaluation of the complex impact of skills.

The recent health crisis has introduced an additional element of reflection by showing how quickly individuals and organizations responded to the new remote working context (LeBlanc, 2020). These lessons in how humans can react rapidly and adapt to a new context provide some optimism about their future abilities to manage the technological world (Moor & Boéchat-Heer, 2023): provided that they have the right motivations to do so.

1.2 NEW WORLD, OLD POPULATION

The global demographic landscape is witnessing an aging phenomenon.

Population aging is propelled by two primary factors: declining fertility rates and increasing life expectancy. In a myriad of nations, total fertility has witnessed a notable decrement. Presently, nearly half of the world's population resides in regions where the lifetime fertility rate is below the threshold of 2.1 live births per woman, a level deemed necessary for low mortality populations to maintain zero growth over the long term (UN, 2019). For instance, Germany's total fertility rate, which stood at the replacement level of 2.1 live births per woman in 1950, plummeted to 1.5 by 2017 (UN, 2017). Contrarily, Africa remains an outlier with an average family size of 4.7 children per woman, positioning it as the sole continent projected to experience continual population growth beyond 2100.

Life expectancy has surged considerably over the past two decades, with disparities in income levels significantly influencing this trend. Despite remarkable strides in

reducing child mortality and combating infectious diseases, low- and lower-middle-income countries lag in achieving optimal health outcomes, markedly falling behind the global average (WHO, 2020). The global life expectancy at birth reached 72.6 years in 2019, an increase of over 8 years since 1990. Anticipated advancements in healthcare are expected to raise the average global lifespan to approximately 77.1 years by 2050 (UN Prospect, 2019). It is argued by Harari (2016) that the extension of human life expectancy is not solely attributable to medical advancements but also to the mitigation of potential mortality causes such as diseases, conflicts, or starvation.

Globally, the elderly population is expanding at a rate surpassing all other age groups. Projections suggest that by 2050, individuals aged 60 or over will outnumber the adolescent and youth population aged 10-24 years (2.1 billion versus 2.0 billion) (UN, 2017). These demographic trends symbolize stark social disparities worldwide and simultaneously pose substantial socio-economic challenges for nations across the spectrum.

For less developed countries, curbing demographic growth remains a critical challenge, as it hinders GDP and overall economic development. Conversely, in many developing nations, the phenomenon of increased life expectancy necessitates significant adjustments in working life expectancy, consequently necessitating a delay in the retirement age.

1.3 THE IMPACT OF EDUCATION AND LEARNING ON DEMOGRAPHICS

The development of knowledge and skills can support both population control and the impact of longer working lives. Indeed, education has several positive effects: reducing fertility while increasing GDP and competitiveness.

Education is likely to have a causal effect on both the timing and the outcome of fertility; however, its magnitude depends on the socioeconomic and cultural setting. It has been found that women's fertility is, on average, significantly lower for the more educated—around 30% lower when comparing the most and least educated groups—and that this gap is even greater in poorer, high-fertility contexts. (KC et al., 2008)

Lutz and KC (2011) have recently shown that even when assuming identical education-specific fertility trends, different scenarios about future female education levels can lead to a difference of more than 1 billion in world population by 2050.

Education can be seen also in correlation with country GDP intended as a measure of productive capacity of an economy (Feenstra et al., 2015).

In developed countries the aging effect is impacting social security and pensions in all countries where a demographic transition is already taking place, specifically in Europe.

Older people today are living longer and healthier lives than previous generations did. When public pension systems were first established, people could typically look forward to only a few years of life in retirement (if they were lucky enough to reach pension age) (Whitehouse, 2007). Now that life expectancy is longer, longer careers force employees to have competitive skills that keep value over time. It also requires workers to be able to learn new skills in order to keep their own employment value high.

The effect on cognitive function of postponing retirement may also depend on the level of educational attainment. Those with higher education are likely to be in more cognitively stimulating, complex occupations, and those with lower education may be in more physically demanding occupations (Potter et Alii 2008). Evidence suggests that the level of job complexity or intellectual demands is associated with later-life cognitive functions. If intellectually demanding work is associated with better cognitive function, those who work in more monotonous jobs may not experience as much of a benefit from postponing retirement. Socioeconomic stressors related to routine or physically challenging jobs may also reduce the benefits of ongoing labor force participation. These countervailing forces lead us to cautiously hypothesize that postponing retirement could be more beneficial for those with white-collar jobs (Mahiri Hale et al.2020).

1.4 RIGHT SKILLS MATTER

The skills required to enter and advance in the labor market are undergoing profound changes due to megatrends such as technological progress, new trade patterns, and population aging. This process is driven by shifts in not only the occupational structure of employment but also changing skill requirements within each occupation (OECD, 2019).

In the current era dominated by the innovation economy, where new technologies and work methods demand fresh skills and talents, the educational system is falling short in meeting the demands of the labor market. Consequently, employers struggle to find and hire enough qualified workers (Puckett J. et al., 2020).

"Qualified workers" have the knowledge and skills that render them eligible to enter and advance in their chosen career path. Technological progress and the associated changes in work organization are reshaping most occupations by altering the job tasks involved, leading to an increased demand for high-level cognitive and complex social interaction skills (OECD, 2019).

In the following pages, we will examine the skill gap resulting from a lack of technical skills and the skill mismatch arising from an inappropriate distribution of competencies. The terms used to describe this phenomenon are "competence mismatch" and "qualification trap," denoting situations where professionals possess either excessive skills e for demand or insufficient compared to the profiles sought (Tijdens et al., 2018; Brunello & Wruuk, 2019).

To comprehend the primary dynamics shaping the labor market, we will focus on two key perspectives. First, we will analyze trends and forecasts on the impact of automation and digitalization. Second, we will investigate the relationship between the demand and supply of skills in the employment market.

Given that we are examining trends from recent years and making forecasts for the near future, this study will present analyses from statistical observatories and assessments of the future conducted by leading consultancy firms. Our objective is to verify the congruence among these analyses to identify who will be primarily affected in the future and to what extent.

1.5 AUTOMATION AND DIGITALIZATION: JOB DISPLACEMENT AND JOB CREATION

1.5.1 Employment Effects of Automation and Artificial Intelligence

The impact of automation and artificial intelligence on employment has been extensively studied by various scientific institutions and reputable consulting firms.

Frey and Osborne's groundbreaking study in 2014, suggesting that 47% of jobs in the United States were at high risk of automation, sparked a series of research endeavors. Subsequent studies from international organizations like the OECD, WEF, and ILO have further contributed to the discourse, often presenting estimates in the high double digits.

Given the rapid pace of technological innovation, particularly in artificial intelligence and automation, our analysis includes only the most recent publications and studies. While media coverage often emphasizes alarming data, these studies are more complete analyses although they unanimously agree that automation will impact jobs and organizations. The focus of these studies varies, including task automation job losses, leading to diverse forecasts regarding the magnitude and timing of the proposed scenarios.

One undeniable trend is the exponential increase in investments in automation. The global stock of robots has tripled over the past two decades, reaching 2.25 million units in use worldwide. Projections indicate a potentially even faster growth rate, with the global stock of robots potentially reaching 20 million by 2030, including 14 million in China alone (Oxford Economics report, 2019).

The question of which professions will be most affected by automation and artificial intelligence led to an in-depth analysis by the US Bureau of Labor Statistics examining job evolution from 2018 to 2028 (Dubina et al., 2019).

The study found that roles requiring complex human interactions such as personal and health care, cooking, and medical assistance are expected to see notable growth. High-skilled positions in technology and digital marketing sectors are also projected to expand significantly. However, roles like secretaries, assistants, assemblers, fabricators, and cashiers are expected to decline, with significant decreases in positions for secretaries and assistants, assemblers and fabricators, and cashiers.

The forecast provided by the US Bureau of Labor aligns with other studies indicating that health and personal care occupations will be less affected by automation, showing a trend toward downsizing in the next decade for these roles (Hawksworth et al., 2018). Job automation correlates closely with organizational structures and processes. Positions requiring personal care, attention, and problem-solving, such as cooks in restaurants, are anticipated to grow significantly. Conversely, roles in mass production

with repetitive tasks are expected to decrease. Routine, predictable physical and cognitive tasks face the highest risk of automation, with jobs not requiring a bachelor's degree being twice as vulnerable as those demanding higher education qualifications, such as engineering and financial operations. Approximately 14% of these highly skilled jobs are projected to disappear in the short term (Muro et al., 2019).

The World Economic Forum indicated that in 2018, an average of 71% of total task hours across 12 industries were performed by humans, compared to 29% by machines. By 2022, this average was expected to shift to 58% task hours performed by humans and 42% by machines (World Economic Forum, 2018).

Researchers at Brookings predict that 25% of US workers will face high exposure to automation in the coming decades, potentially impacting 36 million workers, primarily low-skilled workers who may struggle to acquire new skills (Muro et al., 2019). And a McKinsey study estimated that automation could impact anywhere from 75 to 300 million jobs, depending on the pace and localization of innovation (Manyika et al., 2017).

Despite varying approaches in calculating the impact of automation, there is consensus among researchers that most, if not all, jobs will be influenced by artificial intelligence, leading to significant job displacement in the next decade. In cases of more minor impact, there is an urgent need to align workers' skills with new task or job requirements.

1.5.2 Digitization and New Skills: Creating and Displacing Jobs

In the Fourth Industrial Revolution era, the interplay between labor and capital in technological innovation discussions is a prevalent concern (Frey & Osborne, 2013). A 2014 PEW Foundation survey revealed a divided opinion among US technology experts, with 48% predicting substantial workforce replacement by robots and digital agents. Concerns about increasing income inequality, widespread unemployment, and potential social order disruptions were highlighted (Smith & Anderson, 2014).

Contrary to these apprehensions, empirical studies on digital innovation's employment impact show a more nuanced picture. Deloitte's research indicates that jobs lost over the past 150 years were predominantly repetitive and physically demanding, replaced

by roles centered on personal care. The advent of personal computers, for instance, has generated 15.8 million net new jobs in the US since 1980, predominantly in PC-using occupations across various sectors (Manyika et al., 2017).

Emerging technologies like AI and robotics are anticipated to spawn numerous job opportunities, both directly related to these technologies and indirectly through enhanced productivity, increased incomes, and wealth creation. Historical precedents of technological advancements suggest that additional incomes from such innovations stimulate demand, thereby generating new employment opportunities (Hawksworth et al., 2018). The World Economic Forum's study, encompassing a multinational workforce of over 15 million, predicted the creation of 133 million new jobs and the displacement of 75 million jobs due to technological innovations.

1.5.3 New Skills: Meeting Market Demands

In the evolving job landscape, pinpointing in-demand skills is crucial. A World Economic Forum study identified technologies that companies wish to adopt between 2018-2022, including big data analytics, app-enabled markets, the internet of things, and cloud computing (World Economic Forum, 2018).

Every year LinkedIn publish the list of more recurrent Hard Skills mentioned in its Job vacancies, approximately 20 million jobs every year. In the below table we can observe how hard skill demand well represents the rapid evolution of business transformation.

Table 1-1 Hard Skills more quoted in LinkedIn Job Posting 2014 2020 2023

2014	2020	2023
Statistical Analysis and Data Mining	Blockchain	SW Development
Middleware and integration SW	Cloud Computing	SQL
Storage Systems and management	Analytical Reasoning	Finance
Network and Infromation security	Artificial Intelligence	Python
SEO/SEM Marketing	UX design	Java

The acquisition of digital skills is increasingly vital for future competitiveness, especially in developed countries where high-level skills are crucial for engaging in technologically advanced activities (OECD, 2019). Countries like France and the

United States anticipate shortages in specialized IT workers and data scientists. Access to adult learning opportunities becomes paramount so that workers can adapt, particularly those in nonstandard employment arrangements. Enhancing training quality and adult learning systems is necessary to align with changing demands (OECD, 2019).

1.5.4 Skill Misalignment in the Current Labor Market

As digital innovation transforms organizations and necessitates new technical skills, substantial investments in education and training initiatives are underway to bridge the skill gap. These initiatives predominantly target populations with access to high-level skills, including students and existing workers. However, even for mid-skill jobs, a significant skill adequacy issue persists, leading to a considerable shortage in the market.

The US labor market serves as a case of mismatch. Between 2008 and 2018, six career clusters were identified as particularly robust: manufacturing, marketing sales and service, transportation logistics distribution, health sciences, business management and administration, and hospitality and tourism (Georgetown CEW, 2010). Yet hundreds of thousands of vacancies annually remain unfilled, increasing employment costs for the right skill sets. Notably, twenty-seven percent of workers with occupational licenses earn more than the average bachelor's degree recipients (Georgetown CEW, 2010).

Several factors contribute to this situation. A key issue is the high number of bachelor's degree holders struggling to find jobs aligning with their skill profile. Despite significant US government higher education investments, not all graduates possess the skills required to adapt to social and technological changes. Consequently, many end up accepting lower-skilled jobs that do not match their educational qualifications. Occupations not requiring a bachelor's degree now employ many college graduates, leading to a mismatch between qualifications and job requirements (Vedder et al., 2015).

Moreover, the lack of sufficient quality vocational training exacerbates this mismatch. The US faces challenges in producing skilled workers in manufacturing, healthcare,

and the trades due to insufficient apprenticeship programs. With the resurgence of domestic manufacturing, the demand for professionals skilled in production processes, robotics, mechatronics, and quality control is rising. Universities, however, are not catering to these specific workforce needs, often requiring two-year programs rather than traditional four-year degrees. This results in a mismatch between taught skills and evolving labor market needs, leading to a scarcity of qualified candidates for specialized roles (Newman & Winston, 2016). The US also has the highest college dropout rate among industrialized countries, further intensifying the skills gap (Pathway to Prosperity, 2011).

This skills mismatch has contributed to wage polarization in the US, with a shift in the types of jobs available. The fraction of males employed in low-skill service occupations has increased, while those in professional, management, and technical occupations decreased, despite changes in educational attainment (Acemoglu & Autor, 2010).

In response, the US government-initiated programs to expand apprenticeship job-training programs to fill the six million vacant jobs due to skill mismatches. However, challenges persist, especially in inner cities, where unemployment rates, particularly among African Americans, remain high.

Globally, similar skill mismatch issues are evident, with some exceptions like Germany and Switzerland, which have effectively integrated educational paths with production requirements and thus serve as benchmarks for vocational education and training (VET) systems. Despite historical neglect, there is growing recognition of the importance of VET in integrating learners into the labor market and providing pathways for further learning and personal development (OECD, 2018).

The substantial global impact of skill mismatch is anticipated to affect over 1.4 billion individuals by 2030 who will be over- or underqualified for their jobs (Puckett et al., 2020). This disparity poses a significant risk of intensifying inequalities, affecting not only wage disparities but also accessibility to appropriately skilled jobs.

In an economy on the brink of automating millions of jobs in the upcoming decades, the acquisition and refinement of digital skills has become an essential requirement rather than an option. Those equipped with specialized skills, or the requisite education can effectively harness technology to generate and capitalize on value. In contrast, individuals with more generic skill sets face escalating competition from automated

systems, including computers, robots, and digital technologies, underscoring the critical need for upskilling in today's dynamically changing job market (Brynjolfsson & McAfee, 2014).

1.6 The Health Crisis and the Explosion of Generative Artificial Intelligence

In recent years, two events have indelibly marked the trajectory of technological development and human capacity to respond to sudden changes: the COVID-19 health crisis and the development of generative artificial intelligence, highlighted by the success of ChatGPT.

The COVID-19 pandemic has been one of the most significant and disruptive events in modern history, triggering an unprecedented global crisis that has impacted every aspect of daily life. First identified in Wuhan, China, in December 2019, the SARS-CoV-2 virus rapidly spread across the globe, forcing governments, institutions, and individuals to adapt to new realities and challenges (World Health Organization, 2020). The pandemic significantly altered work environments, with a substantial increase in remote work.

The Global Survey of Working Arrangements revealed that among full-time workers in 27 countries, 43% of those in teleworkable jobs worked exclusively from home (Aksoy et al., 2023). Remote working became one of the main topics when discussing about the future of work. Researchers found that 37% of jobs in the United States could be performed entirely at home (Dingel & Neiman, 2020).

After the end of emergency period, despite the initial rise in remote work, there is a trend toward hybrid working models. Many companies have required employees to return to the office at least part-time. Even Zoom, a symbol of remote communication during the pandemic, asked employees to return to the office part-time (Mahdawi, 2023).

Remote work also introduced challenges, such as blurred boundaries between work and personal life. An April 2022 survey found that 47% of remote workers in the U.S. were concerned about these blurred boundaries, leading to demands for a "right to disconnect" (Silver, 2023). In response, some countries, like Portugal, have enacted

laws to protect remote workers, such as banning out-of-hours employer contact and requiring contributions to increased utility costs due to home working.

The COVID-19 pandemic has caused the largest disruption of education systems in human history, impacting nearly 1.6 billion learners across more than 200 countries. School closures affected over 94% of the world's student population, leading to significant interruptions in learning and development (Pokhrel & Chhetri, 2021). On average, the pandemic had a detrimental effect on learning, with a learning deficit of approximately 0.19 standard deviations, comparable to the impact of major natural disasters like Hurricane Katrina (Di Pietro, 2023). Students struggled to catch up on lost learning even a year after the initial lockdown. The pandemic's effect on learning varied significantly based on district demographics and resources. High-poverty schools, for instance, experienced greater learning losses compared to low-poverty schools, with an average U.S. public school student in grades 3-8 losing half a year of learning in math and a quarter of a year in reading (Fahle et al., 2023). In Spain, for example, 70% of students in private government-dependent schools had access to a desktop or laptop for online classes, compared to only 40% of students in public schools (Hurtado-Martín et al., 2023). Access to home computers and reliable internet emerged as essential for remote learning, directly impacting students' ability to participate in online classes effectively.

Additionally, areas with higher rates of serious illness or death from COVID-19 experienced more trauma among students and staff, contributing to greater learning loss (Ettman et al., 2023; Kush et al., 2022; Gassman-Pines et al., 2020). What we all have experience during the Covid crisis, was a global reaction that suddenly turned activities done in presence into remote work. When an activity or behavior done in physical presence is transferred in digital word without adaptation, we use the term skeuomorph, that is valid to the first transition but not to leave a solid legacy in the long term. Indeed, adapting to remote work or learning requires the development of new protocols, policies, and behavioral guidelines that allow users to experience these environments differently than they would in person. This is evident in the mixed success of remote working and learning initiatives during the pandemic (Dingel & Neiman, 2020; Aksoy et al., 2023).

On November 30, 2022, OpenAI launched ChatGPT, powered by the advanced language model GPT-3. This generative AI-powered interface has garnered significant attention for its ability to perform complex language comprehension and generation tasks. An unprecedented success, it reached 1 million users in just five days, a milestone that took much longer for platforms like Facebook and Twitter. With 175 billion parameters, GPT-3 generates human-like text, and the subsequent release of GPT-4 has further improved its reliability, creativity, and nuance (Wu et al., 2023). The development of models using generative AI has rapidly multiplied with the market entry of Google and Microsoft, as well as the expansion of application ranges. The latest version proposed by OpenAI, GPT-4, not only integrates text and image generation but also includes the ability to interpret images, opening uses not yet evaluated, such as support for visually impaired individuals (Kuzdeuov et al., 2024).

The proliferation of generative artificial intelligence solutions, according to McKinsey (2024a), has led to a drastic increase in the usage rate of these technologies, adopted by over 65% of companies in 2024. This is double the rate of the previous year. The significant potential of these technological solutions is also transforming the job market. Unlike traditional automation technologies, which primarily affect low-skill jobs, generative AI is set to transform high-paying and knowledge-intensive professions by automating complex tasks previously considered immune to automation. This shift underscores the need for continuous skill development and adaptability among workers to remain competitive in the evolving job market (McKinsey, 2024b).

The introduction of tools like ChatGPT into the education sector has led to mixed interpretations. On one hand, the strong potential of the tool is particularly appreciated by the new generations of students. On the other hand, older generations of educator’s express concerns about over-reliance on technology, ethical implications, and the need for clear guidelines to ensure responsible use (Chan & Lee, 2023). Educators emphasize the importance of balancing the benefits of AI with maintaining the integrity of the learning process (Alkaissi & McFarlane, 2023; Dahmen et al., 2023).

For learners, generative artificial intelligence opens up new perspectives. ChatGPT offers numerous advantages for self-learners, including personalized support, real-time feedback, increased accessibility, and the ability to learn at one's own pace. These features make ChatGPT an invaluable tool for those without access to traditional

educational resources, providing tailored assistance and enhancing the use of open educational resources (Firat, 2023).

Although ChatGPT can significantly enhance the learning experience by automating routine tasks and promoting adaptive learning, it cannot fully replace the role of teachers. Studies highlight that while AI can support educational processes, it must be integrated carefully to avoid issues such as factual inaccuracies, potential biases, and academic dishonesty (Elbanna & Armstrong, 2024; Rejeb et al., 2024; Ausat et al., 2023).

Less than two years after its introduction, ChatGPT appears to be the technological solution representative of this rapidly accelerating new century. The difficulties in predicting the future developments of this technology align with Friedman's assertion in his book on human adaptability and technological evolution: "When the pace of change gets this fast, the only way to retain a lifelong working capacity is to engage in lifelong learning" (Friedman, 2017).

1.7 ACTING ON SKILLS

Addressing the skills gap is crucial, as empirical research consistently establishes a direct connection between skill acquisition, employability, and career progression. Studies by the U.S. Bureau of Labor Statistics provide robust evidence linking opportunities for skills-based education with increased employability and career advancement (Bureau of Labor Statistics, 2015).

To effectively bridge this skills gap, a concerted effort involving governments, educational institutions, and corporations is imperative. However, these collaborative efforts are likely to show outcomes in the medium term. The complexity of achieving desired outcomes in skill alignment has been highlighted in studies conducted for the UK government by Shebolt and Wakeham in 2016. These studies not only reaffirm skill mismatch challenges but also shed light on the complexities involved in addressing these issues (Shebolt Review 2016, Wakeham Review 2016).

Academic institutions face the challenge of identifying and teaching the exact skills that match the ever-changing market demands and the rapid evolution in the business landscape. At the same time, students and professionals are required to adopt a culture

of lifelong learning, preparing themselves to continually update and enhance their skills throughout their career journeys (Blackwood 2016).

Driven by the pressure to achieve short-term results, companies often seek "ready-to-use talent" – individuals with the precise skills needed who are immediately capable of contributing to the organization.

Meeting companies' expectations for hiring "ready-to-use" talent poses significant challenges. The Manpower Group's report on employability highlights this issue, revealing that employers in Japan (89%), Taiwan (78%), Hong Kong (76%), and Singapore (56%) face difficulties in finding candidates that match their desired skill profiles (Manpower Group, 2018). Consequently, many organizations are turning inward, expanding their training programs and budgets to develop the required skills within their existing workforce.

For certain roles, skill development will focus on aligning employees' knowledge with emerging technologies and processes. In other instances, merely updating existing competency profiles will not suffice. A more radical approach may be needed: the creation of entirely new skill sets that can redirect employees' career trajectories and enhance their marketability.

This imperative is relevant not only for companies aiming to upskill their current workforce but also for reemployment organizations that support individuals in pursuit of new job opportunities. The focus must now shift to implementing effective learning initiatives designed to reduce skill gaps and mismatches, thereby aligning workforce capabilities with the evolving demands of the contemporary job market.

2 THE EVOLUTION OF LEARNING IN 21ST CENTURY

2.1 UPSKILLING AND RESKILLING

Learning has become one of the main sources of sustainable competitive advantage (Senge, 1990). The Toronto Finance Services Alliance (TFSA) and PwC Canada conducted a 2018 survey that showed that the vast majority of CEOs worldwide are worried about having access to the skills necessary for their businesses to grow and flourish.

While many feel the burden of upskilling and reskilling should be on the individual versus the employer, executives see investments in skills development as an urgent priority that should be led by business rather than government.

Major companies have already begun making major investments in their employees' skills and, in doing so, maintaining their own competitiveness. In 2010 Accenture was a pioneer in launching an upskilling program, announcing a dedicated annual training budget of one billion dollars with the ambitious goal of training their entire workforce. Similarly, other blue-chip corporations started massive investments in learning. WalMart decided to invest 2.7 billion dollars in upskilling programs, Amazon announced its intention to train 240 thousand employees by 2025, and SAP increased its training budget by 270% (Cuckier, 2020).

The myriads of learning programs currently in place are mostly defined as upskilling and reskilling programs. As these terms are extensively used both by companies and researchers, we think it is useful to provide basic definitions.

The definition of upskilling, learning or teaching new skills, remains vague about the reason why skills must be learnt. Whether it is for professional development (medical) or production cycle reasons (automation of some pre-existing job skills), upskilling works to improve competencies in a domain where the learner already has some expertise.

The definition of reskilling, on the contrary, involves learning new skills for a new job. It no longer involves professional improvement but a career change. This happens both within companies (a change of position) and among those who need to find a new job. Uncertainty is becoming the norm, and millions of workers need to prepare for the transition taking place in the job market globally (Sivalingam & Mansori, 2020). For that reason, many companies, in addition to reskilling and upskilling programs targeted to specific populations, are promoting learning programs to make their employees aware of the need for skills training. The aim is to promote a lifelong learning mindset, so that learning is not perceived only as the responsibility of the employer but is seen as an intrinsic need of the employee.

As the culture moves from exploitation of the known to exploration of the unknown, a set of organizational parameters, management practices, and attitudes must be re-evaluated. Companies that take the forces and challenges of digitalization seriously think about how they operate and about the interactions between digital skills, work practices, resource allocation and the mechanisms that enable the collective development of new learning capacities. (Petitbon et al, 2020)

In addition to upskilling and reskilling, other terms are used frequently in discussions of skills learning and development. One term related to maximizing competency effectiveness is “cross-skilling”: the practice of developing additional skills to enable employees to perform tasks outside their usual scope (Petitbon et al, 2020). In this case, the new skills guarantee greater employability of employees within the organization, increasing their internal value.

On the other hand, “deskilling” is not related to employees but to the intrinsic human skills required for a job. Deskilling is the process by which skilled labor within an

industry or economy is eliminated by the introduction of technologies operated by semi- or unskilled workers. This results in cost savings due to lower investment in human capital, and reduces barriers to entry, weakening the bargaining power of human capital. This term has a long and ideological history and has been used in both Taylorism and Marxist interpretations (Braverman 1974). The deskilling concept has been revamped recently (Brugger & Gehrke, 2018) as it relates to how new technologies can reduce the need for human skills in certain jobs (e.g., an automated coffee machine replacing a skilled barista).

The opposite of upskilling seems to be “unlearning”. Drawing on experiments from psychology, researchers have suggested that unproductive or obsolete knowledge should be discarded or eliminated to make space for the creation of new ideas (Hedberg, 1981, Nystrom & Starbuck, 1984).

However, not all researchers agree that some skills can be consciously forgotten. The conclusions are different when seeing learning as a cognitive or as a neurological process, which involves the control of those processes. Neuroscientists say that when the unlearning process happens it is an act of sabotage by our brains in a period of negativity and stress (Martin et al. 1996; Savalingam 2020). Because of the complexity and controversy surrounding this term, we will not address it in this research.

2.2 How Technology and Investment are Changing the Learning “Ecosystem”

Zhao and Franck (2003) proposed a bold metaphor between technology and ecology: the introduction of the Zebra mussel into the ecosystem of the American Great Lakes and the various factors that influence computer use. The metaphor draws a parallel between the properties of a biological ecosystem and the technological world. The term "technological ecosystems" refers to an evolution of traditional information systems.

A parallel concept can also be found in learning, where we speak of "learning ecology" (Barnett & Jackson, 2019) and "learning ecosystem" (García-Holgado & García-Peñalvo, 2017). The learning ecosystem forms the sum of its interconnected parts, which must coexist without destroying the overall cohesion and balance of the system. The components of this system are:

- tools, services, and digital resources
- the community of users, whether learners, experts, trainers, or managers
- the surrounding socio-economic environment, with its own rules and flows

The specificity of an ecosystem is to coexist without self-destruction and to balance the whole (Väljataga et al., 2020), especially in the face of internal and external changes to the system. This requires agility, adaptation to personal needs, and the transfer of skills to real-world situations (Walcutt & Schatz, 2019).
In recent years, rapid technological advancements have significantly transformed the learning ecosystem (Pfeiffer, 2015) due to a confluence of economic, technological, and social factors. This is evident in the impact of the health emergency and the widespread adoption of generative artificial intelligence by the general public.

Increased Scope of the Learning Industry

The learning industry has become a sector creating products, services and platforms that are accessible to the whole public, not just enrolled students or companies.
In 2019 EdX (a MOOC company created by Harvard and MIT) delivered the result of a survey addressed to its audience. The survey found that more than one-third (37%) of respondents had experienced a lack of proficiency in at least one new skill area or subject area of a current or past job, but that almost half (40%) also didn't feel comfortable asking their employer for help with paying for a learning solution. In addition, respondents were split between who should be responsible for making sure that they are prepared for the jobs of the future with the right skills - 41% allocating responsibility to individuals individual's responsibility, 33% to employers 16% to higher education and 9% to the government (Medros, 2019).
As the consumer market opened up, the learning sector began to attract large investors and thus to have the necessary tools at its disposal to generate innovative solutions.
These new, highly profitable markets attract financial investments and generate innovative solutions. Today, we observe a proliferation of low-cost technologies, where anyone can create a digital course and distribute it to a wide audience who perceive its market value.

Awareness of Lifelong Learning Needs

Mark McElroy (2000) described two generations of knowledge management (KM): First-generation KM focuses on knowledge sharing and how to distribute existing organizational knowledge through technology, while second-generation KM focuses on knowledge creation and how to satisfy organizational needs for new knowledge, usually through processes of learning and innovation.

Because skills are evolving rapidly, it is necessary to make young people aware of the importance of lifelong learning. earning needs to be considered not simply a phase in life to access the job market but as an intrinsic feature to maintain employability.

Changes in Technology: Cloud Computing

A third element of change is based on technology. The wide adoption of cloud solutions makes it possible to offer technologically advanced solutions, without any local downloads, creating software that does not burden the memory of users' hardware.

Cloud transformed technological products and solutions into Everything as a Service (Miyachi, 2018), meaning software (SaaS), platform (PaaS) and infrastructure (IaaS) that are hosted and accessible via cloud technology (Mell & Grance, 2011).

One of the first companies to realize the high potential of the cloud and the need to change its business model was Microsoft. When Satya Nadella was appointed as CEO, he decided that the company needed to transform its business model; this changed all of the products offered by Microsoft: a shift from SW product to cloud-based services. That profound change required a new company mindset. Inspired by Carol Dweck's work on the f growth mindset in achieving learning goals, Ibarra and Rattan used the Satya Nadella and Microsoft case to describe a company that decided to adopt a growth mindset at the organizational level (Dweck, 2006; Ibarra & Rattan, 2018).

Changes in Technology: Mobile Connections

Another technology with great impact on the learning industry is the launch of new mobile devices. Since 2007 (when the iPhone was launched) users have been able to access almost anything from a portable device. Learning has become not only remote but also mobile, multiplying the opportunities to access content.

Mobile training and education modify the learning process, since the use of mobile devices changes how materials are both presented and accessed and contributes to the selection and creation of new forms of transferring knowledge and mentality.

Ideally, technology and education will co-evolve, with educational needs driving technological progress as well as adapting to it. Outlined below are some of the technological advances most likely to impact teaching and learning from a global perspective. Technology will be more accessible, affordable, and functional; devices will be able to collect, synthesize, and analyze massive amounts of data; language barriers will be broken down; new types of data will be available; and energy sources and power capacity will improve (Shuler et al., 2013).

Changes in Technology: AI and Big Data Supporting Individual Learning Paths

The final pillar in the new learning landscape is the integration of big data and artificial intelligence. These technologies enable a personalized approach to employability, as evidenced by IBM's AI application for HR management, Watson (Manuli & DePalma, 2018). They facilitate the identification of individual employability needs and match them with tailored solutions.

2.3 THE EFFECTS OF CHANGE IN THE LEARNING SECTOR

The technological advancements listed above have reshaped the learning landscape, affecting course design, the learner's role, technology use, and content distribution. The digital transformation within the training ecosystem has introduced an array of products and services to the market, produced by diverse actors and accessible through technologies that were nonexistent 15 years ago. Technology has empowered companies to produce quality content on a large scale. However, this oversupply does not automatically translate into more learning opportunities. It requires learners to have discernment in choice and information, while also potentially causing stress from too many choices.

The following sections will examine various aspects of learning transformation within companies, including the broadening portfolio of training products, the transformation

of the training business, the endless supply of content, new methods of accessing content, and the centrality of the learner.

2.3.1 Digital Training: Broadening Portfolio of Training Products

While new technologies require more skills, digital evolution has also offered an unprecedented amount of easily accessible training products over the last twenty years. Learning has gone remote, and the dematerialization of content and its availability on the web have transformed training.

The first digital training products were e-learning, available via external media even before the explosion of networked and cloud-based solutions. This made them the subject of academic evaluation; their true usefulness and effectiveness has been debated over the past two decades.

Because e-learning was the forerunner of educational provision, the first formats were very rudimentary. The graphics, interaction, pedagogy, and storytelling were very basic, and their duration was too long.

While many studies have investigated the effectiveness of e-learning (Chien, 2012), most of them have focused exclusively on the technologies and systems used (Volery et Lord, 2000; Cidral et al, 2018; Turhangil Erenler, 2018), although there were objections to this approach (Louati, 2020).

However, since technology is making great strides in learning solutions, the design of the lessons, the interactions, and the cognitive approach are also essential to the effectiveness of the module.

Today, the learner experience is becoming more engaging compared to the first examples of static and pedagogically simple e-learning in the early 2000s.

Technology allows for graphics similar to commercially available video games and even immersion in augmented reality (AR) or virtual reality (VR). The graphics quality level is essential to capture the interest of the learner and maintain a motivating learning experience. Immersive environments like Second Life, Roblox, and Minecraft are based on VR technologies and have already collected hundreds million users in the last twenty years (Rospogliosi, 2022)

Second Life provided an environment for pioneering experiments in interactive learning. It grew rapidly during the early 2000s and was used by about a million at the height of its success (De Back et al, 2021; Sancar-Tokmak & Dogusoy, 2020).

The VR technologies used in those successful games are opening the door of the Metaverse.

The rebranding of the world's largest online social network from Facebook to Meta is indicative of a shift that is well underway among the generation who are now in school and university and is accelerating in those who will engage in learning in the future. It is a turn towards the virtual that is likely to play an important role in interactive learning environments.

While consumers are eagerly awaiting the Meta platform to reach its VR potential, some of the weaknesses of an environment designed primarily for a consumer audience should be borne in mind. First of all, the commercial exploitation of these spaces can conflict with teaching quality (Rospogliosi, 2022) Furthermore, it has been shown that several applications defined as educational and aimed at children did not respect the principles for truly educational programs (Meyer et al., 2019).

It is certainly too early to draw any conclusions, but it does seem important to show some caution in approaching a world that is so immersive that it can easily convey messages that are not part of the learning objectives.

2.3.2 Learning Industry: Transformation of Business Training

Among the many online training offerings, new learning channels have emerged that target education as well as professional training and personal development.

Digital training has become synonymous with distance learning, which brings with it the possibility of learning anywhere and at any time of day. The phenomenon is growing exponentially.

In the United States, for example, as early as 2015/2016, 42.5% of students were taking distance learning courses (National Center for Education Statistics 2019), more than double that of 2008 (Radford, 2011).

People engage in online learning at school, in their private lives, and at work. Online learning is therefore a phenomenon that has exploded, not limited to educational or professional channels but accessible and appealing for personal development as well.

An interesting example of the market's evolution is MOOCs (Massive Open Online Courses), courses to support students put online for free for what was defined as democratic access to knowledge (Paek, 2021)

The most important of these is the Khan Academy, which since 2008 has been providing online lessons from school age up to SAT preparation for college.

In 2020, at the height of the health crisis, the Academy recorded a 41% increase in new registrations compared to the previous year. While it still remains an initiative that primarily impacts the US audience, which accounts for two-thirds of registrations, the phenomenon is becoming global. Content translation is increasingly available, and in the first year of the pandemic, new registrations outside the US grew by 49%. (Khan Academy Annual report 2020)

Online academic offerings have also grown enormously. University MOOCs offered by the company Coursera have been trending exponentially. Registrations grew from 45 million in 2019, to 93 million in 2021 (Q3), and course offerings more than doubled to over 8000 titles.

The differences between Khan Academy and Coursera are significant. The former caters to young people from the early years to college entrance, offering free courses and operating as a foundation supported by large donations from foundations and business celebrities. Coursera, born as a company of MOOCs, which by their very definition must be defined as free as Open Courses, has become a profitable public company.

The target audience is consumers, but a business line for companies was inaugurated in 2016. In 2017, Coursera had 500 corporate clients, but companies' growing interest in providing themselves with valid and immediately available content has grown the number of clients to 2900 at the end of 2021. Companies have developed an interest in integrating Mooc courses into their training catalogs. However, platforms such as Coursera and EdX (created by a synergy between Harvard and MIT) are the most successful as they are linked to reputable universities (Gallagher & Palmer 2020).

The intersection of entertainment and education has created an industry offering on-demand solutions for self-production of educational materials. The availability of professional and freeware tools like Audacity for audio management and da Vinci Resolve or Vimeo for video editing has democratized content creation. Videos can be made with countless free or low-cost applications, making it possible to independently produce adequate, though not excellent, audio and video.

Many companies with specialized or exclusive skills like IT, security and environment, and consultancy firms, offer training solutions to their clients.

2.3.3 An Unlimited Supply of Content

The proliferation of low-cost pre-created content represents a significant opportunity for companies to optimize training budgets. The cost per course or per platform subscription becomes very attractive and allows access to high-profile content (from prestigious universities and consultancy firms) that was previously not affordable. Many organizations are therefore improving their training offerings to employees. However, these extensive training catalogs can be disorienting to employees.

On the one hand, corporate training divisions run the risk of being out of touch with the content on offer due to the vastness of the offerings. While this limitation is compensated by the quality of the source for technical competencies, the content on organizational competencies like culture, management, and soft skills offered by the platforms could conflict with the company's past or future courses. From this point of view, the training department risks becoming a mere intermediary of training offers designed by others.

The second loss of orientation concerns employees because excessive choice can lead to disorientation. Adults cannot always define their own training plans if they lack suitable orientation tools or if the benefits of the courses are not made explicit. One of the most visible effects of this fungibility of training is the low completion rate of courses (Khalil & Ebner, 2014; Romero-Rodríguez et al., 2020). The perceived value of what is taught is lower when its accessibility is not constrained.

Adult learners' ability to choose their own pathway and define their learning strategy is also a fascinating issue.

Over the last twenty years, research has developed a new concept of learning that places learners and their ability to make choices at the center of training: heutagogy (Hase & Kenyon, 2000)

Heutagogy focuses on adults and their ability to make their own choices. In a world dominated by information, every person must be able to define their own learning objectives, self-evaluate what they have learned and define their own paths without the need for external support.

2.3.4 Content Access and Distribution

The growth of digital content within organizations has led to the emergence of Learning Management Systems (LMS), platforms that can provide access to content, monitor participation, create assessments of acquired competencies, and manage communication with participants and the rest of the organization.

LMS have multiple online operations and behave as a framework to capture numerous layers of progressive learning (Jung & Huh, 2019; Kuosa et al., 2016; Oakes, 2002; Watson & Watson, 2012). LMS behave as a platform to distribute and oversee pedagogical material (Watson & Watson, 2012). They also provide users with a productive learning environment to assimilate multiple components of systematic applications (Jung & Huh, 2019; Watson & Watson, 2012).

Although LMSs were born in the 1990s to support all training, before the explosion of digital content they became an essential tool in medium to large organizations because they allow the use of content and real-time evaluation metrics.

Today LMSs have become web-based and therefore support the collection of digital data and metrics that can be acquired through both the content hosted by the platform and the information that can be acquired online.

In fact, e-learning, synchronous training with interactive pedagogy, has been developed through specific technology (e.g. Scorm format or with API protocols) that allows multiple users to participate at different times in the same course. It also makes it possible to record the activities carried out by the participant and, where possible, to track their interactive activities (chat, quizzes, videos, etc.).

Market analysts predict annual growth of between 16% and 23% per year, assuming a doubling of global revenue over the next four years.

2.3.5 Individual and Distance Learning Experience

Teaching and learning modes have transformed. Whereas in previous decades, learning in companies took place mainly through formal classroom channels or on-the-job coaching, the new paradigm of digital training has changed tools and balances. Training is no longer in a physical place, at a fixed time, nor does it require synchronizing with a teacher. It is also no longer necessarily a group experience, and professional learning increasingly appears to be based on the individual's organization and motivation.
Thanks to the evolution of technology, learning programs are becoming increasingly immersive. It is therefore necessary to design training that takes into account the many stimuli that the media can provide to maintain a high level of attention. (Kalyuga, S., Chandler, P., & Sweller, J. 2000).
Training needs are becoming more personalized, with organizations requiring micro-learning and bite-sized training modules, easily accessible to employees when required. Training and development programs should be designed for employee engagement and extent of training transfer. (Maity 2019)
Therefore, the concepts of customer experience (CX) and user experience (UX) have been expanded to learner experience (LX), comparing the participant in a course to a user or customer of digital experiences.

2.4 From Distance Learning to Learning Everywhere: Historical Evolution

The landscape of training has undergone significant changes in recent years. To fully appreciate this transformation, it is instructive to trace the evolution of distance learning, from its origins using postal services to the contemporary era of mobile learning. This trajectory aligns with the current acceleration in technology and can be categorized into three distinct phases: the genesis of distance learning in the 18th and 19th centuries, advancements in the 20th century mainly through audio and radio

technology, and the digital era that ushered in mobile learning and universal connectivity. A final section is dedicated to examining the impact of the COVID-19 crisis on human behavior and learning.

Origin

One of the earliest known examples of distance learning was the shorthand correspondence courses offered by Caleb Phillips in the Boston Gazette in 1728.
In the following century we find the first organized distance learning initiatives in Sweden, (Holmberg, 1986 as cited in Picciano, 2019), in Japan (Hisano 1989), and again in the United States. In Germany, the Frenchman Charles Toussaint and the German Gustav Langenscheidt created a school for teaching language by correspondence (Noffsinger 1926, Holmberg 1986).

Worthy of mention is Anna Eliot Ticknor's 1873 correspondence course aimed at "encouraging ladies to develop the habit of devoting time every day to study". Her Society to Encourage Studies at Home succeeded in involving over 7000 women who could choose courses in different study disciplines (Caruth & Caruth, 2013).
Formal initiatives from the academic world were not long in coming; beginning in the 1890s, the University of Wisconsin began to offer Bachelor's, master's and even PhD correspondence courses. (Sherow, S., & Wedemeyer, C. A. 1990). In France, Leon Eyrolles created *École chez soi* in 1891, and later gave birth to *École Spéciale des Travaux Publics*, which also included a correspondence school.

20th Century

In the twentieth century, learning by correspondence was consolidated with massive training courses involving thousands of participants. The courses were delivered by teachers who had not taken part in the planning.
In France, during the Second World War, the *Ministère De L'éducation Nationale* set up a center for young adolescents forced to flee the cities. Later called the *Centre National De Télé-Enseignement* (CNTE), it then provided education for isolated people and the sick (UNESCO 1970).

The 20th century was dominated by new media. Radio and television broadcasts were introduced as teaching tools. The United States was already in the vanguard by producing educational content via radio and later television.

In the 1950s, 12% of the more than two thousand television channels in the United States broadcast educational programs, including shows from prestigious institutions such as the University of California (Sherow & Wedemeyer,1990).

Towards the end of the 1960s, technological progress made it possible to use different media tools for learning. In 1969, the British Open University (OU) was created in the UK, the first online educational body to rely on audiovisual and link sharing, creating a truly connected community (Weinbren, 2015).

The birth of the OU represents the link between the distance learning of the last century and today's mobile learning. In between came the creation of the internet, the acceleration of technology in terms of miniaturization of hardware spaces, the increase of data transmission and data storage.

New Millennium

The final decade of the 20th century marked a pivotal shift in the adoption of computer technology, with the personal computer market achieving global prominence. This period heralded the ubiquity of computers in homes, driven by the burgeoning development of the Internet. The transformative period of the early 2000s, especially with the emergence of Web 2.0, represented a significant shift in the landscape of digital training. This era empowered users to not only access content online but also contributes actively to content creation. The democratization of content production and the evolution of synchronous communication systems such as chat and videoconferencing revolutionized the digital training experience, making it more interactive and real-time.

Moreover, the advent of mobile technology introduced a new dynamic to learning. The freedom to access educational content anytime and anywhere revolutionized the concept of distance learning.

During this period, several groundbreaking initiatives were launched that significantly increased access to knowledge. The Massachusetts Institute of Technology (MIT) introduced Open Courseware, which made the teaching materials for undergraduate

and graduate courses widely accessible online. This initiative represented a significant step towards open and inclusive education.

In tandem, the concept of Open Education Resources (OER) gained momentum. OER are educational resources that are freely accessible and modifiable, embodying the principles of open knowledge sharing and collaboration. This movement represented a significant shift in the traditional educational paradigm, emphasizing the democratization of knowledge and learning resources.

The latter part of the new millennium also witnessed the proliferation of Massive Open Online Courses (MOOCs), with platforms like EdX and Coursera expanding access to academic materials. These platforms, initially offering free courses, gradually evolved to include fee-based and subscription models, reflecting the growing commercialization of online education.

With the rise of e-learning, video, and other digital learning formats, there was a corresponding need for robust platforms for content management. Learning Management Systems (LMS) emerged as essential tools in medium to large organizations, facilitating the distribution, validation, and tracking of learning activities. These systems enabled the integration of various digital learning formats and provided valuable data analytics and metrics for organizational learning and development (Adams Becker et al., 2017).

The Pandemic Period

In the short span of 30 years, technology has thus enabled the dissemination of knowledge access technology, made learning portable and always available, enabled the dissemination of knowledge through freely accessible content, and developed platforms for the distribution and monitoring of these activities. Then the COVID-19 pandemic and the consequent lockdowns accelerated this process by introducing major behavior changes regarding work, cooperation, learning, and the purchasing of goods and services (Elyassi, 2021)

Technologies are widely accessed and used in the private domain, and the recent pandemic has shown how invaluable they are to continuing business operations and fulfilling employment responsibilities. For organizations to withstand the changes

brought by the COVID-19 pandemic in 2020, they had to break with standard procedures and adopt new ones (Szopiński & Bachnik, 2022).

What the health emergency has brought with it is not an innovative technology per se but the diffusion of pre-existing technologies and the forced adoption of new behaviors by users. This transformation is evident even in educational institutions, as observed by respondents in the FNEGE survey (Caby, Kalika & Thévenet, 2020), where 70% of the participants indicated that the lockdown had challenged the education system.

2.5 CONCLUSION

The topic of learning and technology is becoming increasingly relevant. The technological acceleration since the beginning of the century has brought constant change in technology and ways of teaching. The recent health crisis has also accelerated users' ability to embrace technology. Forms of training are no longer limited to connecting to a desktop computer in the office or at home but have become mobile, allowing learners to educate themselves anywhere.

The relationship with technology thus becomes a fundamental element of learning. The solutions implemented have become a means of interaction between learners and teachers, or, as in the case of e-learning and asynchronous training, replace the teacher's lectures. During the isolation period due to the health crisis, we experienced a forced adaptation to new technologies and also a reinforcement of the isolation that technology imposes in the learning process. The absence of a teacher can challenge learning, but isolation can also reduce motivation through social imitation. These aspects related to how and why we learn are at the core of the upcoming chapters.

3 LEARNING IMPACT: THE ROLE OF TECHNOLOGY AND THE INDIVIDUAL LEARNER

3.1 MEASURING THE IMPACT OF LEARNING

In an era of rapid global advancement, harnessing digital resources for learning has become imperative. Evaluating the effectiveness of digital learning not only enhances teaching methods but also shapes optimal learning approaches.

Numerous studies underscore the significance of evaluating learning effectiveness for success in academic and professional domains. Analyses of corporate training programs' effectiveness has shown positive impacts on both employees and organizations (Kirkpatrick & Kirkpatrick, 2006). To maximize learning productivity, considerations must include aspects such as constructive feedback, effective teaching methodologies, and fostering self-reflection on learning outcomes. Furthermore, new technologies play a vital role in creating personalized, interactive learning experiences through educational software, online tools, and mobile devices.

The rising prominence of digital e-learning has sparked extensive scientific interest regarding its utility and effectiveness. For instance, Homan and Macpherson (2005) explored the Corporate University approach, particularly its integration of e-learning in corporate training programs. They discussed the advantages and disadvantages of e-learning in comparison to traditional classroom-style teaching.

The advantages of e-learning, such as convenience, accessibility, reduced costs, and timely training delivery, are well-documented. However, challenges in implementing e-learning, such as the need for robust technological infrastructure and engaging course design, are also recognized. The mode of content delivery and the learners' capacity for self-regulation in autonomous learning are crucial to the learning process. The presence of an instructor to set a pace for learning significantly influences learner success (Baker, 2010).

The convenience factor offered by digital tools contributes significantly to their success. Digital tools not only offer learners flexibility in access and timing but also enable organizations to save time, space, and costs while achieving superior results (Baudoin & Tahssain-Gay, 2013).

Information technology offers scalability in teaching, enabling a wider audience with a more modest economic investment than traditional methods. Analyses of cost-effectiveness comparing digital learning delivery with traditional face-to-face training, as well as return on investment (ROI) assessments, highlight the advantages of digital learning (Garrison & Cleveland-Innes, 2005). In educational settings, self-evaluation and reflective learning have been shown to potentially improve student performance by up to 10% (Hattie & Timperley, 2007).

Various methodologies have been employed over the past two decades to assess the efficiency of digital learning among adult learners. These methods include learner satisfaction surveys, assessments of learning outcomes, analyses of impact on work performance, cost-effectiveness evaluations, and measures of learner engagement (Garrison & Kanuka, 2004). Surveys provide useful feedback on learner experiences with digital learning, including engagement levels, usability, and overall satisfaction (Chen & Liang, 2009). Another approach involves evaluating learning outcomes achieved by learners, such as improvements in knowledge, skills, and abilities, through pre- and post-tests or other assessment tools (Palloff & Pratt, 1999).

To fully comprehend digital learning's effectiveness, student engagement must be assessed by observing factors like time spent on the platform, course completion rates, and the success rate of specific courses (Garrison, 2011). Engaging in e-learning requires learners to access systems offering tutorials and individual progress monitoring. When evaluating the effectiveness of digital learning, it is crucial to

consider more than just professional or academic outcomes and to examine aspects like student satisfaction with the material, technology used, and time spent on learning platforms.

3.2 DIGITAL LEARNING FACT BASE: ALARMING STATISTICS

In recent years, educational institutions, including prestigious ones like MIT and Harvard University, have embraced digital teaching solutions. The early 2000s saw the creation of digital modules by these institutions. Research in this domain has been primarily focused on analyzing completion rates in distance learning courses and massive open online courses (MOOCs), where physical attendance is not mandatory.

Studies investigating factors influencing student engagement and completion in online learning environments have evaluated aspects such as student engagement, dropout rates, and knowledge improvement. Variables such as age, education, and the desire to learn have been examined to comprehend the motivations behind students' learning experiences.

These insights have been instrumental in shaping the design and delivery of future MOOCs, with the goal of enhancing student engagement and completion rates. The findings across four key studies on distance learning completion rates have revealed a common thread: completion rates in MOOCs typically range from 5% to 15% of enrolled students, underscoring significant challenges in student engagement and retention within the online learning environments.

Several pivotal factors have emerged as determinants of completion rates. Student motivation and prior knowledge are instrumental in shaping these rates. Furthermore, learner support and interaction, including peer engagement, access to instructors, timely feedback, and support mechanisms, play a key role in promoting student engagement and ensuring completion. The design of MOOCs can significantly impact completion rates; features like gamification, adaptive learning, and interactive elements have been observed to enhance student engagement and thus course completion.

In 2016, a comprehensive report by Isaac Chaung and Andrew Ho presented findings from a four-year examination of Open Online Courses at MIT. Utilizing data from EdX

and Coursera MOOCs spanning from 2012 to 2016, the study encompassed nearly 300 courses, 245,000 certifications, 4.5 million participants, and over 28 million hours of training. It found that 60% of paid course participants completed their courses, in stark contrast to a mere 7% completion rate for those with free access.

Subsequently, Reich and Ruipérez-Valiente (2019) conducted an extended analysis spanning six years to study the behaviors of individuals enrolled in online courses. The authors highlighted the growing popularity of MOOCs, adopted by universities and organizations worldwide.

However, they also shed light on the challenges faced by MOOCs, including low completion rates and difficulties in monetizing courses. Early research on MOOCs pointed to high attrition rates, with 52% of registrants not engaging with course content. The largest influx of MOOC learners occurred during the 2015-2016 academic year, with 1.1 million unique learners. However, only 12% of these learners pursued additional courses offered by HarvardX and MITx in the subsequent year.

Reich and Ruipérez-Valiente (2019) argued that MOOCs have undergone a significant transformation in recent years, shifting towards targeted approaches catering to specific populations, such as working professionals and underserved communities. This strategic reorientation has the potential to enhance the impact and sustainability of MOOCs, addressing some of the field's persistent challenges.

3.3 EVALUATING TRAINING AND COURSES

In the domain of educational and training settings, the systematic process of evaluation, aimed at determining the worth, value, or significance of an activity or process (Phillips & Phillips, 2016), is of paramount importance. The seminal work of Donald Kirkpatrick in the realm of training evaluation, conceptualized in 1959, stands as a cornerstone in the field of instructional design and technology. Kirkpatrick's comprehensive model delineates four critical levels of evaluation: reaction, learning, behavior, and results.

At the initial level of reaction, evaluators focus on assessing participant satisfaction, delving into their engagement, contributions, and responses to gauge sentiments about the training. Progressing to the learning level, the emphasis shifts to measuring the

acquisition of knowledge, skills, and attitudes, exploring participants' confidence and motivation for applying the skills.

The third level, behavior, scrutinizes changes in work behaviors post-training, with observations typically spanning several weeks or months. The culminating level, results, examines the long-term outcomes of the training program, demonstrating the challenges of evaluating institutional impacts (Phillips & Phillips 2016).

The Kirkpatrick Model primarily assesses workplace training courses. Surveys have indicated that a substantial percentage of HRD executives (67%) find the Kirkpatrick Model important (ASTD, 1997). It has proven valuable in evaluating educational training effectiveness, incorporating four levels of measure.

Kirkpatrick & Kirkpatrick's (2006) model has also become a standard for assessing training programs' success, including trainee response, knowledge acquisition, behavior change, and the organization's bottom line. This systematic approach informs decisions on resource allocation and training program quality.

In the context of technology-based learning, contemporary authors have adapted the Kirkpatrick model, extending it to assess online courses, e-learning programs, and technology-enhanced instructional approaches (Kirkpatrick & Kirkpatrick, 2006; Lent, Brown, & Hackett, 1994; Phillips & Phillips 2016). A technology acceptance model has also been proposed, considering factors like perceived usefulness and ease of use when evaluating technology-based learning programs (Venkatesh, Morris, Davis, & Davis, 2003). These contemporary approaches aim for a comprehensive assessment system that examines all aspects of tech-based learning and its influence on students and organizations.

Despite its recognized effectiveness, the Kirkpatrick model has encountered critiques (Bates, 2004) but continues to be used across various educational settings, including digital group work (Baskin, 2001), curriculum changes (Paull et al., 2016), online information literacy courses (Chang & Chen, 2014), training courses (Farjad, 2012), and blended learning environments (Embi et al., 2017). Discussions on its limitations are ongoing, particularly in the context of higher education evaluation (Steele et al., 2016; Haupt & Blignaut 2007).

The critical link between training evaluation and effectiveness is widely recognized within the instructional design and technology field. Training effectiveness measures

how successful a training program is in attaining its desired outcomes, while training evaluation assesses the impact of the training program on both learners and the organization. Through the evaluation of training programs, organizations gain valuable insights into a program's success, pinpoint areas for enhancement, and make well-informed decisions about resource allocation for future training initiatives (Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997).

Training evaluation is key to measuring the effectiveness of training programs against set goals and objectives (Kirkpatrick & Kirkpatrick, 2006). This structured assessment offers insights into the training's impact on learners and the entire organization, empowering decision-makers to enhance training quality.

Training evaluation plays a pivotal role in assessing the success of training initiatives. It offers a systematic and unbiased mechanism to appraise the outcomes of training programs, enabling companies to ascertain whether the training has achieved its intended objectives and if it has positively impacted the trainees and the organization as a whole. This evaluation allows organizations to identify strengths and weaknesses, paving the way for future training programs to be more effective (Watkins et al., 1998).

3.4 TECHNOLOGY ACCEPTANCE: T.A.M. AND U.T.A.U.T MODELS

In an era where technology significantly influences learning and learner engagement, understanding the dynamics of technology adoption is crucial. The Technology Acceptance Model (T.A.M.), introduced by Fred Davis in 1989 has been influential in predicting and comprehending the adoption of new technologies. This model suggests that perceptions of a technology's utility and ease of use are crucial in determining an individual's willingness to employ it. Applied across various technologies, including e-learning systems, T.A.M. provides vital insights into user adoption factors (Davis, 1989).

The objective Davis aims to achieve with the Technology Acceptance Model (TAM) is to predict the behavior that facilitates the adoption of new technologies. The theory, therefore, studies information systems (IS) as an external factor and draws inspiration from the Theory of Reasoned Action, which provided a psychological perspective on

human behavior that was not present in the information systems literature (Davis, 1989; Davis, 1993). The theory then identified two variables that, according to the author, had a higher correlation with technology adoption.

Perceived ease of use and perceived usefulness were already considered in the scientific literature (Johnson & Payne, 1985; Robey, 1979). Perceived usefulness refers to performance improvement, while ease of use pertains to the effort required for its adoption. Perceived usefulness means that students must feel comfortable using the system, perceiving it as a convenient tool for their academic needs (Davis, Bagozzi & Warshaw, 1992).

These two constructs have a strong relationship with Bandura's Social Learning Theory (1982) and the construct of self-efficacy, which refers to a situational specific belief about how well someone can execute a future task (Davis, 1989; Bandura, 1982). The proposed system is therefore composed of an external environment (the characteristics of the technological and informational system), intrinsic characteristics of the system that promote a cognitive response (ease of use and usefulness), which will act on the individual's self-efficacy and thus influence the positive or negative perception of being able to act successfully. From a practical standpoint, the application of the model has made it possible to evaluate users' motivation to adopt a range of technologies (Hwang, 2005; Araújo & Casais, 2020). Similarly, students who perceive e-learning as advantageous and straightforward are more motivated to interact with the technology and persist over the long term, leading to better learning outcomes (Dziuban, Hartman & Moskal 2004; Sun et al., 2008).

Nonetheless, it must be noted that the initial model required further investigation into the factors influencing the perceived usefulness in the adoption of technology. An investigation into the antecedents of perceived usefulness was necessary for the development of information systems (Venkatesh & Davis, 2000). Consequently, five variables previously discussed in the literature were introduced into the model:

- Subjective Norm: The perception that most people who are important to an individual expect him or her to adopt a particular behavior (Venkatesh & Davis, 2000). The subjective norm postulates that when an individual does not want to perform a certain behavior, but the important members of the social group think that he or she should do it, the individual will follow the opinion of the social group (Venkatesh & Davis, 2000).

- Image: In line with the Diffusion of Innovations Theory proposed by Rogers (Mahajan, 2010), it links the subjective norm to perceived status within one's social system, reinforcing the sense of belonging to the group (Pfeffer, 1992).
- Job Relevance and Output Quality: Two elements strongly correlated with perceived usefulness, but they broaden the scope by considering that the quality of the obtained result increases the positive perception of the technology, thereby improving the perception that it is useful for work (Venkatesh & Davis, 2000).
- Result Demonstrability: The tangibility of the obtained benefits. This means that the value of the work and its quality must be tangible and communicable.

New to this model were the direct predictors of perceived ease of use, which include computer self-efficacy, perception of external control, computer anxiety, computer playfulness, perceived enjoyment, and objective usability (Venkatesh & Bala, 2008). The anchoring factors (computer anxiety, computer self-efficacy, perception of external control, and computer playfulness) guide the initial judgment of perceived ease of use and differentiate users based on the degree of their apprehension or fear related to the use of technology. The adjustment factors come into play after individuals gain direct experience with information systems (Venkatesh, 2000). The adjustment factors include perceived enjoyment and objective usability, which measure the degree to which information systems are perceived as enjoyable and the level of effort required by the systems to complete specific tasks (Venkatesh, 2000).

However, the main strength of the T.A.M.3 extension is the development of the behavioral model of the antecedents of both perception factors (perceived ease of use and perceived usefulness). This provides a comprehensive set of conditions and scenarios under which technology acceptance is most likely to occur, as well as a complete list of interventions with direct implications for the implementation and management of information technologies (Venkatesh & Bala, 2008).

The review of existing theories led Venkatesh to identify limitations, which in turn triggered the need to develop the Unified Theory of Acceptance and Use of Technology (U.T.A.U.T.). The primary limitation was that the literature had not empirically tested and compared dominant technology acceptance models, and studies primarily examined the use of simple systems (e.g., PCs) while neglecting the use of more complex technologies (Venkatesh et al., 2003). The focus on a single technology

limited the explanatory power of the theories, as individuals' experiences, purchase decisions, and use cases vary depending on IT systems and contexts (Brown, Venkatesh & Hoehle, 2015). The theoretical model of UTAUT suggests that the actual use of technology is determined by behavioral intention. The perceived likelihood of adopting the technology depends on the direct effect of four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. The effect of these predictors is moderated by age, gender, experience, and voluntariness of use (Venkatesh et al., 2003).

Among the facilitating conditions: "The degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system" (Venkatesh et al., 2003). After initial use, the effect of this construct on usage intention becomes non-significant, but it has a direct significant effect on use behavior (Venkatesh et al., 2003).

The moderating effects of age, gender, experience, and voluntariness of use define the strength of the predictors on intention. Age moderates the effect of all four predictors; gender moderates the relationships between effort expectancy, performance expectancy, and social influence; experience moderates the strength of the relationships between effort expectancy, social influence, and facilitating conditions; and voluntariness of use moderates only the relationship between social influence and behavioral intention (Venkatesh et al., 2003).

UTAUT has made significant contributions to the literature by providing an empirical understanding of technology acceptance by comparing the major technology acceptance theories. UTAUT demonstrates that the proposed factors explain 70% of the variance in usage intention (Venkatesh et al., 2003), offering stronger predictive power compared to other models (e.g., Davis, 1993; Sheppard, Hartwick & Warshaw, 1988). The interactive effect of some constructs with personal and demographic factors demonstrates the complexity of the technology acceptance process, which depends on individuals' age, gender, and experience (Venkatesh et al., 2003).

3.5 COMPUTER-BASED EDUCATION AND ITS RECOGNITION

When Computer-Based Training (CBT) made its debut, learners held varied opinions about it. Many found the use of technology to be a productive and stimulating way of acquiring knowledge and developing skills; however, some faced difficulties with the technology, making it less satisfactory than more traditional forms of training.

In the early days of CBT, researchers conducted studies to assess the attitudes of learners towards this new type of training. At an early stage of CBT development, for instance, Williams and Zahed (1996) asked learners to compare their experience with CBT to traditional training techniques. The results revealed that there was no significant difference in level of learning between the two groups, retention after one month was significantly higher in the CBT groups, there was no correlation between educational level or computer anxiety and learning, and there was no significant difference between the two groups on satisfaction with the training experience. This initial perception was not confirmed in the data collected when CBT became a widely used tool in education, as we saw in MOOC statistics.

An investigation conducted by Schwier & Misanchuk (1993) looked into elements that affected the perspectives of learners regarding Computer-Based Training. The inquiry demonstrated that the structure of the CBT program, the kind of assignment finished, and the learner's prior involvement with the technology all had a significant effect on learner attitudes. The analysts concluded that CBT was most successful when it was expertly designed, the tasks were relevant and meaningful to the learners, and the learners had significant involvement with the technology.

The attitude of learners towards Computer-Based Training (CBT) has shifted and developed over the years, and studies have demonstrated that as technological advancements have been made and more opportunities for interaction and teamwork have become available, their views have become more favorable.

At the beginning, many learners felt that CBT was too strict and distant, and so they had no interest in using the programs (Kirschner, Strijbos, Kreijns, & Beers, 2004). However, the proliferation of mobile devices and the availability of virtual learning systems have made CBT more attainable and practical for students (Venkatesh et al., 2003).

Recent studies have found that learners are increasingly seeing CBT as a valid form of learning. For instance, those who employed CBT in their work environment reported higher levels of satisfaction and a greater likelihood of using it again in the future (Kirschner et al., 2004).

It has been recognized that motivation plays a pivotal role in modern digital learning like computer-based training and online instruction. Research has proven that motivation boosts learners' involvement, commitment, and success in their learning (Deci, Koestner, & Ryan, 1999).

To understand the factors that influence motivation in digital learning, researchers have investigated the design and usability of digital learning platforms, social and collaborative learning features, and gamification. Zaharias (2009) found that the quality of the user interface, navigation, and other design features of e-learning platforms can impact learners' motivation. Similarly, Al-Rahmi, Othman and Yusuf (2015) found that social media and other collaborative learning features can enhance motivation by providing opportunities for interaction, communication, and collaboration.

Research conducted by Pintrich, and de Groot (1990) showed that motivation is particularly crucial for learners in self-directed educational settings, such as those created by digital learning tools and systems. The self-directed nature of digital learning can make it hard for learners to stay motivated without the help of a teacher or other students. Consequently, it is essential to understand the elements that can affect a learner's enthusiasm so that these learning experiences can be optimized for effectiveness.

Gamification has also emerged as a popular strategy for enhancing motivation in digital learning. Dicheva, Dichev, Agre, and Angelova (2015) conducted a systematic review of the literature and found that gamification can help increase learners' motivation by providing a sense of challenge, achievement, and fun. Educators and instructional designers can use this knowledge to create engaging and supportive learning environments that enhance learners' motivation.

Research shows that highly interactive multimedia learning environments can significantly increase learning motivation (Huang, 2011). The impact of technology on learning

motivation has been widely debated recently as customized education and gamification have emerged in various educational settings.

Customized learning systems allow students to pace their education and access tailored resources. This approach positively affects engagement, enabling interaction with relevant material (Rickabaugh, 2016). Additionally, personalized learning promotes autonomy and responsibility among learners, which are linked to increased motivation and academic success (Reeve, 2012).

Gamification, as an instructional approach, involves integrating game-like elements into educational activities. By incorporating elements like points, badges, and leaderboards, educators can encourage students to stay focused and achieve their goals. This sense of accomplishment can sustain their motivation, even in virtual learning environments and give them a sense of progress, challenge, and achievement (Kapp, 2012). Hanus and Fox (2015) observed that this method leads to a more enjoyable learning experience and an intrinsic motivation to learn.

While technology is invaluable, other factors like teacher support, course content, and learning environment play crucial roles (Ryan & Deci, 2000). Therefore, integrating a variety of motivational strategies alongside technology is paramount for effective learning outcomes.

3.6 CHALLENGES IN TEACHING AND LEARNING IN 21ST CENTURY

Implementing new technology and adopting a different learning mindset can pose unique challenges for students. Potential barriers to success may include technical issues with tools, adapting to a new learning environment, and lack of interest in the material.

Research has shown that pre-existing experience and knowledge significantly influence the implementation and use of cutting-edge educational tools. Learners may face significant hurdles due to a lack of digital literacy, the ability to effectively use digital platforms and tools to enhance learning (Selwyn, 2016).

Without digital literacy, adult learners might lack the confidence to use online resources, collaborate in digital spaces, or search through various information sources (Hew & Brush, 2007). Digital literacy is crucial to unlocking technology's full potential for learning.

Technical challenges such as poor internet access, outdated hardware, and obsolete software can also disrupt the learning process and frustrate students. Educational programs and institutions must ensure the necessary technological infrastructure is in place to enable successful learning experiences (Ertmer & Ottenbreit-Leftwich, 2010).

Distractions pose a significant challenge in technology-based learning. With the prevalence of online diversions like social media and email alerts, learners may struggle to concentrate on their educational activities. These distractions can diminish the effectiveness of the learning process and hinder overall development (Kay, 2012).

When addressing these challenges, it is crucial to consider the individual needs and perspectives of students. Numerous studies have assessed the impact of motivation on the use of technology in information systems (Davis et al., 1992; Soliman and Lapointe, 2009; Venkatesh, 1999; Venkatesh et al., 2002). User experience must be the primary concern when developing learning technologies, ensuring they are designed with students' needs at the forefront. Identifying and addressing potential roadblocks is essential for success. Educators and trainers can foster positive learning outcomes by providing relevant instruction, encouraging active learning, and creating a constructive and supportive learning environment.

Students who believe in their ability to work with and succeed in modern learning technologies are more likely to engage with digital educational content and complete online courses (Park and Choi, 2009). Giving careful attention to each student's individual needs and perspectives is vital to overcoming these barriers.

People and organizations struggle to keep up with the rapid changes and adapt to new skills. To address these challenges, collective efforts have emerged to establish rules and guidelines for technology and social change.

One such effort is the Agile Manifesto, created in 2001 by software developers aiming to provide guidance for software development. It emphasizes the importance of collaboration, adaptability, and flexibility and has become widely recognized and influential in the software development community.

Another initiative is the Partnership for 21st Century Learning (P21), established in 2002 to meet the needs of the modern world. This organization brings together educators, business leaders, and policymakers to ensure that individuals have critical thinking skills, collaboration abilities, and information comprehension. This has raised

awareness about the importance of these skills and led to changes in school policies and practices nationally and internationally.

According to Trilling and Fadel (2009), the concept of "21st Century Skills" shifts the focus from memorizing content to developing process abilities and competencies. This change recognizes the rapidly changing environment and the importance of students' ability to adapt and create in order to succeed. The framework also highlights the value of lifelong learning and the need for individuals to continuously learn, unlearn, and relearn to cope with changing conditions.

The International Society for Technology in Education (ISTE) has played a significant role in promoting the use of digital tools to enhance education. According to the ISTE (2017), educational technology involves using digital tools to improve teaching and learning. Hwang and Wu (2012) offer another perspective, seeing technology as a means to create, manage, and deliver educational content and experiences. This reinforces the idea of technology as a tool to support and enhance the teaching and learning process.

Mishra and Koehler's framework from 2006 couples three kinds of knowledge that are needed to be an effective teacher in the digital age: Technological, pedagogical, and content knowledge (TPACK). Technology knowledge is related to the comprehension of the technology tools and how they can be used to enhance teaching and learning.

The TPACK framework states that in order to be an effective teacher within the digital age, it is necessary to possess a combination of pedagogical, technological, and content knowledge. This means being able to employ technological tools to enhance student learning, devise instructional approaches that support the educational material, and deploy pedagogical tactics that promote successful student understanding.

The TPACK framework has been adopted and implemented in the educational sector to create technology-based learning settings and to train teachers. Additionally, it has been used to judge the impact of technology assimilation in education.

Mishra and Koehler (2006) emphasized that the TPACK framework does not give a formula for successful teaching, but rather offers a comprehensive understanding of the intricate connection between technological, pedagogical, and content knowledge.

All in all, the TPACK framework has been beneficial in increasing our knowledge of teaching well in the modern era and will remain a helpful resource for creating and improving educational spaces with the use of technology.

Aside from these classifications, Clark and Mayer (2016) have suggested that e-learning constitutes its own distinct field of learning. They argue that e-learning necessitates its own distinct set of design rules and procedures, which have to be taken into account separately from regular classroom-based learning. The following year, ISTE (2017) formulated a set of standards for technology in teaching that emphasize how technology can be employed to assist with teamwork, communication, and innovation in the learning experience. The Association for Educational Communications and Technology (AECT, 2018) defines instructional design as a systematic approach to designing, creating, assessing, and managing educational resources to promote learning. This definition highlights the role of technology in constructing and supplying instructional resources tailored to the requirements of each student. Technology in education has various specialized areas of focus, including instructional design, computer learning, and data analytics (Spector, Ifenthaler, Sampson, & Isaias, 2014) and several tools (multimedia instruction, computer simulations, and educational games) observed to have the potential to improve educational results (Hwang and Wu, 2012).

3.7 FROM PEDAGOGY TO HEUTAGOGY: THE NEW ROLE OF LEARNER

In an era characterized by rapid technological advancements, sudden adaptations, and uncertainties about the future, reflections on the nature of learning are continually evolving. While older generations struggle to keep pace with innovation, younger generations are becoming emblematic of a new approach to learning that heavily emphasizes personalization and self-direction. Technologies and new teaching methodologies are transforming learning experiences in schools and workplaces into highly individualized journeys.

Technology is not just asking for new skills, in not just adding new tools and content to learner's availability. The whole individual experience "to learn" is changing, the role of the teacher as well the role of the learner.

As we know, Pedagogy traditionally refers to the art and science of teaching children. Originating from the Greek words "paid" (child) and "agogos" (leading), it involves a teacher-centric approach where the educator directs all aspects of learning. In pedagogy, the teacher is the central figure, responsible for delivering knowledge and guiding learning activities. The curriculum is typically predefined and structured, focusing on a specific sequence of content.

Children are generally dependent on the teacher for knowledge and guidance, with motivation often being extrinsic, relying on rewards, grades, and teacher approval. Pedagogy is commonly applied in primary and secondary education, where learners are in the early stages of cognitive and social development and require more guidance and structure.

In the 1970s Malcom Knowles introduced the term Andragogy, in his studies on adult learning. Derived from the Greek words "aner" (man) and "agogos" (leading), it places the learner at the center of the educational process, acknowledging their prior experiences and knowledge.

Adult learners are typically more self-directed and take responsibility for their own learning. Learning in andragogy is often based on the learners' experiences, which are used as a resource, and adults are usually intrinsically motivated, driven by personal goals, professional development, and self-improvement.

Andragogy is applied in adult education settings, including higher education, workplace training, and continuing professional development, where learners need greater autonomy and relevance to their life experiences.

The focus on individual differences in learning is not new. Corno and Snow (1986) highlighted the importance of tailoring teaching methods to accommodate the emotional and cognitive characteristics of individual learners. Their work on adaptive teaching stressed that recognizing and addressing individual differences could significantly enhance learning outcomes. This approach allows teachers to employ various learning methodologies suited to each student's unique needs (Randi & Corno, 2005).

The shift towards individualized learning has been accelerated by the advent of e-learning and remote education. Corporations, in particular, seek cost-effective training methods without compromising quality (Alraddadi & Almistarihi, 2013). The integration of big data and advanced analytics in education helps create personalized learning experiences that cater to individual preferences and progress rates (Mohammed et al., 2018).

Individualist experience is also one of the key assumptions of George Siemens (2006) who introduced connectivism, a learning theory that emphasizes the role of social and technological networks in the learning process. Siemens posits that learning begins with the individual, even though it is mediated by connections with the broader network. Similarly, Bell (2011) suggests that while learning is facilitated by the internet and social media, it fundamentally starts with the individual learner.

In the meantime, the high availability of digital learning sources and the skepticism versus new form of employment more oriented to precarious labor markets (Aronowitz & DiFazio, 2010; Brown, Lauder, & Ashton, 2010), are redefining the roles of teachers and learners.

Heutagogy, introduced by Stewart Hase and Chris Kenyon in 2000, is the study of self-directed learning, where learners are highly autonomous and responsible for their learning process. This approach emphasizes complete learner autonomy, with individuals determining what they need to learn and how they will learn it.

Heutagogy encourages double-loop learning, where learners reflect on and adjust their strategies and understanding. It focuses on developing learners' capacity to learn, enhancing their ability to acquire and apply knowledge in various contexts. Learning in heutagogy is non-linear and fluid, with learners engaging in exploration and discovery rather than following a fixed curriculum.

Heutagogy is particularly relevant in contexts requiring high adaptability and continuous learning, such as in rapidly changing industries, personal development initiatives, and environments that foster innovation and creativity. This approach has gained traction in the context of digital and remote learning, where students must become more self-directed (Moore, 2020). Blaschke (2021) further explores how the combination of heutagogy and technology prepares learners for lifelong learning by fostering self-directed and self-determined educational experiences.

Table 3-1: Comparison of Pedagogy, Andragogy and Heutagogy.

Aspect	Pedagogy	Andragogy	Heutagogy
Learner's Role	Dependent on teacher	Self-directed	Highly autonomous
Teacher's Role	Central, directive	Facilitator, guide	Minimal, supportive
Learning Approach	Structured, sequential	Flexible, experiential	Non-linear, self-determined
Motivation	Extrinsic (rewards, grades)	Intrinsic (personal goals)	Intrinsic, self-motivation
Learning Content	Predefined curriculum	Based on learners' experiences	Determined by learners
Application Context	Primary and secondary education	Adult education, professional development	Lifelong learning, innovation-driven fields

This increasing form of autonomy self-directed is in line with further development of learning experience. Learners become self-autonomous and able to choose and identify how to learn. It is up to the individual to find and choose source of learning.

Decentralized learning environments are seen as more likely to foster the complex skills and potentials needed for future social and technological innovations (Peters & Heraud, 2015).

The DIY (Do-It-Yourself) movement in learning epitomizes the trend towards personalized, flexible, and technology-driven education. Kamenetz (2010) discusses how individuals are bypassing traditional educational pathways to create tailored learning experiences, giving rise to "edupunks" and "edupreneurs." This movement is supported by a culture of collaboration that integrates youth learning, technology, and a DIY ethos (Domingo-Coscollola et al., 2016).

As we have observed, the individual relationship with learning is now more representative than ever of the evolution of the personal learning experience. The term "Learner Experience" is increasingly used to understand the value that individuals place on their personal learning journeys, much like "User Experience" and "Customer Experience" are used to enhance individual experiences to improve relationships and services.

4 LEARNING WHY TO LEARN. RESEARCH QUESTION AND PROPOSED HYPOTHESES

4.1 THE CONTEXT IN WHICH THE RESEARCH QUESTION DEVELOPS

This study is not research on the implications of technology on learning motivation. This research is based on the evidence that technological acceleration imposes professional updating and a constant openness to acquiring new competencies and skills. *Keyword: Lifelong learning.*

Competencies that are not sufficiently present in the labor market and that, in perspective, given the high technological acceleration, will be increasingly in demand. *Keywords: Constant need for competencies and skills.*

But while on one hand, technology requires new skills and competencies, on the other, it transforms the methods of delivering these competencies. Both in-person and remotely, in synchronous or asynchronous relation with teachers and other participants, training is changing. Digital training is increasingly transforming into an experience with strong individual connotations. *Keywords: Individual learning experience.*

The individual dimension of learning, in the educational system as well as in the professional one, is determined by the perceptions, evaluations, and interests of the learner, as well as being influenced by their conditions and expectations. In general, all these elements can be considered the motivational aspects of the individual, that is,

finding a reason to perform an action capable of satisfying personal needs. *Keywords: Motivation as satisfaction of an individual need.*

The growing demand for competencies and skills, which the labor market is unable to meet, requires individuals to continuously update their professional skills throughout their professional life. This acquisition of competencies takes place through new technologies and in modes, often remote or asynchronous, in which the individual approach is crucial. For this reason, it appears important and urgent to focus on individual motivations to understand which components (ingredients) most effectively support learning.

While it is true that this study is not research on the implications of technology on motivation, we will not entirely overlook this aspect. In light of the above considerations, we will add a hypothesis concerning elements outside the learner's control. The appreciation of technology and different teaching methods used during the course have an impact on the motivation to learn.

4.2 LEARNING AND TO LEARN: SEMANTIC DIFFERENCES

This thesis is titled "Learning Why to Learn." Prior to formulating the research question, and to ensure its comprehensive understanding, it is pertinent to clarify the terminology employed in this study. Semantically, the expressions "Learning" and "To Learn" appear quite similar. However, their usage might generate confusion, particularly given that the term "learning" can be interpreted both as a noun and as a verb.

Learning, as a noun, refers to the process of acquiring knowledge or skills through experience, study, or teaching. An example can be found in the expression, "Learning is a process that accompanies us throughout our lives: lifelong learning." It is not merely an action but a phenomenon that can be studied and analyzed.

In this context, "learning" represents a comprehensive process that can include various experiences and methodologies useful for acquiring knowledge. The term can also function as a determinative adjective for another noun, as in the cases of "learning methodology" or "learning experience."

Numerous learning theories explore how "learning" occurs, including behavioral, cognitive, and constructivist models. In the context of organizational learning, "learning" refers to how organizations as a whole acquire and utilize knowledge to improve performance.

In contrast, "to learn" is a verb that describes the act of acquiring knowledge or skills through instruction, experience, or observation. For example, "I would like to learn the English language" represents the specific action taken by a person to acquire new information or skills. It also defines the individual's willingness to engage in the process of acquiring language skills.

"Learn" can be conjugated in various verb forms such as "learns" (present), "learned" (past), and "learning" (gerund). "To learn" is a component of the broader process of "learning" (noun). Each act of learning contributes to the overall learning process of an individual or an organization. "Learning" represents the cumulative result of multiple acts of "to learn." Learning without the action of "to learn" would lack substance.

"Learning" is often used in academic, educational, and professional contexts to describe the entire process of acquiring knowledge. "To learn" is used to describe specific activities and actions undertaken by individuals.

The semantic and conceptual distinction is important for understanding the acquisition of knowledge and skills. "Learning" as a noun refers to the overall and continuous process, while "to learn" as a verb refers to the specific and individual act of acquiring new information or skills.

"Learning Why to Learn" uses the verb "to learn" twice, both in its infinitive and gerund forms. This research focuses on the individual action of learning, rather than on the learning process in general.

4.3 WHY TO LEARN

As mentioned in the previous chapter, one of the most successful training courses (MOOC) in recent years is titled "Learning How to Learn." Launched for free on the Coursera platform, it has reached 5 million enrollments. As an enthusiast of education and learning, the author of this research has completed the 4-week online course. This experience helped define the title of this research: "Learning Why to Learn."

In this context, an additional semantic and conceptual distinction is introduced in the title. When someone learns, one might ask what they are learning (what), through which cognitive process (how), and also the reason or need they are fulfilling (why).

That example applies to the verb “to learn”. We have discussed the difference between "learning" and "to learn". If we apply the same distinction to "learning," as process, we will identify which skills have to be acquired (what), how to facilitate learning through methodologies and pedagogies (how), and what the expected benefits for the organization in acquiring these skills are (why).

These examples further highlight the difference between the expressions "to learn" and "learning." Additionally, this introduces another semantic distinction among three concepts: What, How, and Why.

In philosophy, particularly in teleology, the "why" of things is explored in terms of purpose or goals. Teleology is the doctrine that studies the purposes or ends present in natural processes or human actions. This approach can be seen in the works of Aristotle, who discusses final causes (the "why") and how these influence the design (the "how") and realization (the "what") of objects or actions.

Kant further developed the concept by distinguishing between teleological judgment and determining judgment. For Kant, teleology is not only a characteristic of scientific explanations but also a fundamental principle for moral and practical understanding.

One of the fathers of modern sociology, Max Weber, analyzed social action by distinguishing between the motive (why), the method (how), and the result of the action (what). This approach explores how values and beliefs influence social behavior and organizational structures.

Studies on motivation recognize Maslow and his theory of need satisfaction as highly influential. According to his theory, human behavior is driven by the fulfillment of needs, which are ordered from the most basic to self-actualization.

Regarding motivation to learn, Deci and Ryan (1985), in describing the Self-Determination Theory, illustrate how motivation can be considered intrinsic or extrinsic. The psychological needs (the why) of autonomy, competence, and relatedness guide behavior. The actions taken to satisfy these needs represent the how, while the what is replaced by the goals intended to be achieved through these actions.

In the context of learning, constructivist theories explore how individuals construct knowledge (why), through which learning processes (how), and what the outcomes of learning are (what). Piaget (1952) and Vygotsky (1978) studied how experiences and social interactions influence the acquisition of knowledge.

Beyond scientific contributions, but significant for its impact and following, we cannot overlook the success of an author like Simon Sinek. His book "Start with Why" and his theory of the Golden Circle argue that the true differentiator for the best companies is their ability to articulate why their actions are guided, compared to competitors who know what they do (the product or service), know how they do it (the operational qualities), but struggle to explain the true essence of why they do it (the purpose). The relevance of Sinek's work lies not so much in scientific validation (which was never pursued) but in its application and success in business contexts.

Most authors, seem to provide a similar perspective. The why appears to be the determining element of human behavior, aimed at achieving learning through cognitive processes.

If we were to use a metaphor, we could say that to achieve a competence or skill, we need a means of transportation powered by energy. The destination (what to learn) can change, the means of transportation (how to learn) can employ different cognitive approaches, and the propulsion (why to learn) can vary for each individual. Without propulsion, the means of transportation is useless, and the destination will not be reached.

4.4 LEARNING WHY TO LEARN

As we have illustrated, the theme is "why learn." But why do we believe it is necessary to understand the "why" of learning?

This connects to what was expressed in the early chapters of this thesis. There are essentially three reasons, or individual needs, which define why it is important to learn in a constantly evolving context:

- Life-long learning: The theme of learning throughout one's professional life (and beyond) pertains to both the individual and the organization. Continuous

change within organizations requires motivation, adaptability, and individual skills.

- Skills shortage: We have seen how the possibility of being employed is linked to possessing the right skills demanded by the labor market. Professional development or retraining are essential tools for the individual's competitive value.
- Worker competitiveness: With the extension of professional life and the end of the dogma that one studies only for a single career, roles are more exposed to the risk of being marginalized or even excluded from the labor market. Only a constant orientation towards learning will support the reemployment or employability of those who have been sidelined.

It is not easy to determine how well these reasons are understood today. On the one hand, there are no shortages of retraining and professional development programs for those who have left the labor market but wish to re-enter it. On the other hand, we cannot say the same about raising awareness of the reasons for learning within the adult population in companies.

A reflection and research on what elements support the motivation to learn are necessary. Research suggests that an individual's intrinsic motivation is a predictor of performance compared to extrinsic motivation, although in the absence of intrinsic motivation, external pressures enable learning (Liu et al., 2020).

For these reasons, investigating how human motivation operates to create interest, curiosity, participation, and contribution to a learning path can provide interesting tools for management science.

4.5 LEARNING WHY TO LEARN AND MANAGEMENT SCIENCE

Management science deals with the study and practice of managing organizations. It has an extremely interdisciplinary nature, integrating models and theories originating from various disciplines, with the aim of improving the efficiency and effectiveness of organizations.

Regarding learning, two components of management science have gained significant relevance in recent decades, thanks to a flourishing and solid scientific literature: knowledge management and organizational learning (Song & Chermack, 2008).

Knowledge management (K.M.) is the process through which organizations create, share, use, and manage knowledge to achieve their goals (Girard & Girard, 2015). The main purpose of K.M. is to optimize organizational knowledge that is based on individual knowledge.

For K.M., knowledge is defined as a set of structural connectivity patterns. Its contents have proven to be viable for the achievement of goals. This individual knowledge enlarges the organizational knowledge base and individual learning is a central element in organizational learning (Argyris & Schön, 1996).

K.M. deals with the knowledge existing within a company in tacit or explicit form, its codification, acquisition, and circulation within the organization. The conversion of knowledge is based on the interaction between tacit knowledge (experiential, difficult to codify) and explicit knowledge (documented, easily shareable), which transforms into organizational knowledge.

According to this theory, there are four modes of conversion. The sharing of tacit knowledge among individuals through shared experience (Socialization), the transformation of tacit knowledge into explicit knowledge through codification and documentation (Externalization), the combination of different forms of explicit knowledge to create new knowledge (Combination), the integration of explicit knowledge into the organization's processes and practices, transforming it into tacit knowledge (Internalization).

Organizational learning is another concept addressed in management science, closely related to KM, though it should be distinguished from it. Continuous learning refers to the ongoing process of acquiring, developing, and transferring skills. It is the way an organization learns and adapts to internal and external changes.

- Adaptive Learning (Single-Loop Learning): This concept, introduced by Argyris and Schön (1978, 1996), involves how individuals reflect and adapt based on past experiences. Adaptive learning implies continuous improvement within existing boundaries.

- Double-Loop Learning: This concept goes beyond merely correcting errors and is capable of challenging previous assumptions by examining not only the methods but also the causes of a past problem.
- Generative Learning: This type of learning focuses on creating new skills and knowledge through social interaction and the sharing of tacit knowledge, which is converted into explicit knowledge (Nonaka & Takeuchi, 1995). This mode is crucial for continuous organizational change and performance improvement (Ramanujam, 2003; Sessa & London, 2006).
- Transformative learning, influenced by critical reflection and validation of actions, allows individuals to reformulate their knowledge and improve organizational practices (Mezirow, 1991, 1997). This process enables individuals to reshape their knowledge through critical reflection and validation of actions (Mezirow, 1991, 1997). The combination of experience-based and research-based knowledge is crucial for the success of transformative learning (Kreber & Cranton, 2000; Habermas, 1971).

The described theories primarily focus on the processes of creating organizational knowledge and the interaction between tacit and explicit knowledge. These theories start with individual learning phenomena and build upon them. Individual knowledge, derived from personal and tacit experiences, is considered the foundation upon which organizational knowledge is constructed through processes of socialization, externalization, combination, and internalization.

In the decades following the development of the main theories on K.M. and organizational learning, the learning experience has increasingly been mediated by technology, becoming more of an individual experience, sometimes physically decentralized from the organization.

The phenomenon of learning and skill acquisition requires an upstream element: the individual motivation to learn. Engaging in a distance learning course without feeling the need for it negatively impacts learning outcomes, thus affecting the generation of useful skills for the organization.

The term motivation rarely appears in definitions of knowledge management (Girard & Girard, 2015), and when it does, it refers to the action of motivating those who belong to an organization (King, 2009).

Studies connecting motivation with organizational learning concern the general work motivation of employees (Egan, Yang, Bartlett, 2004; Kauppila, 2018) towards achieving goals (Chadwick & Raver, 2015).

There is no contradiction between the pages we are writing and the organizational theories on knowledge and learning, but we strongly feel the need to think upstream of the process and focus on the energy needed for each individual to engage in the action of learning.

Exploring this area can contribute to improving practices in management science for skill acquisition to strengthen organizations in times of significant transformation.

4.6 The Role of the Learner: Deterministic and Constructivist Approaches to Learn

The focus shifts towards the reasons each individual have for learning. Before proceeding, a further consideration must be made regarding the role of the "learner."

Is what is learned something predefined and immutable (deterministic approach), or is it the result of a changing interpretation by the learner (constructivist approach)?

At the dawn of learning studies, behaviorism was discussed, which falls under the definition of determinism. According to behaviorism, learning develops around what can be observed and measured, and therefore describes learning and development in terms of stimulus-response. By arranging appropriate 'contingencies of reinforcement,' specific forms of behavior can be set up and brought under the control of specific classes of stimuli... a student is 'taught' in the sense that he or she is induced to engage in new forms of behavior and in specific form upon specific occasions. (Skinner, 1958).

Here, knowledge is seen as pre-defined, and the learner's role is to acquire it in a systematic manner. Deterministic theories often define well-defined guidelines for interactions (Thorndike, 1921) and feature a clear, organized structure for presenting concepts (Bruner & Sherwood, 1976)

Constructivist theories, (Vygotsky, 1926), emphasize the individual's active role in constructing their own knowledge. They imagined students not as passive recipients of information, but as explorers actively building understanding through interactions with the environment and others (Winn, 1993). This process is inherently flexible and context-dependent, as described by Piaget (1947). Each learner's journey is unique, shaped by their background and experiences. Constructivism also emphasizes the formation of intricate connections between concepts (Papert, 1980). Learners weave these connections into rich tapestries of meaning, fostering a deeper understanding of the world around them.

More recent research avoids placing learning motivation into strict "constructivist" or "determinist" categories, with many motivational theories incorporating elements of both. Educators often skillfully merge aspects from both paradigms to create sophisticated, well-rounded learning environments. The choice of emphasis ultimately depends on the specific needs of the students and the learning context.

For example, the concept of mindset (Dweck, 2006) aligns with constructivism, focusing on the individual's development through effort and continuous learning. Similarly, self-efficacy (Bandura, 1977) emphasizes learners' belief in their own capabilities, a belief shaped by experiences and interactions – another tenet of constructivism. However, other motivational theories lean more towards a deterministic perspective. Effort/Value/Cost theory (Eccles et al., 1983) considers external factors like perceived effort and value as influences on student behavior. Goal orientation (Elliot & McGregor, 2001) incorporates a blend of both perspectives, acknowledging the importance of personal growth (constructivist) and goal achievement relative to others (determinist). Even self-regulation, the ability to manage one's learning process, can be interpreted through both lenses. While setting goals may be externally influenced (deterministic), students actively engage in tailoring learning strategies (constructivist).

Neil Postman (1995) in his book titled The End of Education: Redefining the Value of School, critiques the modern educational system and discusses the implications of various educational approaches. Postman highlights how deterministic educational approaches are often based on strict standards, standardized assessments, and a

hierarchical structure of knowledge. This rigidity facilitates the systematization and comparison of concepts, but it can also limit students' imagination and individuality.

Postman regards more flexible and constructivist approaches as those that consider students' individual needs and encourage creativity and independent thinking. According to Postman, these approaches are “crucial for preparing students to navigate the complex and ever-changing world of the future" (Postman, 1995).

The digital era has woven technology into the fabric of education, prompting the emergence of various theoretical perspectives. One prominent thread is technological determinism, which views technology as the primary driver of societal change, influencing human choices and behaviors (Smith and Marx, 1994; Kanuka, 2008). Hauer (2017) elaborates on this, suggesting that technological determinists see societal shifts as inevitable consequences of technological advancements.

Digital technology is used to monitor student activities, including responses to learning tasks, interpret those responses based on domain-specific models, and present them with new activities or resources in order to address learning needs, hence embracing a cognitivist model of learning. As a procedural system, adaptive learning is inherently behaviorist. Jonassen (1996) on uses determinism: “carpenters use their tools to build things; the tools do not control the carpenter. Similarly, computers should be used as tools for helping learners build knowledge; they should not control the learner.”

In Scenario-Based Learning, interactive scenarios and simulations engage learners in realistic settings, reflecting behaviorist learning through practice and observation. The principles of Operant Conditioning are also integrated in new learning technologies using virtual rewards, such as points or badges, to encourage desired behaviors. Finally, adaptive digital platforms can tailor content to individual performance based on behavioral data. This allows learners to progress at their own pace and focus on areas needing improvement. However, behaviorism in digital education also faces criticism for potentially neglecting deeper understanding in favor of surface-level learning objectives.

Despite its behaviorist roots, digital education often integrates constructivist elements like self-direction and social interaction. These strive for comprehensive and engaging learning experiences that go beyond rote memorization. By acknowledging both the influence of technology and the importance of social context, educators can design

effective learning environments that leverage the strengths of both behaviorist and constructivist approaches.

This blended approach creates a richer tapestry for understanding the complex interplay between technology, learning, and education in the digital age. It allows educators to harness the power of technology while fostering critical thinking, collaboration, and a deeper understanding of the world around us.

4.7 THE HYPOTHESES PROPOSED IN THIS RESEARCH

If the topic is individual motivation for learning in a context of continuous change, three addition hypotheses have been made regarding learning motivation.

the connection between theoretical constructs, and the impact that technology, learning methods, and course organization can have on the motivation to learn.

4.7.1 Hypothesis 1: the Creation of a Tool for Measuring Learning Motivation that Utilizes Different Scientific Approaches allows the Identification of the Constructs that most Significantly Contribute to Learning Motivation

The scientific literature has developed different theories on learning motivation, treating them mostly separately. Many studies have focused on individual theories, proposing comparisons between two theoretical approaches, but rarely considering the measurement of learning motivation from multiple and integrated perspectives.

A significant exception in this landscape is represented by the theories of Deci and Ryan. Their Self-Determination Theory (SDT) has had wide diffusion and application, exploring how intrinsic and extrinsic factors influence motivation. SDT identifies three basic psychological needs—autonomy, competence, and relatedness—that must be satisfied to promote intrinsic and sustainable motivation for learning. This approach has allowed for a deeper understanding of motivation in various educational contexts and has influenced multiple areas of research.

Additionally, Paul Pintrich has made fundamental contributions to the field of learning motivation, laying the groundwork for a cross-cutting understanding of the

phenomenon. Pintrich integrated various aspects of motivational theories into his Motivational Self-Regulation Model. This model considers how students regulate their motivation through cognitive, metacognitive, and behavioral processes, and how these processes are influenced by personal, situational, and contextual factors. Pintrich's work has helped to bridge different theories, offering a more comprehensive and articulated view of learning motivation.

The combination of Deci and Ryan's theories with Pintrich's integrated approach represents an ideal starting point for constructing a model to measure adult learning motivation. Considering these theories not only individually but also in their interaction allows for the development of measurement tools that reflect the complexity and multidimensionality of learning motivation. This integrated approach is essential for fully understanding how various factors can interact to influence adult motivation and for developing more effective and personalized educational interventions.

4.7.2 Hypothesis 2: Theoretical Constructs on Learning Motivation that Exhibit similar Characteristics Show the same Performance during the Learning Process

The second hypothesis posits that motivational constructs have common points regardless of the scientific theory they are based on. This implies that, although motivational theories may differ in their approaches and terminologies, there are cross-cutting elements that connect them. For example, the concept of self-efficacy is central both in social learning theory and in self-determination theory. Similarly, the value attributed to learning is relevant both in expectancy-value theory and in self-determination theory. This hypothesis suggests that an integrated understanding of motivational constructs can provide a more solid foundation for the construction of the measurement model.

As previously mentioned, to develop a measurement tool based on various theoretical approaches to learning motivation, it is necessary to isolate the theoretical constructs underlying these theories. The thirteen identified constructs were grouped into clusters that described the nature and causal relationship of the construct with a learning theme.

These themes include the learner's belief in the utility of learning itself, the value and usefulness of what is intended to be learned, the desire to self-determine one's skill development, and the relationship with a methodology that regulates learning in its phases.

4.7.3 Hypothesis 3: Technology, Teaching Methods and Organization Influence Learning Motivation

In the first hypothesis (and consequently in the second), we focused on theories and constructs related to the perceptions, beliefs, expectations, or goals of learners (for example, the desire to demonstrate one's abilities, the belief in being able to learn, feeling autonomous, perceiving certain content as useful or interesting). In this third and final hypothesis, we introduce elements that, in the opening chapters, we defined as part of the ongoing digital transformation: the use of technology and innovative teaching methods.

In the previous chapters, we illustrated how technology is influencing the landscape of education and training, but also how the effectiveness of these interventions appears quite controversial. The completion rate in Mooc courses often does not reach double digits. We stated that with new technologies, the learning experience becomes increasingly individual, isolated in space (remote) or time (asynchronous).

The ongoing transformation influences how content is presented. It may be perceived favorably or unfavorably by learners. It can engage or isolate, bore or captivate, and be useful in certain phases of learning and less so in others.

The teaching method can generate dynamics among participants, invert the traditional way of learning, or introduce complementary activities and multimedia content that are diverse yet complementary in achieving the pedagogical objective. In the teaching method, we can feel a stronger connection with other participants.

In incorporating new teaching methods, participants are generally provided with very clear guidelines. A range of organizational parameters (timing, content, objectives, activities, evaluation methods) that are often implicit in traditional pedagogical courses tend to be explicitly specified. These elements, in addition to being more prevalent where the teaching methodology is innovative, can share common points with

motivational elements (expectations, definition of expected effort, definition of learning objectives, and support for metacognitive aspects).

The sample of respondents for the survey will consist of students from a French Business School (present on two campuses, Lille and Paris) enrolled in courses that use different teaching methods: flipped classroom, active learning, and business educational games.

In each of these activities, there is a different use of technology, both in terms of the amount of technology used and the diversity of technological and multimedia tools employed, as well as the purpose for which they are used (e.g., learning, evaluation, engagement in discussion).

This hypothesis diverges from the central theme of the research, which focuses on the individual's predisposition to learn. However, in the initial chapters, we explained that this century has seen a significant technological acceleration that has increased the need for personal updating and has transformed the learning experience through innovative methods and techniques.

Therefore, we aim to verify whether the perception of technology and the teaching techniques used in the course influence the theoretical constructs of motivation. This will allow us to evaluate further in-depth analysis, focusing on the general themes of this hypothesis.

4.8 THE ROLE OF TECHNOLOGY IN THIS STUDY.

To conclude this chapter dedicated to the research question, it is necessary to clarify a point that might lead to misunderstandings. What role does the author assign to technology in this research? The first chapters of this research give significant attention to technological innovation and acceleration, and the last hypothesis reintroduces this theme. The temptation to consider this a study on technology is strong, but it would be a mistaken path, even though we understand the possible reasons.

To clarify, let us summarize the assumptions you have read in the initial chapters:

1. Technological acceleration in the 21st century creates a demand for skills that the labor market is unable to meet (skill shortage).

2. The educational and training sector, called upon to respond to this urgent need, is itself undergoing radical changes in methods, delivery, technologies, unlimited offerings, and the expectations of learners who demand increasingly advanced products.
3. Digital training is economically efficient but not effective for learners. The technology used requires increasing adaptability (TAM and UTAUT).
4. The role of the learner is transforming: they prefer to autonomously conduct not only the training process but also define what to learn (Heutagogy). The training experience is increasingly learner centered.

These points make it clear that, while technology plays a significant role in the context of this research, the focus is not on technology itself. Instead, it is on understanding and enhancing the motivation to learn in a rapidly evolving technological landscape.
Technology creates the need and makes the learning experience increasingly dependent on the individual. It is the catalyst for change, but our interest lies in the final part: the individual and their personal motivation to learn. We aim to create a system that can identify what motivates an individual to learn and what does not.
When we decided on the external element to introduce to verify the evolution of motivation in a given context, we reintroduced technology. But not alone: we combined it with teaching methods and course organization, elements beyond the learner's control. We could have examined motivation in relation to other factors (age, subject matter, gender, social background, etc.), but we chose to use technology, teaching methods, and organization. This decision was also influenced by the suitability of our research setting, Iéseg School of Management, which is particularly well-suited for this analysis.

PART II: LITERATURE REVIEW, CONSTRUCTS IDENTIFICATION AND EXISTING MEASUREMENT SYSTEMS

5 LITERATURE REVIEW

5.1 ENHANCED CLASSIFICATION OF LEARNING THEORIES

In the exploration of human learning, we find ourselves at the intersection of diverse yet interconnected domains: cognitive science, education, psychology, and neuroscience. Each of these fields offers unique insights into the mechanisms behind how we acquire, process, and retain information.

The nuanced classification of learning theories is crucial when developing educational programs and assessing their effectiveness. Understanding these classifications helps to devise strong teaching methodologies and training regimes; each area of study provides important insights into the understanding of the learning process.

The domains of education, cognitive science, and psychology share many overlapping theories and concepts, making it challenging to draw clear borders between them (Pintrich & Schunk, 2002).

One example is the cognitive load theory (Sweller, van Merriënboer, & Paas, 2019; Paas, 1998), which draws on concepts from cognitive science. It emphasizes the importance of managing the burden placed on learners' working memory during the learning process. While this theory is primarily used in educational settings, it is based on insights from cognitive science research on working memory and attention.

Similarly, the theory of situated cognition (Greeno, Collins, & Resnick, 1996) is a cognitive science theory that has important implications for education.

Self-regulated learning is another valid example of interconnection. While this theory (Zimmerman, 2000) is often studied in the context of educational psychology, it draws on insights from cognitive science and emphasizes the role of metacognition, motivation, and self-regulation in learning.

Theories adjacent to the field of education attempt to explain the process of gaining knowledge and how to encourage a successful learning experience across various educational scenarios. These theories take into account studies from a range of areas, such as psychology, sociology, anthropology, philosophy and neuroscience (Hannafin et al., 2013).

Familiarity with these classifications can enable educators and researchers to create effective teaching and training methods.

5.1.1 Education

In 1897, John Dewey described education as "a process of living and not a preparation for future living," emphasizing the importance of experiential learning, active participation, and the integration of knowledge into everyday life.

Indeed, education involves many factors that can have an impact on learning, such as teaching techniques, evaluation, preparation of lessons, enthusiasm, intellect, self-development, social and cultural background, and individual differences.

The various approaches of teaching and learning, such as pedagogy, assessment, and curriculum design, are pivotal for the construction of educational theories. Pedagogy covers a broad range of techniques, ranging from direct instruction to collaborative learning and problem-based learning (Graham et al., 2018).

Some instructional techniques focus on the student's role in forming their understanding of the world. These include team-oriented cooperation and knowledge-sharing, problem-solving to foster creativity and intelligent analysis, as well as constructivism, collaborative learning, and problem-based learning (Bransford et al., 2000).

As curriculum design is the process of planning and organizing a course or program of study, creating a curriculum requires the alignment of objectives, educational methods, and assessments (Fink, 2013)

The subject of education objectives has generated a rich literature. In 1956, Benjamin Bloom introduced his Educational Objectives Taxonomy, categorizing learning objectives into cognitive, affective, and psychomotor domains (Table 5-1). Bloom's taxonomy has become widely used in education, consisting of six levels of cognitive complexity.

Table 5-1 Bloom's Taxonomy Model

			Critical Thinking		**Evaluation**
					Appraise
				Synthesis	Argue
				Arrange	Assess
			Analysis	Assemble	Choose
			Analyze	Categorize	Compare
		Application	Appraise	Collect	Conclude
		Apply	Arrange	Combine	Contrast
	Comprehension	Calculate	Associate	Compose	Convince
	Associate	Change	Breakdown	Construct	Criticize
Knowledge	Classify	Complete	Categorize	Create	Critique
Arrange	Compute	Conduct	Combine	Design	Decide
Cite	Convert	Construct	Connect	Develop	Defend
Collect	Discuss	Demonstrate	Debate	Devise	Determine
Count	Distinguish	Discover	Detect	Explain	Evaluate
Define	Estimate	Dramatize	Determine	Formulate	Grade
Delineate	Explain	Employ	Diagram	Generate	Judge
Describe	Express	Illustrate	Differentiate	Group	Justify
Duplicate	Extend	Interpret	Discriminate	Integrate	Measure
Identify	Extrapolate	Interpolate	Distinguish	Invent	Rank
Label	Generalize	Manipulate	Examine	Manage	Rate
List	Give examples	Modify	Experiment	Modify	Recommend
Match	Indicate	Operate	Infer	Order	Revise
Name	Infer	Predict	Inspect	Organize	Score
Order	Locate	Prepare	Inventory	Plan	Select
Outlines	Paraphrase	Practice	Order	Prescribe	Support
Point	Predict	Produce	Outline	Propose	Value
Quote	Restate	Relate	Point out	Rearrange	
Read	Review	Show	Question	Reconstruct	
Recall	Rewrite	Sketch	Relate	Reorganize	
Recite	Summarize	Solve	Select	Setup	
Recognize	Tell	Translate	Separate	Specify	
Record	Translate	Use	Subdivide	Substitute	
Relate			Test	Tell	
Repeat			Utilize	Transform	
Report					
Reproduce					
Select					
Specify					
State					
Tell					

Further works expanded this model: some emphasized the importance of emotions, attitudes, and feelings in education (Krathwohl, Bloom, and Masia, 1964) or

highlighted goals such as verbal proficiency and forming positive opinions (Gagne, 1985). More recently, some authors (Marzano & Kendall, 2007) proposed applying more evidence-based teaching strategies and including the interpersonal domain in the taxonomy. In recent years, Bloom worked with Anderson and Krathworth (2001) to revise the original proposal stressing the significance of diverse thinking competencies. In the field of education, various instructional methods have been scrutinized for their effectiveness. Notable figures like John Hattie and Geoff Petty have made significant contributions in this domain. Hattie's extensive meta-analyses, spanning over 800 studies, have identified the most impactful teaching methods under the concept of visible learning (Hattie, 2009), while Petty has focused on practical teaching strategies (Petty, 2014).

The evaluation of learning outcomes (assessment) can take various forms such as tests, essays, projects, and observations. Assessment can be used to provide feedback to learners, inform teaching, and improve learning outcomes (Black & Wiliam, 1998). Formative, authentic, and performance-based assessment are some of the key approaches that provide ongoing feedback to learners, evaluate learners in real-world contexts, and examine their ability to perform a task or complete a project (Black & Wiliam, 1998).

Educational theories take into account the social and cultural atmosphere of learning. Background, economic standing, and cultural convictions can all have a substantial influence on the results of learning (Lareau, 2002). They try to comprehend how social and cultural components impact learning and how to construct more comprehensive and impartial learning surroundings. Effective pedagogy looks into the interests, needs, and prior knowledge of learners to foster meaningful involvement in the learning procedure. Assessment is a way to examine learning results, which can be used to direct further learning and enhance teaching. Ultimately, educational theories manage the social and cultural context of learning, which includes elements such as the effects of culture and socioeconomic status on educational outcomes.

5.1.2 Cognitive Science

Cognitive science is a multidisciplinary field that integrates principles and methods from psychology, neuroscience, linguistics, philosophy, and computer science to enhance our understanding of the mind (Anderson, 2014). It investigates how individuals acquire, process, and utilize information (Sternberg & Sternberg, 2012), with a focus on attention, perception, memory, and problem-solving.

Ann Brown (1982) posits that learning is a complex process involving the interpretation of new and existing knowledge, influenced by contextual factors and prior understanding.

Exploration in the cognitive domain helps us to understand how experts organize and apply their knowledge (Chi, Glaser, and Farr, 1988), emphasizing the role of problem-solving in skill acquisition and the development of mental representations or schemas.

Posner and Petersen (1990) contended that attention is not a single phenomenon but is composed of several interconnected systems that allow us to concentrate on relevant information while disregarding less important data.

In that sense, Sweller (1999) underscores the importance of instructional design in reducing cognitive load and facilitating meaningful learning, advocating for clear presentation of material to support integration with prior knowledge. Similarly, Richard Mayer's work on multimedia learning theory investigates optimal techniques for presenting visual and auditory instructional materials (Mayer, 2005).

Kahneman's (2011) "Thinking, Fast and Slow" delves into the two types of thinking that people use and offers important knowledge about the intricate cognitive activities related to making decisions, while Pashler et al. (2008) challenge the concept of learning styles and emphasize individual differences in learning.

Motivation in learning is explored by Pintrich and Schunk (1996), who emphasize the role of students' beliefs and expectations in influencing motivation, and by Deci and Ryan (1985), whose self-determination theory highlights the importance of autonomy in fostering motivation.

Cognitive science is significantly interconnected with other domains, specifically with neuroscience, which explores how the brain encodes and maintains information

(Kandel, Schwartz, & Jessell, 2012) and how to enhance brain function for improved learning outcomes (Medina, 2017).

5.1.3 Psychology

Psychologists have developed many theories of learning that seek to explain these processes and provide a framework for understanding how they operate. Theorists such as Skinner (1953), Bandura (1977), and Piaget (1952) have all contributed greatly to the understanding of human behavior, including the impact of reinforcement and punishment on behavior (behaviorism), the power of modeling and observation in gaining new skills (social learning theory), and the significance of mental processes and active engagement in learning (cognitive constructivism).

This field uses empirical methods to investigate the intricate processes related to human activity, with a variety of research approaches and techniques to attain novel insights into the mental and behavioral mechanisms (Schacter et al., 2015).

The study of learning has important implications for education, cognitive and developmental processes, and human behavior more broadly. Psychology and cognitive science are two closely related fields that share a common goal of understanding the workings of the human mind. While psychology is a broader field that encompasses a wide range of sub-disciplines, cognitive science is a more specialized area that focuses specifically on the study of cognition, including perception, attention, memory, and language.

One key difference between psychology and cognitive science is their approach to research. While psychology has historically relied heavily on qualitative methods and case studies, cognitive science tends to be more focused on quantitative research methods and experimental studies (Sternberg & Sternberg, 2012). Cognitive science also places a strong emphasis on computational modeling and artificial intelligence, using computer simulations to better understand and model cognitive processes (Rumelhart et al., 1986).

Despite these differences, there is significant overlap between the two fields, with many researchers and theories spanning both domains. For example, Noam Chomsky, a linguist, is widely considered one of the founders of cognitive science due to his work

on language acquisition and the idea of a universal grammar (Chomsky, 1957). Similarly, George Miller, a psychologist, was instrumental in the development of the cognitive revolution in psychology and made significant contributions to the study of memory and language processing (Miller, 1956).

Other researchers have endeavored to join psychology and cognitive science by investigating the connection between the brain and the psyche through cognitive neuroscience which has enabled remarkable progress in comprehending perception, focus, recollection, and language, and has assisted in connecting the divide between psychology and cognitive science.

In spite of distinctions between psychology and cognitive science, the two disciplines are tightly intertwined. As a consequence of cooperation and interdisciplinary research, researchers in both fields will continue to make significant advances in our comprehension of the human mind and the principles driving cognitive activities.

5.1.4 Neuroscience

Neuroscientists explore the processes of knowledge acquisition on various levels, from cellular signals and synaptic transmission to the functions of particular brain regions, such as the cerebellum (Goswami, 2008).

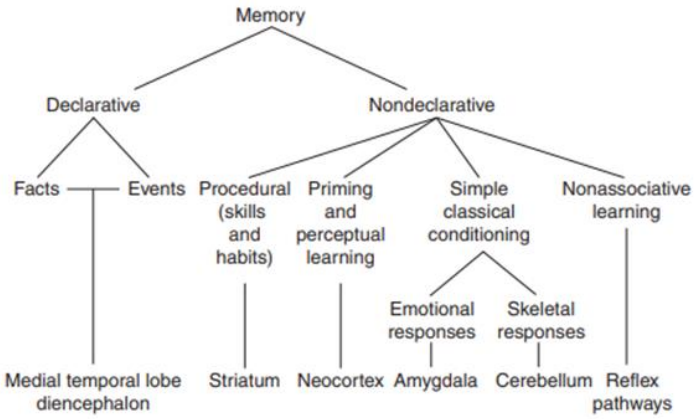
Our brain is constructed of cells that can be electrically stimulated, called neurons, that converse with each other at particular points of connection, known as synapses. These cells assemble into circuits that control certain functional activities. Neurophysiologists study gene manifestation, neuron maturation, synapse formation and adaptability, and the communication of signals between and within neurons, with the aim of understanding and deciphering these activities and how they direct behavior. Neurons in the brain share information by transmitting electric pulses from one cell to the next across their synapses. This sparks the delivery of neurotransmitters, which are chemical messengers. It is believed that the various mental states and representations are associated with the 100 billion neurons of the brain, which are interconnected. The brain's function can be altered by effective education, which involves adjusting how neurotransmitters are released or strengthening and weakening neural pathways. Learning is the process of making modifications to these neural links.

While neuroscience is not used in this thesis, it has significant connections with other research domains. For this reason, and because we will discuss the neuroscience literature, we will provide a more in-depth view of the approach.

Specifically, cognitive neuroscience investigates how information is processed, represented, and stored in the brain, and how these processes change over time in response to experience (McNab & Klingberg, 2008). In addition, it explores neural mechanisms underlying cognitive processes, such as attention, memory, perception, and language. This sub-domain uses neuroimaging techniques such as fMRI and PET to identify the brain regions involved in these processes and to study their interactions (Gazzaniga et al., 2013).

Cognitive neuroscience research has identified various brain regions and networks that are involved in different aspects of learning. For example, the hippocampus is a brain structure that is critical for forming new memories, and research has shown that it is involved in many forms of learning, including spatial learning, associative learning, and declarative memory (Eichenbaum, 2017). In addition to the hippocampus, other brain regions such as the prefrontal cortex, basal ganglia, and cerebellum are also involved in various forms of learning (Gerraty et al., 2018). Consider the taxonomy proposed by Squire and Dede (2015) concerning long-term memory creation in the mammalian brain (Figure 4).

Figure 4 Taxonomy: Memory systems in mammals' brain (modified from Squire & Dede, 2015)



Neuroimaging studies have revealed that learning involves changes in the strength and connectivity of neural circuits in the brain. For example, studies of the visual system have shown that learning to recognize objects can lead to changes in the activity and connectivity of neurons in the visual cortex (Gauthier & Tarr, 2016). Similarly, learning a new motor skill can lead to changes in the connectivity between different regions of the brain involved in motor planning and execution (Dayan & Cohen, 2011). Cognitive neuroscience research has also identified different types of learning, such as declarative and procedural learning. Declarative learning involves the acquisition of knowledge about facts and events and is dependent on the hippocampus and other brain regions. Procedural learning, on the other hand, involves the acquisition of skills and is dependent on the basal ganglia and cerebellum (Doyon & Benali, 2005).

For over a hundred years, neuroscience and educational studies have been at the heart of scientific exploration. Cajal, Sherrington, and Pavlov's work formed the cornerstone of current neuroscience, leading to them being recognized on a global scale and given Nobel Prizes for their efforts.

Loewi's research in 1921 showed that chemicals can activate and control the nervous system, adding to the prevailing knowledge that nerve impulses enabled neurons to communicate. The McGaugh studies (1966) established the critical role of protein synthesis in the formation of long-term memory. It was also discovered that the intake of psychotropic substances could selectively inhibit the creation of long-term memory while leaving short-term memory unaffected. Every learning experience involves memory.

Behavior is a complex set of actions and reactions. It can range from the most basic, automatic reactions like a knee-jerk reflex to the highly complex movements of a ballet dancer or chess grandmaster. Behavior is made up of several parts: sensory processing (what you see, hear, touch, and smell), motor processing (your reflexes and coordinated movements), and cognitive processing (learning, thinking, and planning). Behavior also includes psychological processes like personality and mood.

As organisms become more complex, their behaviors become more intricate. Human behavior is the most intricate of all because it is affected by many factors, such as

genetic codes, environmental factors, and different stages of development. The challenge in neuroscience is to understand the contributions of different factors to specific behavioral and emotional functions.

Various neural systems are designed to encode distinctive forms of data, with sensory input the clearest illustration. Nevertheless, many environmental experiences are multisensory, and thus links between different senses are common. Our brains can respond to various sensory cues that allow us to fill in a missed word when someone interrupts another speaker. This implies that if we teach children new information using multiple senses, their understanding and comprehension could be significantly improved (James, 2007), though this is still to be determined. It is clear, however, that knowledge stored across multiple senses is activated even when stimuli are only seen. This empirical method provides an avenue for exploring whether students actually possess varying learning styles, such as being visual or kinesthetic learners.

Research in neuroscience has greatly expanded our understanding of learning effectiveness. Exploring neural processes related to learning, like the influence of attention, motivation, and memory, can be used to create highly engaging and suitable learning environments for individuals (Medina, 2008).

Furthermore, it helps understand individual disparities in education and intellect, including those linked to dyslexia, and aid in the creation of interventions that are suited for diverse learners (Shaywitz & Shaywitz, 2008).

In conclusion, behavior is a complex interplay of sensory processing, motor coordination, and cognitive functions. Interdisciplinary research and collaboration are crucial for advancing our understanding of the brain and optimizing educational practices and interventions.

5.2 KEY THEORIES ON LEARNING MOTIVATION

Motivation is a condition that activates and sustains behavior toward a goal. It is critical to learning and achievement across the life span in both informal settings and formal learning environments (Pintrich 2003).

Motivation is driven by many needs and desires (Ambrose and Kulik 1999) that originate from within a person and from external influences. It has been studied widely

(Ambrose and Kulik 1999; Benabou and Tirole 2003; Deci and Ryan 1985) and has been used in various applications including education, psychotherapy, sports, and organizations (Deci and Ryan 1985; Frey and Jensen 2001; Gagne and Deci 2005).

Historically, research on motivation explores conscious as well as unconscious (implicit) responses to social and cultural circumstances, the will to engage (connect, participate), the influence of feelings about the self (self- concept, self- efficacy) and the work needed to address those feelings (self- regulation, self- motivation) (Hidi and Renninger 2019).

Motivation theories are classified into two main groups: content (traditional theory) and process (more modern). Content theories explain the factors that drive and motivate people, while process theories focus on how various personal factors affect human behavior (Brooks, 2006).

As illustrated in the chapter dedicated to the research question, the starting point is the individual's motivation to learn. Studies regarding motivation to learn are very broad. They address how and when individuals engage their attention and information processing as well as the acquisition and use of learning strategies (Hidi & Renninger, 2019).

The theories that will be analyzed address the motivation to learn from different perspectives. The approach used is constructivist and considers the elements that learners can perceive, interpret, and modify in different ways, thereby giving different meanings to the learning experience.

While recognizing the value of other aspects of learner motivation (such as age, gender, social background, etc.), these are not considered here as they are characteristics of the learner that do not change through the learning process. These aspects can be further explored at a later stage or through independent and parallel studies.

The identified theories belong to cognitive sciences, education, and psychology. They have been developed over the past fifty years, and even the oldest ones still enjoy a solid body of literature in scientific journals.

As we will have the opportunity to verify in the following chapters, these theories have been compared with each other and also share common points on which to build a measurement model.

We mentioned that these theories offer different perspectives on motivation to learn. How might we represent them? Let's think of a classroom or a training course. The people who attend have developed different reasons for being there and for being interested or not in the subject. Some think the course is worthless because they don't believe they can learn the material, while others think the course topic useful for their career. Some other believe that having a structured approach is important for effective participation, while others feel they are making an autonomous choice that contribute to develop personal competences and expect an enjoyable course aligned with their passions.

The reasons why one person might feel more motivated than another before, during, and after the course are numerous.

Following the example just described, let's try to classify the seven theories underlying this research by asking the following questions:

- Why do we learn? What needs drive us to learn.
- What do we learn? How we perceive the content that will be taught.
- Who is learning? How we position ourselves as individuals towards learning.
- How do we learn? What rules we set for ourselves to better participate in learning.

For each of these different perspectives, we will present one or more theories. As we present the literature related to these questions, we will see a strong interaction among the theories.

5.2.1 Why we Learn: Needs, Self-Actualization, and Self - Determination.

It would be difficult to discuss motivation without citing the work of Abraham Maslow and the indelible mark that the theory of the Hierarchy of Needs (1943; 1954) has left in the scientific literature. However, because of the widespread diffusion of his theories, we will pause only to explain the extent to which the principles outlined by Maslow remain part of the most recent theory on motivation. Maslow's work starts from the assumption that there is a hierarchical order of fundamental needs generating a sequence oriented to the psychophysical well-being of people. According to the author,

the highest point in the hierarchy of needs is self-actualization, which represents the individual's full realization and the achievement of their full autonomy (Maslow, 1943).

While content theories on motivation are seen as old-fashioned compared to the more modern process theories, Maslow's work (belonging to Content theory) has significantly influenced more recent researchers on motivation to learn.

Self Determination Theory, (SDT) described by Deci and Ryan is among the most appreciated and most successful theories that pay tribute to the Maslow hierarchy.

SDT was developed by Richard Ryan and Edward Deci at the University of Rochester (Deci, 1971) as a theoretical approach to motivation. It refers to the functioning of the human personality within a given social context (Deci and Ryan, 1985; Ryan and Deci, 2000). It has been also defined as a theory focused on the" reasons for engagement" (Eccles and Wigfield, 2002).

For the authors, motivation must be examined from the perspective of individuals' personal growth and in consideration of their universal psychological needs: competence, relatedness and autonomy. These are able to impact people's psychophysical well-being (Gagne and Deci 2005). The concepts of competence, relatedness, and autonomy can be linked to Maslow's corresponding concepts of self-esteem, self-actualization, and belongingness and love respectively (Howard et al., 2010)

Self Determination Theory is composed of sub-theories that aim to consider all aspects of motivation.

Cognitive Evaluation Theory (CET), a psychological construct, focuses on the influence of extrinsic results on intrinsic motivation, proposing the notion of "intrinsic incentive" or "intrinsic motivation." This theory posits that intrinsic motivations, such as enjoyment, enhance participation in an activity (Agarwal and Karahanna, 2000; Gottschalg and Zollo, 2007; Beecham et al., 2008). Deci and Ryan (2000) delineated three types of motivation: extrinsic regulation, intrinsic regulation, and intrinsic motivation, emphasizing the need for intrinsic motivation. They argued that intrinsically motivated individuals are more engaged and perform better (Cerasoli et al., 2014), though they acknowledged that social and environmental conditions significantly influence how intrinsic motivation is sustained.

Organismic Integration Theory (OIT) explores the integration of behaviors that are not initially self-determined (Hagger and Chatzisarantis, 2008). Deci and Ryan (1985) proposed a continuum of regulatory modes ranging from non-self-determined to self-determined behaviors. This continuum, validated by subsequent research (Horn, 2008), includes amotivation, external regulation, introjection, identification, integration, and intrinsic regulation.

Causality Orientations Theory (Deci and Ryan, 1985) looks at how individuals perceive events that influence the level of self-determination in their behavior, specifically focusing on causality orientation (Deponte, 2004). They identified three orientations: autonomy, control, and impersonal, and examined how individuals respond to various hypothetical situations (Horn, 2008).

The Basic Needs Theory (BNT) within SDT asserts that intrinsic motivation is rooted in the universal, biologically hard-wired need for autonomy, competence, and relatedness. These needs must be collectively satisfied for complete fulfillment (Deci & Ryan, 2000), encompassing the understanding of external and internal outcomes (competence), developing secure connections with others (relatedness), and being self-initiating and self-regulating (autonomy).

SDT focuses on the extent to which human behavior is self-determined, positing that people seek optimal stimulation and challenging activities that are intrinsically motivating due to a basic need for competence. Recent discussions, such as those by Schwarts & Wrzesniewski (2019), have debated whether SDT's classification of intrinsic motivation is exhaustive. They suggest redefining internally motivated actions to include those that, while not inherently pleasurable, bring about a well-being that is unattainable through purely instrumental actions (Schwarts & Wrzesniewski, 2019).

5.2.2 What we Learn: Learning Content and Interest

Research has been increasingly interested in the topic of information seeking, the desire to know the unknown, and the activation of neural and cognitive mechanisms. Similarly, the implication of motivation as an engine of the search for information, has often been described using two concepts that have long been interchangeable: curiosity

and interest. (Gottlieb et al., 2013; Hidi & Renninger, 2006). Studies today tend to separate these two characteristics (Grossnickle, 2016).

In particular, the studies carried out by Hidi and Renninger (2006) provide a theoretical structure for the concept of interest. The learner has two distinct types of interest: Situational and personal interest.

Situational interest has a temporary nature and is activated by learning stimuli offered by the environment (Hidi & Renninger, 2006). Otherwise, interest is a more stable individual characteristic. For example, a lifetime love of mathematics differs from the sporadic interest generated from a challenging math puzzle. For this reason, situational interest is often compared to intrinsic motivation.

In terms of effectiveness, it must be said that while situational interest can be more influenced by formal elements such as the quality and form of the training course, personal interest is influenced to a lesser extent (Hunsu et al., 2017). Therefore, when interest is not adequately stimulated, the rate of absenteeism in lessons increases, leading to a decrease in effectiveness (Ackerman et al., 2001)

Within these two main concepts Hidi and Renninger then defined evolutionary sequences in four phases. Activation is precisely defined as "triggered situational interest", which is then stabilized in "maintained situational interest". From the situational phase, we then move on to personal interest, which here too is identified in two "emerging" and subsequently "well-developed" phases.

The first phase shows that in activated interest (triggered situational interest), the attention is drawn to environmental elements that can also be incongruous. These environmental stimuli provide a series of pieces of short-term information (Palmer et al., 2016).

Once activated, interest can run out unless there are some aspects that support and maintain it. An interesting and easy to understand theme, a game dynamic, or the involvement of a group can transform an initial interest into something lasting.

Thus, in the learning processes, a trainer or coach who introduces an activity or a demonstration to support or involve the participants in activities will tend to maintain that interest that was simply activated at the beginning. (Nieswandt & Horwitz, 2015). This adds a sense of usefulness to the interest (Hulleman & Harackiewicz, 2009).

Even maintained situational interest can run out; a case in point is interest overload. Renninger uses the example of a dancer who after years of practice is overloaded with pressure and activity to the point that she prefers to leave (Renninger et al., 2018)

Motivation is transformed when people discover the pleasure of finding information on their own. In this phase we begin to talk about internal motivation and personal interest, no longer situational and therefore dependent on exclusively external factors. People in this stage develop both positive and negative feelings that must be countered with positive reinforcement and encouragement. (Renninger et al 2018).

In the fourth and final phase when personal interest is well rooted, people find the motivation to seek knowledge because their interest is self-generated. The strong radicalization of interest allows the person to overcome even moments of difficulty, thanks to internal motivation (O'Keefe & Linnenbrink- Garcia, 2014).

Interest therefore has its own path of transformation. While in its initial stages it is exclusively dependent on external stimuli, once transformed into personal interest, it follows the principles of intrinsic motivation, generating a virtuous cycle of motivation to acquire new information and skills.

5.2.3 What we Learn: Evaluating Effort and Value

Expectancy Theory posits that the strength of the tendency to act in a certain way depends on the expectation of a specific outcome and the attractiveness of that outcome to the individual (Robbins, 2013). Expectancy Value Theory (Vroom, 1964) postulates that the motivation for a given behavior or action is determined by two factors: (i) expectancy, i.e., how probable it is that a desired (instrumental) outcome will be achieved through the behavior or action; (ii) value, i.e., how much the individual values the desired outcome. These two core factors are integrated through multiplication, such that motivation = expectancy × value.

Motivation is high when both expectancy and value are high but disappears when one of these factors equals zero.

The first subcomponent relates to individuals' beliefs about their personal ability to perform a given activity at a required level, in other words, the perceived relationship between effort and performance. This subcomponent is termed "expectancy" (just like

the overall factor). The second subcomponent relates to individual beliefs about the probabilistic association between a performed activity and the desired outcome (termed "instrumentality"). These two subcomponents are again integrated through multiplication, such that overall expectancy is high when individuals both believe that they will be personally able to perform a given activity and that successful performance of this activity will likely lead to the wanted outcome.

Vroom's (1964) studies define the motivational drive as the product of the intensity of the expectation that the individual has towards an expected result and the value (attractiveness) of this result. This process is based on a sequential logic that can be diagrammed as a dynamic of effort - result - reward. Needs, understood in their structural dimension, are not sufficient to explain the motivational tension: in fact, new elements of subjectivity, such as valence and expectations, must necessarily be introduced.

Motivation therefore becomes a multiplicative function of expectation, instrumentality, and value: individuals are attracted to different types of rewards, the value of which is conditioned by needs for self-realization and by variables associated with self-determination in the professional environment. The management challenge is to leverage all three variables at the same time (Vroom, 1973).

Eccles et al. (Eccles, 1983; Eccles and Wigfield, 2002; Wigfield and Eccles, 2000) and Lawler and Porter (1967) extended the definition and adopted the results of the theories defined by Atkinson, for whom the achievement of a goal is the result of the multiplication of three components: motive (or need for achievement), probability of success (expectations), and the incentive value of the task.

Eccles and colleagues argue that expectancy and value are affected by task-specific beliefs (i.e., perceived difficulty) and individuals' self-image and goals, which in turn are influenced by other peoples' beliefs, socialization, and past achievement experiences.

Research has confirmed that expectations for success and task value are distinct constructs (see Eccles & Wigfield, 2002; Wigfield & Eccles, 2001). Moreover, both factors predict children's achievement-related outcomes. Expectations for success (i.e., competence-related beliefs) are more strongly linked to performance. For example, girls who believe they will do well in math will tend to get higher math grades than

girls who do not expect to do well. Task values are more strongly tied to achievement-related choices. For example, girls who value math are more likely to take advanced math courses than girls who do not value math. In summary, expectancy-value theory highlights the dual importance of competence-related beliefs (expectations for success) and values in explaining children's motivation (Eccles & Wigfield, 2002).

Research with learners of various ages supports the idea that those who expect to succeed at a task exert more effort and have higher levels of performance (Eccles and Wigfield, 2002). However, some studies have suggested that task valuation seems to be the strongest predictor of behaviors associated with motivation, such as choosing topics and making decisions about participation in training (Linnenbrink-Garcia et al., 2008).

Such research illustrates one of the keys to expectancy-value theory: the idea that expectancy and value dimensions work together. For example, a less-skilled reader may approach a difficult reading task with strong motivation to persist if it is interesting, useful, or important to the reader's identity (National Research Council, 2012). As learners experience success at a task or in a domain of learning, such as reading or math, the value they attribute to those activities can increase over time (Eccles and Wigfield, 2002)

5.2.4 Who is Learning: Self-Efficacy and its Performance Impact

Self-efficacy, as conceptualized by Bandura (1977), refers to individuals' belief in their capability to successfully execute specific activities or manage aspects of their psychological or social functioning. It is essentially the perception of one's own competence in doing, feeling, expressing, being, or becoming. These beliefs and convictions about oneself lead to the formation of goals or objectives, with goals being derived from a clear understanding of one's capabilities and the means to achieve them. Research suggests that self-efficacy operates as a hierarchical organization of beliefs, varying in levels of concreteness and complexity of action, and these beliefs profoundly influence both learning and long-term development (Bandura, 2000; Ehremberg, Cox, and Koopman, 1991).

Self-efficacy beliefs are sensitive to variations in situation, context, and task. They guide and organize each person's performance and actions, which in turn will have positive or negative physical, social, and self-esteem consequences. Post-performance evaluations alter individual self-efficacy beliefs, changing the likelihood of future repetition of the specific task (Bandura, 1997).

Self-efficacy is also closely related to the concept of self-esteem, a set of beliefs that people hold about themselves. The constructs of self-esteem and self-efficacy are interrelated, influencing and determining each other in a dual relationship where an increase in one lead to an increase in the other.

The theoretical underpinnings of self-efficacy originate from learning, cognitive, and socio-cognitive theories. Learning theories initially focused on conditioning and the consequences of behavior, while cognitive theories introduced cognition within behavior generation processes. Bandura's Socio-Cognitive Theory views human functioning as the result of a dynamic interplay between personal (cognitions, affects, and biological events), behavioral, and environmental influences.

Bandura introduced the term “modeling “to refer to the type of learning where an observer’s behavior is modified by observing another acting as a model. In this theory, thoughts and emotions are co-causal with behavior, highlighting how personal and others' performance expectations influence behavior, performance evaluation, and ultimately learning.

Individual behavior and performance are influenced by expectations of one's capabilities. However, future performance is affected by not only past achievements but also the subjective interpretations and causal attributions of successes or failures. Weiner (1994) stated that attributions can be distinguished along three dimensions: locus of control, stability, and controllability. Attributing failure to external, unstable, uncontrollable factors can lead to a lack of commitment, distrust in one's abilities, and helplessness.

Self-efficacy beliefs, according to research, are strong predictors of actual behavior, academic performance, and even career choices. Self-efficacy theory states that beliefs about oneself and consequently performance depend on the interplay between four psychological processes: cognitive, motivational, affective, and selection processes. These processes include assessing one's abilities and skills, regulating motivation,

handling negative emotions, and proactively creating an environment conducive to achieving goals and personal development.

Self-efficacy beliefs are dynamic, constantly shaped by interpretations of past and present experiences. Sources such as mastery experiences, vicarious experience, social persuasion, physiological and affective states, and imaginative experiences all contribute to shaping these beliefs (Bandura 1997; Uscher and Pajares 2008; Schunk, 1981; Schunk and Zimmerman, 2007).

Three specific mental processes explain the relationship between self-efficacy and performance in a given situation: analysis of demands posed by a situation/task, attributional experience analysis, and assessment of personal and situational resources and constraints. These processes involve evaluating what is required to manage a situation or perform a task, assessing reasons for success or failure, and considering personal abilities and situational demands.

The constructs incorporated in Social Learning Theory are diverse and have been integrated into various models of motivation and learning, making this theoretical structure a lasting pillar of research in the motivational domain.

5.2.5 Who is Learning: Learning Goals and Learner's Mindset

Originally defined as Achievement Goal Theory (AGT) it has been a prominent theory in educational research for over 25 years (Senko, 2011). Developed by Murray (1938) this approach sustains that goals are a critical element in motivation. Murray was among the first to explore the connection between goals and motivation, investigating the efforts required to achieve defined results. Murray's ideas, initially sidelined, were later rediscovered and developed into what is now known as Achievement Goal Orientation theory (Ames 1992; Anderman and Maher 1994).

In the 1970s, researchers at the University of Illinois, inspired by Murray's concepts, began to explore the connection between learning motivation and goals (Senko, 2011). The new defined Goal Orientation Theory (GOT) posits that goal orientation affects people's cognitive or emotional tendencies towards events, which in turn triggers behavioral responses (Dweck and Leggett, 1988). These responses guide decisions about effort expenditure, attention direction, planning, responses to failure, and other

behaviors critical for learning (Albaili, 1998; Dweck and Elliot, 1983; Hastings and West, 2011).

Two primary types of goals are emphasized: mastery goals, focusing on acquiring and developing competence; and performance goals, centered on demonstrating competence and outperforming others. These goals stem partly from different views of ability. Students with mastery goals tend to see ability as malleable, while those with performance goals often view it as fixed (Dweck, 1986).

Behavioral responses to these goals can be further categorized into approach and avoidance goals (Elliot and Murayama 2008; Elliot and Harackiewitcz). Performance approach goals aim for competence relative to others, while performance avoidance goals steer clear of situations with uncertain competence. Mastery approach goals strive for competence through learning, whereas mastery avoidance goals evade situations that hinder learning. Work avoidance goals minimize effort in achievement situations (Harackiewicz et al., 1997). The theories developed by Elliot, Harackiewitcz, Murayama and others are considered more specific and detailed than Dweck works and are defined as Achievement Goal Theory (AGT). For the sake of this research, we will adopt GOT acronym to address both theories concepts that are, indeed, very similar.

Additionally, within the performance-approach category, researchers have identified self-presentation and normative goals (Hulleman et al., 2010). Learners who adopt performance-avoidance goals work to avoid appearing incompetent, while those with performance-approach goals seek to appear competent and receive positive social judgments (Senko et al., 2011).

The theory of the learner's mindset is intimately related to goal classification. Mindset—assumptions, values, and beliefs about themselves and the world—significantly influences people’s perception, interpretation, and actions in their environment (Dweck, 1999). Dweck (1986) suggested that achievement goals reflect underlying theories about the nature of intelligence or ability, either fixed or malleable. This belief that intelligence can be changed is linked to one's views on whether personal abilities can be developed (Hong and Lin-Siegler, 2012).

Belief in the malleability of intelligence fosters confidence that commitment and perseverance will lead to achieving learning goals. Conversely, perceiving abilities as innate can lead to a perception that poor results are a reflection of one’s capabilities.

Learning from failure, as suggested by Shepherd et al. (2011), indicates that individuals can gain knowledge and skills from failure and apply these in practice.

A flexible mindset is crucial for self-motivation in a constantly changing environment. Those with a flexible mindset interpret defeats very differently from those who consider their abilities innate. This mindset plays a pivotal role in the self-motivation of learners adapting to changing educational landscapes.

5.2.6 How we Learn: Cognitive and Metacognitive Approaches to Learning

The concept of self-regulation is pivotal in understanding how students control their cognition, behavior, emotions, and motivation through the use of personal strategies to achieve established goals. Initially perceived as solely the "control of cognition," or metacognition, it was considered the precursor of strategic learning (Boekaerts and Corno, 2005).

Understanding and directing one's own learning is vital not only in academic settings but throughout life. Self-regulated learners are adept at controlling the strategies and behaviors they employ for learning. They effectively direct cognitive activity by setting learning goals, identifying methods to achieve them, actively pursuing these methods, and monitoring progress towards their goals (Loyens et al., 2008).

Self-regulation forms a core component of metacognition, the ability to reflect on and monitor one's cognitive processes. It involves both monitoring one's cognitive activities, including learning and memory, and regulating these processes (Bjork, Dunlosky, Kornell, 2013; Dunlosky and Metcalfe, 2008). Hattie and Donoghue (2016) describe self-regulation as the interplay of the will to learn, curiosity, and the skills required for deeper content understanding. Carver and Scheier (2017) define it as self-corrective adjustments made to stay on track with one's purpose.

The significance of self-regulation in learning has garnered attention due to concerns over students' struggles to achieve academic competence. Often, underachievement in school is attributed to a lack of self-regulation, with procrastination leading to low learning levels and heightened dissatisfaction and stress (Schmitz & Wiese, 2006). Self-regulated learning and performance refer to a process in which learners activate

and sustain cognitions, affect, and behaviors systematically oriented towards personal goal attainment (Zimmerman & Schunk, 2011).

Students who are proactive in self-regulation perform better academically. This achievement results from initiatives like setting learning goals, employing effective strategies, monitoring progress, learning in a positive environment, and maintaining high self-efficacy (Zimmerman & Schunk, 2011). The complexity of these processes has been extensively explored in theoretical and experimental work over the past decade (Puustinen, M., & Pulkkinen, L., 2001, Panadero, 2017; Sitzmann & Ely, 2011), leading to various models that characterize self-regulation processes and suggest interventions to enhance learners' ability to direct their learning (Panadero, 2017).

Models by Zimmerman, Pintrich, and Boekaerts consider motivation as a key construct in Self-Regulated Learning (SRL) theory (Zimmerman 2000; Boekaets & Niemivirta, 2000; Pintrich 2000). Zimmerman (2000) highlights self-motivation beliefs as a crucial component; Pintrich (2000) developed a model similar to Zimmerman's, with an added emphasis on metacognition. Boekaerts asserts that students' activation of goals follows their interpretation of the task and context, influencing their decision to engage in regulatory actions (Boekaerts and Niemivirta, 2000).

Zimmerman's model, widely recognized in the field of self-regulated learning (Panadero & Alonso-Tapia, 2014), explains the dynamic influence of self-regulatory processes alongside environmental and behavioral events. For instance, a student's problem-solving approach may be shaped not only by self-efficacy perceptions but also by environmental events (e.g., instructor feedback) and behavioral events (e.g., solving a problem accurately) (Zimmerman, 1989; Zimmerman & Campillo, 2003).

According to Zimmerman's model, three self-regulatory phases operate cyclically: forethought, performance, and self-reflection. In the forethought phase, learners engage in task analysis. During the performance phase, they engage in self-control and self-observation. The self-reflection phase involves self-judgment and self-reaction, with these phases repeating throughout the learning process (Zimmerman & Kitsantas, 2005). Effective learning emerges from identifying the right strategy, evaluating the effectiveness of learning strategies, and correcting strategies, thereby improving academic achievement (Schunk, 1982).

Most theories of self-regulated learning have focused on school and post-secondary learning to understand school performance predictors. Some studies have examined how SRL functions in the workplace, including evaluations of the theory of Self-Directed Learning (SDL), which originated from Knowles' concept of Adult Learning (1975). While SRL and SDL are sometimes linked conceptually, it is crucial to note that the motivational definitions and objectives in academic and workplace settings differ. In SRL, the teacher sets the training objective, whereas in SDL, the learner does so.

SDL includes SRL, with the self-directed learner expected to self-regulate. However, self-regulated learning does not inherently include self-directed learning (Saks, 2014). For this research, we will focus on the principles of SRL, considering SDL useful but insufficient for analyzing the "how" of effective learning. Using an instrument based on SRL would make it possible to identify specific sub-processes that predict work-related learning success.

6 CONVERGENCES AND DIVERGENCES IN MOTIVATION TO LEARN THEORIES

6.1 MOTIVATION TO LEARN THEORIES

In the previous chapter of this research, we provided an overview of seven theories that have significantly contributed to the study of motivation in learning. In this section, we aim to identify commonalities and interconnections among these theories to build a comprehensive understanding of motivation in learning. It is worth noting that these theories are not mutually exclusive and have numerous interrelationships, which necessitates a holistic approach to grasp their full meaning. Therefore, we seek to identify the key concepts that are repeatedly mentioned in the literature and form the foundation for the subsequent modeling of our research.

Motivation is a multidimensional construct that refers to the forces that drive behavior, specifically the initiation, direction, and persistence of actions aimed at achieving a particular goal (Pintrich & Schunk, 2002). Motivation is critical to learning as it determines the effort, strategies, and persistence individuals apply to their learning activities. However, the nature and sources of motivation are complex and multifaceted, and their effects on learning vary among individuals, contexts, and situations (Hidi & Renninger, 2006).

Several theories attempt to explain the nature and sources of motivation in learning, including Self-Determination Theory, Expectancy-Value Theory, Social Cognitive Theory, and Achievement Goal Theory, among others. While each theory offers a

unique perspective on motivation, they share a common goal of understanding the processes that drive behavior and shape the quality of learning outcomes.

In this chapter, we will focus on identifying the commonalities between these theories, recognizing the numerous interconnections that exist between them. By doing so, we hope to gain a deeper understanding of the fundamental concepts that underlie motivation and learning. By synthesizing the main recurring themes in the literature, we aim to construct a model that will help us to better understand how motivation and learning are related, and how they can be effectively fostered and supported.

The goal of this research is to identify key elements of these motivational theories that can be used to improve the design and delivery of educational interventions, whether they be in traditional classroom settings or in online learning environments. By understanding the various factors that contribute to learning motivation, we hope to be able to design interventions that can help learners to become more self-directed and engaged in their own learning, and ultimately to achieve better outcomes.

By exploring the interconnections between these theories, we can gain a more comprehensive understanding of the complex nature of learning motivation. By identifying the commonalities between these theories, we can construct a model that integrates the various perspectives, which will provide a more nuanced and comprehensive understanding of the nature of learning motivation. Ultimately, this model can be used to design and deliver educational interventions that are better suited to the diverse needs and motivations of individual learners.

6.2 COMPARING THEORIES: EXPECTANCY VALUE THEORY

6.2.1 Expectancy Value Theory vs Self Efficacy Theory

Eccles' research on achievement motivation and the development of ability beliefs is consistent with Bandura's self-efficacy theory, which emphasizes an individual's belief in their ability to perform specific tasks or achieve specific goals (Bandura, 1997). Eccles has emphasized the role of mastery experiences in shaping individuals' beliefs about their abilities, which is a key component of self-efficacy theory. In addition,

Eccles has suggested that self-efficacy plays a critical role in the development of individuals' expectancies and values related to academic achievement (Eccles, 2009).
Research has found that self-efficacy beliefs influence individuals' expectancies for success and failure, as well as their subjective task values, which are related to their interest and importance in a given task (Eccles & Wigfield, 1995). Students who believed they were capable of succeeding in a particular subject were more likely to perform well in that subject, even when controlling for prior achievement and other factors.
Hulleman and Harackiewicz (2009) suggest that self-efficacy is a critical factor in shaping individuals' task values and expectancies for success. Individuals with high levels of self-efficacy are more likely to assign high task values to challenging tasks, as they are confident in their ability to succeed (Wigfield & Eccles, 2000). Lent and Brown (2006) propose that self-efficacy beliefs are a key determinant of individuals' expectancies for success and failure, as well as their subjective task values. They also suggest that self-efficacy beliefs can interact with other factors, such as interest, in shaping individual motivation and engagement.
Finally, Wolters and Pintrich (1998) compared self-efficacy theory with expectancy-value theory and found that the combination of both self-efficacy and task value provided a more comprehensive understanding of motivation than either self-efficacy or task value alone. Their research suggests that self-efficacy and task value are highly interrelated and mutually reinforcing in driving motivation and behavior.
In conclusion both self-efficacy theory and expectancy-value theory have been found to be highly interrelated in shaping motivation and behavior.

6.2.2 Expectancy Value Theory vs Mindset

The relationship between expectancy-value theory (EVT) and growth mindset highlights the significance of individuals' beliefs in shaping their motivation and achievement. EVT suggests that an individual's motivation and achievement are influenced by their expectations for success, as well as their subjective task values (Eccles & Wigfield, 2002). On the other hand, growth mindset is the belief that

intelligence and abilities can be developed through effort and hard work (Dweck, 2006).

Research has shown that individuals with a growth mindset may be more likely to believe that they can succeed in a particular task, which is consistent with EVT's emphasis on individuals' expectations for success (Blackwell, Trzesniewski, & Dweck, 2007). Furthermore, individuals with a growth mindset may be more likely to assign high task values to challenging tasks, as they view these tasks as opportunities for growth and development (Yeager & Dweck, 2012). In addition, Paunesku and colleagues (2015) found that a brief online intervention designed to promote a growth mindset led to improvements in students' academic achievement in a high school math course.

The combination of self-efficacy and task value, as proposed by EVT, may provide a more comprehensive understanding of motivation than either self-efficacy or task value alone (Wolters & Pintrich, 1998). Hulleman and Harackiewicz (2009) compared EVT with Goal Orientation theory and self-determination theory, which emphasizes the importance of intrinsic motivation and autonomy in driving behavior. Additionally, other researchers have found that EVT is closely related to self-determination theory, as both theories highlight the importance of individuals' expectations and subjective values in driving motivation (Deci & Ryan, 2002; Wigfield & Eccles, 2002).

Overall, the relationship between EVT and growth mindset suggests that individuals' beliefs play a critical role in shaping their motivation and achievement.

6.2.3 Expectancy Value Theory vs Self Determination Theory

Expectancy-Value Theory (EVT) and Self-Determination Theory (SDT) are two distinct theories with different focuses. EVT is concerned with an individual's subjective beliefs about their ability to succeed and their perceived value of the outcomes associated with a particular task or goal, while SDT focuses on the individual's intrinsic motivation, autonomy, and competence in pursuing and achieving goals. Although EVT does not explicitly incorporate the concepts of autonomy and intrinsic motivation, research has suggested that EVT can be integrated with SDT. Studies have found that individuals' intrinsic motivation can influence their task values

and expectancies for success, which are key components of EVT (Gottfried, Fleming, & Gottfried, 2001; Wigfield & Eccles, 2000). Additionally, some researchers have proposed that EVT can be expanded to incorporate the concepts of autonomy and intrinsic motivation (Harackiewicz and Elliot, 1993).

Savolainen (2018) notes that both SDT and EVT share the belief that motivation is driven by internal processes and that individuals are active agents in their own learning and achievement. However, there are important differences between the two theories. SDT emphasizes the importance of fulfilling three basic psychological needs: autonomy, competence, and relatedness. EVT, on the other hand, emphasizes the role of goal setting and the value individuals place on achieving those goals.

The author notes that EVT has been criticized for not taking into account the social context in which individuals set and pursue their goals. SDT, on the other hand, emphasizes the role of social factors, such as supportive relationships and a sense of community, in fostering intrinsic motivation and well-being (Savolainen, 2018).

The concepts of intrinsic motivation and task value are two areas where EVT and SDT intersect. According to Eccles and Wigfield (2002), task value is an important component of the expectancy-value model, representing the degree to which a task is perceived as important, interesting, or useful. Intrinsic motivation, as defined by SDT, is the internal drive to engage in an activity for its own sake, without external rewards or pressure (Deci & Ryan, 2000). Both concepts emphasize the importance of individuals' internal experiences and perceptions of a task, which can influence their motivation and behavior.

In summary, while EVT and SDT have different foci, there are areas where the two theories intersect, such as the concepts of intrinsic motivation and task value.

6.2.4 Expectancy Value Theory vs Self-Regulation Theory

Self-regulated learning (SRL) and expectancy-value theory (EVT) are two prominent theoretical frameworks in educational psychology that aim to explain and improve learning outcomes. SRL emphasizes the critical role of self-regulatory processes, such as planning, monitoring, and evaluating, in achieving learning goals (Zimmerman, 2000). In contrast, EVT posits that individuals' motivation and achievement are

determined by their expectancies and values regarding specific tasks (Eccles & Wigfield, 2002). The core idea of EVT is that individuals' beliefs about their ability to succeed in a task and the value they place on achieving that task influence their motivation and behavior. Pintrich (2003) suggested that EVT and SRL are related, and individuals' beliefs about the value and importance of a task influence their self-regulated learning processes.

Several researchers have investigated the similarities and differences between SRL and EVT, Pintrich (2003) proposed that individuals' beliefs about task value and importance can influence their self-regulated learning processes. Similarly, Vansteenkiste, Simons, Lens, Sheldon, et al. (2004) proposed that SRL and self-determination theory (SDT) share common principles, including a focus on individuals' autonomous motivation and their beliefs about their own competence.

In the context of reading comprehension, Dinsmore, Alexander, and Loughlin (2008) found that SRL and EVT contributed to academic achievement, but in different ways. Specifically, SRL was related to the quality of students' reading strategies, while EVT was related to the quantity of reading completed. Vrugt and Oort (2008) found that the use of SRL strategies was related to task value and expectancy beliefs, which are key components of EVT.

SRL and EVT share a common focus on motivation and achievement, as well as the importance of self-regulatory processes. Task value and expectancy beliefs are essential components that link these two constructs.

6.2.5 Expectancy Value Theory vs Interest

Interest is a key construct in both expectancy-value theory (EVT) and interest theory. EVT posits that interest is a multidimensional construct that is related to an individual's subjective task value, which in turn influences their motivation to engage in a task (Eccles & Wigfield, 2002). Interest is influenced by both situational and individual factors, such as the perceived relevance and enjoyment of a task. Situational interest refers to a temporary interest in a specific topic or activity that is sparked by features of the task or context. Individual interest, on the other hand, is a more enduring and stable disposition toward a particular domain or activity.

In contrast, interest theory, developed by Renninger and Hidi (2016), emphasizes the development and regulation of individual interest over time. It suggests that interest develops through three phases: triggered situational interest, maintained situational interest, and individual interest. Interest theory places a greater emphasis on the role of emotions and self-regulation in the development and maintenance of interest.

While there are similarities between the two theories, they have distinct conceptualizations of interest and their relationships to motivation and learning. EVT emphasizes the influence of interest on task value, whereas interest theory emphasizes the development and regulation of interest over time (Hidi & Renninger, 2006).

Research has shown that situational interest can play an important role in promoting engagement and learning in academic tasks. For example, when a teacher presents a topic in an interesting and engaging way, it can spark students' situational interest and increase their motivation to learn (Hidi & Renninger, 2006).

While EVT and interest theory share some common ground in their use of the construct of interest, their specific meanings and conceptualizations of interest may differ, highlighting the need for further exploration of this construct in the context of motivation and learning.

6.2.6 Expectancy Value Theory vs Goal Orientation Theory

Goal orientation theory and EVT are distinct theories, they share commonalities in their focus on achievement motivation and the influence of beliefs and attitudes on motivation and behavior.

Both theories suggest that individuals' beliefs and attitudes toward achievement are shaped by their goals, values, and expectations.

Goal orientation theory emphasizes the importance of the type of goals individuals pursue and the reasons for pursuing them (Elliot & Dweck, 2005). The theory proposes two types of goal orientations: mastery orientation and performance orientation.

EVT emphasizes the importance of individuals' beliefs and values in shaping their motivation and behavior. According to the theory, individuals' motivation is influenced by their expectations for success and failure, as well as the value they place on a given task or activity (Eccles & Wigfield, 2002).

Study found that students who received an intervention aimed at promoting expectancy beliefs and task values showed greater gains in their achievement over time compared to a control group (Hulleman and Harackiewicz, 2009) Research has found a link between goal orientation and expectancy-value beliefs. For example, individuals with a mastery orientation have been found to have higher expectancy-value beliefs than those with a performance orientation (Elliot & Church, 1997). Moreover, studies have shown that individuals with a mastery orientation are more likely to engage in SRL processes, which are important for achieving mastery goals (Schunk & Zimmerman, 2007).

Pintrich and Schunk (2002) suggested that EVT and goal orientation theory can be combined to provide a more comprehensive understanding of motivation and learning. Similarly, Elliot and McGregor (2001) proposed that mastery goals, which are central to goal orientation theory, are related to task value and expectancy beliefs, which are key components of EVT.

6.3 COMPARING THEORIES: GOAL ORIENTATION THEORY

6.3.1 Goal Orientation Theory vs Self Determination Theory

One common point between SDT and GOT is the emphasis on the role of goals in shaping individuals' motivation and behavior. In particular, research has shown that mastery goals are generally associated with higher levels of intrinsic motivation and achievement, while performance goals can lead to lower levels of intrinsic motivation and increased focus on social comparison (Harackiewicz et al., 2016).

In addition to goals, both SDT and GOT highlight the importance of social factors in shaping individuals' motivation and behavior. SDT emphasizes the role of social contexts that support individuals' basic psychological needs, such as autonomy, competence, and relatedness. For example, research has shown that autonomy-supportive environments, where individuals are given choices and opportunities for self-direction, can promote intrinsic motivation and well-being (Deci & Ryan, 2008).

In contrast, GOT suggests that social norms and feedback from peers and authority figures can influence individuals' goal orientation and motivation. GOT research has shown that feedback that emphasizes mastery and improvement can promote mastery goal orientation, while feedback that emphasizes performance and competition can promote performance goal orientation (Elliot & Harackiewicz, 1996).

Van Yperen and Orehek (2013) found that both SDT and GOT contributed to predicting academic achievement, but goal orientation theory had stronger predictive power. Xiang, McBride, and Guan (2004) compared the effects of goal orientation and SDT-based interventions on learning outcomes and found that both types of interventions improved learning outcomes and motivation, but the SDT-based intervention had a stronger effect on enhancing intrinsic motivation. Moreover, Niemiec and Ryan (2009) found that autonomous motivation was positively associated with intrinsic motivation, whereas controlled motivation was positively associated with performance-approach goal orientation.

Although SDT and GOT have some differences in their explanations of individuals' motivation and achievement, they share similarities in their emphasis on the importance of goals, social factors, and intrinsic motivation.

6.3.2 Goal Orientation Theory vs Self-Regulation Theory

Both self-regulated learning (SRL) and goal orientation theory (GOT) highlight the importance of goals in motivation and achievement, but they differ in their approach to goal setting and orientation. SRL emphasizes the setting of specific, challenging, and achievable goals, and the importance of monitoring progress towards those goals, whereas GOT focuses on the orientation towards goals, either mastery or performance, and the impact of feedback on that orientation (Pintrich, 2000).

SRL's goal setting process involves breaking down complex tasks into smaller, manageable components and setting goals for each component. This approach is based on the notion that setting specific goals leads to increased motivation and achievement, and that progress monitoring is necessary to maintain motivation and ensure success (Zimmerman, 2000). In contrast, GOT emphasizes the impact of the type of goal orientation, either mastery or performance, on motivation and achievement. Research

has shown that a mastery goal orientation is associated with higher levels of intrinsic motivation and achievement, whereas a performance goal orientation may lead to lower levels of intrinsic motivation and increased focus on social comparison (Harackiewicz et al., 2016).

While both SRL and GOT highlight the importance of goals in motivation and achievement, there is relatively little research directly comparing these two constructs. However, a few studies have explored the relationship between goals in SRL and GOT. For example, Cleary and Zimmerman (2004) found that mastery-oriented students were more likely to use self-regulatory strategies in studying for exams than were performance-oriented students. Similarly, Pintrich and De Groot (1990) found that goal orientation was positively related to self-regulated learning in a college course.

In a study by Kramarski and Gutman (2006), students who received training in both SRL and mastery goals showed higher achievement on a mathematics test compared to those who only received training in SRL or who received no training at all. Other studies have investigated the relationship between SRL and specific types of goals, such as performance-approach and performance-avoidance goals. For example, Liem, Lau, and Nie (2008) found that performance-approach goals were negatively associated with self-regulated learning, whereas performance-avoidance goals were positively associated with self-regulated learning.

There is a connection between GOT and SRL: individuals with a mastery goal orientation are more likely to engage in SRL processes, such as setting specific, challenging goals, monitoring progress, and reflecting on their learning (Schunk & Zimmerman, 2006).

6.3.3 Goal Orientation Theory vs Mindset

Goal orientation theory (GOT) and growth mindset theory have both been extensively studied in the field of motivation and learning. GOT proposes that individuals can have either a mastery or a performance orientation towards their goals. In contrast, growth mindset theory suggests that individuals can have either a fixed or growth mindset, which relates to their belief about the malleability of intelligence and abilities.

There is evidence to suggest that there may be a correlation between these two theories. Research has shown that individuals who have a mastery goal orientation are more likely to have a growth mindset, while those with a performance goal orientation are more likely to have a fixed mindset (Dweck, 2006; Elliot & Church, 1997). Individuals with a growth mindset are more likely to believe that they can develop their abilities and skills through effort and practice, while those with a fixed mindset may be less likely to believe that their abilities can be improved.

Similarly, research has shown that individuals with a mastery goal orientation are more likely to engage in self-regulated learning (SRL) processes, while those with a performance goal orientation may be less likely to engage in these processes (Pintrich, 2000). SRL processes such as planning, monitoring, and evaluating can help individuals to achieve their goals by regulating their learning and guiding their behavior. This suggests that there may be a connection between mastery goal orientation, SRL, and growth mindset, as all three focus on the process of learning and developing new skills.

Hong and Lin (2016) found that individuals with a mastery goal orientation and a growth mindset were more likely to engage in deep learning strategies, which involve making connections between new information and prior knowledge, as well as applying new knowledge to real-world situations. In contrast, those with a performance goal orientation and a fixed mindset were more likely to engage in surface learning strategies, such as rote memorization and focusing on grades.

While it would not be accurate to argue that the correlation between the two theories is solely due to the fact that they come from the same author, it is nonetheless noteworthy that some of the concepts of mindset theory may have originated from GOT before advancing to a higher level of belief.

6.3.4 Goal Orientation Theory vs Self Efficacy Theory

Both Goal Orientation Theory (GOT) and self-efficacy are crucial constructs in the field of motivation, and their impact on various educational settings has been studied extensively. Self-efficacy refers to an individual's belief in their ability to accomplish a task, and those with high levels of self-efficacy are more likely to set challenging

goals and persist in the face of obstacles. Research has shown a relationship between goal orientation and self-efficacy. Individuals with a mastery goal orientation are more likely to have high levels of self-efficacy as they are motivated to learn and develop new skills, whereas those with a performance goal orientation may have lower levels of self-efficacy, as they are more focused on achieving good grades or outperforming others.

Hulleman and Harackiewicz (2009) found that while both GOT and self-efficacy theory (SET) emphasize the importance of goals in motivation and achievement, they differ in their focus on feedback and the type of goals that individuals pursue. GOT proposes that feedback from peers and authority figures can influence the type of goal orientation, whereas SET highlights the importance of individuals' beliefs about their ability to achieve their goals, which can be shaped by past experiences and feedback.

Similarly, Elliot and Dweck (2005) found that GOT and SET share a common theme of the importance of motivation and goal pursuit in achievement but differ in their focus on the content and structure of goals. GOT emphasizes the different types of goals that individuals can pursue, whereas SET focuses on individuals' perceptions of their ability to achieve their goals.

Research has also shown that GOT and self-efficacy are related to academic achievement. Elliot and Church (1997) found that undergraduate students with a mastery goal orientation and high levels of self-efficacy had higher GPAs than those with a performance goal orientation and low levels of self-efficacy.

In conclusion, GOT and self-efficacy some commonalities but they differ in their focus on feedback, goals, and self-beliefs.

6.3.5 Goal Orientation Theory vs Interest Theory

The connection between goal orientation and interest is a significant research area in the fields of motivation and learning. When individuals possess a mastery goal orientation, they tend to be more interested in the task or subject they are learning since they are motivated by the challenge and satisfaction of developing new skills and knowledge.

Researchers have found that students' interest in a task or subject is influenced by their goal orientation (Hidi & Renninger, 2006). Specifically, students who have a mastery goal orientation are more likely to be interested in a task or subject, as they are motivated by the desire to learn and develop their skills. On the other hand, students who have a performance goal orientation may be less interested in a task or subject, as they are more concerned with achieving good grades or outperforming others (Hidi & Harackiewicz, 2000).

Moreover, researchers suggest that interest can influence goal orientation since students who are interested in a task or subject may be more likely to adopt a mastery goal orientation (Hidi & Renninger, 2006). According to Hidi, interest and goal orientation are closely related, and both play vital roles in students' motivation and engagement in learning.

Several studies have examined the link between interest and motivation in the context of Goal Orientation Theory (GOT). For instance, Harackiewicz and colleagues (2008) found that interest in a task was positively related to the degree to which individuals had a mastery goal orientation and negatively related to the degree to which they had a performance goal orientation. Similarly, Elliot and colleagues (2011) found that individuals who had a mastery goal orientation were more likely to find a task interesting. This interest, in turn, was positively related to their motivation to learn and perform well.

The research indicates that students with a mastery goal orientation tend to be more interested in the subject or task they are learning. Consequently, when individuals are interested in a task, they are more likely to adopt a mastery goal orientation, which leads to higher motivation and engagement in the learning process.

6.4 COMPARING THEORIES: SELF-EFFICACY

6.4.1 Self-Efficacy vs Self Determination Theory

Self-efficacy is a key component of Self-Determination Theory (SDT) and is related to several critical aspects of human motivation, such as competence, autonomy,

relatedness, goal orientation, and interest. Deci and Ryan (1985) argued that self-efficacy is an important factor in fulfilling the basic psychological needs for competence and autonomy in SDT. Self-efficacy is closely related to individuals' sense of competence, which is a fundamental aspect of autonomy. Moreover, Vansteenkiste et al. (2014) suggested that self-efficacy is also connected to the basic psychological need for relatedness in SDT, as individuals with high levels of self-efficacy are more likely to engage in social interactions and seek feedback from others to develop and maintain positive relationships.

In the context of sports performance, Vallerand et al. (1997) found that self-determined motivation was positively related to self-efficacy, indicating that individuals who are more self-determined are also more likely to believe in their ability to perform well in sports. Boudrias et al. (2012) further demonstrated that self-determination and self-efficacy were both positively related to work-related outcomes such as job satisfaction and performance. This implies that individuals who have higher levels of self-determination and self-efficacy are more likely to be satisfied with their jobs and perform better.

Autonomy is also crucial in the development of self-efficacy, as shown by a study by Deci et al. (1991). The researchers found that individuals in autonomy-supportive environments were more likely to have enhanced self-efficacy beliefs and promote optimal functioning.

6.4.2 Self-Efficacy vs Mindset Theory

The correlation between self-efficacy and mindset has been explored by numerous researchers. According to Dweck's work on mindset, an individual's belief in their ability to learn and improve can significantly impact their motivation and achievement. Those who have a growth mindset, or the conviction that their abilities can be developed through effort and hard work, are more likely to persevere through challenges and setbacks (Dweck, 2006).

In addition to the impact of mindset on self-efficacy, research has shown that self-efficacy beliefs can also influence mindset. Haimovitz and Dweck (2016) found that self-efficacy beliefs in math were positively associated with growth mindset beliefs.

Students who believed they could improve in math were more likely to view challenges as opportunities for learning and growth.

The correlation between self-efficacy and mindset has also been studied in various contexts. In the realm of sports, self-efficacy beliefs of athletes have been linked to their mindset about their abilities. For instance, Vealey and colleagues (2013) reported that athletes with high levels of self-efficacy were more likely to have a growth mindset about their abilities in sports.

Similarly, self-efficacy and mindset have been explored in the context of academic achievement. Blackwell and colleagues (2007) conducted a study of undergraduate students and found a relationship between their mindset about intelligence and academic performance. Students with a growth mindset about intelligence had higher GPAs and were more inclined to pursue challenging coursework.

Research highlights the significant role of self-efficacy beliefs in shaping an individual's mindset about their abilities, and how this correlation can impact their motivation, behavior, and achievement.

6.4.3 Self-Efficacy vs Interest Theory

The relationship between self-efficacy and interest has been a topic of interest for researchers in the field of motivation and learning. Lent and Brown (2008) developed a social cognitive model of career development that highlights the bidirectional relationship between self-efficacy and interest. This model suggests that individuals with high self-efficacy beliefs are more likely to develop and maintain interest in an activity, while individuals with high interest are more likely to develop and maintain self-efficacy beliefs.

Similarly, Hidi and Renninger (2006) proposed a model of interest development that includes self-efficacy as a key factor. This model suggests that self-efficacy influences an individual's level and intensity of interest in a particular topic or activity. Individuals with high self-efficacy beliefs are more likely to engage in and persist in challenging tasks, which can lead to increased interest in those tasks.

Research has also shown that interventions designed to enhance self-efficacy can have a positive impact on interest and motivation. For example, Wigfield and Eccles (2000)

found that a self-efficacy intervention designed to help students set specific learning goals and develop plans for achieving those goals led to increased interest and motivation in a challenging academic task. Similarly, Bandura (1997) suggested that increasing self-efficacy through mastery experiences and other means can lead to increased motivation and interest in a particular task or activity.

The relationship between self-efficacy and interest is complex and bidirectional, with each construct influencing and being influenced by the other.

6.4.4 Self-Efficacy vs Self-Regulation Theory

Self-efficacy and self-regulated learning (SRL) are two essential constructs that are closely linked in the field of learning motivation and achievement. Several studies have shown that an individual's self-efficacy beliefs can have a significant impact on their engagement in SRL processes, such as planning, monitoring, and evaluating their learning progress (Zimmerman & Schunk, 2011). Specifically, individuals with high levels of self-efficacy are more likely to engage in these processes as they possess greater confidence in their abilities and tend to view challenges as opportunities for growth and development (Schunk & Pajares, 2002). On the other hand, individuals with low levels of self-efficacy may be less likely to engage in SRL processes as they may doubt their ability to succeed and experience negative emotions and feelings of helplessness (Bandura, 1997).

Moreover, research has indicated that SRL processes can also impact an individual's self-efficacy beliefs. For instance, setting specific learning goals and monitoring progress towards those goals can help individuals track their progress and develop a sense of competence and mastery, which can in turn boost their self-efficacy beliefs (Zimmerman, 2000).

It is important to note that the relationship between self-efficacy and SRL can be influenced by other factors, such as the level of task difficulty and feedback quality. Studies have suggested that self-efficacy beliefs have a more significant impact on SRL processes for moderately difficult tasks, as individuals are more likely to engage in SRL when they perceive the task to be challenging but not overwhelming (Zimmerman & Schunk, 2011). Additionally, high-quality feedback that is specific and informative

can also help to enhance individuals' self-efficacy by providing clear guidance on how to improve and achieve their goals (Schunk & Pajares, 2002).

Pintrich (1999) was one of the key researchers who wrote about the relationship between self-efficacy and self-regulated learning (SRL). In particular, his work on self-regulated learning highlighted the importance of self-efficacy beliefs in motivating and guiding students' use of SRL strategies. He emphasized the role of self-efficacy in helping students to set goals, monitor their progress, and persist in the face of challenges, and argued that interventions aimed at enhancing self-efficacy can have a significant impact on students' SRL skills and academic achievement.

6.5 COMPARING THEORIES: SELF-DETERMINATION

6.5.1 Self-Determination Theory vs Interest Theory

Self-determination theory (SDT) posits that individuals are motivated to engage in activities that meet their basic psychological needs for autonomy, competence, and relatedness (Ryan & Deci, 2000). According to SDT, the satisfaction of these needs' leads to enhanced interest and engagement in the activity, which in turn leads to increased motivation and achievement (Deci & Ryan, 2008).

Hidi and Renninger's model (2006) of interest development suggests that SDT is a useful framework for understanding the cognitive and motivational processes that underlie interest. By highlighting the importance of autonomy, competence, and relatedness in the development of interest, their model emphasizes the role of internal motivation and personal agency in driving learning and engagement.

Research has shown that the relationship between self-determination and interest is bidirectional, with each construct influencing and being influenced by the other (Ryan & Deci, 2000). For example, individuals who have a high level of self-determination are more likely to be interested in the activities they are engaging in, as they feel a greater sense of choice and control over their actions (Reeve, Deci, & Ryan, 2004). On the other hand, individuals who are interested in a particular activity are more likely to

experience a sense of autonomy, competence, and relatedness, which can contribute to their self-determination (Ryan & Deci, 2000).

Moreover, research has shown that the relationship between self-determination and interest can also be influenced by other factors, such as the social context and the task characteristics. For example, studies have found that autonomy-supportive environments, where individuals are provided with choice and control over their activities, can enhance their interest and self-determination (Reeve et al., 2004). Additionally, activities that are perceived as challenging but attainable can promote interest and self-determination, as individuals feel a sense of competence and accomplishment when they successfully engage in the activity (Harackiewicz et al., 2002).

SDT proposes that individuals are more likely to pursue activities that align with their interests when their basic psychological needs for autonomy, competence, and relatedness are met (Ryan & Deci, 2000). For example, when individuals feel that they have a choice in what activities to engage in and feel competent in their abilities to perform those activities, they are more likely to pursue activities that align with their interests. Similarly, when individuals feel a sense of connection and belonging with others who share their interests, they are more likely to engage. In addition, research has shown that SDT can be applied to educational contexts, where interest and engagement are critical factors in promoting academic success. For example, a study by Kanekta and colleagues (2020) found that students who reported high levels of interest in a particular subject were more likely to engage in that subject and to report greater levels of academic motivation. The study also found that students' sense of autonomy in the subject was related to their interest and motivation.se activities.

6.5.2 Self-Determination Theory vs Self-Regulation Theory

Self-determination theory (SDT) is a macro-theory of motivation that explains how social, cultural, and contextual factors interact with individuals' inherent psychological needs to influence their motivation and engagement. (Ryan & Deci, 2000).

Self-regulated learning (SRL), on the other hand, is a micro-theory of motivation that focuses on the cognitive, metacognitive, and motivational processes that individuals

use to regulate their own learning. SRL emphasizes the importance of individuals' self-regulatory processes, such as planning, monitoring, and evaluating, in achieving their learning goals (Zimmerman, 2000).

There is a close relationship between SDT and SRL. SDT provides a theoretical framework for understanding the motivational processes that underlie SRL. According to SDT, individuals are motivated to engage in behaviors that satisfy their basic psychological needs for autonomy, competence, and relatedness. In the context of SRL, this means that individuals are motivated to regulate their own learning when they feel a sense of autonomy, competence, and relatedness in their learning environment (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004).

Research has shown that the satisfaction of these basic psychological needs is closely related to the use of self-regulatory strategies in learning. For example, students who feel a sense of autonomy in their learning are more likely to use self-regulatory strategies such as goal setting and planning (Reeve & Jang, 2006). Similarly, students who feel competent in their learning are more likely to engage in self-regulated learning behaviors such as self-evaluation and reflection (Zimmerman, 2000).

There is a strong connection between SDT and SRL: SDT provides a theoretical framework for understanding the motivational processes that underlie SRL, while SRL provides a micro-theory of motivation that focuses on the specific cognitive, metacognitive, and motivational processes that individuals use to regulate their own learning.

6.5.3 Self-Determination Theory vs Mindset Theory

Self-determination theory (SDT) and mindset theory have both been extensively studied in the field of motivation, with researchers exploring the relationship between the two concepts. SDT focuses on individuals' intrinsic motivation, autonomy, and competence, while mindset theory emphasizes individuals' beliefs about their intelligence and ability to grow and develop their skills.

Research has suggested that individuals with a growth mindset, who believe that their intelligence and abilities can be developed through effort and practice, are more likely to have high levels of intrinsic motivation and a strong sense of autonomy, which are

key components of SDT (Dweck, 2006). Similarly, individuals with a fixed mindset, who believe that their intelligence and abilities are fixed and unchangeable, may be less likely to experience intrinsic motivation and autonomy.

Several studies have also explored the relationship between mindset and autonomy-supportive behaviors, which are central to SDT. For example, a study by Blackwell, Trzesniewski, and Dweck (2007) found that individuals with a growth mindset were more likely to report that their teachers provided autonomy-supportive feedback, such as encouragement and choice, compared to individuals with a fixed mindset.

Other studies have explored the relationship between mindset and goal setting, another key component of SDT. For example, a study by Burnette, O'Boyle, VanEpps, Pollack, and Finkel (2013) found that individuals with a growth mindset were more likely to set learning goals, which are associated with intrinsic motivation, compared to individuals with a fixed mindset.

SDT and mindset theory are distinct concepts. Nevertheless, individuals with a growth mindset may be more likely to experience high levels of intrinsic motivation, autonomy, and learning-oriented goal setting, which are key components of SDT.

6.6 COMPARING THEORIES: SELF-REGULATION THEORY

6.6.1 Self-Regulation Theory vs Mindset Theory

SRL refers to the process of regulating one's own learning through cognitive, metacognitive, and motivational strategies, such as setting goals, planning, monitoring progress, and self-evaluating (Zimmerman, 2000). SRL focuses on how individuals actively control and manage their learning in order to achieve their goals.

In contrast, mindset refers to an individual's beliefs about their own intelligence, talent, and ability to learn and grow. A growth mindset is characterized by the belief that one's intelligence and abilities can be developed through effort and learning, while a fixed mindset is characterized by the belief that one's abilities are fixed and unchangeable (Dweck, 2006).

While SRL and mindset are distinct concepts, they are related in that a growth mindset can support and facilitate SRL. Individuals with a growth mindset are more likely to set challenging goals and persist in the face of obstacles, as they believe that their abilities can be developed through effort and practice. This can lead to a greater engagement in SRL processes, such as goal setting and self-evaluation (Blackwell, Trzesniewski, & Dweck, 2007).

Research has also shown that interventions aimed at promoting a growth mindset can lead to improved academic achievement and greater engagement in SRL processes (Yeager et al., 2016). For example, teaching students about the malleability of intelligence and providing them with strategies to develop their abilities can lead to improved academic performance and greater motivation to learn.

In conclusion, while SRL and mindset are distinct concepts, they are related in that a growth mindset can support and facilitate SRL.

6.6.2 Self-Regulation Theory vs Interest Theory

SRL focuses on learners' self-regulatory processes, such as planning, monitoring, and evaluating, and how these processes can be optimized to enhance learning and achievement (Zimmerman, 2000). Interest Theory, on the other hand, emphasizes the role of situational and personal factors in shaping individuals' motivation and engagement with learning activities (Hidi & Renninger, 2006).

While SRL and Interest Theory have different foci, they share the idea that learners are active agents in their own learning process. SRL proposes that learners can regulate their own learning through the use of cognitive, metacognitive, and motivational strategies, while Interest Theory proposes that learners are more likely to engage in learning activities that are interesting and personally relevant.

One way that SRL and Interest Theory can be integrated is by considering learners' interests and personal goals as a factor in their self-regulation. For example, a learner who is interested in a particular topic may be more likely to engage in planning and monitoring activities related to that topic and may be more persistent in the face of obstacles (Hidi & Renninger, 2006).

In conclusion, while SRL and Interest Theory share the idea that learners are active agents in their own learning process. By considering learners' interests and personal goals, SRL can be enhanced to optimize learners' motivation and engagement, while Interest Theory can be integrated with SRL to promote learners' self-regulation and achievement.

6.7 COMPARING THEORIES: MINDSET THEORY

6.7.1 Mindset Theory vs Interest Theory

The concepts of interest and mindset are both important factors in determining individuals' motivation and achievement. Interest refers to the degree to which individuals find a particular task or topic engaging and enjoyable, while mindset refers to individuals' beliefs about the nature of intelligence and their own ability to learn and grow.

Research has shown that individuals who have a growth mindset, which is the belief that intelligence can be developed through effort and persistence, are more likely to be motivated to learn and to achieve success (Dweck, 2006). This is because individuals with a growth mindset are more likely to view challenges as opportunities for learning and growth, rather than as threats to their self-concept.

Similarly, individuals who are interested in a particular topic or task are more likely to be motivated to engage with that topic or task, as they find it intrinsically rewarding (Hidi & Renninger, 2006). Interest has been shown to be a key predictor of academic achievement, as individuals who are interested in a particular subject are more likely to engage in learning activities and to persist in the face of obstacles.

While interest and mindset are distinct constructs, they are related in important ways. For example, individuals with a growth mindset may be more likely to develop an interest in a particular subject, as they are more likely to view learning as a process of growth and development. Similarly, individuals who are interested in a particular topic may be more likely to develop a growth mindset, as they see the potential for growth and development in that area.

6.8 COMPARING THEORIES: INTEREST THEORY

As we anticipated at the beginning of this chapter, each theory has been compared with the other six. To avoid repetitions, each new section had reported one less theory than the previous ones. Once we have reached the end of this comparison, in this section dedicated to Hidi and Renninger's Interest Theory, we do not find any comparison. It is enough to retrace the six previous sections to find the theory of interest compared to the other theories.

6.9 CONCLUSIONS

To facilitate a comprehensive understanding of the detailed comparative analysis of different theories of motivation to learn, a summary table has been created to encapsulate the main components analyzed. The Tables 6.1 and 6.2 allow for the synthesis and comparison of the seven examined theories using the following parameters:

- Historical Background: The origin and development timeline.
- Primary Authors: The main theorists or researchers associated
- Domain: The primary field from which the theory originates.
- Causality: The main driving forces behind motivation.
- Core Components: The main elements or constructs.
- Applications: Practical applications where is most commonly used.
- Strengths: Key strengths or advantages.
- Limitations: Known limitations or criticisms.
- Key Studies: Important studies that have validated or expanded on the theory.
- Impact on Policy/Practice: Influence on educational or teaching practices.
- Measurement Tools: Tools or methods used to measure the constructs proposed.
- Overall Similarity: A qualitative measure of how similar the theory is to others, based on the identified elements.

Table 6-1: Summary of key elements of 7 theories analyzed part 1

Theory	Historical Background	Primary Authors	Domain	Causality	Core Components	Applications
Self-Determination Theory (SDT)	Developed in the 1980s	Deci, Ryan	Psychology	Internal factors (autonomy, competence, relatedness)	Autonomy, Competence, Relatedness	Classroom, sports, workplace, leadership
Expectancy-Value Theory (EVT)	1980s	Eccles, Wigfield	Education Psychology	Expectations and values	Expectancy, Task Value	Educational interventions, career choice
Goal Orientation Theory (GOT)	1980s-1990s	Dweck, Elliot	Psychology Education	Goal setting and orientation	Mastery goals, Performance goals	Academic settings, professional development
Self-Efficacy Theory (SEFF)	1970s	Bandura	Psychology	Belief in own ability	Self-efficacy beliefs, Mastery experiences	Education, health, organizational behavior
Mindset Theory (MIND)	2000s	Dweck	Psychology/ Education	Belief about intelligence	Fixed vs. Growth mindset	Educational reform, personal development
Self-Regulation Theory (SRT)	1980s-1990s	Zimmerman	Cognitive Science Education	Self-regulatory processes	Goal setting, Monitoring, Evaluation	Self-paced learning, online education
Interest Theory (INT)	2000s	Hidi, Renninger	Cognitive Science Psychology	Interest development	Situational interest, Individual interest	Curriculum design, instructional strategies

Table 6-2 Summary of key elements of 7 theories analyzed part 2

Theory	Strengths	Limitations	Key Studies	Impact on Policy/Practice	Measurement Tools	Overall Similarity
Self-Determination Theory (SDT)	Comprehensive framework, practical applications	Can be complex to implement fully	Deci & Ryan (2000), Vansteenkiste et al. (2004)	High impact on educational practices	Self-Determination Questionnaire (SDQ)	High with EVT and SRL
Expectancy-Value Theory (EVT)	Clear structure, applicable to various settings	Does not account for social context	Eccles & Wigfield (2002)	Influences curriculum design, Resilience	Task Value Scale	High with SDT and SET
Goal Orientation Theory (GOT)	Focuses on both mastery and performance goals	Performance goals may reduce intrinsic motivation	Dweck (1986), Elliot & Dweck (2005)	Informs feedback and assessment practices	Achievement Goals Questionnaire	Moderate with EVT and SDT
Self-Efficacy Theory (SEFF)	Focus on personal belief systems	May not account for environmental factors	Bandura (1997)	Shapes interventions for skill development, Coaching, Feedback	Self-Efficacy Scale	High with EVT and Mindset
Mindset Theory (MIND)	Encourages adaptive learning behaviors	Simplistic dichotomy	Dweck (2006)	Teaching strategies, Strategy and Learning culture in Org.	Implicit Theories of Intelligence Scale	High with SET and GOT
Self-Regulation Theory (SRT)	Emphasizes learner autonomy	Requires high learner self-discipline	Zimmerman (2000)	Enhances learner autonomy in education	MSLQ	High with SDT and EVT
Interest Theory (INT)	Addresses both situational and individual factors	Needs further empirical validation	Hidi & Renninger (2006)	Stimiuate interest and engagement strategies,	Situational Interest Scale	Moderate with SDT and SRL

The comparative analysis reveals that, although each theory offers a unique perspective on motivation to learn, numerous points of convergence highlight their interconnections. For instance, the Self-Determination Theory, Expectancy-Value Theory, and Self-Efficacy Theory all emphasize the perception of autonomy and individual competence as critical factors in motivation. By examining and evaluating

the various theories on learning motivation, we have gained a deeper understanding of their similarities, differences, and unique contributions to the field.

By understanding these concepts and how they are incorporated into different theories, we can begin to see how they influence an individual's motivation to learn. We can also identify potential gaps or areas for further research in the field of learning motivation.

In the next chapter, we will synthesize the findings of this analysis and explore how operational constructs work together to influence motivation for learning. We will also discuss the implications of this analysis for the development and implementation of effective learning interventions.

7 THEORETHICAL CONSTRUCTS AND THEIR MEASUREMENT

7.1 MODELING: UNVEILING THE COMPLEXITIES OF LEARNING MOTIVATION

A comprehensive understanding of learning motivation hinges on the integration and synthesis of various motivational theories. For instance, self-determination theory (SDT) could serve as a broad framework, with other theories contributing specific mechanisms or applications.

Researchers have employed various methodologies to compare and assess the convergence of different motivational theories. For example, Hulleman and Harackiewicz (2009) proposed a framework integrating key constructs from SDT, expectancy-value theory, and goal orientation theory. Similarly, Middleton and Midgley (1997) proposed a framework for comparing achievement motivation theories. This section contributes to the ongoing effort by systematically outlining the primary convergence points among the learning motivation theories discussed earlier.

7.2 COMPARING THEORIES AND CONSTRUCTS

The methodology adopted in this research follows a multi-step process. First, each theory will be situated within its specific academic domain: cognitive science,

psychology, or education. Identifying the disciplinary lens through which each theory was developed provides valuable context for interpreting its core tenets (Deci & Ryan, 2008).

Following domain identification, each theory will be thoroughly analyzed. This will involve extracting key elements such as the theory's proposed goals of learning, the factors believed to influence motivation, and the predicted outcomes for learners (Pintrich & Schunk, 2002). Next, the scientific constructs within each theory will be isolated and defined. Finally, the identified constructs from each theory will be compared and contrasted. This comparative analysis aims to identify similarities and differences in how various theories conceptualize the motivational landscape. Through this comparative approach, the strengths and weaknesses of each theory can be illuminated.

Constructs such as interest (Hidi & Renninger, 2006; Renninger & Hidi, 2016), autonomy (Deci & Ryan, 1985; Ryan & Deci, 2000), and mastery (Elliot & Dweck, 2005) are acknowledged as influential constructs in learning motivation, further underscoring the parallels between major theories.

This approach facilitates the identification of theoretical intersections and potential avenues for synthesis. Besides pinpointing shared constructs, research has examined various methodologies for comparing motivational theories. Concept maps and coding schemes, for instance, have been utilized to visually represent interrelationships between concepts and to discern common themes and patterns across disparate theories (Kinchin & Caballero, 2016; Schunk & Pajares, 2002). Identify Constructs

David Whetten (1989) suggests that there are four building blocks of a theory: constructs, propositions, logic, and boundary conditions/assumptions. Constructs capture the “what” of theories, i.e., what concepts are important for explaining a phenomenon.

A construct is a fundamental concept or idea used within a theory. It represents a specific phenomenon or attribute that the theory seeks to explain or measure (Trochim, 2006). Imagine a scientific theory as a house. The theory itself is the blueprint, outlining the overall structure and explaining how the different parts work together. But to build this house, we need essential components – the bricks and mortar. In the world of scientific theories, these components are called constructs.

For instance, in Self-Determination Theory (SDT), a core construct is intrinsic motivation. This construct refers to the desire to engage in an activity for the inherent enjoyment and satisfaction it brings (Deci & Ryan, 2008).

Constructs are often identified and defined by researchers as a means of understanding and explaining complex psychological or social processes. For example, the construct of self-efficacy refers to an individual's belief in their own ability to successfully complete a specific task or achieve a desired outcome (Bandura, 1977).

The relationship between constructs and theories is crucial. Constructs provide the foundation upon which a theory is built. By clearly defining and operationalizing these constructs (making them measurable), researchers can test the theory's predictions and evaluate its effectiveness in explaining the phenomenon of interest (Babbie, 2010).

For example, SDT not only defines intrinsic motivation but also proposes that it is fostered by factors like autonomy and competence (Deci & Ryan, 2008). Researchers can then design studies to manipulate these factors (e.g., providing students with more control over their learning) and measure the impact on intrinsic motivation.

In conclusion, constructs are the essential building blocks of scientific theories. As we have several theories, we want to determine how many common buildings block we can be defined as cornerstone of our theoretical constructions.

Constructs can be defined as abstract concepts or variables that are used to explain phenomena and can be operationalized for measurement in empirical research (Cronbach & Meehl, 1955). They are often used as a basis for developing measurement tools or questionnaires that are used to assess various psychological or social phenomena. For example, the Academic Self-Regulation Questionnaire (SRQ-A) is a tool used to measure self-regulated learning, which is a construct that refers to the ability of individuals to monitor, control, and regulate their own learning processes (Ryan & Deci, 2000). The Expectancy-Value Theory questionnaire is another tool used to measure a specific construct related to motivation to learn, namely, the expectancy-value beliefs that individuals hold about their ability to succeed in a particular task and the perceived value of the task (Eccles & Wigfield, 2002).

In order to evaluate the effectiveness of a particular theory or intervention, it is often necessary to identify and isolate the key constructs that are believed to be responsible for producing a desired outcome. For example, a study on the effectiveness of a growth

mindset intervention may focus on the construct of mindset itself, as well as other constructs such as motivation and self-efficacy (Yeager & alii, 2016). Similarly, a study on the effectiveness of self-regulated learning interventions may focus on constructs such as metacognitive awareness, goal-setting, and self-monitoring (Zimmerman, 2002).

It is important to note that constructs are not always unique to a particular theory but may be shared by multiple theories.

For the purpose of this analysis, we will isolate the constructs that specifically represent and distinguish a theory. In the context of learning motivation, constructs refer to the underlying factors or variables that influence an individual's motivation to learn. For instance, self-efficacy is a construct in self-efficacy theory that refers to an individual's belief in their ability to perform a specific task or achieve a particular goal (Bandura, 1986). Similarly, interest is a construct in interest theory that describes an individual's level of enjoyment or engagement with a particular topic or activity (Hidi & Renninger, 2006).

Isolating and identifying the key constructs of each theory is essential for evaluating the contributions of each theory to learning motivation. By isolating the key constructs, we can compare and contrast the similarities and differences between theories and determine the extent to which they overlap or complement each other. For instance, self-determination theory proposes three key constructs: autonomy, competence, and relatedness, which describe the individual's basic psychological needs that must be satisfied for optimal motivation and well-being (Ryan & Deci, 2000). These constructs are distinct from those proposed by other theories, such as self-efficacy, goal orientation, and mindset, which focus on different aspects of learning motivation.

In the table below, the main constructs of the theories examined in this research have been reported.

Moreover, examining the relationship between constructs is crucial for gaining a comprehensive understanding of learning motivation. Constructs are not isolated entities but are interconnected and interdependent on each other (Wigfield & Eccles, 2000). For example, self-efficacy and goal orientation are related constructs, as individuals' beliefs in their ability to achieve a specific goal influence their goal orientation (Schunk, 1991). Similarly, self-determination theory proposes that the

satisfaction of the three basic psychological needs (autonomy, competence, and relatedness) is necessary for the internalization and integration of the underlying values and goals, which can influence an individual's goal orientation (Deci & Ryan, 2000)

In addition to the constructs of the mindset theory such as the concept of growth mindset, the goal orientation theory proposes constructs related to the willingness to pursue a mastery goal rather than a performance goal. Similarly, in the expectancy-value theory, constructs such as the value and expectancy of a learning outcome play a significant role. Recent developments in the theory have also highlighted the concept of effort as a construct. However, the Self-Regulated Learning theory contains numerous constructs due to its broad scope and coverage of various topics already addressed in other scientific publications. Its originality is undoubtedly given by its focus on metacognition, specific learning objectives, as well as the definition of actions or operational strategies for cognitive process improvement such as managing space, time, study strategies, etc. (Zimmerman, 2000).

Various studies have identified several other constructs relevant to the motivation to learn, such as interest, self-efficacy, and autonomy (Deci & Ryan, 2000; Schunk & Pajares, 2002; Hulleman & Harackiewicz, 2009). The interest theory proposes that intrinsic motivation is driven by personal interest and enjoyment of a topic. The self-efficacy theory suggests that beliefs about one's ability to succeed in a task play a significant role in motivating behavior. The autonomy theory, developed within the Self-Determination Theory framework, posits that individuals are motivated to learn when they perceive themselves as having control over their learning experiences (Ryan & Deci, 2020). These constructs can be seen as complementary to the constructs proposed by the previously mentioned theories. The constructs that have been isolated and proposed for further analysis are as follows. Mindset: Growth mindset. Interest: Situational interest. Self-efficacy theory: Self-efficacy. SDT: Competence; Autonomy; Relatedness; Intrinsic motivation; SRL: Goal setting; Metacognition; GOT: Mastery/performance goals; EVT: Expectancy learning result; Value; Cost/effort (see Table 7.1)

Table 7-1 List of Learning Theories and Related Constructs

THEORY	CONSTRUCT
SELF EFFICACY	Self efficacy
MINDSET	Growth Mindset
INTEREST	Interest (initial, situational)
EXPECTANCY VALUE	Expectancy, Value, Effort
GOAL ORIENTATION	Mastery Goals
SELF DETERMINATION	Competence, Autonomy, relatedness, Intrinsic Motivation
SELF REGULATION	Metacognition, Goal setting/achievements

Overall, the identification and understanding of the constructs that underlie the motivation to learn are essential for the development of effective teaching strategies and the promotion of lifelong learning. The similarities between the constructs of different theories highlights the importance of a multidisciplinary approach to the study of learning motivation (Wigfield & Eccles, 2000). The integration of various theories and constructs could lead to a more comprehensive and nuanced understanding of the motivation to learn and its practical implications for education.

7.3 CONSTRUCTS: DEVELOPING HYPOTHESES OF RESEARCH

Following the identification of theoretical constructs, an evaluation of their convergence in practical theory application was conducted, carried out 169 times. Each was assessed for theoretical construct convergence using a scale highlighting strong (High=3), moderate (Moderate=2), and less significant convergences (Low=1). Existing scales defining convergence (e.g., MSLQ), comparative theory analyses from previous chapters, and a qualitative assessment of the applicability of their conceptual extension content were evaluated. Each construct's reciprocal convergence was highlighted, with full analysis results in Appendix 5.

Table 7-2 Convergences and similarities amongst Constructs

	AUT	COMP	EFF	EXP	GOAL	MASTERY	MINDSET	INT MOT	METAC	RELAT	SEFF	INTER	VALUE
Autonomy (SDT)		1	2	1	2	1	1	2	1	2	1	1	2
Competence (SDT)	1		2	2	2	3	2	2	2	1	3	1	2
Effort (EVT)	2	2		2	2	2	2	2	2	1	2	2	2
Expectancy (EVT)	1	2	2		2	2	2	2	2	1	3	1	2
Goal Setting/Achievement (SRL)	2	2	2	2		3	2	2	2	1	2	1	2
Mastery Goal (GOT)	1	2	2	2	3		3	3	2	1	3	1	2
Growth Mindset (Mindset Theory)	1	2	2	2	2	3		2	2	1	2	2	2
Intrinsic Motivation (SDT)	2	2	2	2	2	3	2		2	1	2	2	3
Metacognition (SRL)	1	2	2	2	2	2	2	2		1	2	1	2
Relatedness (SDT)	2	1	1	1	1	1	1	1	1		1	1	2
Self-Efficacy (Self-Efficacy)	1	3	2	2	2	3	2	2	2	1		1	2
Situational Interest (Interest Theory)	1	1	1	1	1	1	2	2	1	1	1		1
Value (EVT)	2	2	2	2	2	2	2	3	2	2	2	2	
	17	22	22	21	23	26	23	25	21	14	24	15	24

The collected data (Table 7.2) reveal greater convergence among constructs focused on learners' beliefs: Self-efficacy, Mastery Goal, and Mindset, along with the perception of the Value of what is learned and intrinsic motivation to learn, scored the highest. Relational aspects like relatedness, autonomy, and interest were less convergent with other constructs. The presence of multiple constructs from the same theory did not alter results. For instance, in SDT, while relatedness and autonomy appeared less convergent with other constructs, competence and intrinsic motivation showed high general convergence rates.

The assessment of theoretical convergences among different constructs faces undeniable challenges for scientific validation. It necessarily overlooks the cross-cutting semantic meaning of each concept, potentially holding different significances in theories with varied objectives.

Nonetheless, a perceptual value remains, effectively representing how certain constructs are more effectively operational in relation to others and how some scientific theories have developed valid theoretical concepts with limited dialogue with corresponding concepts in other theories.

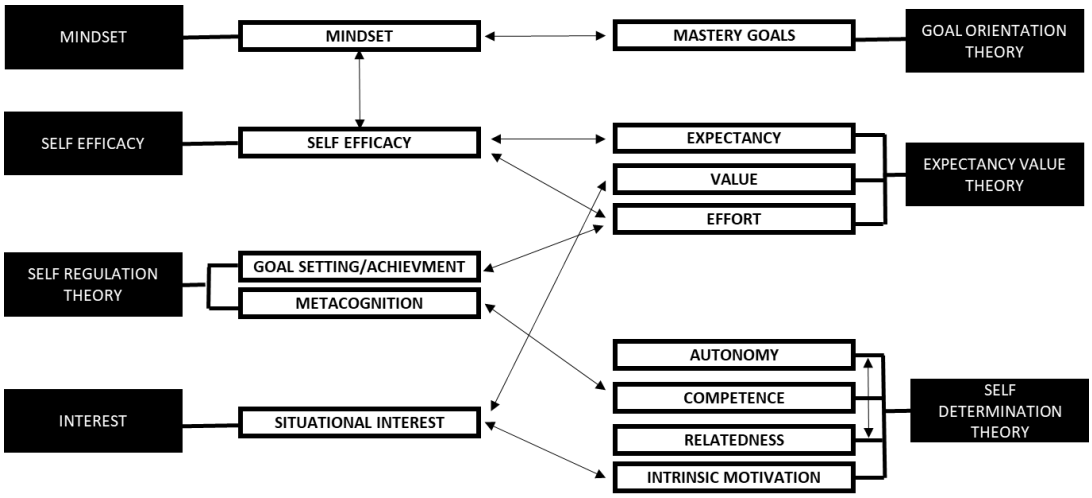


Figure 5 Connections amongst Theories and Constructs.

In this phase, we have focused on two aspects: identifying similarities and divergences in both theories of learning motivation and different constructs. Understanding these aspects is essential for constructing a hypothesis of a measurement tool. The model proposed in Figure 5 will thus allow for the development of validation models for the measurement tool and validate the first hypothesis on the feasibility of a measurement instrument that considers different scientific approaches to motivation.

In the previous pages, we addressed the convergence of constructs contained within the analyzed theories. This analysis serves as a preliminary reflection before taking a further conceptual step.

In the second research hypothesis, it is posited that if constructs are grouped according to specific criteria, they will tend to similarly measure motivation to learn, as they are linked by causal relationships that influence their performance. This exercise of "condensing" clusters within a broader theoretical concept, detached from their original theories, anticipates an essential theme in this research: beyond individual motivational ingredients, there may exist a class of constructs sharing the same causal purposes that behave similarly.

This step aims not to add complexity but to provide an additional interpretative framework, creating conceptual clusters that either strengthen or question the results of individual constructs.

In this research, we propose a classification based not just on conceptual similarity but on the ultimate purpose of the theoretical construct, aiming to analyze the who, what, why, and how of individual motivation to learn. The "why" supports personal individual motivation to learn:

- Personal values and beliefs about learning
- Perceived enjoyment and utility of the content
- External elements supporting individual self-determination.
- Study methods and regulation in the learning process.

Clusters and their connection to theoretical constructs are graphically represented, noting that clusters at the bottom depict constructs united by the same theory, while those at the top contain constructs from different scientific theories. The theories of self-regulation and self-determination exclusively contribute to the last two clusters, with both values and content constructs having different theoretical origins.

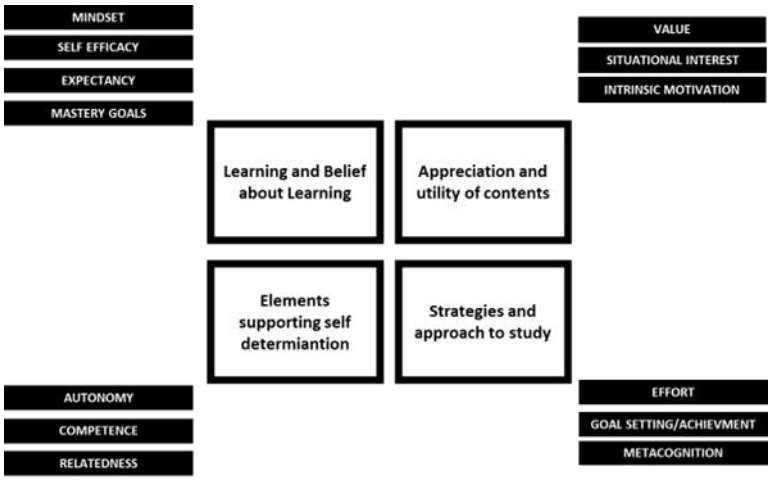


Figure 6 Graphical representation of Construct related to Clusters.

Creating clusters of theoretical constructs and their classification can serve as a valuable tool for interpreting data collected at this research's end. It allows verifying if some constructs perform coherently with others in the same grouping, enabling a broader data interpretation and a more structured and complete potential corrective plan.

7.4 MEASUREMENT SYSTEMS FOR LEARNING MOTIVATION

To measure learning motivation, various systems have been developed and refined over time. Traditionally, researchers focused on specific theories or comparisons between two theories. This limited the understanding of the complex landscape of learning motivation. However, this changed with Deci and Ryan's (2000) Self-Determination Theory, which broadened the scope of motivational constructs by integrating them across sub-theories, offering a more detailed view of motivational dynamics.

A significant advancement came with Paul Pintrich's work, inspired by Zimmerman's (1989) exploration of self-regulation, aimed at integrating a wider range of theoretical constructs. Pintrich's creation of the Motivated Strategies for Learning Questionnaire (MSLQ) broke from conventional methods by incorporating various constructs from different theories into a unified assessment tool (Pintrich, Smith, Garcia, & McKeachie, 1993). The MSLQ evaluates cognitive and metacognitive strategies alongside beliefs about success and task value, making it invaluable for exploring the connections between motivation, self-regulated learning, and academic achievement.

This integrative perspective is crucial for advancing our understanding of how motivational orientations, beliefs about intelligence, goal orientations, and self-regulatory practices influence student learning. By synthesizing insights from Self-Determination Theory (Ryan & Deci, 2000), Social Learning Theory (Bandura, 1997), and Expectancy-Value Theory (Wigfield & Eccles, 2000), Pintrich's work provides a holistic framework for examining student motivation. Furthermore, the design and psychometric rigor applied in developing measurement tools like the MSLQ facilitate a comprehensive assessment of learning motivation, as noted by Wolters (2004) and Eccles and Wigfield (2002).

Pintrich's contributions, deeply rooted in the intersection of motivational theory and self-regulated learning theory, have profoundly influenced both theoretical and practical dimensions of educational research. His framework, emphasizing the interplay of expectancy, value, and affect, has been validated through empirical research across diverse educational settings (Schunk, Pintrich, & Meece, 2008; Zimmerman & Kitsantas, 2014). Moreover, applying his theories in instructional

interventions has shown effectiveness in enhancing motivation and self-regulation among learners (Wolters & Pintrich, 1998).

Incorporating validated questionnaires such as the MSLQ into research studies facilitates a detailed exploration of motivational dynamics, enabling the identification of patterns and relationships crucial for designing interventions aimed at boosting student motivation (Ryan & Deci, 2009; Dweck & Leggett, 1988).

Inspired by Pintrich's groundbreaking work, this section presents an approach to modeling a measurement system that incorporates constructs from the theories explored in this thesis. The process begins with an examination of the primary measurement tools for learning motivation in the scientific literature.

Drawing from the insights gained from the literature review, we will conduct an in-depth analysis to identify a set of questions that effectively capture the key constructs of the integrated model. The goal is to develop a comprehensive questionnaire that accurately measures the various dimensions of learning motivation as defined by the integrated theoretical framework.

Once the questionnaire is finalized, we will conduct a psychometric validation process to ensure its reliability and validity. This will involve collecting data from a large and diverse sample of students and conducting statistical analyses to assess the scale's internal consistency, construct validity, and discriminant validity. The results of the validation process will determine the suitability of the measurement scale for future research on learning motivation.

By following this systematic approach, we can develop a robust measurement system that integrates constructs from different theories and provides a comprehensive assessment of learning motivation. This will contribute to a deeper understanding of the complex factors that influence student motivation and academic success.

7.5 BUILDING THE MEASUREMENT SYSTEM

The landscape of research instruments designed to measure learning motivation is expansive. Over the last four decades, the scientific literature in this domain has flourished, owing to the success of numerous theories that have spurred extensive scholarly discourse.

While this study does not intend to undertake a comprehensive review of existing assessment instruments for learning motivation, its objective is to present the selected questions used to measure the theories and constructs discussed in the preceding chapters.

To identify relevant questions for inclusion in the research questionnaire, we employed a methodological approach involving the analysis of commonly used research instruments for each theory of learning motivation. The following prominent instruments are frequently utilized to evaluate the effectiveness of our chosen theories, including Self-Determination Theory (SDT), Mindset, self-efficacy, Self-Regulated Learning (SRL), interest, Goal Orientation Theory, and Expectancy-Value Theory (EVT):

- Self-Determination Theory (SDT): The Self-Determination Questionnaire (SDQ), developed by Deci and Ryan (1985), is widely employed to measure motivation according to SDT. Additionally, the Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS), also developed by Deci and Ryan (2000), is frequently utilized to assess the satisfaction of basic psychological needs.
- Mindset: The Implicit Theories of Intelligence Scale (ITIS), developed by Dweck and Leggett (1988), is a recognized instrument commonly used to measure individuals' beliefs about intelligence and their mindset, making it a prevalent tool in mindset research.
- Self-efficacy: The General Self-Efficacy Scale, developed by Schwarzer and Jerusalem (1995), stands as a prominent instrument for measuring self-efficacy. Additionally, the Academic Self-Efficacy Scale, developed by Riggs and Enochs (1990), is often employed to assess students' beliefs in their academic capabilities.
- Self-Regulated Learning (SRL): The Metacognitive Awareness Inventory (MAI), developed by Schraw and Dennison (1994), is commonly used in SRL research. Furthermore, the Motivated Strategies for Learning Questionnaire (MSLQ), developed by Pintrich et al. (1991), encompasses scales that measure various aspects of self-regulated learning, including self-efficacy, goal orientation, and utilization of learning strategies.

- Interest: The Situational Interest Scale (SIS), developed by Hidi and Renninger (2006), is frequently employed to assess interest and its impact on motivation and engagement. Moreover, the Individual Interest Survey, developed by Hidi (1990), is often used to gauge individual interests.
- Goal Orientation Theory: The Patterns of Adaptive Learning Scales (PALS), developed by Midgley et al. (1995), are commonly utilized in goal orientation research. Additionally, the Achievement Goal Questionnaire (AGQ), developed by Elliot and McGregor (2001), is a widely used instrument that assesses individuals' goal orientations in terms of mastery, performance-approach, and performance-avoidance goals.
- Expectancy-Value Theory (EVT): The Expectancy-Value-Cost (EVC) Survey of Student Motivation, developed by Barron et al. (2017), is a valuable instrument aligned with EVT. Moreover, the Task Value Scale, developed by Eccles et al. (1983), is frequently used to assess individuals' subjective task values, including intrinsic value, utility value, and attainment value.

These instruments are designed to gauge one or more constructs, either in contrast or harmony with each other. Notably, certain questions that initially seem aligned with one construct within a questionnaire can also serve in measuring another (Dweck & Leggett, 1988; Pintrich et al., 1991; Zimmerman, 2000).

The convergence of measurement tools reflects the intricate nature of motivational constructs and their multifaceted dimensions. For example, the central construct of self-efficacy, capturing individuals' belief in their capacity to achieve success, can be assessed using established scales like the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991). Within the MSLQ, items probe students' self-efficacy beliefs pertaining to academic performance and their ability to overcome learning challenges. Questions such as "I expect to excel in this course" and "I can overcome difficult problems with sufficient effort" resonate with self-efficacy, spotlighting individuals' confidence in their abilities (Pintrich et al., 1991).

Furthermore, self-regulation theory encompasses facets of self-efficacy by accentuating individuals' competence in monitoring, governing, and adapting their learning behaviors. Zimmerman (2000) underscores self-efficacy's pivotal role as a

motivating force in self-regulated learning. The evaluation of self-regulation frequently encompasses an assessment of metacognitive processes, such as goal setting and achievement. Items within the MSLQ, such as "I establish goals to manage my study time for this course" and "I evaluate my goal achievement once I conclude my work on this course," capture elements of self-regulation and metacognition (Pintrich et al., 1991; Zimmerman, 2000).

Evidently, these measurement systems provide invaluable insights into individuals' learning motivation by encapsulating the subtleties of various constructs. However, it is imperative to consider contextual factors and the interplay between constructs during result interpretation. The amalgamation of multiple measurement tools and the application of comprehensive assessment approaches can furnish a more holistic grasp of individuals' motivation to learn, consequently enriching educational interventions and practices (Elliot & McGregor, 2001; Linnenbrink-Garcia et al., 2010).

These questionnaires have served as reference points for further exploration in the literature. Notably, in the realm of learning assessment, most questionnaires have been adapted to measure specific contexts (such as student age, specific subjects, instructional methods, etc.).

Based on the primary measurement instruments identified in the form of questionnaires, we compiled a list of over 300 questions. These questions were subsequently filtered based on the theoretical constructs analyzed thus far. The outcome is a selection of 22 questions aimed at measuring the presence of each construct at different learning stages.

The 22 questions are distributed as follows for selected theories: Self-efficacy (2), Mindset (2), Interest (2), Goal Orientation (1), Self-Regulated Learning (4); Expectancy-Value Theory (5), Self-Determination Theory (6). The detailed analysis of the questions is provided in the appendix, including both the source, purpose, and any alternative questions. In the Table 7.3, we summarize the questions included in the questionnaire.

Table 7-3 List of Questions ordered by questionnaire

QUESTION	THEORY	CONSTRUCT	BIBLIOGRAPHIC REFERENCE
"I consider the topic of this course relevant to my future professional experiences."	EVT	Value	Pintrich & Zusho (2002)
"I believe that my intelligence and abilities can be developed with effort and practice."	Mindset	Mindset	Dweck (2006)
"I enjoy learning new things and exploring different ideas."	Mindset	Mindset	Elliot & McGregor (2001)
"I think that the topic of the course is very interesting."	Interest	Interest	Linnenbrink-Garcia, et alii. (2010).
"I participate in this course because I want to."	SDT	Autonomy	Deci & Ryan (1985).
"I expect to perform well in this course."	Self efficacy	Self efficacy	Bandura (1997)
"I consider myself proficient in this activity."	SDT	Competence	Deci & Ryan (1985).
"I can always manage to solve difficult problems if I try hard enough."	Self efficacy	Self efficacy	Zimmerman (2000).
"I find the topic covered in this subject interesting."	Interest	Interest	Hidi & Renninger (2006).
"I anticipate achieving an excellent grade in this class."	EVT	Expectancy	Pintrich & Zusho (2002)
"In a class like this, I prefer course material that challenges me, enabling me to acquire new knowledge."	GOT	Mastery	Pintrich & Zusho (2002)
"I recognize the importance of studying this subject."	EVT	Value	Barron et alii (2017)
"I experience a sense of belonging and acceptance within my study group."	SDT	Relatedness	Ryan & Deci (2017)
"I often find myself thinking of other things during class, causing me to miss important points." (Reverse phrased)	SRL	Metacognition	Pintrich & Zusho (2002)
"I establish goals to effectively manage my study time for this course."	SRL	Goal	Zimmerman (1989).
"I believe the knowledge gained in this course can be applied to other courses."	EVT	Value	Zimmerman (1989).
"I lack sufficient time to dedicate to my [insert class subject] class due to other commitments." (Reverse phrased)	EVT	Effort	Barron, Hulleman, Getty & Taylor (2017)
"I engage in regular self-reflection regarding my goal attainment and performance evaluation in this course."	SRL	Goal	Mokhtari & Reichard (2002)
"I regularly evaluate the effectiveness of my study strategies for comprehending the course material."	SRL	Metacognition	Pintrich et alii (1991).
"I find value and meaning in acquiring new knowledge through participation in a group setting."	SDT	Relatedness	Ryan & Deci (2017)
"I feel competent and capable after engaging in an activity for a certain period."	SDT	Competence	Deci & Ryan (1985).
"I would willingly engage in the activity again based on its perceived value."	SDT	Intrinsic Motivation	Deci & Ryan (1985).

A Likert 5-point rating scale is utilized for participant responses, offering a structured method for quantifying attitudes and perceptions (Likert, 1932).

Among these theories and models, the use of Likert scales is common for measuring attitudes, beliefs, and perceptions. This scale offers a balance between simplicity and sensitivity to variations in respondent attitudes.

It provides a range of responses to statements, allowing participants to indicate their level of agreement or feeling about a specific topic. This scale provides a range from 'strongly disagree' to 'strongly agree,' allowing nuanced assessment of participant perspectives.

- Strongly Disagree: This option indicates that the respondent completely disagrees with the statement or finds it entirely inaccurate.
- Disagree: This choice suggests that the respondent disagrees with the statement, but not as strongly as the "strongly disagree" option.

- Neutral: This middle option is chosen by respondents who neither agree nor disagree with the statement or feel that they cannot decide. It can indicate indifference or uncertainty about the statement.
- Agree: This option shows that the respondent agrees with the statement, though not to the fullest extent (which would be "strongly agree").
- Strongly Agree: Choosing this response indicates that the respondent fully agrees with the statement or finds it completely accurate.

It's important to note that the choice of measurement tool depends on the specific aspects of motivation being studied, the theoretical framework guiding the research, and the context in which the research is conducted. Each of these instruments has been developed to address particular constructs within the broader domain of motivation to learn, reflecting the diversity and complexity of this area of study.

PART III: RESEARCH TERRAIN, MODELING, AND EXPERIMENTAL SETTING

8 RESEARCH TERRAIN: BUSINESS SCHOOL IN FRANCE

8.1 THE CHOICE OF TERRAIN OF RESEARCH

In the following pages, we aim to identify a relevant research terrain in order to understand how learning motivation can be a determinant in the field of management science. In this chapter, we intend to discuss the reasons why business schools can be considered a useful and significant environment for such an investigation. The positioning of these higher education institutions stands at the crossroads between theory and practice. Thus, business schools provide a useful backdrop to measure how learning motivation can contribute to its effectiveness.

The identification of the research terrain in business schools was not a straightforward choice. Rather, it was a response to tangible obstacles encountered in the professional training environment. However, business schools were not and are not a fallback solution. Their long tradition of merging theory and practical application constitutes an ideal environment for this research. Business schools in Europe, as well as those in France, have made a significant contribution to managerial science. Their growth and commitment to integrating rigorous academic pathways with real-world business dynamics are the primary reasons this management-focused study can use the collected

data with profitability and credibility. To define business schools merely as learning centers is an understatement, as they represent institutions capable of proposing innovation and promoting excellence in business education, thus offering varied perspectives on what may drive or hinder learning motivation.

In the context just described, we can therefore identify complex and varied teaching methods. It must be said that while business schools rightly draw inspiration from the corporate environment, it is equally true that in forms of teaching and applied pedagogy, they can be considered avant-garde compared to professional training courses delivered within companies.

Initially, the research was poised to examine motivation for learning within corporate environments, specifically targeting Italian companies undergoing reskilling programs for employee skill development.

Unfortunately, and with deep regret, several attempts to conduct the aforementioned research in a corporate environment yielded no results. Some companies backed out due to concerns that the project would create an excessive workload, while others withdrew due to staffing issues. Finally, one company produced research results that were so unclear that we had to, reluctantly, abandon the research findings as they could not be used for scientific purposes, raising doubts in the author's mind about whether the data had been manipulated or fabricated to terminate the scientific research.

This series of "unfortunate" events led to an extension of the project timeline and prompted significant reflection on the scope of the research. Consequently, it has been decided to shift the focus of this thesis. While keeping the central theme of learning motivation and its drivers unchanged, given the constant need to acquire new skills, we opted to investigate the same elements in a more controlled environment—the academic world that prepares individuals for entry into the corporate sector.

Given the aforementioned challenges, a strategic decision was made to reorient the focus of this thesis. While maintaining the core theme of learning motivation and its drivers, particularly in the context of skill acquisition, the research shifted towards the academic environment, specifically business schools preparing individuals for the corporate sector.

8.2 BUSINESS SCHOOLS

Business schools cannot be seen merely as institutions that limit themselves to the transmission of technical and managerial skills. Their placement at the crossroads between theory and practice allows these academic institutions to provide a privileged and unique context for investigating and measuring learning motivation (Kaplan, 2017).

The evolution of European business schools has not only bridged the gap between academic management and its real-world application but has also influenced managerial practices across the continent (Kaplan, 2017). Such an approach has enabled business schools to shape contemporary management paradigms.

Furthermore, their international orientation has enriched the quality and relevance of research, positioning these schools at the forefront of the already rich global managerial education landscape (Dubois & Walsh, 2017). The wealth of insights offered by these institutions has represented a continuous push towards innovation, a crucial point for effectively responding to industry challenges. The complexity of management issues arising in our century requires varied approaches capable of capturing different dimensions, making the capacity to innovate and adapt a central element in educational programs (Schad et al., 2016).

On the continent, business schools play a crucial role in the dissemination of knowledge that goes beyond academic boundaries and, through new generations, directly influences the business world (Prado-Gascó et al., 2020). An example can be seen in the integration of technological tools capable of preparing students for the ongoing digital and business transformation, thus emphasizing the importance for future generations to maintain a constant update and adapt to new market realities (Chauhan & Jaiswal, 2016).

The investigation conducted by Kaltenecker and Okoye (2022) into prestigious business schools revealed how the educational models in a country can benefit from the internationalization and innovation proposed by these schools. It was therefore highlighted that the educational approach of these institutions has allowed the introduction of innovative elements and a greater orientation towards a global mindset in environments that previously focused only on local skills and perspectives.

Addressing global challenges such as poverty is essential, but these institutions must go beyond mere profit-oriented strategies, developing the ability to navigate complex socio-economic landscapes (Neal, 2017). A cross-sectional approach that can spread global challenges and commitment to promote a positive social impact.

The centrality of the global perspective in teaching is also recognized through international accreditation, which can improve the educational quality of business schools as well as increase their prestige worldwide (Istileulova, 2018).

Thus, we can perceive that within the fabric of international business schools and French *Écoles de Commerce*, there is a common thread that intertwines theory, practice, innovation, globalization, and social commitment, essential ingredients for building a new generation of managers equipped to face the challenges posed by ongoing transformations.

8.2.1 Learning Management Sciences

The dynamic field of management sciences is continually evolving, adapting to the multifaceted organizational challenges and technological advancements of the modern era.

Starting from Kaplan (2017) work, which provides a retrospective view, tracing the intricate relationship between European management practices and European business schools. This historical lens offers valuable context, enabling learners to grasp the foundational tenets of management sciences and the necessity for continuous innovation in response to evolving business environments.

Adding to the historical approach a holistic view, Daellenbach, McNickle, and Dye (2017) present an all-encompassing view on management science, underscoring the significance of systems thinking in decision-making. his perspective argues that addressing today's intricate organizational challenges requires more than straightforward decision aids. An integrated approach, where systems thinking is paramount, enables a deeper understanding of the interrelationships and complexities within organizations, fostering a comprehensive mindset crucial for identifying and solving problems effectively.

The focus on the methodologies used in management sciences underscores the need for robust, comprehensive, and adaptable research methods to tackle increasingly complex management issues. A thorough engagement with scientific research methods equips students with the skills required for detailed analysis and evidence-based decision-making (Dwigo and Dwigo-Barosz, 2018). Dubois and Walsh (2017) examine the globalization of academic research, particularly within French business schools, illustrating how research networks have become more global in parallel with the expansion of international business. This global interconnectedness enriches management sciences with diverse perspectives and cross-pollination of ideas.

Investigations into the real-world applications of management science methodologies, reveal their broader social and ethical implications (Distelhorst, Hainmueller, and Locke, 2017). In the analyzed case (Nike supply chain) that approach led to reflect about the need for a human approach to business operations, encouraging students to consider the wider social and ethical ramifications of management strategies

Business school have also to adapt to the new social norm created by digital transformation. In their editorial overview, Keeble and Wilkinson (2017) shed light on high-technology clusters in Europe. They emphasized the power of networking and collective learning as a critical factor in the success of these clusters. It has never been more important for professionals to be able to work together, share their knowledge, and come up with innovative solutions collectively than it is in the interconnected world of today. The emergence of these high-tech clusters is representative of an evolution in learning methodologies, which suggests that opportunities in management sciences are moving toward collaborative and collective knowledge hubs.

In addition, the research conducted by Boer, Berger, Chapman, and Gertsen (2017) highlights the transition from traditional suggestion systems to more complex organizational learning models. They go into detail regarding the strategies for continuous improvement that have been implemented in Europe and Australia, with an emphasis on a shift in cultural norms. Instead of organizations merely being receptive to the ideas of others, they actively incorporate learning into their operational structures, which helps to create an atmosphere that is continuously evolving and adapting.

The integration of technology into business education, specifically in France. The authors (Di Marco, Venot, & Gillois, 2017; Kastornova & Gerova, 2021), explored and highlighted the challenges and opportunities of hybrid learning in France. Their research indicates a growing acceptance and reliance on hybrid learning modalities in management education, reflecting the ongoing digital transformation in the academic realm. Nevertheless, as Chauhan and Jaiswal (2016) highlighted in their research the importance to have a solid understanding of the factor that drive the adoption of new technology. That is linked to topic as Technology Acceptance Model, already discussed in previous chapters.

8.2.2 Business Schools in France

Business schools in France play a crucial role in shaping the social fabric of Western societies, particularly within the context of the social class reproduction theory (Bourdieu, 1977). This theory delves into how class-specific habitus and exclusive education perpetuate social structures within the European business elite (Bourdieu, 1974). Empirical studies by Hartmann (2000) on senior executives in Germany and France reveal the significant influence of social origins and educational paths on the composition of the top echelons of the largest enterprises in these countries. The research found that a majority of these executives hail from elite backgrounds, indicating a strong link between social class and corporate leadership.

In France, elite recruitment is primarily facilitated through a selective educational system that emphasizes exclusive degrees. This contrasts with Germany, where less emphasis is placed on educational qualifications for senior executives, with a greater focus on desirable personality traits, especially among the *gehobenes Bürgertum* (Hartmann, 2000). This study supports Bourdieu's analysis of class-specific habitus and its varied impact on social class structures in Europe.

Moreover, the research networks within French business schools, as explored by Dubois and Walsh (2017), significantly contribute to their international reputation and curriculum development. The globalization of research networks enhances the quality and relevance of education in these institutions, making them leaders in global management education.

Historically, French business schools have been influenced by a variety of educational philosophies and models. Ben-David's (2017) comparative study and De Fournas's (2007) examination of American models within the Grande Écoles highlight the diversity and evolution of educational approaches in France. These institutions have traditionally provided a strong, foundational education, but there has been a notable shift towards more flexible, student-centered pedagogies.

Bruland and Bournois (2019) discuss the implications of anglicization in French business education, noting the trade-offs between attracting international students and preserving Francophone culture. This tension between national identity and global integration is a recurring theme in the French educational context.

Keeble & Wilkinson (2017) and Boer, Berger, Chapman, and Gertsen (2017) illustrate a shift in France towards collaborative, technology-driven learning environments and holistic organizational learning models. These studies underline the importance of iterative learning and adapting to stakeholder demands in the educational process.

The inclusion of ethical considerations in business education, as highlighted by Distelhorst, Hainmueller, and Locke (2017), and the increasing focus on experiential learning, as shown in the research by Galland et al. (2018), signify a move towards more comprehensive educational models. These models blend technical competence with moral and ethical considerations, preparing students for the complexities of modern business environments.

Wotto's (2020) analysis and the findings of Di Marco (2020) and Kastornova and Gerova (2021) emphasize the growing acceptance of hybrid learning models in France. These models combine traditional classroom teaching with online elements, offering a pragmatic and inclusive approach to education.

Finally, the research by Schurz and Sundqvist (2022) and Arvidsson and Jemstedt (2022) on language skills highlights the importance of multilingualism in France’s diverse and globalized society. While French remains a central linguistic anchor, the necessity of learning multiple languages is increasingly recognized to prepare students for a multilingual international environment.

In summary, French business schools are navigating the complex interplay of preserving national identity and culture while embracing internationalization and global trends. The evolution in educational approaches, from traditional pedagogies to

innovative, technology-driven models, reflects this dynamic balance between local and global influences.

8.2.3 Pedagogies and Teaching Methods: Bridging the Gap Between Theory and Practice

Learning within business schools is not merely a foundational aspect; it serves as a critical catalyst in molding students for the professional realm and influencing the progression of management science. This intricate interplay between educational learning and managerial efficacy presents a compelling area of scholarly inquiry, meriting a profound analysis of its multifaceted implications (Mintzberg, 2009).

These institutions are esteemed for their unwavering dedication to cultivating robust managerial abilities among their students. By imparting knowledge in strategic planning, human resource management, and leadership, business schools' endeavor to furnish students with the essential competencies' requisite for successful management roles (Hersey & Blanchard, 1988). Learning in this context is not merely an academic exercise; it is an instrumental process through which individuals assimilate the necessary expertise and acumen for effective resource stewardship and operational management.

Yet, the nexus between learning and management transcends the mere preparation of students. The very essence of management science is deeply rooted in evolving principles and theories, frequently cultivated through persistent research and the pursuit of lifelong learning (Senge, 1990). This aspect underscores the necessity for business managers to perpetually update themselves with emerging trends and practices, thereby embodying a relentless commitment to learning and adaptability.

The dynamic between academic learning in business schools and the practical world of management is inherently reciprocal. Business schools are reliant on insights from management research and practice to shape and refine their curricular offerings. Conversely, academicians and practitioners often seek inspiration from scholarly research to forge novel management models and theoretical frameworks. This symbiotic relationship fosters the continuous evolution and refinement of management theories and methodologies.

In essence, learning is the pivotal conduit linking the educational endeavors in business schools with the broader discipline of management science. It equips students with the requisite skills to become adept managers and fuels the advancement and innovation in business management practices. This synergy between the academic and professional spheres underscores the importance of embracing and prioritizing learning as a core tenet in both fields (Kolb, 1984). Therefore, a deep appreciation and understanding of learning's role are imperative for the ongoing development and relevance of research and practice in these interconnected domains of management education and application.

The deployment of robust learning methodologies in business schools is pivotal, as these techniques profoundly influence future business management practices (Hersey & Blanchard, 1988). In these academic settings, a diverse array of pedagogical approaches is employed, including case studies, simulations, and mentoring programs, each contributing uniquely to the student learning experience.

Case studies, a cornerstone of business education, facilitate students' engagement with intricate business scenarios (Yin, 2018). This method encourages the application of theoretical knowledge to practical situations, enhancing students' critical thinking and problem-solving skills, both of which are indispensable for effective business management.

Simulations represent another crucial pedagogical tool (Smith & Smith, 2017). These immersive, virtual experiences allow students to navigate complex business environments without the risks associated with real-world decision-making. This methodology not only prepares students to confront uncertain and intricate scenarios but also significantly bolsters their management acumen.

Moreover, mentoring programs serve as vital conduits connecting students with seasoned professionals (Ragins & Kram, 2007). This approach fosters informal learning, allowing students to acquire hands-on skills and a nuanced understanding of the dynamics in business settings.

Assessing student learning within higher education, particularly in business schools, serves multiple critical functions (Peterson et al., 2008). Student evaluations offer direct and invaluable feedback to faculty, guiding them in refining their teaching methodologies. Furthermore, these assessments provide administrative staff with

essential data to support and enhance faculty instructional effectiveness. Importantly, the feedback gleaned from evaluations is instrumental in shaping faculty performance decisions (Suskie, 2018).

Various assessment forms exist, including exams, projects, presentations, and other evaluative tools. The key lies in designing these assessments to mirror the skills and knowledge pertinent to the realm of business management (Angelo & Cross, 1993). For example, exams might be tailored to address realistic business scenarios or necessitate the application of management theories in specific contexts.

Project-based assessments are particularly effective in bridging the gap between academic learning and real-world business practices (Thomas, 2000). Students engaged in these projects tackle simulated company challenges, developing solutions grounded in thorough analysis and research.

Meaningful assessment in business schools, therefore, is not just an evaluative tool; it is a bridge connecting the educational journey to the professional world. When assessments are thoughtfully aligned with workplace skills, students emerge better prepared to contribute significantly to organizational success.

Learning in business schools, however, extends beyond the confines of the classroom. It is the commencement of a lifelong journey in professional development (Senge, 1990). This continuous learning approach is vital for sustained professional growth and adaptability in a dynamic business landscape.

Business schools lay the foundational groundwork for addressing the complexities of the business world. Yet, the learning journey should not conclude with graduation. Rather, it should be viewed as the first step in an ongoing process of professional development.

Progressive organizations recognize the value of nurturing their employees' continuous learning (Marsick & Watkins, 1990). They offer various programs, including internal training, mentorship, and skill-updating opportunities. This commitment to continuous learning ensures that professionals remain abreast of emerging trends and practices, maintaining their relevance in a rapidly evolving job market.

Such learning often focuses on cultivating leadership, problem-solving, and adaptability skills (Garavan & McCarthy, 2008). These competencies become

increasingly crucial as professionals progress in their careers and undertake more significant responsibilities.

Moreover, an organizational culture that champions continuous learning fosters an ethos of ongoing improvement (Argyris & Schön, 1996). Companies invested in their employees' learning are typically more innovative and competitive, benefitting from the fresh perspectives and insights their employees bring.

In conclusion, learning in business schools represents the inception of a comprehensive professional development journey, crucial for success in the ever-changing business world. This perspective underscores the importance of continuous learning as a key element of professional growth and organizational success.

8.2.4 Critical Voices

Business schools are serving as pillars of management education, nurturing the next generation of business leaders. However, they have increasingly faced scrutiny and criticism from both the academic community and society at large.

One vocal critic of business schools is Henry Mintzberg, a renowned management scholar (Mintzberg, 2004). Mintzberg argues that these institutions tend to prioritize theoretical knowledge at the expense of practical experience. He advocates for a more action-oriented approach to management education, one that emphasizes real-world contexts and hands-on learning.

Another criticism revolves around the exorbitant cost of business education, rendering it inaccessible to many students. This raises concerns about equitable access to quality management education, echoing social elitism concerns present in systems like France's Grande Ecole (Walter, 2009).

Another critical issue, especially in light of financial scandals and opaque business practices, is the approach to teaching ethical themes (Hooker, 2004). With worldwide management models heavily influenced by the US productivity model, questions arise about whether these market-driven approaches are underpinned by a robust ethical framework (Pfeffer & Fong, 2004). In France, efforts have been made to limit the influence of American models and address these inequalities (Aubert & De Gaulejac, 2018; De Fournas, 2007).

The absence of behavioral principles within managerial pathways, as highlighted by Khurana (2010), has led to courses and MBAs being perceived as commoditized products from Business Schools. Similarly, Albouy et alii. (2019) critique current source quality assessment methods as akin to a "box office approach" in cinema, relying heavily on quantitative metrics and visibility.

Shifting the focus to curricular concerns, innovations, and challenges, business schools' impact is examined through various lenses. Neal (2017) advocates for the integration of poverty-related topics, emphasizing the broader societal responsibilities of future managers. Kaltenecker & Okoye's (2021) exploration of the relationship between innovation and internationalization in elite business schools underscores the critical role of origin countries and program types in shaping innovative capacities. Conversely, Ratle et al.'s (2020) examination of internal dynamics discusses the "mechanisms of micro-terror," shedding light on how internal pressures and administrative targets may impact the quality of learning within business schools.

Concerns about continuous professional development have also been raised. Critics argue that business education should extend beyond degrees and continue throughout one's career (Watkins, 2018).

While these criticisms carry weight, it's crucial to acknowledge that business schools have initiated efforts to address some of these concerns. Initiatives promoting diversity, ethics, and experiential learning have been introduced. However, these efforts vary among institutions and may not comprehensively tackle the underlying issues.

In conclusion, business schools are not immune to criticism, and these critiques have sparked important debates and calls for reform. Areas such as the cost of education, curricular relevance, diversity and inclusion, ethics, and the need for continuous learning demand sustained attention. It is imperative that business schools heed these critiques and adapt to the evolving landscape of management education to better prepare future business leaders.

8.3 RESEARCH TERRAIN: IÉSEG BUSINESS SCHOOL

Iéseg School of Management is a non-profit organization and a member of Lille Catholic University, constituted as a federation of 25 institutions. The school is fully recognized by the French state and has achieved the highest levels of national and international accreditation, holding the prestigious triple crown (EQUIS, AACSB, and AMBA). More than 7000 students enrolled annually at school. Iéseg is a leader in France with its Grande École program and is well-ranked internationally.

Iéseg is dedicated to academic quality, focusing on teaching and research. It has a high level of internationalization, evidenced by the diverse nationalities among staff and faculty. The internationalization of the school is reflected in the diversity of its graduates, who work in 120 different countries.

Iéseg's curriculum is designed to meet global market demands, including practical components such as case studies, projects, and internships. Teaching methods emphasize critical thinking, problem-solving, real-world applications, and business ethics.

At this school, a variety of animation and teaching tools are employed to enhance student engagement. These include content memorization tools (Deep Memory), peer evaluation systems (Challenge Me), applications for active participation both in-person and remotely (Wooclap), business educational games (Ceti and Harvard Business Publishing), and external training platforms (LinkedIn Learning). Furthermore, to continuously offer innovative teaching solutions, monthly Pedagogical Cafés are organized to showcase new digital teaching methods. In the spring of 2024, the school developed an e-learning module for all faculty members to demonstrate how Gen AI can serve as a highly effective tool for the design and delivery of classroom courses.

The school boasts superior resources and facilities, including access to exclusive databases, advanced technology, and well-funded research centers. It offers international exposure through exchange programs and global university partnerships. All programs are taught in English, enhancing the school's global appeal. IESEG's commitment to CSR (Corporate Social Responsibility) has been recognized by awards such as the Best Overall Responsible Business School by the Financial Times in 2024.

To sustain its upward trajectory, Iéseg focuses on key differentiators such as academic quality, internationalization, and CSR. The school has intensified its communication and leverages its strong alumni network for support and advocacy.

In light of the school's reputation and the technological and educational tools employed, Iéseg appears to be an appropriate choice for assessing student learning motivation in a constantly evolving technological and educational context.

8.3.1 The Ideal Setting to Verify Hypothesis 3

The first two proposed hypotheses focus on creating a measurement tool for motivation: identifying the constructs that support motivation and verifying the convergence of the performance of certain constructs grouped by their intended purpose. In principle, verifying the reliability of a measurement tool and its results does not require the establishment of an experimental setting.

However, in the third hypothesis of this research, the aim is to verify the measurement tool in relation to external elements that alter the tools, methods, and content of training: applied technologies, teaching methods, and course organization. To do this, the research setting of a business school proved to be an appropriate choice.

At Iéseg School of Management, many innovative or traditional teaching methodologies that employ innovative activities are used. Technology is utilized in very different ways, both as a main teaching tool (e.g., videos, e-learning) and as an integrative and experiential tool (e.g., simulation games, podcasts). Monthly Pedagogical Cafés are organized with professors to discuss and promote new teaching methods and educational technologies. The school provides professors with numerous materials, including business cases, simulation games, and articles from the Harvard Business Publishing catalog.

Additionally, the school offers students an online platform (Moodle) called Mycourse-Ieseg, where the programs and materials for all courses assigned to each student are available to support course organization.

These characteristics make this school an ideal setting to test the model and validate Hypothesis 3, which requires the use of technologies, the adoption of teaching methods, and tools to share course organization.

9 EXPERIMENTAL SETTING

9.1 UNDERSTANDING MANAGEMENT: THE ROLE OF EXPERIMENTATION

Scientific research has ever wondered how to discover the best ways to manage people and organizations. A key tool in this quest is experimentation, an approach that allows researchers to pinpoint cause and effect. Like in a detective story, where we manipulate specific factors, like changing the work environment, and observe their influence on employees and overall performance. All the while, we control for any distractions that might skew the results.

What sets experimental research apart is its definitive capacity to clarify cause-and-effect relationships. Beyond mere observation, this method involves the active manipulation of variables to unveil the dynamics of change. This hands-on control underscores robust evidence for causal links, a principle reinforced by Campbell and Stanley (1963) and Shadish et al. (2002). Across disciplines, from psychology to business management, experimental research empowers scholars to validate theories, scrutinize new methodologies, and decode the intricate interconnections among variables. Ethical considerations hold significant importance in this scientific journey.

Principles such as informed consent, ensuring confidentiality, and minimizing any potential harm are critical for conducting ethical research (Sieber, 1992).

Focusing on the methodologies employed scholars have a variety of techniques at their disposal, including pretesting and post-testing groups, different experimental designs, and randomized controlled trials. These methods help to isolate the effects of specific factors, ensuring understanding the unique impact of each, like separating ingredients in a recipe. Nevertheless, it's crucial to evaluate how experimental outcomes translate from the lab to the real-world settings of organizations, ensuring practical applicability and avoiding pitfalls in implementation (Rosenthal & Rosnow, 2008).

Management science has a long history of using experimentation. Early pioneers like Frederick W. Taylor (1911) and Elton Mayo (1933) explored ways to optimize workplaces and how environmental factors could influence productivity. These early studies paved the way for using experiments to investigate all sorts of managerial and organizational questions.

By meticulously controlling experiments, researchers can analyze the finer points of leadership styles, incentive structures, even the complex dynamics within an organization itself. They can then observe how these factors impact outcomes like employee performance or satisfaction. This approach has shed light on a multitude of management concepts, from the inspiring effects of transformational leadership (Avolio, 1999) to the effectiveness of training programs (Kraiger et al., 1993) and how pricing strategies influence consumer behavior (Huang & Sarigöllü, 2014).

We can say that every time we encounter a particularly effective management practice, we should remember to detect the work behind it. The strategic application of experimentation not only enhances our comprehension of management but also fosters the development of practical solutions that advance organizational effectiveness. Indeed, informed and carefully executed research remains the cornerstone of progress across all domains.

Experimental methodology offers a powerful lens for business schools, providing educators with crucial insights into how instructional strategies impact student motivation and learning outcomes. This study delves into a fundamental question: how significantly do different teaching methods influence student motivation within a business school setting?

A key component of educational research is the use of Randomized Controlled Trials (RCTs) (Shadish, Cook, & Campbell, 2002). These studies allow researchers to compare learning outcomes among participants subjected to different conditions, such as diverse teaching methods. By minimizing confounding factors, RCTs provide robust evidence regarding the effectiveness of various instructional approaches.

This research employs an RCT design to examine the impact of specific teaching methodologies on student motivation in business school courses. The initial phase involves defining the theoretical constructs of motivation and developing a validated questionnaire to measure them in students. We then establish a suitable experimental environment: a business school setting with adult learners. To ensure generalizable results and facilitate comparisons across diverse learning contexts, the study focuses on university courses with common curricular elements but varying teaching methods.

9.2 Organization and Delivery of the Measuring Instrument

As we saw in the previous chapter, to identify the construct(s) that most influence learning motivation, a measurement instrument composed of 22 questions was developed. The measurement instrument consists of three separate questionnaires, which, as we will see, were administered to students at different times.

The questionnaires were delivered electronically in the classroom through a Google Form link, maintaining anonymity. Students used their birth date for identification across different questionnaire responses.

Initial questionnaire responses also gathered data on students' professional experience. Questions addressed previous internships, time spent in corporate environments, and anticipated timeframe for entering professional settings. This was intended to gauge the "temporal distance from initial employment" and the students' professional maturity at the time of responding.

As mentioned, the measurement instrument is divided into three questionnaires to be administered at three distinct times during the study program. Designing three separate

questionnaires meets certain organizational needs and provides numerous advantages in the quality of result detection.

- Capturing Evolving Attitudes and Perceptions: Administering questionnaires at different stages of the study allows researchers to gain insights into how attitudes and perceptions evolve over time (Schwarz, 2007). This is particularly valuable in understanding how learning experiences might influence students' motivation.
- Targeted Exploration of Constructs: Thematic segmentation through separate questionnaires allows researchers to focus on specific constructs at each stage (Dillman et al., 2014). This targeted approach ensures in-depth exploration of each construct without overwhelming respondents.
- Combating Respondent Fatigue and Enhancing Data Quality: Distributing the survey across three questionnaires reduces respondent burden (Dillman et al., 2014). This approach helps participants avoid fatigue and provide more thoughtful responses, ultimately leading to higher quality data.

The first questionnaire (Q1, 8 items) focuses on initial stage constructs like autonomy, competence, and perceived value. Subsequent questionnaires (Q2, 7 items; Q3 7 items) revisit some of these elements while introducing new constructs related to technology use, teaching methods, and course organization. This structured distribution ensures comprehensive exploration of the research constructs without overwhelming participants, maintaining methodological rigor throughout the study.

Questionnaire Content Breakdown:

- Questionnaire 1 (Beginning of the course): It included 8 questions addressing learning motivation, covering theoretical constructs like mindset, course choice autonomy, self-efficacy, skill level, situational interest, and course content value. The growth mindset question also served to evaluate mastery orientation.
- Questionnaire 2 (Mid-term): This edition comprised 7 learning motivation questions and 3 course characteristic questions. The motivation questions covered content value, outcome expectations, participant relationships, metacognition, course interest, goal management, and competence acquisition goal. Additional questions evaluated technology use, teaching method, and course organization.

• Questionnaire 3 (End of the course): This final questionnaire repeated the format of the second, focusing on content value, effort, participant relationships, metacognition, intrinsic motivation, course goal achievement, and acquired competences. The intermediate questionnaire's course evaluation questions were also reiterated.

Furthermore, in the mid-course and end-of-course surveys (Q2 and Q3), 3 questions are added regarding the quality of course organization, teaching method, and technology used. The questions are repeated identically in both surveys.

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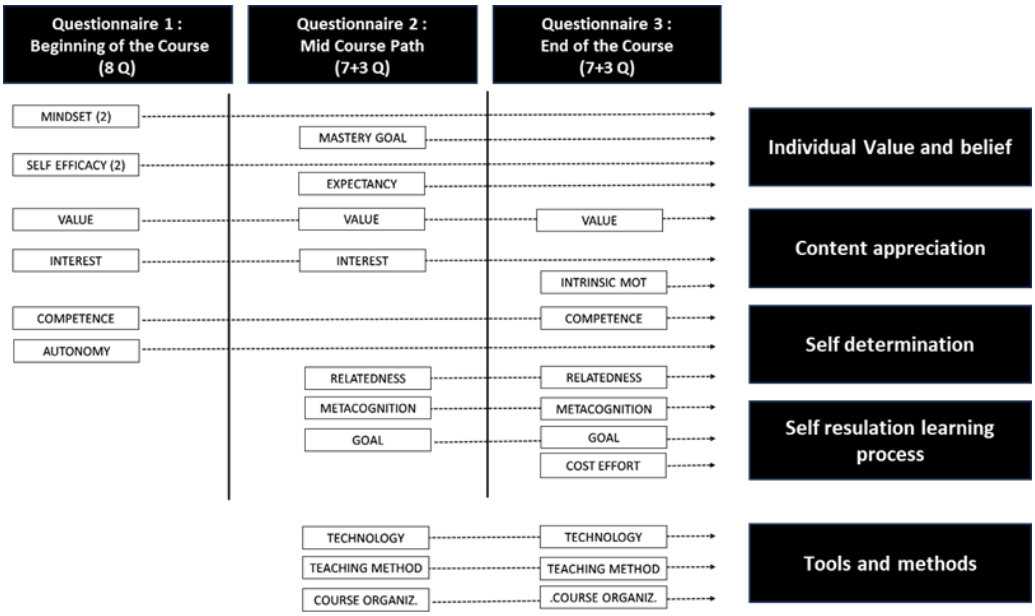

Figure 7 Graphic Representation of Questionnaires and integrated questions about Organization, Teaching Methods and Technology.

9.3 DIFFERENT TEACHING METHODS

To investigate the dynamics of learning motivation in different contexts, we selected a set of courses that employed distinct teaching methods, organizational structures, and technology integration levels.

The first step involved identifying a range of teaching methods that represent modern approaches capable of stimulating student interest. The selected methods included:

- Flipped Classroom: Students study assigned materials and complete activities before class, allowing for in-class discussions and hands-on learning.
- Active Learning: Students actively participate in the learning process through group work, problem-solving exercises, and case studies.
- Educational Games: Gamified learning experiences that utilize competition, collaboration, and strategic decision-making to enhance engagement and motivation.

The use of technology also varied across the selected courses, with some courses making extensive use of online resources, interactive platforms, and virtual collaboration tools, while others relied more on traditional face-to-face instruction.

By employing a diverse range of teaching methods, organizational structures, and technology integration levels, we aimed to create a rich and varied learning environment that would cater to different student needs and preferences. This approach also allowed us to better understand the factors that influence learning motivation in different contexts.

9.4 TEACHING METHOD: FLIPPED CLASSROOM

The traditional lecture format, while familiar, can sometimes struggle to capture student attention and foster deep understanding. The Flipped Classroom model offers a compelling alternative, presenting a flipped script on the learning process (Bergmann & Sams, 2012). This innovative approach flips the order of instruction, placing pre-recorded lectures, readings, or other preparatory materials outside the classroom, and dedicating in-class time to active learning activities and discussions.

A core feature of the Flipped Classroom is the replacement of traditional lectures with self-paced, preparatory materials. This empowers students to take control of their learning journey, allowing them to revisit and explore concepts at their own rhythm (Dickenson, 2016). This shift in ownership fosters a sense of responsibility for their learning, often leading to improved outcomes and increased self-efficacy – the belief in one's ability to succeed.

The flipped approach transforms in-class time from passive listening to active engagement. Instead of lectures, professors can facilitate discussions, problem-solving

exercises, and collaborative activities (Strayer, 2012). This active involvement allows students to grapple with the material in a more meaningful way, fostering deeper understanding and a stronger connection to the course content.

The Flipped Classroom and gamification can be powerful allies in igniting student motivation and engagement. Imagine pre-class video lectures transformed into interactive experiences with quizzes and challenges. In-class activities could incorporate game mechanics like points, badges, and leaderboards to add a layer of friendly competition and excitement to problem-solving exercises or group projects. This combined approach can not only make learning more engaging but also promote teamwork and collaboration – essential skills for the professional world (Dichev & Dicheva, 2017).

The Flipped Classroom model's effectiveness extends beyond traditional classroom settings. Research by Campillo-Ferrer and Miralles-Martinez (2021) highlights its value during the COVID-19 pandemic, where it facilitated student engagement and maintained performance during periods of remote learning. This adaptability underscores the model's potential for enhancing learning experiences across diverse environments.

While the Flipped Classroom offers significant potential for boosting motivation and engagement, it's important to acknowledge that it might not be the perfect fit for every learning style or subject matter (Tomas et al., 2019). Effective implementation requires careful planning and consideration of student needs. By thoughtfully integrating the Flipped Classroom with other engaging strategies like educational games. This approach can transform pre-class video lectures into interactive experiences with quizzes and challenges (Halverson & Dwyer, 2019). This combined approach can not only make learning more engaging but also promote teamwork and collaboration – essential skills for the professional world (Dichev & Dicheva, 2017).

9.5 TEACHING METHOD: ACTIVE LEARNING

Active Learning transcends the passivity of traditional lectures, inviting students to actively participate, think critically, and collaborate with peers (Prince, 2004; Felder & Brent, 2009). This approach aligns with constructivist learning theories, emphasizing

the importance of building new knowledge upon existing understanding (Baviskar, Hartle, & Whitney, 2009).

One of Active Learning's core strengths is its positive influence on student motivation. By immersing students in the learning experience, it cultivates their interest, investment in the subject matter, and a sense of ownership – all factors that bolster motivation (Goffe et al., 2017). Furthermore, Active Learning empowers students by granting them control over their learning journey, fostering a stronger sense of commitment.

Active Learning strategies also play a pivotal role in developing critical thinking, communication, and collaboration skills – essential tools that prepare students for real-world applications (National Research Council, 2012). Through activities that necessitate the application of knowledge and skills, students perceive the practical relevance of their learning, further reinforcing motivation and engagement.

Empirical evidence consistently supports the advantages of Active Learning. A comprehensive meta-analysis of 225 studies revealed that Active Learning strategies led to higher exam scores and lower failure rates (Freeman et al., 2014). This approach proves effective across various educational settings. For instance, Mendonca, Nicola, and Pinto (2018) emphasized its role in fostering self-motivation in mathematics classes, highlighting its significance in comprehending complex topics. Similarly, Pérez Poch et al. (2019) reinforced these findings, emphasizing the impact of integrating Active Learning strategies into curricula to improve motivation and academic outcomes.

However, it's important to acknowledge potential challenges. Owens et al. (2020) pointed out that while Active Learning can increase motivation, it may also introduce resistance, particularly when students are required to engage in complex scientific practices. Cooper, Downing, and Brownell (2018) added nuance by highlighting potential increases in student anxiety, particularly in large-enrollment science classrooms.

Active Learning's impact extends beyond students. Appova and Arbaugh (2018) shed light on its significance in teachers' professional development, underscoring its potential to engage and motivate educators in the pursuit of ongoing learning and growth.

By empowering students, developing critical skills, and promoting practical relevance, Active Learning fosters an enriched understanding of subjects. While challenges may arise, Active Learning's profound impact on motivation and learning outcomes underscores its importance in contemporary education, extending its benefits to both students and educators alike.

9.6 TEACHING METHOD: EDUCATIONAL GAMES

In a dynamic educational landscape, educational games have emerged as a compelling strategy to enhance student motivation and engagement. By integrating gameplay elements into learning contexts, these games offer experiential opportunities that deepen understanding and foster a stronger connection to the material (Kapp, 2012).

One specific type of educational game, the business simulation game, provides students with a virtual platform to tackle real-world business scenarios (Gatti et al., 2019). Through these games, students can make decisions, solve problems, and observe the consequences within a safe environment. Research suggests that business simulation games are not only engaging but also effective in teaching critical sustainability concepts (Gatti et al., 2019). Farashahi and Tajeddin (2018) also highlight their advantages over traditional lectures and case studies, demonstrating their efficacy in business education.

Educational games, in general, facilitate experiential learning, enhancing student engagement and comprehension of complex concepts (Sugahara & Lau, 2019). By immersing themselves in simulated business environments, students gain a deeper understanding compared to traditional lectures (Kapp, 2012).

Moreover, research by Zulfiqar et al. (2019) suggests that business simulation games can positively influence students' attitudes towards career paths and entrepreneurial endeavors, impacting not just what students know, but also their aspirations and future goals. Matute-Vallejo and Melero-Polo (2019) explore the psychological aspects of such games, finding that they intrinsically engage students, driving motivation.

This trend towards engaging and effective learning experiences is supported by Zhonggen's (2019) meta-analysis on serious games in education. Serious games prioritize educational objectives and efficiently impart knowledge and skills while

keeping students engaged, enhancing motivation, comprehension, and preparedness for real-world challenges (Kapp, 2012).

Gamification, the integration of game-like elements into educational contexts, adds excitement and challenge to learning tasks (Deterding et al., 2011). This approach leverages the motivational power of games to enrich learning activities (Landers & Callan, 2011). Gamified sessions create engaging experiences, motivating students through rewards and recognition (Seaborn & Fels, 2015), fostering a sense of achievement and progression.

Beyond engagement, gamification fosters essential skills such as problem-solving, critical thinking, and collaboration, directly applicable in real-life scenarios (Nicholson, 2015). By making the material relevant and applicable, gamification further increases student motivation and engagement.

Effective integration of gamification with other teaching strategies is crucial for its success (Kapp, 2012). Strategically incorporating gaming elements into instruction empowers educators to cultivate essential skills and intrinsic motivation in learners, promoting long-term educational success.

Educational games and gamification offer innovative pedagogical approaches that cultivate student motivation and engagement. When effectively integrated, these methodologies empower educators to develop essential skills and intrinsic motivation in learners, paving the way for enriching learning experiences and long-term educational success.

9.7 ACADEMIC COURSES ADOPTING DIFFERENT TEACHING METHODS

In the second semester of the 2022/2023 academic year, several courses within the business school were identified as applying the selected teaching methods. These courses were organized differently and took place between January and May 2023.In the following pages will provide more details about the identified courses, including their specific teaching methods, organizational structures, and implementation periods.

9.7.1 Course: Managing Learning and Development in Organization (Flipped Classroom)

The "Managing Learning and Development" course, held at the Paris campus, served as a case study for the Flipped Classroom approach. This elective course spanned 16 sessions, each lasting nearly three hours. The lengthy duration necessitated a consistent study pace. Students prepared for each session by reviewing assigned scientific articles and videos beforehand, demonstrating their understanding through written platform responses. In-class activities focused on group exercises facilitated by the professor, who acted as a coach. Additionally, teams tackled a weekly group assignment. However, a challenge emerged – the Saturday morning schedule resulted in lower student motivation, highlighting the potential drawbacks of scheduling for engagement.

9.7.2 Course: Well-being & Work-Life Balance (Active Learning)

The "Well-being & Work-Life Balance" course showcased the power of Active Learning. This four-day intensive program, held at both the Paris and Lille campuses, consisted of four-hour daily sessions. The curriculum employed a variety of engaging strategies, including individual and group reflection, business case studies, simulation games, videos, and questionnaires. Students actively participated in collective analysis during the third lesson and engaged in a role-playing exercise on the final day. The course culminated with an individual assignment due two weeks later. This immersive and interactive approach likely contributed to a more motivated learning environment.

9.7.3 Course: Master Business Game (Educational Game)

The "Master Business Game" serves as the culminating experience of the Master's program. This mandatory course involves all students, divided into teams of approximately 20-25 across both campuses. The game environment fosters healthy competition, with teams vying for the best results and a small reward. Students work collaboratively within smaller teams of 4-5 members within each class, strategically managing their simulated companies over a period of 16 hours, divided into four-hour sessions. Following the game, an additional four-hour session allows teams to present

their strategies, results, and areas for improvement. While fatigue might be a natural factor in this final semester course, the engaging nature of the game likely helps to mitigate this challenge.

9.8 TECHNOLOGY, TEACHING METHODS AND COURSE ORGANIZATION: OBSERVABLE DIFFERENCES PER COURSE

The third hypothesis related to the research question concerns technology and teaching methods. This hypothesis aims to verify whether those external elements might influence learner's motivation.

9.8.1 Technology and Teaching Methods

Here we propose a comparison amongst the different courses considered in this research. First of all, it can be noted in Table 9.1, that all courses have a different gender composition among participants. While the Learning and Development course (Flipped Classroom) has a predominance of female participants (71%), the two sessions of Well Being (Active Learning) do not show a significant gender difference. In contrast, the students in the Master Game class (Educational Game) are predominantly male (62%).

Another notable element is the voluntariness of course enrollment. While the courses using Flipped Classroom and Active Learning methods were chosen by students as electives, the online game was part of the mandatory program and engaged over 1,000 students simultaneously during the same week. This element should also be verified with the construct of Autonomy of choice, considering that in the elective Flipped Classroom course, scheduled on Saturdays, many students had requested not to attend the course but received a negative response from the school administration.

Another significant differentiating factor is the duration. While the Learning course consisted of 13 weekly classroom lessons over nearly four months, the other two courses were completed in one week with daily lessons averaging four hours each.

Table 9-1: Teaching Methodology and Course Organization: participants and duration.

Topic	Choice	Participants	Male	Female	Campus	Editions	Number of Classes per program	Duration	Total Hours in Class
Learning and Development in the organization	Elective	24	7 (29%)	17 (71%)	1	1	13	4 months	42
Well being and Work Life balance	Elective	111 (59 PARIS LILLE 51)	52 (47%)	59 (53%)	2	2	4	one week	16
Master Business Game	Mandatory	34	19 (62%)	13 (38%)	1	1	5	one week	20

Table 9.2 focuses on how much time students spent in using technology in the various courses. As might be expected, the course that includes a simulation game has the highest number of hours spent using technology, both in absolute terms (17 hours) and as a percentage of total classroom hours (17 out of 20: 85%). The fact that it is a simulation game means that only one technology is used throughout the course, with the only significant variation in teaching occurring at the end when students must give a presentation on the tactics used in the simulation.

The Learning course foresee 11 hours of technology usage in the classroom. More importantly, it has an estimated 22 hours of technology use at home to prepare for each lesson (video lessons, readings on the computer, and weekly online assignments). The specificity of this course is therefore a heavy workload (effort construct) outside the classroom that extended over four months.

Finally, Active Learning is characterized by a medium to low number of technology hours used but by a decent variety of tools used during the classroom course.

Table 9-2: Teaching Methodology and Technology: time spent on technology activities and its variation.

Teaching method	Topic	Main technology	Time spent on TECH in Class	Time spent on TECH out Class	Variation of technology	Multi media engagement
Flipped Classroom	**Learning and Development in the organization**	Out of class: Video leactures, and assignment.In class: different pedagogy every week.	11	22	HIGH	Business simulation, Video, podcast, Digital design
Active Learning	**Well being and Work Life balance**	Not predominant Technology	5	0	MEDIUM	Business Simulaton, Video, Music, Use of Smartphones
Educational Business Game	**Master Business Game**	One Single Platfrom for the whole Game	17	1	LOW	The game was 17 hours spent on the same platform

Finally, it can be observed in Table 9.3 that, in addition to technology, different activities are used to engage students in each lesson of the Flipped Classroom and Active Learning courses. In contrast, and unsurprisingly, the Master Game course maintains a monopoly on activities on the game platform.

The organization of classroom teaching also includes group activities (Relatedness construct). The Well Being course conducts significant group activities only on one out of four days, while both the Flipped Classroom and Educational Game courses include group activities in every lesson.

Table 9-3: Teaching Methodology and Technology: time spent on technology activities and its variation.

Teaching method	Topic	Different activities in class	Variation of class Dynamics	Group activities in class
Flipped Classroom	**Learning and Development in the organization**	HIGH	1 different activitiy each session	HIGH
Active Learning	**Well being and Work Life balance**	HIGH	3 activities per session	MEDIUM LOW
Educational Business Game	**Master Business Game**	LOW	the same activity every session apart final presentation	HIGH

The specificities of each course could prove interesting when monitoring the results of each construct applied to a specific teaching method.

9.8.2 Organization of the Course

As we have observed, the courses have different characteristics from each other. This does not mean they have nothing in common. On the contrary, as we have seen, two out of three courses (considering Well Being as a single course with two separate sessions) are elective, last about a week, use a high level of technology, and offer a wide variety of activities. These common points are distributed differently among the courses, creating a portfolio of courses structured in significantly different ways.

This results in different methods of organizing the course and communicating to students how this structure is composed, which elements they will need to better prepare, engage, and perform by the end of the course.

From a strictly academic perspective, the Well Being course, which follows the Active Learning method, has the most classic structure. The presentation of objectives, structure, and sequence of activities (individual and group) does not require "unusual" information for students. These details are communicated at the beginning of the course in an introduction lasting about an hour. On the Moodle site provided by the business school, the information is repeated, and most materials are immediately available, along with the description of the assignments to be completed.

The Managing Learning course, organized as a Flipped Classroom over 13 sessions, requires specific explanations. Students are informed before the first lesson that they need to prepare in advance. In the opening session, a significant portion is dedicated to explaining (and showing on the school's Moodle platform) how to find the materials and videos for weekly preparation and where to complete the weekly assignments on what has been learned. These are the individual activities. In class, group activities are carried out and explained during each lesson. Students participate in group activities every week and must submit a presentation at the end of the activity. They are also informed that they will need to evaluate each other's contributions through the Challenge Me application.

For the Master Game, information about the course is provided well in advance. It is important to note that this course synchronizes numerous classes, which will perform all activities simultaneously, as the game platform progresses and updates for all participants at the same pace. Students are shown a video explaining how the game works, and the mechanisms and themes of the simulation are illustrated. In the first lesson, after forming groups and re-explaining the steps and rules of the game, a trial session is launched to help understand the dynamics and prevent technical errors during subsequent game sessions. This part is essential as the game sessions will follow the same format for eight consecutive times (each session corresponds to a fiscal year). In between, they must submit two Word documents outlining the mission, vision, and strategy. The last half-day is dedicated to presenting the game strategy and results in a PowerPoint format and obtaining the consensus (or not) of other participants who assume the role of investors.

The dynamics in class remain the same throughout the week, except for the final part where teams first prepare, then present, and discuss the value of their work. As we can observe, each course has its own specificity due to its peculiar structure, and therefore, the information provided to students varies greatly in terms of detail, timing, and mode of communication.

The amount of information shared with students is usually proportional to the originality (relative to the students' expectations) of the teaching method or the amount of technology used. The timing chosen for communication varies depending on whether or not there is a need to prepare in advance for the course.

9.8.3 Diversity and Course Duration

From a scientific rigor standpoint, employing a wide range of teaching methods and organizational approaches can pose challenges in result validation. The selected courses also varied significantly in terms of time as some courses were short and intensive, while others were longer and spread out over a semester. Differences are detectable in intensity as well, as some courses involved high levels of student participation and engagement, while others were more lecture-based. Finally, not all

courses had the same rhythm; some courses had a regular schedule, while others had a more flexible or asynchronous format.

However, it also presents opportunities to explore various dimensions:

- Applicability in Diverse Contexts: Evaluating the instrument's applicability in heterogeneous contexts allows for assessing its flexibility and adaptability to different needs.
- Motivational Perception Performance: Analyzing whether students' motivational perception varies based on pedagogy and course organization provides valuable insights for designing more effective learning experiences.
- Uniform Perception of Methodologies and Technology: Comparing students' perceptions of organization, teaching methods, and technology usage across different courses helps identify potential biases related to the specific context.
- Course duration variation is another important variable to consider. Short, intensive courses like "Well-being & Work-Life Balance" may generate higher initial engagement, while longer courses like "Managing

Analyzing this variety of experiences, considering course duration, provides a holistic view of the effectiveness of different pedagogies and organizational approaches. The collected information can be used to improve the design and implementation of future learning experiences, ensuring a specific focus on scientific rigor and result validity.

PART IV: ANALYSIS OF RESULTS, HYPOTHESIS VALIDATION, MAJOR FINDINGS, AND CONCLUSIONS

10 DEMOGRAPHIC RESULTS AND DESCRIPTIVE STATISTICS

10.1 STRUCTURE IN PRESENTING COLLECTED DATA

The results collected through the methodology outlined in the previous chapter were promptly made available. By May 2023, just days after the conclusion of the last curse, all information necessary for quantitative analysis was at hand.

The data presentation in this research will follow a two-phase approach. This first chapter will illustrate the general results, including participant demographics and overall learning motivation outcomes, as well as descriptive statistics per construct. The subsequent chapter will analyze the data to answer the three hypotheses formulated at the beginning of this work:

- Hypothesis 1: The creation of a tool for measuring learning motivation that utilizes different scientific approaches allows the identification of the constructs that most significantly contribute to learning motivation.
- Hypothesis 2: Theoretical constructs on learning motivation that exhibit similar characteristics show the same performance during the learning process.
- Hypothesis 3: Technology and teaching methods used influence learning motivation.

The analysis focuses on identifying statistical correlations between various theoretical constructs of student motivation. This process draws on the scholarly works of Creswell (2014) and Field (2018) in research design and data analysis in management science. The goal is to reveal connections between theoretical dimensions and their influence on learning outcomes.

The data collection process yielded a dataset that allows for exploring the relationships between motivational constructs. By employing statistical techniques, we can uncover patterns and relationships, enabling a comparative study across different courses.

The data analysis journey, detailed in subsequent sections, will utilize the methodologies of Creswell (2014) and Field (2018), with a particular focus on multivariate data handling. The use of statistical tools and techniques will be explored in depth, linking quantitative findings with students' perceptual responses to provide a comprehensive view of the educational impact.

The resulting findings, combined with student perceptions, offer a holistic understanding of the interplay between instructional methods and learning experiences. Through this empirical investigation, we strive to map the trajectories of student motivation in relation to teaching methods, leading to a richer understanding of the dynamics in the learning journey.

10.1.1 How Data Concerning Teaching Methods and Courses Will Be Presented

Given that three different courses (Learning, Well-being, Master Game) utilize distinct teaching techniques (Flipped Classroom, Active Learning, and Educational Game), we questioned how to best present these data. Should we organize it by academic course or by teaching methodology? The answer lies within the hypotheses we posed. Hypothesis 3 specifically aims to verify whether teaching methods (along with technology and organization) impact the motivation to learn.

To avoid confusion, we decided to use terminology related to the courses in the general data presentation and to limit, as much as possible, the use of the terms Flipped Classroom, Active Learning, and Educational Game exclusively to Hypothesis 3. At first glance, this may seem like an unnecessary distinction. However, if teaching

techniques were always discussed, Hypothesis 3 would permeate every dimension of analysis. This approach ensures clarity and maintains the integrity of our hypothesis testing.

10.1.2 Demographic Analysis: Participation Rate

This section examines the participation rate in completing questionnaires across three courses. The returned questionnaires totaled 333, representing the sum of all questionnaires completed across various courses and at different time points. The overall count of responses to individual questions amounted to 2606.

10.1.2.1 Distribution of Respondents

A total of 169 students were invited to participate in the survey, and the courses were not balanced in terms of participants. For example, the number of students involved in Managing Learning class is usually not very high due to the significant amount of activity requested (it is a 5-credit course). The were 24 enrolled students. The Master Game course had hundreds of participants, and they were divided into classes of about 32 people each. Finally, the Well-being course had many participants, and to obtain a more significant sample, both the Paris and Lille courses were included, totaling 111 students. As we can see, the difference in population distribution will have a marginal, if not negligible, impact on our data analysis. The response rate mentioned earlier marginally modified the initial percentages, as shown in Figure 8.

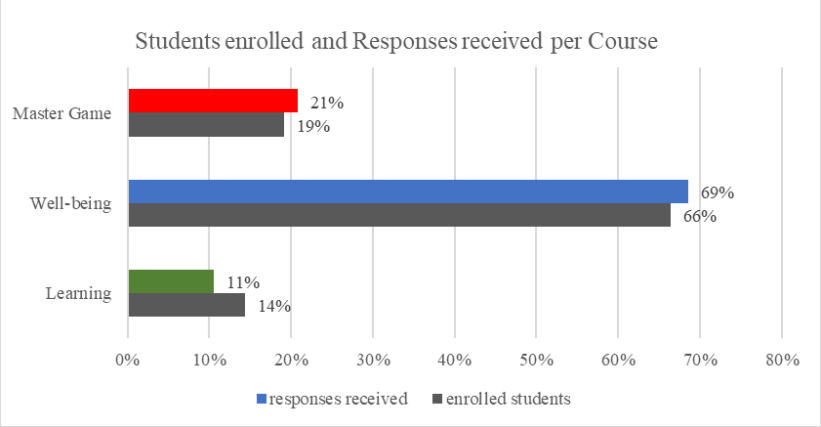

Figure 8: Students enrolled, and responses received per Course.

Our analysis will specifically focus on students' perception within their respective courses, and correlation studies will pay greater attention to the points of convergence of theoretical constructs in each applied pedagogy.

10.1.2.2 Participation Rate and Evolution Over the Time

Table 10.1 summarizes the participation rate for each course across the three questionnaires (Q1, Q2, Q3) administered throughout the semester. The table shows the total number of enrolled students, the number who completed each questionnaire, and the corresponding percentages.

Table 10-1 Participation rate

	Enrolled	Completed Questionnaires							
	Students	Q1	%	Q2	%	Q3	%	Total	%
Learning	24.00	15	62.50%	11	45.83%	9	37.50%	35	48.61%
Well-being	111.00	92	82.88%	73	65.77%	64	57.66%	229	68.77%
Master Game	34.00	32	94.12%	21	61.76%	16	47.06%	69	67.65%
Overall	169.00	139	82.25%	105	62.13%	89	52.66%	333	65.68%

Overall Participation: The overall participation rate across all courses was 65.68%. However, the rate varied significantly between courses and across questionnaires.
Managing Learning: The course had the lowest participation rate, particularly in the first questionnaire (48.61%). This could be attributed to a high absenteeism rate, especially during the initial phase.
Master Game: The course achieved the highest initial response rate (94.12% in Q1). This can likely be explained by the course being mandatory for the master's program and having punitive measures for absences that impacted final exams. However, participation significantly declined in subsequent questionnaires.
Well Being: The course had a moderately high participation rate (around 68%) with a more consistent decline across questionnaires compared to the other courses.

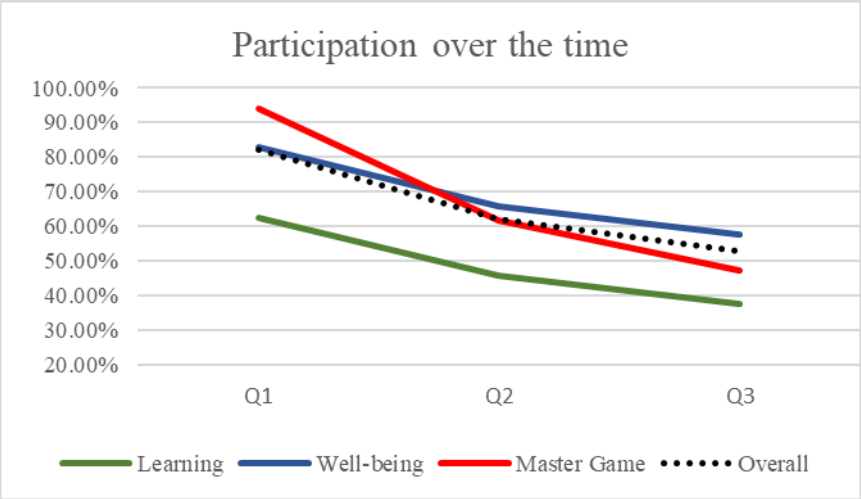

Figure 9 Evolution of Participation during the 3 Questionnaires.

The Well-being course flattened its negative curve in the third questionnaire, ending above the Master Game course. The decrease in the response rate is more pronounced among participants in the Education Game course, while the rate of decline in the other two courses is relatively similar. It is also worth considering that in the Managing Learning course, the last session in which the questionnaire was distributed (including through email to absentees) had a very low absenteeism rate. This was because it represented the sixteenth session in which no exams were held, and no grades were assigned.

As we have illustrated in the previous pages, data collection was carried out through three questionnaires at three different times during the course. This resulted in different participation percentages compared to the entire population involved. This overall percentage decreased, both due to a natural decline in interest in participation and because there was no pressure to complete the questionnaires. They were completed anonymously, with no ability for the professor to address those who had not completed them.

The response rate to a motivation for learning questionnaire could be considered as an evaluative factor in itself. However, it cannot be the sole determinant, as both a high and extremely low response rate may obscure environmental factors that statistics alone cannot elucidate (Hoel & Dahl, 2019).

The relationship between the number of responses to a motivation questionnaire and respondents' actual motivation is a nuanced issue with considerations rooted in survey

methodology and psychological research. It is essential to discern whether non-response should be regarded as a form of response, which depends on the specific research context and objectives.

As Robinson and Schumacker (2009) point out, motivation to respond to a survey may not necessarily reflect the motivation under investigation in the survey itself. In other words, the decision to participate in a survey may be influenced by extraneous factors, such as the perceived relevance of the survey or the incentive offered, rather than the intrinsic motivation being measured within the questionnaire.

The phenomenon of non-response in surveys is a well-recognized concern in survey research. Groves, Dillman, and Eltinge (2002) highlight the potential for non-response bias, wherein those who choose not to respond differ systematically from those who participate. This bias can distort survey results and limit the generalizability of findings.

Nonetheless, non-responses can also be interpreted as meaningful indicators of respondents' motivation or engagement levels. In educational research, for instance, researchers have explored the concept of "response rates as a proxy for motivation" (Eisen et alii, 2013). In such cases, lower response rates may suggest lower motivation or interest in the survey topic.

In conclusion, the relationship between survey response rates and the motivation being measured is complex and context dependent. While the literature recognizes the potential impact of non-response on survey findings, it is crucial to adopt strategies to maximize response rates, consider potential sources of bias, and carefully interpret non-responses within the specific research context.

10.1.2.3 Respondent Profile: Professional Experience, Internships, and Job Market Entry Prospects.

As observed in Table 10.1, the highest number of respondents per questionnaire was in the first questionnaire, and the number gradually decreased. It's important to remember that in the first questionnaire presented to students, they were asked if they had already engaged in activities within a company through internships, and the approximate total duration of work done in a company. This demographic data allowed us to understand whether the collected sample had significant prior experience in companies.

Since there were 139 respondents to the first questionnaire, 139 instances were collected that can quantify and qualify students' prior experience.

Table 10.2 details the percentages of internships among 139 observations or cases. A significant majority, 96.4% or 134 cases, reported having experienced an internship program. This data suggests that most participants had already been exposed to work within a company or organization. Internships are valuable learning opportunities that offer students practical industry experience, help them apply their academic knowledge, and foster networking opportunities that could lead to future job prospects. The prevalence of internships observed reflects that participant already had real-world experiences, enhancing their job readiness upon graduation.

On the other hand, a very small portion of cases, only 3.6% or 5 cases, reported not having an internship. This could be due to various reasons, such as students opting out, course exemptions, or certain cases where internships may have yet to be part of the program's requirements.

Table 10-2 Internship

		Frequency	Percent	Valid Percent	Cumulative Percent
Internship	No	5	3.6	3.6	3.6
	Yes	134	96.4	96.4	100.0
	Total	139	100.0	100.0	

Table 10.3 presents the duration of internship experience at the time of the survey. A total of 136 valid observations or cases were collected, with 3 missing values. The largest portion of cases, representing 30.1% or 41 instances, corresponds to experiences lasting 6-9 months. Considering that the average internship duration is around 6 months, this means that the majority in this range had at least one internship experience. The second most common duration is 'More than 12 months,' accounting for 27.2% or 37 instances. These longer-duration experiences may indicate comprehensive programs where students have completed multiple in-company experiences and have acquired significant industry experience.

Considering all respondents, the total number of students with less than 6 months of experience in companies accounts for 32.4% or 45 instances, while the number of

students with more than 9 months of experience accounts for 36.0% or 50 instances. These durations could represent more specialized or focused programs or perhaps introductory or foundational courses in the case of those lasting less than 3 months. Finally, the data from Table 10.3 and Figure 10 reflect diversity in job experience durations, with a preference for 6-9 months or longer courses. This suggests that most respondents had already gained an acceptable understanding of the work environment and its needs to enhance their personal profile.

Table 10-3 Experience in Industry (Internship duration)

		Frequency	Percent	Valid Percent	Cumulative Percent
Intership duration	Less 3 mo.	15	10.8	11.0	11.0
	3-6 months	30	21.6	22.1	33.1
	6-9 months	41	29.5	30.1	63.2
	9-12 months	13	9.4	9.6	72.8
	More 12 mo.	37	26.6	27.2	100.0
	Total	136	97.8	100.0	
Total		139	100.0		

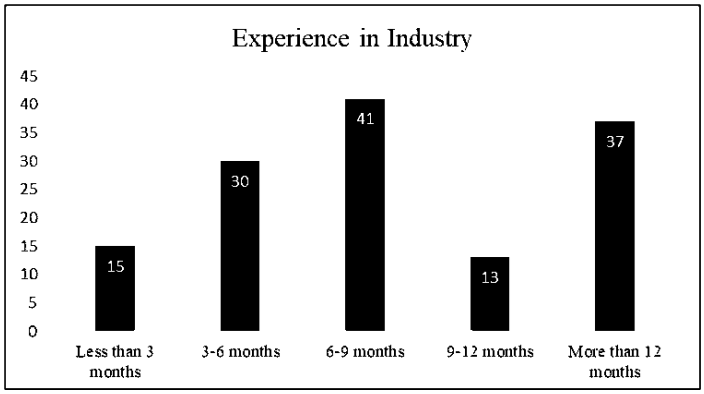

Figure 10 Experience in Industry

From these initial data, we can see that the students who responded to the questionnaire already have a comprehensive understanding of the world of work awaiting them. Therefore, the current sample can serve as a valid test for theories related to management sciences.

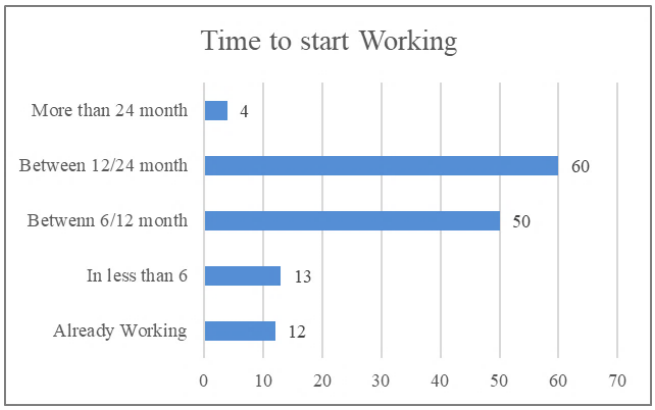

Figure 11 Expected time before starting to Work in a Company

The last question posed to students can also help us understand whether the sample of students involved can provide a valid starting point for discussing management issues. As you can see in Figure 11, the majority of students will enter the workforce definitively within less than 12 months from the time of the survey (75 responses out of 139), and of these, 12 are already working. A small portion of them thinks that their career goal is still far away (over 24 months).

10.2 Overall Results and their Evolution over the Time

As previously elucidated, a 5-level Likert scale was employed for assessment. The mean of all responses stands at 3.96 out of 5. It is worth noting that this datum holds negligible significance due to the uneven distribution of survey participants across the courses. Consequently, this result is predominantly influenced by the outcomes of the course Well-being, which accounts for almost two-thirds of the respondents.
However, a different significance arises when considering the overall appreciation of students engaged in courses where different teaching strategies were applied. As observed in Figure 12, the course most highly esteemed by students was Well-being, which employed Active Learning techniques, encompassing a wide variety of instructional solutions. The mean of the responses stands at 4.06. In contrast, the Managing Learning course, received an evaluation of 3.88, slightly lower than the

former two courses. Significantly lower in terms of student motivation and interest was the Master Game course, which garnered a rating below the other two courses, at 3.69.

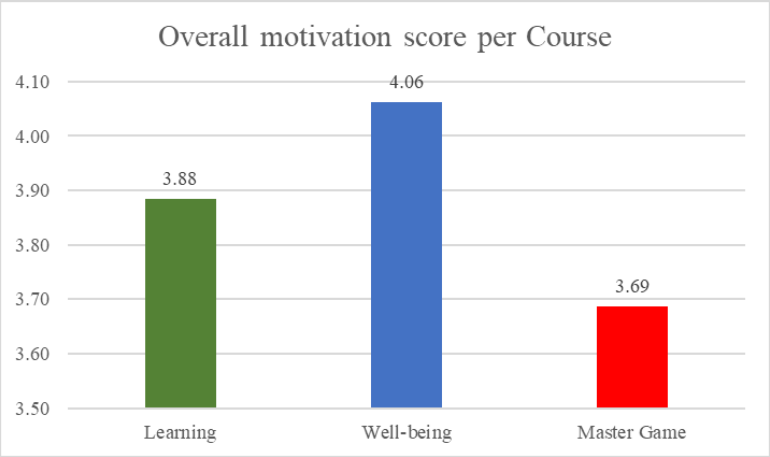

Figure 12 Overall Motivation Score per Pedagogy

The obtained scores provide a static snapshot of the motivational level within the course, offering insufficient elements for a more profound commentary. More comprehensive insights emerge when analyzing the scores obtained in the different questionnaires, which represent distinct moments over time. In this instance, as illustrated in Figure 13, the motivational trajectory varies across courses and does not follow a linear trend.

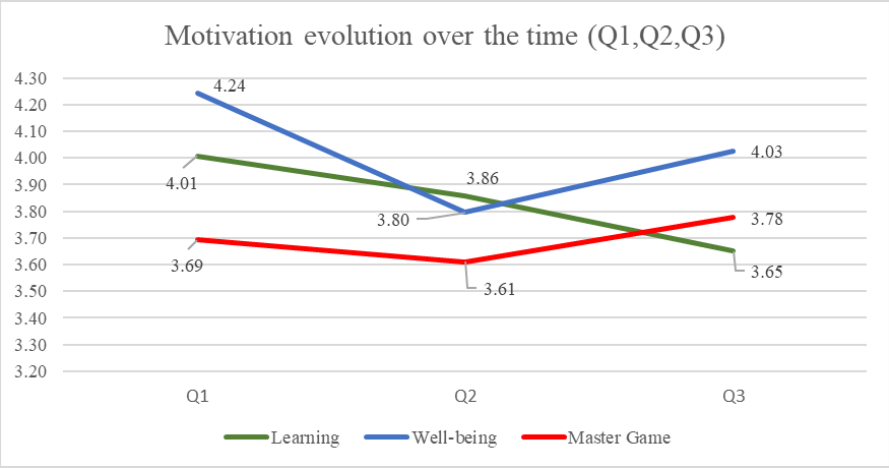

Figure 13 Motivation's evolution over the time.

The course Well Being pedagogy maintains significantly higher scores than any other course, both in the initial phase (4.24) and the final phase (4.03). However, it exhibits a notable dip during the middle phase (3.80), during which responses from the Managing Learning yield higher scores (3.86). A similar trend is observed in the other course with a short duration and high intensity, the Master Game. In this case, in the first questionnaire, the result (3.69) is considerably lower compared to other pedagogies, and in the second assessment, we also observe a marginal decline (3.61). But in the class Master Game, the motivational level increased in the concluding part (3.78), the only instance where we find a higher final value compared to the measurement at the start of the course, placing the motivation level at the end of the course in the last position, overtaken by the evaluations in the Educational Game class. Finally, a different dynamic is observed in Managing Learning course. The initial score is high (4.01), but subsequently, after a mid-course dip (3.86), unlike the other courses, there is no rebound in scores in the final phase (3.65), indicating significant signs of fatigue, as also evidenced by the low number of responses received.

10.2.1 Responses Analysis: Overview per Class

In this section, we analyze the scores obtained for each response, taking into account the temporal sequence and the varying perception in each course. Therefore, we assess the evolution of responses for each questionnaire as shown in Table 10.4.

First Questionnaire:

In the Well- being course, scores are close to or above 4 in all responses, except for the competence related to the subject matter. This suggests that the course was chosen with the expectation of acquiring new skills in Well-being. Students who participated in the Well-being questionnaire gave the highest scores in the entire first questionnaire for the two Mindset-related questions (4.43 and 4.46). Managing Learning course has 4 responses rated above 4, all related to personal perception, while questions regarding interest, autonomy, and competencies are rated half a point below 4. In Master Game, low scores are undeniably negative.

This course is mandatory for all students, and responses to questions about the autonomy of course choice are the lowest in the entire first questionnaire (3.06), as

well as the perception of being able to perform the activity (3.19). Responses to questions related to Mindset provide the highest scores in all pedagogies. Conversely, responses to questions regarding initial competencies and abilities, with the exception of autonomy in the Master Game, receive the lowest scores in all pedagogies.

Table 10-4 Responses per questionnaire and per pedagogy

QUESTIONS	Construct	Learning	Well-being	Master Game
I consider the topic of this course relevant to my future professional experiences"	Value	3.60	4.20	3.48
I participate in this course because I want to.	Autonomy	3.60	4.36	3.06
I believe that my intelligence and abilities can be developed with effort and practice	Mindset	4.40	4.43	4.13
I think that the topic of the course is very interesting	Interest	3.87	4.28	3.68
I consider myself proficient in this activity	Competence	3.53	3.64	3.19
I expect to perform well in this course	Self Efficacy	4.27	3.99	3.61
I enjoy learning new things and exploring different ideas	Mindset	4.33	4.46	4.13
I can always manage to solve difficult problems if I try hard enough	Self Efficacy	4.13	4.38	3.81
QUESTIONNAIRE 1		**4.01**	**4.24**	**3.69**
I find the topic covered in this subject interesting	Interest	3.82	3.93	3.50
I believe I will receive an excellent grade in this class.	Expectation	3.91	4.32	3.77
In a class like this, I prefer course material that challenges me, enabling me to acquire new knowledge	Mastery	4.00	3.78	3.81
I recognize the importance of studying this subject	Value	4.36	4.38	3.38
I experience a sense of belonging and acceptance within my study group.	Relatedness	3.73	3.81	4.10
I often find myself thinking of other things during class, causing me to miss important points (Reverse)	Meta cognition	3.36	2.86	3.33
I establish goals to effectively manage my study time for this course	Goal	3.82	3.49	3.38
QUESTIONNAIRE 2		**3.82**	**3.80**	**3.61**
I believe the knowledge gained in this course can be applied to other courses	Value	3.89	4.23	4.06
I lack sufficient time to dedicate to my [insert class subject] class due to other commitments (Reverse)	Effort	2.78	3.67	3.28
I engage in regular self-reflection regarding my goal attainment and performance evaluation in this course	Goal	4.00	3.97	3.50
I regularly evaluate the effectiveness of my study strategies for comprehending the course material	Meta cognition	3.56	4.03	3.94
I find value and meaning in acquiring new knowledge through participation in a group setting	Relatedness	3.78	4.31	4.25
I feel competent and capable after engaging in an activity for a certain period	Competence	3.89	3.97	3.56
I would willingly engage in the activity again based on its perceived value	Intrinsic Motivation	3.67	4.00	3.88
QUESTIONNAIRE 3		**3.67**	**4.03**	**3.78**

Second Questionnaire:

As previously mentioned, the second questionnaire exhibits a decline in scores across all pedagogies. Any variation, whether positive or negative, is primarily due to the type of questions posed. With the exception of Value, Mastery Goal, and Interest, the questions in the second questionnaire focus on the learning process: setting goals, group work, learning strategies, and outcome expectations (which can be connected to Self-efficacy and Mastery Goal). The results appear much less linear, both in scores and in the comparison between the different pedagogies employed. This is not unusual but rather a reflection of pedagogical approaches that produce different perceptions when assessing the learning process and methods.

In questions focusing on self-perception, results remain consistently high, with marginal fluctuations. Initial interest declines slightly in Managing Learning and Master Game classes, and more noticeably in Well-being. The value of what is being learned, already high in the first questionnaire in Well-being, increases further (from 4.2 to 4.38) and records a relatively high relative increase compared to the previous questionnaire (0.076) in Managing Learning. In the middle part of Managing Learning course, individuals seem to appreciate the variety of topics covered, which change weekly.

During this same period, a decrease in absenteeism is observed compared to the beginning of the course when Saturday morning classes were heavily criticized. Conversely, the Value decreases in Master Game. It should be noted that the Master Game is a team simulation game conducted on a technological platform and consists of identical phases repeated daily. This repetitive approach could provide an explanation for the perception of value. The fact that it is a team game seems to be well-received in the relatedness question, where the result of 4.1 is the highest score in Master Game in the second questionnaire.

Finally, it is interesting to note that questions related to metacognition appear to have the lowest scores. The ability to pay attention appears to be extremely low in Well-being course, which, unlike the other courses, is consistently guided by the instructor. In an intensive course (each session lasts 4 hours for 4 consecutive days), students claim to have significant difficulties (2.86) in not missing some topics. Interestingly, in Managing Learning (where students are required to prepare weekly for the next

lesson), the ability to set learning goals appears much higher (3.82) compared to courses where the study pace and topic sequence are determined by the professor (3.49) or a gaming platform (3.38).

Third Questionnaire:

In this final questionnaire, the results tend to reflect the specific characteristics of each instructional path. Firstly, it is noticeable that students do not believe they have sufficient time to dedicate to this course compared to other priorities (effort). This question yields the lowest scores, especially in the long duration Managing Learning course, which spanned over 18 sessions of almost 3 hours each, occupying students for three months. While it is true that responses regarding effort were the lowest in all pedagogies, in Managing Learning course, the score of 2.78 represents the lowest score among all responses collected in all pedagogies. This fatigue can also be inferred from the score on the willingness to engage in a similar activity (Intrinsic motivation), which is the third-lowest response in that course.

Conversely, in the other pedagogies, intrinsic motivation appears close to the highest scores in the last questionnaire. Metacognition, formulated as the ability to reflect on one's learning strategies, receives a significantly higher score compared to the attention question posed in the previous questionnaire. The constructs of Value and group work continue to receive very high scores.

10.3 DESCRIPTIVE STATISTICS

10.3.1 Value as Learning Motivation Construct

The first construct that we assess, and measure based on questionnaire responses is the Value construct. As previously mentioned, it has been measured through all three questionnaires, allowing us to examine its complete trajectory over time.

As depicted in Figure 14, we can observe that Value is perceived differently in the three pedagogical approaches as well as at different measurement points. In all three measurements, Value at the end of the course is perceived as higher than at the

beginning. The variation appears to be marginal in the Well-being course (where, however, the outcome appears quite high), while in the Managing Learning and Master Game courses, Value is significantly higher than in the initial measurement. However, this is not the result of a similar progression because during the middle phase of the program, the three pedagogical approaches exhibit distinctly different results compared to the beginning: marginal growth (Well-being 0.18), significant growth (Managing Learning 0.76), marginal decrease (Master Game 0.10).

The standard deviation allows us to understand whether questionnaire responses are clustered around the mean. It is noteworthy that the highest convergence of responses for pedagogical approaches occurs in both the middle phase and in the Well-being course (0.66) and the Managing Learning course (0.81), where the highest score was recorded. Conversely, in the Master Game course, there is the greatest dispersion of responses (1.24), also occurring in the middle phase, where the lowest absolute score on the Value construct (3.38) was recorded.

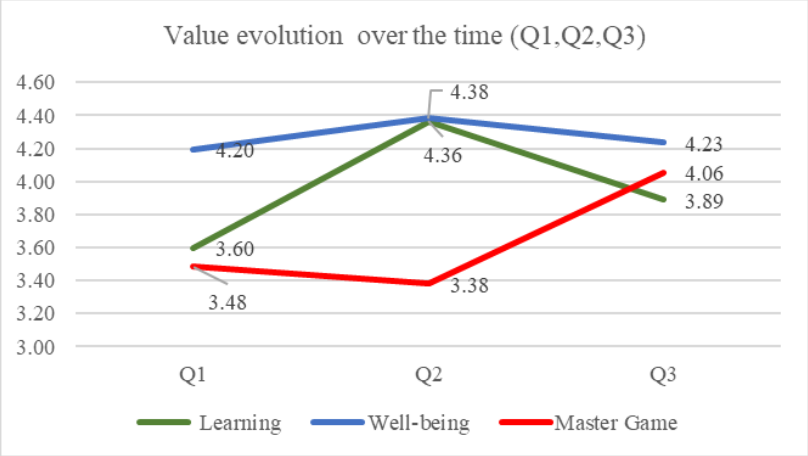

Figure 14 Value construct evolution over the time.

Table 10-5 Value as learning motivation during the course

	VALUE											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q1	3.60	0.83	54.00	15.00	4.20	0.73	386.00	92.00	3.48	0.85	108.00	31.00
Q2	4.36	0.81	48.00	11.00	4.38	0.66	320.00	73.00	3.38	1.24	71.00	21.00
Q3	3.89	0.93	35.00	9.00	4.23	0.75	271.00	64.00	4.06	0.73	73.00	18.00

10.3.2 Autonomy as Learning Motivation Construct

Autonomy is assessed at the beginning of the course. The question aimed to understand whether individuals perceived their participation in the course as an autonomous choice. The three courses presented different perceptions in response to this question, as depicted in Table 10.6.

In the Well-Being course, students expressed their belief that the course was the result of their own choice. This is reflected in the high score (4.36) and low response dispersion (0.75). Conversely, in the Master Game course, students rated the autonomous choice of the course much lower, resulting in one of the lowest scores among all questionnaire responses on motivation (3.06). In this case, students found themselves moderately in agreement (standard deviation 0.89). The data for the Managing Learning course is more complex, providing an intermediate evaluation (3.60) with a more pronounced dispersion (1.12).

The data collected can be explained by the fact that the Master Game course was mandatory and not perceived as a choice by the students. The other two courses are elective, but in the case of the Managing Learning course (which exhibits greater diversity of perspectives), some students had requested to leave the course at the beginning due to Saturday scheduling. Their request had been denied, leading to dissatisfaction. The issue of autonomy will be revisited later when discussing the correlation between constructs.

Table 10-6 Autonomy as learning motivation during the course

	AUTONOMY											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q1	3.60	1.12	54	15	4.36	0.75	401.00	92.00	3.06	0.89	95.00	31.00

10.3.3 Competence as Learning Motivation Construct

Competence is the only construct evaluated at both the beginning and the end of the course. The questions posed aim to understand whether students perceived an increase in their knowledge base.

The first observation that can be drawn from Figure 15 is the symmetrical trend of competence in the assessments. Not only is there an increase in final competence reported by students, but the rate of score increase at the end of the program (around 10%) appears similar across all pedagogical approaches. The lines generated in the graph appear almost parallel to each other. The standard deviation index appears similar in all responses (around 0.8), with the exception of the question asked at the beginning of the Managing Learning course.

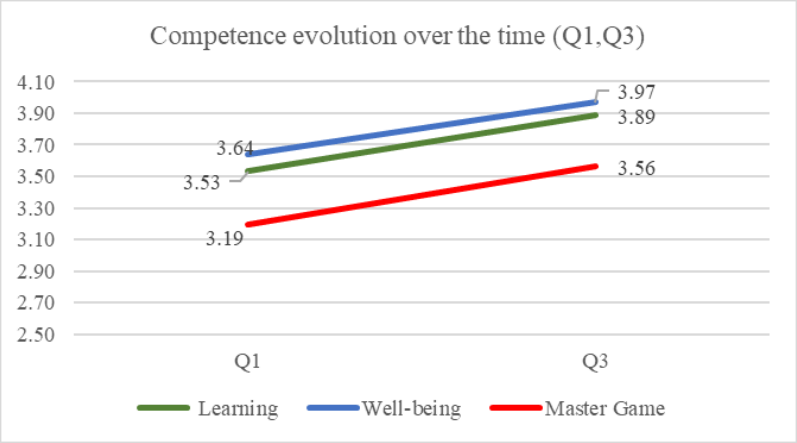

Figure 15 Competence construct evolution over the time.

Table 10-7 Competence as learning motivation during the course

	COMPETENCE											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q1	3.53	1.06	53	15	3.64	0.81	335.00	92.00	3.19	0.83	99.00	31.00
Q3	3.89	0.78	35	9	3.97	0.80	254.00	64.00	3.56	0.89	57.00	16.00

10.3.4 Effort as Learning Motivation Construct

How much energy and attention do students invest in this course? Do they consider it a priority, or are they distracted by other activities they deem important? This question, formulated inversely, was asked at the end of the course to understand whether students still commit to the course even in its concluding part.

The scores presented in Table 10.8 were among the lowest observed in all pedagogical approaches. Students appear to be less inclined to invest further energy. The most notable result is the score (2.78) observed in the Managing Learning course. In this final session, a high number of absences and strong fatigue were noted among the attendees. It should be noted that the course lasted for three months, with 16 lessons of almost 3 hours each. The dispersion was significant (1.72), but the fact remains that among the few students present in the classroom (only 9 out of 25), the majority did not consider the course a priority. Even in the Master Game course, the score was low (3.28). In this case, it should be considered that it was the last course of the MS program and the final evaluation of the semester.

Table 10-8 Effort as learning motivation during the course

	EFFORT											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q3	2.78	1.72	25	9	3.67	1.18	235.00	64.00	3.28	1.13	59.00	18.00

10.3.5 Expectancy as Learning Motivation Construct

In the second questionnaire, there are no questions related to self-efficacy, a predictive construct of performance. Instead, there is a question aimed at understanding whether the respondent expects to achieve a good grade at the end of the course.

Compared to the scores related to self-efficacy, the scores are generally lower in all pedagogical approaches (Table 10.9). The highest score (3.93) is observed in the Well-Being course (Well-being), while the lowest (3.50) is obtained from the average results of the Education Game. Since this is a prediction about the future, it is interesting to see if the average reflects the distribution of responses. In Well-being (0.65) and

Education Game (0.74), responses are predominantly clustered around the mean. This could be a consequence of a game (Simulation Game) that continuously provides performance information to participants (who appear less optimistic) and, in the case of Well-being, participating in a course where the content has been covered at least halfway. In a pedagogy like the Managing Learning, where there are weekly assessments, not everyone shares the idea of achieving a good result by mid-course, especially considering that many absences have resulted in a lowering of the average for some.

Table 10-9 Expectancy as learning motivation during the course

	EXPECTANCY											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q2	3.82	1.25	42	11	3.93	0.65	287.00	73.00	3.50	0.74	77.00	22.00

10.3.6 Goal as Learning Motivation Construct

In the Objective construct, we aim to assess how students pay attention to learning objectives, which is an essential step for self-regulated learning. In the first question oriented towards verifying the definition of objectives, it appears that courses with greater transparency regarding content (Well-being 3.49) or greater repetition of course content (Master Game 3.38) do not seem to stimulate the definition of objectives. Conversely, a course that features variations in topics on a weekly basis with individual and group assignments appears to require more attention to this aspect (Managing Learning 3.82).

Interest in verifying results has shown a significant increase in the last questionnaire. A marginal increase (0.18) is observed in the Managing Learning, which is nevertheless significant given that responses in the final assessment are generally significantly lower in this pedagogy. Even more relevant (0.48) is the increase in the score in the Well-being course, while the verification of results in the Master Game grows marginally.

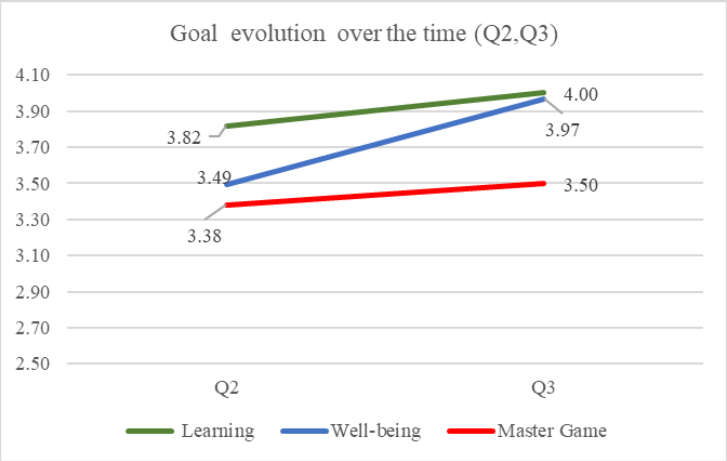

Figure 16 Goal construct evolution over the time.

Table 10-10 Goal as learning motivation during the course

	GOAL											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q2	3.82	0.60	42	11	3.49	0.75	255.00	73.00	3.38	0.97	71.00	21.00
Q3	4.00	0.71	36	9	3.97	0.78	254.00	64.00	3.50	0.73	56.00	16.00

10.3.7 Interest as Learning Motivation Construct

Interest in course content presents an interesting graph (Figure 17) because, similar to what was observed in the Competence construct, the results exhibit a surprising symmetry. They also reveal a strong retention of interest levels compared to the initial phase. The deviation is marginal, just 0.04 points between the first and second assessments in the Managing Learning and Well-being, and 0.07 points in the Master Game.

A slight variation that, for all of them, was an improvement between the first and last assessments. Another peculiarity of the result concerns the mid-course result. We have noticed that strong deviations were evident between the first and second questionnaires. In this case, however, the interest construct remains stable in cases where scores were high (Well-being 4.28-4.32), moderately high (Managing Learning 3.87-3.91; Master Game 3.68-3.77). This could be interpreted as a positive sign of sustained interest from the beginning to the situational context.

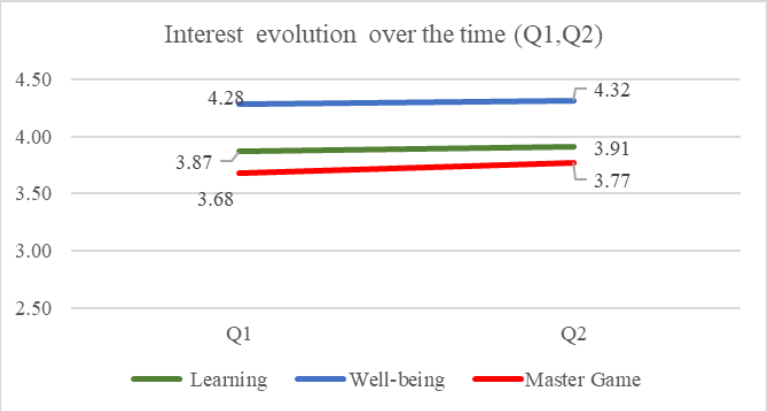

Figure 17 Interest construct evolution over the time.

Table 10-11 Interest as learning motivation during the course

	INTEREST											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q1	3.87	1.06	58	15	4.28	0.68	394.00	92.00	3.68	1.05	114.00	31.00
Q2	3.91	1.14	43	11	4.32	0.68	315.00	73.00	3.77	0.61	83.00	22.00

10.3.8 Intrinsic Motivation as Learning Motivation Construct

Intrinsic motivation is the last construct assessed by the students. It appears as the final question in the last questionnaire. As seen in Table 10.12. the results vary between 3.67 (Managing Learning) and 4.00 (Well-being). The scores align with the end-of-course questionnaire's average, and in all three pedagogies, they represent the fourth highest score in this questionnaire.

The question aims to understand whether the repetition of a course like the one just completed would be appreciated by the respondents. It is evident that in Well-being, students seem to have appreciated the course to the point of considering it useful to follow something similar. Therefore, while the score for Well-being aligns with an overall positive assessment of the course, it is noteworthy that the score of 3.88 obtained in the Master Game is well above previous evaluations of the same course. This indicates that the final evaluation is significantly higher than the impressions during the course. The deviation (ranging from 0.72 to 1) does not present any particular concerns.

Table 10-12 Intrinsic Motivation as learning motivation during the course

	INTRINSIC MOTIVATION											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q3	3.67	1.00	33	9	4.00	0.82	256.00	64.00	3.88	0.72	62.00	16.00

10.3.9 Mastery Goal as Learning Motivation Construct

Firstly, it should be noted that the questions about the Mastery Goal (as well as Expectancy) are the only questions related to the student's approach, which were asked in the second questionnaire. The results follow the average trend of the pedagogies. In particular, in the Well-being course, the score is significantly lower compared to questions in similar constructs (Mindset) asked in the first questionnaire. Something similar can be observed between Expectancy and Self-Efficacy when comparing the two questionnaires.

It should be noted that where overall motivation increases between the first and second questionnaire, as in the case of the Managing Learning course, the Mastery score also remains high (4.00).

The responses to all questions show a deviation within the normal range, below 0.85, indicating that the responses were generally close to the mean.

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Table 10-13 Mastery as learning motivation during the course

	MASTERY											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q2	4.00	0.77	44	11	3.78	0.85	276.00	73.00	3.81	0.75	80.00	21.00

10.3.10 Metacognition as Learning Motivation Construct

The metacognition construct consists of two questions that aim to analyze student self-regulation. On one hand, it seeks to verify, through a reverse question, whether the

individual feels they are paying attention in class to acquire the content. The dimension of attention, along with effort, is the question that received the lowest scores. In particular, Well-being, the course that generally has higher average scores, obtained an extremely low score (2.86), well below the other two pedagogies, which generally perform less. However, even in these cases, the result of the metacognition-attention dimension is quite low. It is worth noting that the standard deviation in all questions is above 1.1.

As we can see, the scores change significantly in the second question, where metacognition is interpreted as the ability to analyze one's approach and study strategies. Here, there is both a significant growth in results and a strong concentration of results around the mean, as can be seen in Table 10.14 (standard deviation ranging from 0.58 to 0.68).

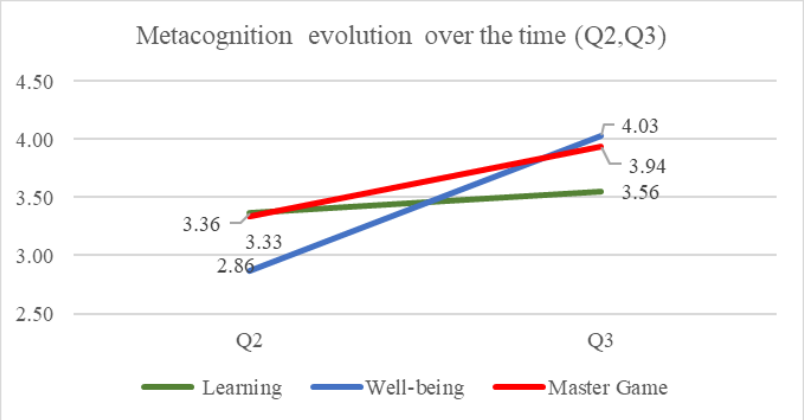

Figure 18 Metacognition construct evolution over the time.

Table 10-14 Metacognition as learning motivation during the course

	METACOGNITION											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q2	3.36	1.03	37	11	2.86	1.12	209.00	73.00	3.33	1.15	70.00	21.00
Q3	3.56	0.53	32	9	4.03	0.67	258.00	64.00	3.94	0.68	63.00	16.00

10.3.11 Mindset as Learning Motivation Construct

Only one construct presents ratings higher than four in all the questions and across all pedagogies: the learning mindset. It should be noted that both questions about mindset were asked at the beginning of the course (as was self-efficacy).
The results to these questions are consistent with each other, with minimal deviations in the two responses and with a moderately low standard deviation (minimum 0.67, maximum 0.76). Therefore, individuals seem to believe in the utility of learning and show pleasure in studying. In other words, they come to class on the first day with a positive attitude towards learning. This construct appears, in quantitative terms, as one of the most influential in the motivational process.

Table 10-15 Mindset as learning motivation during the course

	MINDSET											
	FLIPPED CLASSROOM				ACTIVE LEARNING				EDUCATIONAL GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q1	4.40	0.74	66	15	4.43	0.72	408.00	92.00	4.13	0.72	128.00	31.00
Q1	4.33	0.72	65	15	4.46	0.67	410.00	92.00	4.13	0.76	128.00	31.00

10.3.12 Relatedness as Learning Motivation Construct

The results on the relatedness construct focus on group relationships and the utility of teamwork. All pedagogies involved group activities. The entire Master Game course was a group activity, and there were no individual exercises or grades. In the Managing Learning, group work was required to complete assignments. In Well-being classes, the second part of the course involved more group activities compared to the early lessons, which were more individual. As seen in Figure 19, the Master Game course was the only one to rate group relations highly (4.10) at the halfway point. This is justified because the group had started working together from the first lesson. In Well-being lessons, the group had partially started working together, and the benefits of collaboration were evident in the significant growth of this construct (4.21). It's more challenging to represent the average score and the flat line on the graph representing the Managing Learning between the first (3.73) and second (3.78) measurements. Two environmental factors could have influenced this. On one hand, there was some fatigue

in group work, as students had to complete 12 assignments in 3 months. Secondly, in this course, groups were reformed every 5 weeks, so the group evaluated at the halfway point was not the same as at the end of the course.

Overall, relatedness appears to recognize the importance of working with others, especially when it is present. The distribution of responses showed greater variation in the second questionnaire compared to the final one.

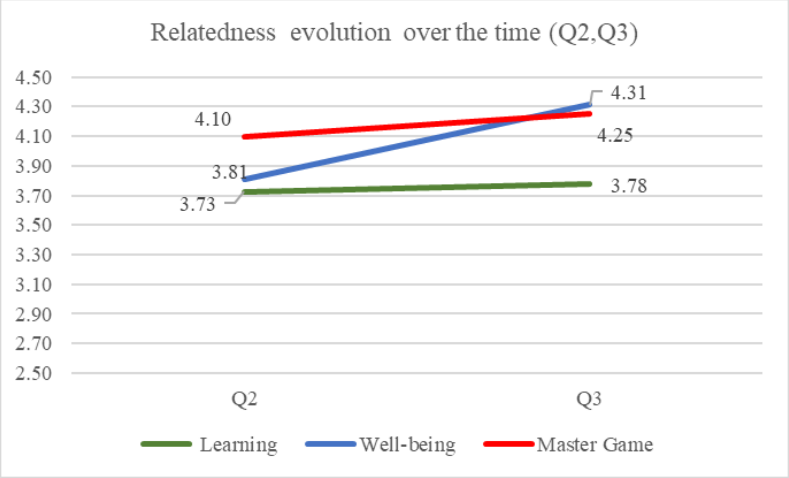

Figure 19 Relatedness construct evolution over the time.

Table 10-16 Relatedness as learning motivation during the course

	RELATEDNESS											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q2	3.73	1.01	41	11	3.81	0.91	278.00	73.00	4.10	1.00	86.00	21.00
Q3	3.78	0.97	34	9	4.31	0.66	276.00	64.00	4.25	0.58	68.00	16.00

10.3.13 Self-Efficacy as Learning Motivation Construct

Similarly to what we observed regarding mindset, the principle of self-efficacy also obtains very high scores. In this case as well, both questions are proposed at the beginning of the course.

Students are, for the most part, convinced that they have the capabilities to carry out the task and, therefore, to succeed. Particularly in the Managing Learning course, students consider themselves capable of completing the course successfully. So, if mindset highlighted the importance of believing in the usefulness of learning, self-

efficacy is the belief in having the means to succeed. The scores vary between those who believe they can achieve excellent performance and those who are confident in handling difficult situations that may arise. In the Flipped Classroom course (4.27), the score of the first response prevails, while in Well-being (4.38) and Master Game (3.81), the second response prevails.

It is also noteworthy that self-confidence seems to be lower in the game compared to the other pedagogies. The distribution of responses shows a moderate deviation, with a standard deviation ranging from 0.64 to 0.88.

Table 10-17 Self Efficacy as learning motivation during the course

	SELF EFFICACY											
	MANAGING LEARNING				WELL-BEING				MASTER GAME			
	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances	Mean	Standard Deviation	Total Score	Instances
Q1	4.27	0.88	64	15	3.99	0.82	367.00	92.00	3.61	0.84	112.00	31.00
Q1	4.13	0.83	62	15	4.38	0.64	403.00	92.00	3.81	0.83	118.00	31.00

10.4 CORRELATIONS

In the field of educational research, understanding the complex nature of student motivation is paramount. Motivation, as a multifaceted psychological construct, plays a crucial role in shaping students' interest, perseverance, and overall success in their academic pursuits.

To gain a comprehensive understanding of the intricate motivational dynamics, this research employed a set of constructs, each designed to capture specific aspects of motivation. These constructs served as analytical tools to investigate motivational dynamics within diverse pedagogical contexts. However, it is essential to recognize that these constructs do not operate in isolation; they are interrelated, influencing and shaping each other in intricate ways.

Examining the interrelationships among motivational constructs is valuable as it offers a holistic perspective on student motivation, moving beyond isolated assessments of individual constructs. Furthermore, identifying correlations contributes to pinpointing key motivational factors, thus aiding in the design of effective teaching and learning strategies. Finally, uncovering relationships among motivational constructs contributes

to the ongoing discourse on motivation theory and its application in educational contexts.

In the following pages, we will present the results of correlation analyses conducted on various motivational constructs. Statistical analysis was performed using Pearson's correlation, allowing us to assess the strength and direction of relationships between constructs. It is important to emphasize that these analyses were conducted at the level of individual questionnaires, taking into account all teaching methods used. This means that correlations are performed between constructs evaluated in the same questionnaires (e.g., between constructs assessed in the first and second questionnaire or between constructs evaluated in the second and third questionnaire), an approach that accounts for the data structure.

As the questionnaires were administered at different time points and some constructs were not assessed in all questionnaires, correlating constructs within each questionnaire yields more reliable and meaningful results. Furthermore, considering that the questionnaires might assess slightly different constructs or different aspects of the same constructs, grouping the data based on the similarity of constructs across different questionnaires can make the analysis more accurate and interpretable.

This approach allows us to explore how correlations between constructs may vary based on both the specific course context and the temporal moment when responses were collected. Such detail provides a more comprehensive and nuanced view of motivational dynamics within the educational environment under examination.

The results will be considered following the following scale of values, applicable to both positive correlations (values above zero) and negative correlations (values below zero).

- **Perfect Correlation** (+1 or -1)
- **Very Strong Correlation** (range from 0.8 to 1.0 or from -0.8 to -1.0)
- **Strong Correlation** (range from 0.6 to 0.8 or from -0.6 to -0.8)
- **Moderate Correlation** (range from 0.4 to 0.6 or from -0.4 to -0.6)
- **Weak Correlation** (range from 0.2 to 0.4 or from -0.2 to -0.4)
- **Very Weak Correlation** (range from 0.0 to 0.2 or from -0.0 to -0.2)

Following the above reported scale, we will focus on the construct that demonstrate a correlation moderate or at higher grade.

10.4.1 Questionnaire 1: Correlations between Constructs in the Initial Phase

As evident from Table 10.18, Autonomy exhibits a strong correlation with Value and Interest. This implies that when the course choice is perceived as an autonomous act, the initial interest in the course and the perception of its usefulness will benefit from it. Conversely, a forced choice will make the subject matter less interesting, at least in the initial phase.
Value and Interest show a moderate correlation between them, as do Autonomy and Competence, and Mindset and Interest.

Table 10-18 Correlation : Questionnaire 1

CORRELATION QUESTIONNAIRE 1

	Value	*Autonomy*	*Mindset*	*Interest*	*Competence*	*Self Efficacy*
Value	1					
Autonomy	**0,635**	1				
Mindset	0,296	0,362	1			
Interest	**0,578**	**0,616**	0,418	1		
Competence	0,301	0,404	0,260	0,393	1	
Self Efficacy	0,118	0,146	0,296	0,096	0,365	1

10.4.2 Questionnaire 2: Correlations between Constructs at Mid-Course

The constructs compared are different from the first questionnaire, except for Interest and Value. In the middle phase of the course, we previously observed very different trends in the perception of motivation. There was a strong increase in motivation in the Flipped Classroom, a significant decline in Active Learning, and marginal variations in Educational Game.

The evidence that, in a highly unstable context, the correlation between Interest and Value remains moderate (0.510) is further confirmation of how being pedagogically capable of keeping students' interest alive can influence the perception of the usefulness of the subject matter taught.

All the other elements do not show significant correlations.

Table 10-19 Correlation : Questionnaire 2

CORRELATION QUESTIONNAIRE 2

	Expectancy	*Interest*	*Mastery*	*Value*	*Relatedness*	*Metacognition*	*Goal*
Expectancy	1						
Interest	0,327	1					
Mastery	0,087	0,186	1				
Value	0,102	**0,510**	0,313	1			
Relatedness	0,114	0,158	0,301	0,111	1		
Metacognition	-0,009	0,160	-0,121	0,148	-0,208	1	
Goal	-0,050	0,177	0,179	0,082	0,159	-0,165	1

10.4.3 Questionnaire 3: Correlations between Constructs at the End of the Course

In the third questionnaire, the data showed a significant increase in scores in the Well-being course (after the decline experienced midway through the course) and the Educational Game course (following two moderately low evaluations in the initial questionnaires). Conversely, the Flipped Classroom course recorded a decline, mainly due to a very low score in the Effort dimension.

In the final part of the course, some significant correlations are evident. Intrinsic Motivation exhibits a strong correlation with competence, suggesting that when a student perceives that they have acquired competence, they are also inclined to seek a similar experience. Intrinsic motivation also shows a moderate correlation with all other constructs, except Effort: Value, Relatedness, Goal, and Metacognition. The presence of these elements partly contributes to the generation of intrinsic motivation. It's worth noting that in Self-Determination Theory, the drivers of developing and generating intrinsic motivation are Autonomy (not assessed here), Competence, and Relatedness.

Similarly, two constructs belonging to Self-Regulation Theory, namely Goal and Metacognition, show a moderate correlation between them (Table 10.20).

Table 10-20 Correlation : Questionnaire 3

CORRELATION QUESTIONNAIRE 3

	Value	*Effort*	*Goal*	*Metacognition*	*Relatedness*	*Competence*	*Intrinsic Mot;*
Value	1						
Effort	0,201	1					
Goal	0,278	0,027	1				
Metacognition	0,334	0,127	0,451	1			
Relatedness	0,409	0,161	0,367	0,450	1		
Competence	0,462	0,265	0,423	0,424	0,490	1	
Intrinsic Mot.	**0,527**	0,203	0,439	0,418	**0,518**	**0,609**	1

10.4.4 Conclusions

Value and Interest exhibit a significant correlation between them, measured both in the initial and central parts of the course. Within the Content cluster, the Intrinsic Motivation construct also shows a moderate correlation with Value. Considering that intrinsic motivation shares similarities with Situational Interest and Personal Interest, it could be concluded that Value, Interest, and Intrinsic Motivation tend to have a significant correlation throughout the duration of the teaching program. The perceived autonomy in choosing the course, or the lack thereof, can also have a significant impact. In fact, while in the first questionnaire, the dimensions of the Self-Belief cluster (Self-efficacy and Mindset) obtained high scores, values related to content (Interest and Value in the initial questionnaire) significantly reflected the perception of freely choosing the course.

Towards the end of the study program, there are also positive correlations between self-regulation elements, with the exception of Effort; Metacognition and Goal exhibit a moderate correlation.

11 VALIDATION OF RESEARCH HYPOTHESES

11.1 RESEARCH HYPOTHESES

We will proceed progressively to understand the validity of these research hypotheses, providing a comprehensive analysis of each. In this chapter, we will examine the data obtained from the questionnaires to validate or refute the three hypotheses proposed when we analyzed the research question: "Learning why to learn."
The three hypotheses are:

- Hypothesis 1: The creation of a tool for measuring learning motivation that utilizes different scientific approaches allows the identification of the constructs that most significantly contribute to learning motivation.
- Hypothesis 2: Theoretical constructs on learning motivation that exhibit similar characteristics show the same performance during the learning process.
- Hypothesis 3: Technology and teaching methods and organization influence learning motivation.

We will proceed progressively to understand the validity of these research hypotheses, providing a comprehensive analysis of each.

11.2 HYPOTHESYS 1: THE CREATION OF A TOOL FOR MEASURING LEARNING MOTIVATION THAT UTILIZES DIFFERENT SCIENTIFIC APPROACHES ALLOWS THE IDENTIFICATION OF THE CONSTRUCTS THAT MOST SIGNIFICANTLY CONTRIBUTE TO LEARNING MOTIVATION

11.2.1 Validation Approach for Hypothesis 1

Instrument validation is a critical step that researchers should employ in order to ensure the generation of scientifically valid knowledge. Without it, the basis of research findings and the generalization of such are threatened (Nunnally & Bernstein, 1967). This is especially true in the social sciences, a discipline in which the majority of published articles utilize subjective instruments in the collection of data. The construction and subsequent validation of measurement tools thus become an essential to demonstrate empirical rigor and credibility (Cronbach & Meehl, 1955; Messick, 1989).

Specific attention will be given to the insights garnered from the descriptive analysis, particularly the identification of a potentially unreliable question within the questionnaires. This aspect underscores the necessity of a thorough validation process, not only to confirm the overall efficacy of the tool but also to refine and rectify any components that may not meet the stringent criteria for psychometric robustness (DeVellis, 2017).

To validate Hypothesis 1, which posits that the creation of a tool for measuring learning motivation using different scientific approaches allows for the identification of constructs that most significantly contribute to learning motivation, we will follow a structured approach incorporating psychometric validation, structural equation modeling (SEM), and t-tests. Each step in this process serves a distinct purpose in confirming the reliability and validity of our measurement tool and understanding its effectiveness in identifying key motivational constructs.

We begin with psychometric validation to ensure that the measurement tools are reliable and valid. This involves several steps. First, we assess the basic properties of the data through descriptive statistics, which include mean, standard deviation, and correlation coefficients. This step helps identify any evident issues in item responses. Next, we perform exploratory factor analysis (EFA) to determine the dimensionality of the questionnaire items and ensure they measure single latent traits or constructs. Following EFA, we conduct reliability analysis to measure internal consistency using Cronbach's Alpha and McDonald's Omega, confirming that items within each construct are related. Finally, we utilize confirmatory factor analysis (CFA) to validate the theoretical model by examining relationships between items and fit indices such as the Chi-square/df ratio, Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Next, we employ structural equation modeling (SEM) to validate the theoretical model by examining the relationships between latent variables and observed data. This process starts with developing a base model to represent each latent variable through measured variables. Using SEM, we analyze the adequacy of the model fit, making adjustments based on fit indices. Refining the model ensures that it represents the theoretical constructs and their interactions.

The final step involves t-test analysis to compare the means of different groups and determine if there are significant differences in motivational constructs. We conduct t-tests to compare motivational constructs across various groups, such as different teaching methods or technologies. By analyzing the results, we can determine if specific constructs significantly impact learning motivation.

11.2.2 Psychometric Validation of the Measurement Tools

The methodology applied to test the reliability of the tools follows a structured process, integrated with bibliographic references:

Descriptive Statistics for Each Questionnaire

The process begins with calculating descriptive statistics for each item within the questionnaires, encompassing the mean, standard deviation, and raw correlation coefficients among items. This initial step, foundational for spotting evident issues in

item responses, relies on the premise that variability in responses across items indicates their potential to measure diverse aspects of the constructs in question.

Exploratory Analysis for Dimensionality

An exploratory factor analysis (EFA), particularly using principal component analysis (PCA) and parallel analysis, was undertaken to assess each questionnaire's dimensionality. Horn (1965) justifies the use of parallel analysis in determining the factor number in factor analysis, a method crucial for ensuring that questionnaire items measure a single latent trait or construct, known as one-dimensionality (Horn, J. L., 1965). The presence of a common latent trait among items is essential for the validity of the instrument, aligning with the psychometric principle that observed scores should be directly related to the characteristic being evaluated.

Reliability Analysis

The reliability of the questionnaires was assessed through measures of internal consistency, employing both Cronbach's Alpha and McDonald's Omega. These metrics evaluate the group of items' relatedness, with a higher value indicating that the items measure the same underlying construct and hence ensuring the instrument's reliability. Cronbach (1951) introduced Cronbach's Alpha, a measure of internal consistency widely utilized in psychometric evaluations, despite some recognized bias in its application. An alpha coefficient above 0.7 is considered acceptable, though above 0.8 is preferred for a robust scale (Cronbach, L. J., 1951). Sijtsma (2009) critically discusses the limitations and applications of Cronbach's Alpha, providing a nuanced view of its utility in psychometric analysis (Sijtsma, K., 2009).

Furthermore, McDonald's Omega is often preferred over Cronbach's Alpha, offering a more accurate estimate of internal consistency, especially when tau-equivalence assumptions are not met. Dunn, Baguley, and Brunsden (2014) explore the practicality of McDonald's Omega as a solution to the pervasive problem of internal consistency estimation, emphasizing its advantage over Cronbach's Alpha in capturing the true reliability of a scale (Dunn, T. J., Baguley, T., & Brunsden, V., 2014). The threshold values for Omega are similar to those for Alpha, where values above 0.7 are acceptable, and above 0.8 are preferred, reflecting the criteria for a scale's robustness in measuring psychological constructs reliably.

11.2.3 Psychometric Analysis per Questionnaire

This tool, structured around 7 theories of motivation, encompasses 13 constructs measured through 22 questions divided among three questionnaires. The psychometric validation process detailed in the document spans descriptive statistics, exploratory analysis, reliability assessment, and confirmatory factor analysis, providing a thorough examination of the tool's psychometric properties.

11.2.3.1 Descriptive Statistics per Questionnaire

Table 11-1 Synthesys of descriptive statistics : Questionnaire 1

	n	raw.r	std.r	r.cor	r.drop	mean	sd
VAL1	140	0.68	0.66	0.62	0.55	3.96	0.84
AUT	140	0.75	0.72	0.69	0.62	3.99	0.99
MIND1	140	0.61	0.63	0.54	0.49	4.35	0.73
INT1	140	0.76	0.75	0.72	0.65	4.09	0.87
COMP1	140	0.68	0.67	0.60	0.54	3.51	0.86
SEFF1	140	0.49	0.50	0.40	0.32	3.94	0.84
MIND2	140	0.66	0.68	0.62	0.56	4.36	0.70
SEFF2	140	0.61	0.63	0.55	0.49	4.21	0.75

Table 11-2 Synthesys of descriptive statistics : Questionnaire 2

	n	raw.r	std.r	r.cor	r.drop	mean	sd
VAL1	140	0.68	0.66	0.62	0.55	3.96	0.84
AUT	140	0.75	0.72	0.69	0.62	3.99	0.99
MIND1	140	0.61	0.63	0.54	0.49	4.35	0.73
INT1	140	0.76	0.75	0.72	0.65	4.09	0.87
COMP1	140	0.68	0.67	0.60	0.54	3.51	0.86
SEFF1	140	0.49	0.50	0.40	0.32	3.94	0.84
MIND2	140	0.66	0.68	0.62	0.56	4.36	0.70
SEFF2	140	0.61	0.63	0.55	0.49	4.21	0.75

Table 11-3 Synthesys of descriptive statistics : Questionnaire 3

	n	raw.r	std.r	r.cor	r.drop	mean	sd
VAL3	92	0.65	0.66	0.58	0.53	4.16	0.76
EFFO-	92	0.54	0.00	-0.24	0.22	3.48	1.25
GOAL2	90	0.60	0.69	0.61	0.44	3.89	0.77
META2	90	0.64	0.69	0.62	0.52	3.94	0.69
RELAT2	90	0.69	0.72	0.66	0.57	4.24	0.69
COMP2	90	0.77	0.74	0.71	0.66	3.88	0.82
INTR1	90	0.78	0.77	0.76	0.67	3.92	0.84

Proportion of responses by category and item of each questionnaire

Table 11-4 Proportion of responses by category: Questionnaire 1

	1	2	3	4	5	miss
VAL1	1.00%	4.00%	22.00%	46.00%	28.00%	0
AUT	1.00%	6.00%	21.00%	34.00%	37.00%	0
MIND1	0.00%	0.00%	15.00%	35.00%	50.00%	0
INT1	1.00%	4.00%	16.00%	43.00%	36.00%	0
COMP1	1.00%	8.00%	41.00%	38.00%	12.00%	0
SEFF1	1.00%	6.00%	17.00%	52.00%	24.00%	0
MIND2	0.00%	1.00%	11.00%	40.00%	49.00%	0
SEFF2	0.00%	1.00%	17.00%	42.00%	40.00%	0

Table 11-5 Proportion of responses by category: Questionnaire 2

	1	2	3	4	5	miss
EXP	1.00%	2.00%	28.00%	52.00%	17.00%	0.24
INT2	1.00%	3.00%	10.00%	53.00%	33.00%	0.24
GOT1	0.00%	6.00%	27.00%	46.00%	21.00%	0.24
VAL2	3.00%	1.00%	13.00%	41.00%	42.00%	0.24
RELAT1	1.00%	7.00%	25.00%	40.00%	27.00%	0.24
META1	8.00%	27.00%	31.00%	23.00%	10.00%	0.24
GOAL1	1.00%	7.00%	44.00%	39.00%	9.00%	0.24

Table 11-6 Proportion of responses by category: Questionnaire 3

	1	2	3	4	5	miss
EXP	1.00%	2.00%	28.00%	52.00%	17.00%	0.24
INT2	1.00%	3.00%	10.00%	53.00%	33.00%	0.24
GOT1	0.00%	6.00%	27.00%	46.00%	21.00%	0.24
VAL2	3.00%	1.00%	13.00%	41.00%	42.00%	0.24
RELAT1	1.00%	7.00%	25.00%	40.00%	27.00%	0.24
META1	8.00%	27.00%	31.00%	23.00%	10.00%	0.24
GOAL1	1.00%	7.00%	44.00%	39.00%	9.00%	0.24

11.2.3.2 Exploratory Analysis

The fundamental prerequisite in developing a psychometric measurement tool is to ensure the one-dimensionality of each questionnaire. This requires the presence of a common latent trait among all the items used for evaluation (Horn, 1965). Failure to uphold one-dimensionality calls into question the validity of the measurement instrument. In such cases, the observed score may not be solely indicative of the assessed characteristic. Descriptively, a principal component analysis is often employed to ascertain the contribution of each item to a common characteristic (Horn, 1965).

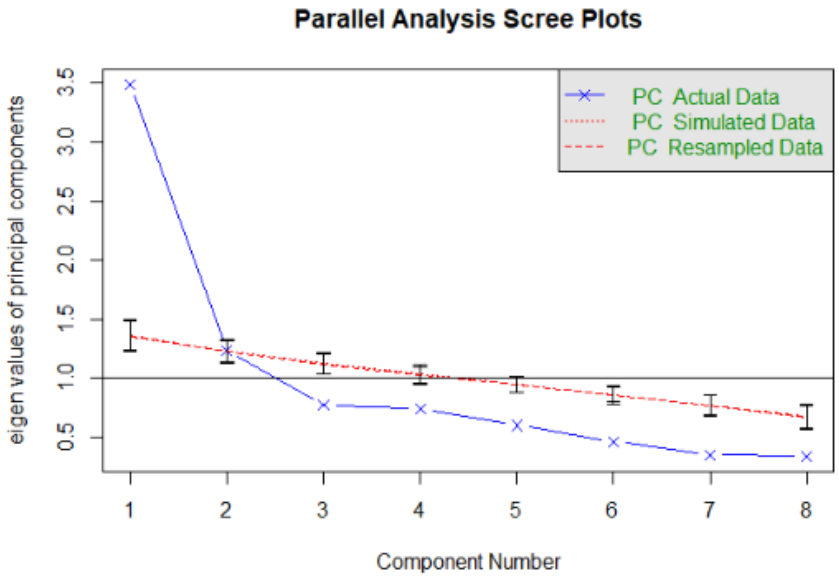

Figure 20 Parallel Analysis Scree plots : Questionnaire 1

	PC1
VAL1	0.6849770
AUT	0.7499486
MIND1	0.6156577
INT1	0.7795681
COMP1	0.6627790
SEFF1	0.4345597
MIND2	0.6742535
SEFF2	0.6215661

The plot showing the distribution of eigenvalues, along with its parallel analysis, indicates that questionnaire 3 has an acceptable level of one-dimensionality.

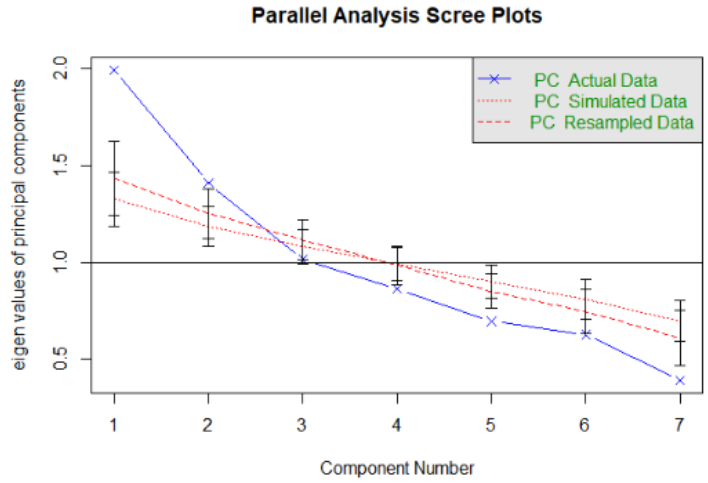

Figure 21 Parallel Analysis Scree plots : Questionnaire 1

	PC1
EXP	0.41268696
INT2	0.75396343
GOT1	0.61668654
VAL2	0.70590943
RELAT1	0.49420651
META1	0.01652118
GOAL1	0.36419388

The scree plot of the eigenvalues, and its parallel analysis indicate two main dimensions. Therefore, the hypothesis of one-dimensionality is not met. The second dimension is exclusively due to the item META1: “During class time I often miss important points because I’m thinking of other things.”

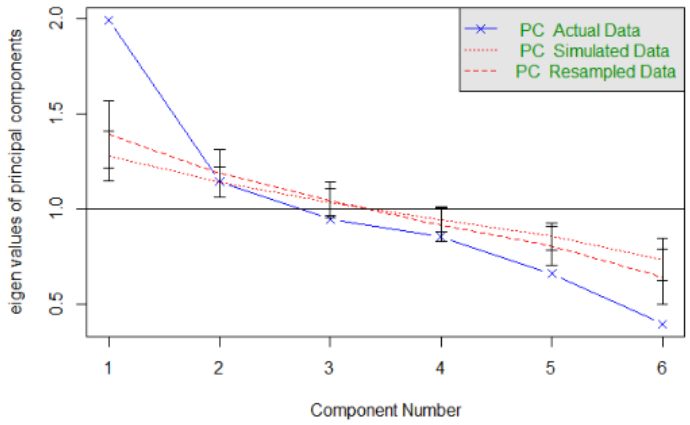

Figure 22 Parallel Analysis Scree plots : Questionnaire 2 removing META 1

	PC1
EXP	0.4133241
INT2	0.7567863
GOT1	0.6145259
VAL2	0.7086208
RELAT1	0.4905023
GOAL1	0.3612136

By removing this item from the analysis, the one-dimensionality is maintained.

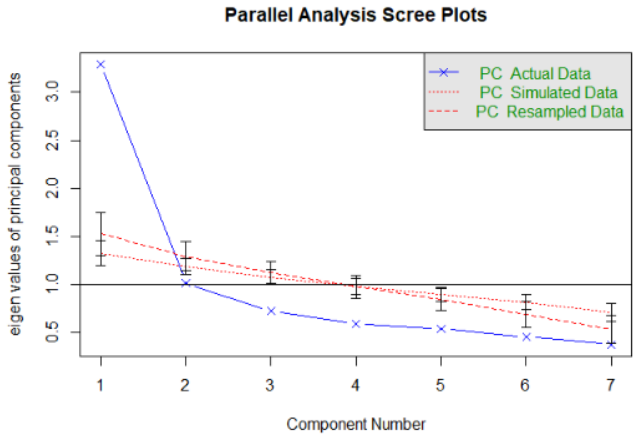

Figure 23 Parallel Analysis Scree plots : Questionnaire 3

	PC1
VAL3	0.6830014
EFFO	-0.3209303
GOAL2	0.6428092
META2	0.6847886
RELAT2	0.7372328
COMP2	0.7940308
INTR1	0.8144644

The plot showing the distribution of eigenvalues, along with its parallel analysis, indicates that questionnaire 3 has an acceptable level of one-dimensionality.

11.2.3.3 Reliability

The analysis of reliability, through the internal consistency of the measurement instrument, is crucial to ensure the persistence of results. A traditional method of measuring this is to conduct a test/retest with the same respondents after a specific period. Indicators such as Cronbach's Alpha or McDonald's Omega also allow for the measurement of this reliability. Cronbach, (1951) introduced the coefficient alpha and delved into the internal structure of tests, laying the groundwork for future research in reliability measurement. This foundational work established the basis for the widespread adoption of Cronbach's Alpha, despite its later-identified limitations.

Despite being demonstrated multiple times that Cronbach's Alpha index may be biased; it remains widely used. An alpha index above 0.7 can be considered acceptable, though an index above 0.8 is preferable for a robust scale. Sijtsma, K. (2009) discusses the usage, misuse, and the limited usefulness of Cronbach’s Alpha, highlighting the nuances and potential pitfalls in relying solely on this metric for assessing reliability. This critique invites a deeper examination of internal consistency measures and encourages the exploration of alternative indices such as McDonald's Omega.

McDonald's Omega index is generally preferred for estimating the reliability of an instrument. Depending on the tool's requirements, the threshold values for Omega are roughly the same as for Alpha, with >0.7 being acceptable and >0.8 preferred.

Dunn, T.J., Baguley, T., & Brunsden, V. (2014) present a practical solution to the pervasive problem of internal consistency estimation, transitioning from alpha to

omega. Their work underscores the importance of considering Omega as a more nuanced and potentially more accurate measure of internal consistency, especially in complex or multidimensional constructs.

Table 11-7 Reliability Questionnaire 1

raw_alpha	std.alpha	G6(smc)	average_r	S/N	ase	mean	sd	median_r
0.8091181	0.8099417	0.8199128	0.3475536	4.261544	0.02418465	4.051786	0.5412369	0.3480005

omega hierarch	omega asympt	omega tot
0.5731567	0.6563304	0.8732747

The reliability of the dimension is sufficient: Cronbach's Alpha 0.809, McDonald's Omega 0.873.

Table 11-8 Reliability Questionnaire 2

raw_alpha	std.alpha	G6(smc)	average_r	S/N	ase	mean	sd	median_r
0.5109792	0.5337543	0.5674451	0.1405551	1.144792	0.06389337	3.757677	0.4440984	0.1578784

omega hierarch	omega asympt	omega tot
0.2743966	0.403941	0.6792987

The reliability of the dimension is insufficient: Cronbach's Alpha 0.511, McDonald's Omega 0.679.

Table 11-9 Raw Cronbach's Alpha if one item is removed.

	raw_alpha
EXP	0.5011043
INT2	0.4320320
GOT1	0.4135587
VAL2	0.4630913
RELAT1	0.4274813
META1	0.5757380
GOAL1	0.4793728

Removing the item META1 would allow for a very slight increase in the alpha index.

Table 11-10 Reliability Questionnaire 2 removing Meta 1

omega hierarch	omega asympt	omega tot
0.4031189	0.5401782	0.7462702

The reliability of the dimension is barely sufficient without the item META1 for Omega. Considering only the Alpha, the index would be too low. The reliability of this questionnaire is questionable.

Table 11-11 Reliability Questionnaire 3

raw_alpha	std.alpha	G6(smc)	average_r	S/N	ase	mean	sd	median_r
0.7641274	0.7189438	0.7482815	0.2676298	2.558008	0.03131826	3.916149	0.5587897	0.418374

omega hierarch	omega asympt	omega tot
0.6535289	0.7495047	0.8719477

The reliability of the dimension is sufficient: Cronbach's Alpha 0.764, McDonald's Omega 0.872.

11.2.3.4 Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is a method used to assess the adequacy of a priori theoretical model to the collected data by examining the relationships between different items (Hu & Bentler, 1999). Indices used to evaluate this adequacy include the ratio of chi-square to the degrees of freedom of the model, where a ratio less than 5 ($\chi 2/df < 5$) indicates good overall fit of the model to the data.

The Comparative Fit Index (CFI) should be greater than or equal to 0.95 to indicate adequate fit precision to the model. Additionally, the Root Mean Square Error of Approximation (RMSEA) should be less than or equal to 0.06 to indicate an accepted average error of fit to the model. Finally, the Standardized Root Mean Square Residual (SRMR) should be less than or equal to 0.08 to indicate minimal discrepancy between the model residuals and initial values (Hu & Bentler, 1999; Yu, 2002; Brown, 2014).

Table 11-12 Reliability Questionnaire 1

	chisq/df	cfi	rmsea	srmr
chisq	3.504044	0.8436442	0.1337387	5.910974e-05

The validity of questionnaire 1 is just about right, with the Chi-square and the SRMR error having correct values, and the CFI and RMSEA being close to expected values.

Table 11-13 Reliability Questionnaire 2

	chisq/df	cfi	rmsea	srmr
chisq	3.504044	0.8436442	0.1337387	5.910974e-05

The validity of questionnaire 2 is quite similar to questionnaire 1 and tends to be acceptable.

Table 11-14 Reliability Questionnaire 3

	chisq/df	cfi	rmsea	srmr
chisq	0.6898512	1	0	0.8990658

The validity of questionnaire 3 is good, with the indices appearing satisfactory; however, an SRMR > 0.08 and a CFI = 1 seem to indicate an overfitting of the data to the model. This can be the case with a lack of variation in the responses to the questionnaire.

11.2.3.5 Conclusions

The validity of the measurement tool tests underscores a robust theoretical foundation, albeit with some areas for improvement, particularly regarding the reliability of questionnaire 2. Here is a concise overview of the main findings.

Questionnaire 1

Dimensionality: The exploratory analysis suggests one-dimensionality, indicating that the items measure a single underlying construct.

Reliability: Exhibits satisfactory reliability with a Cronbach's alpha of 0.809 and McDonald's omega of 0.873, indicating good internal consistency.

Validity: The confirmatory factor analysis presents borderline acceptable model fit indices, suggesting that the questionnaire is just about adequate in measuring the intended construct.

Questionnaire 2

Dimensionality: Initially, a bidimensionality issue was identified due to the item META1, which deviated significantly from the underlying construct measured by other items. Removal of META1 restores the one-dimensionality.

Reliability: Demonstrates poor reliability (Cronbach's alpha of 0.511 and McDonald's omega of 0.679). The removal of META1 slightly improves reliability, but not sufficiently.

Validity: Similar to Questionnaire 1 in terms of acceptability but with concerns over the dimensionality and reliability that impact its overall validity.

Questionnaire 3

Dimensionality: Analysis indicates acceptable one-dimensionality, suggesting that items effectively measure a single construct.

Reliability: Shows adequate reliability with a Cronbach's alpha of 0.764 and McDonald's omega of 0.872, indicating a good level of internal consistency.

Validity: The best model fit among the three questionnaires, with all indices suggesting good validity, despite a potential overfitting indicated by a CFI of 1 and a SRMR greater than 0.08.

The results of the analysis conducted for each questionnaire treated independently indicate results that are barely sufficient to have a measurement instrument for learning motivation that respects the ideal qualities of reliability, validity, and precision.

Specifically, the dimensionality is correct for each of the three questionnaires, with the exception of one item for the second questionnaire (item META1). The internal consistency measured by both Alpha and Omega indices is satisfactory for questionnaires 1 and 3, but not for questionnaire 2. The structural validity of the questionnaires tends to be correct.

The results should be interpreted in light of the limited number of respondents. It could be useful to study this tool with a larger number of respondents. As it stands, questionnaire 2 demonstrates insufficient fidelity (reproducibility) of results.

11.2.4 Analysis of the Global Theoretical Model Through Structural Equation Modeling (S.E.M)

This chapter delves into the examination of a predefined theoretical model by employing structural equation modeling (SEM). The aim is to assess the fit of the theoretical model to the collected data, exploring the relationships between various latent and manifest variables. Through a systematic process of evaluation and

adjustment, the chapter seeks to refine the model, ensuring it accurately reflects the underlying theoretical constructs.

Structural equation modeling (SEM) is a comprehensive statistical approach that allows for the assessment of a predefined theoretical model's adequacy based on collected data, by analyzing the relationships between various items. According to Brown T. in "Confirmatory Factor Analysis for Applied Research" (New York NY: Guildford Press, 2014), SEM is particularly adept at evaluating the fit between theoretical expectations and empirical data. The measurement instrument used to collect participant responses has previously undergone a detailed psychometric analysis. Although some aspects of this analysis are subject to scrutiny, we employ it to determine whether, as a whole, this tool can validate the underlying theoretical model. Structural Equation Modeling (SEM) naturally lends itself to studying the invariance of relationships between underlying constructions (latent variables) and observed responses (manifest variables), as these relationships are explicitly modeled.

11.2.4.1 Basic Model

Initially, it is essential to verify that a simple base model can adequately represent each latent variable through the measured variables (items). The basic model utilized at the beginning of this analysis reflect the graphical representation of the relationships between the theories, the constructs, and the relationships between the theoretical constructs. This model has been defined in section 7.3 after having compared theories and construct and having identified similarities and divergences.

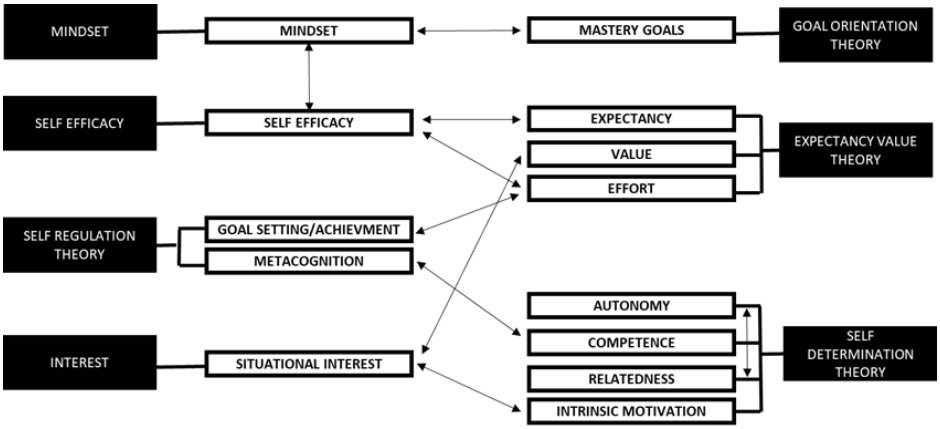

Figure 24: Convergencies amongst Constructs

The acceptability thresholds for the model are as follows:

- Chi-square/df ratio: < 5 indicates good overall fit of the model to the data.
- Comparative Fit Index (CFI): ≥ 0.95 indicates adequate fit precision to the model.
- Root Mean Square Error of Approximation (RMSEA): ≤ 0.08 indicates an accepted average error of fit to the model.
- Standardized Root Mean Square Residual (SRMR): ≤ 0.08 indicates minimal discrepancy between the model residuals and initial values (Hu & Bentler, 1999; Yu, 2002).



Figure 25 Model 1

The "Basic Model" illustrates the relationships between various latent variables (such as Mindset, Mastery Goals, Self-efficacy, Expectancy, Value, Effort, Goal Setting/Achievement, Metacognition, Interest, Autonomy, Competence, Relatedness, and Intrinsic Motivation) and their corresponding manifest variables (items like MIND1, MIND2, GOT1, SEFF1, SEFF2, etc.).

However, this initial model faced issues with a non-invertible singular matrix, attributed to the low number of respondents relative to the number of latent variables and the insufficient number of items for some latent variables. This resulted in a lack of variance among the measured variables to adequately inform all latent variables. Identifying the variable Expectancy (EXP) as problematic, removing this item led to adjustments in the model to better align with the available data and theoretical expectations.

11.2.4.2 Model 2

Following adjustments made after identifying issues in the initial basic model, we present a more refined structure aimed at better capturing the theoretical relationships among the latent variables. After removing the problematic EXP (Expectancy) item due to its singular non-invertible matrix issue, the revised base model—designated as "Model 2"—continues to map out the complex interplay between various psychological constructs. These constructs are represented through direct observations (items), with each aiming to provide a measurable reflection of the latent variables.

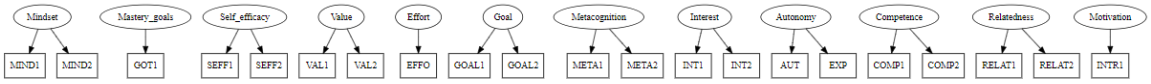

Figure 26 Model 2

In this updated configuration, despite the removal of the EXP item, the model sought to maintain its comprehensive nature, ensuring the representation of each psychological aspect it aims to measure. However, the model faced challenges in achieving satisfactory levels of fit based on standard indices such as the Chi-square/degrees of freedom ratio, Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Although some improvements were noted in the fit statistics, with the CFI moving closer to the acceptable threshold and a slight reduction in RMSEA, the model did not fully meet the conventional criteria for a good fit.

	chisq/df	cfi	rmsea	srmr
chisq	1.512445	0.8694037	0.07953918	0.02484753

	lhs	op	rhs	mi	epc
226	Goal	=~	META1	129.38923	52.5883443
172	Self_efficacy	=~	AUT	52.55498	-28.7086833
304	Competence	=~	META1	50.73692	11.1911897
506	GOAL2	~~	INTR1	17.60862	-0.8218378
346	Motivation	=~	AUT	15.17596	-2.4420075
500	GOAL2	~~	AUT	13.70740	-0.4054802
473	EFFO	~~	META1	12.81323	0.5537178
303	Competence	=~	GOAL2	12.78752	1.3762255
421	SEFF1	~~	COMP1	12.43552	0.1814408
168	Self_efficacy	=~	META1	12.42084	4.9631051

Specifically, the CFI remained below 0.95, and RMSEA was slightly above the 0.08 threshold, indicating that, while close, the model's fit could still benefit from further refinement.

Subsequent adjustments based on modification indices suggested changes in the relationship mappings between certain latent variables and their indicators. For instance, adjustments were considered for better alignment between Mastery Goals and the META1 item, as well as exploring the link between variables like Self-efficacy and Autonomy with other components of the model. These suggested modifications aimed at enhancing the model's theoretical coherence and empirical validity, taking into account the intricate dynamics between psychological constructs and their manifestations in observed data.

Despite these efforts, the refined model—still presented challenges in fully meeting the fit criteria. This suggests that while adjustments could yield incremental improvements, achieving the optimal representation of the complex relationships among psychological constructs requires a delicate balance of empirical evidence and theoretical insight.

11.2.4.3 Model 3

The progression to "Model 3" represents a further evolution in refining the SEM framework. Significant attention was focused on the elimination of the META1 item, which was recognized as a source of measurement noise and potential distortion within the model's framework.

	chisq/df	cfi	rmsea	srmr
chisq	1.488635	0.8902705	0.07766934	0.04501587

The modifications made in Model 3 led to a notable improvement in the fit statistics. The CFI approached closer to the acceptable benchmark, albeit still slightly below the ideal threshold of 0.95, and the RMSEA and SRMR values indicated a better, though not yet optimal, level of model fit. These outcomes suggest that the adjustments, particularly the exclusion of the problematic META1 item, contributed positively to the model's overall alignment with the collected data, enhancing the model's ability to accurately reflect the theoretical constructs.

11.2.4.4 Identifying a Complete Module

The following model (defined as Complete Model 1) emphasizes the dynamic existing between these constructs, proposing specific pathways through which they influence one another. For instance, it suggests how an individual's Mindset might directly impact their Mastery Goals, Self-efficacy, and ultimately their Motivation. Similarly, the model explores the role of Autonomy in fostering Competence and Relatedness, contributing to a person's overall sense of Motivation.

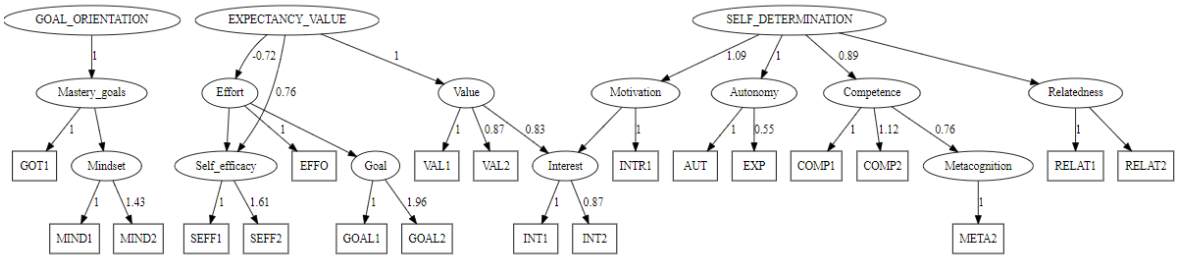

Figure 27 Complete Model 1

	chisq/df	cfi	rmsea	srmr
chisq	1.40575	0.8692308	0.07077611	0.07085101

lhs	op	rhs	mi	epc
Relatedness	=~	MIND2	74.77839	-36.78539807
SELF_DETERMINATION	=~	MIND1	35.55177	-4.09128835
Motivation	=~	MIND1	33.77358	-3.71502527
Competence	=~	MIND1	25.39541	-3.23844620
EXPECTANCY_VALUE	=~	MIND1	21.78319	-7.05325419
Value	=~	AUT	16.36338	1.09639543
Value	~~	Autonomy	14.26139	0.16589390
Autonomy	=~	MIND1	13.51157	-1.47420267
Self_efficacy	~~	SELF_DETERMINATION	12.19718	0.07576412
Interest	=~	AUT	11.81575	1.00005494

The model showed improvement in fit indices compared to previous iterations but did not fully meet the conventional thresholds for a good fit. The Comparative Fit Index (CFI) was below 0.95, indicating that the model's fit to the data could be better. Similarly, the Root Mean Square Error of Approximation (RMSEA) suggested a marginally acceptable error of fit, indicating room for further refinement.

Based on modification indices, several adjustments were suggested to enhance the model's alignment with the data. These adjustments aimed at reconfiguring the relationships between certain latent and manifest variables to better capture the underlying theoretical constructs.

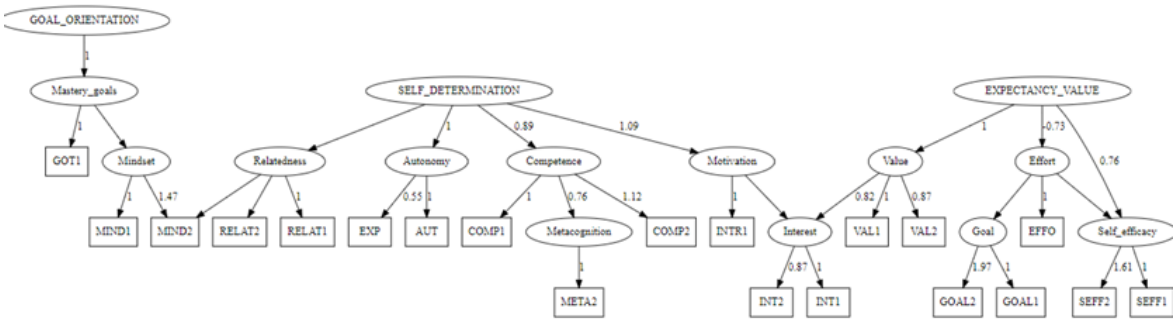

Figure 28 Complete Model 2

One of the key features of the Complete Model is its attempt to integrate complex theoretical propositions with empirical data, using structural equation modeling as a tool to validate the proposed relationships.

Despite the sophistication and comprehensive nature of the Complete Model, the analysis acknowledges that achieving a perfect fit is challenging, especially given the complex nature of psychological constructs and the limitations inherent in empirical research. The fit indices for the Complete Model indicate a generally good fit, with most metrics approaching the acceptable thresholds. However, some indices, such as the CFI, remain slightly below the ideal values, suggesting that while the model is robust and theoretically sound, there is room for further refinement.

11.2.4.5 Conclusion about S.E.M.

The analysis of the global theoretical model through structural equation modeling highlights both the strengths and areas for improvement in the current framework. The fit indices for the complete model indicate a generally good fit, with most metrics approaching the acceptable thresholds. However, some indices remain slightly below ideal values, suggesting room for further refinement.
By continuously refining the SEM framework, we aim to develop a robust model that accurately reflects the complex dynamics of psychological constructs and their manifestations in observed data.

11.2.5 Student's t-test: comparing variables

In this section, we will delve into the analysis conducted using the student's t-test to validate Hypothesis 1, which posits that the creation of a tool for measuring learning motivation utilizing different scientific approaches allows for the identification of constructs that most significantly contribute to learning motivation. The purpose of this analysis is to determine if there are significant differences in motivational constructs across various groups, such as different teaching methods or technologies. This helps in understanding how different educational practices impact student motivation.
A few adjustments and broader-scale experimentation could improve the measurement tool, thus providing a valid, reliable instrument representing a theory of various constructs that allows for the effective evaluation of learning motivation.
With these limitations in mind, we verify the impact of motivation according to the different characteristics present. The scores for each questionnaire are calculated based

on the items retained during previous analyses and compared according to the type of pedagogy used, the campus of the students, their projection into employment, and the duration of the internship.

The student's t-test is a statistical method used to determine if there is a significant difference between the means of two groups, which could be either independent or paired. This test is particularly useful for comparing the effects of different variables on a given outcome, in this case, the motivation to learn among students.

When conducting a student's t-test, the p-value helps us understand if the observed differences between groups are statistically significant, meaning they are unlikely to have occurred by chance. A low p-value (< 0.05) suggests a significant difference between the groups being compared.

A global 'Motivation to Learn' score is calculated as the sum of scores obtained from scores from each questionnaire are then tested across various categories to which the participants belong, using a student's t-test.

Depending on the variables used, several categories are present, and thus, multiple tests are conducted simultaneously. To control the overall error rate due to these multiple categories, a Bonferroni correction is applied to the test statistics to ensure more robust results, thereby making them less sensitive to the randomness of the sample present M. A. García-Pérez (2023). Use and misuse of corrections for multiple testing, Methods in Psychology Volume 8, November 2023

The p-value corresponds to the test statistic 'P-value', which indicates the probability of deviating from a result due to sampling randomness. Typically, an effect is considered significant if $p < 0.05$.

The lower this value, the more marked the effect. 'p. Adjust' indicates the adjusted value of this statistic from the Bonferroni correction. This value is therefore preferred over the first. 'p.signif' and 'p.adjust.signif' indicate the level of significance of the result.

ns: not significant

•: first level of significance $p < 0.05$

**: first level of significance $p < 0.01$

***: first level of significance $p < 0.001$

This approach, while making the analysis more conservative, ensures that any identified differences in motivation to learn across various categories are not merely due to random variation but reflect true differences that can be attributed to the variables being 'studied.ach' questionnaire, discarding any faulty items identified in previous stages.

We observe no significant difference between the results of students from the Lille or Paris campuses.

Table 11-15: T- Students Test data.

Q1	group1	group2	n1	n2	p	p.signif	p.adj	p.adj.signif
q1	ACT LEARN	EDU GAME	93	32	0.0081	**	0.0243	
q1	ACT LEARN	FLIP CLS	93	15	0.679	ns	1	ns
q1	EDU GAME	FLIP CLS	32	15	0.166	ns	0.499	ns
Q2	**group1**	**group2**	**n1**	**n2**	**p**	**p.signif**	**p.adj**	**p.adj.signif**
q2	ACT LEARN	EDU GAME	93	32	0.0087	**	0.0261	
q2	ACT LEARN	FLIP CLS	93	15	0.933	ns	1	ns
q2	EDU GAME	FLIP CLS	32	15	0.0945	ns	0.284	ns
Q3	**group1**	**group2**	**n1**	**n2**	**p**	**p.signif**	**p.adj**	**p.adj.signif**
q3	ACT LEARN	EDU GAME	93	32	0.0816	ns	0.245	ns
q3	ACT LEARN	FLIP CLS	93	15	0.0547	ns	0.164	ns
q3	EDU GAME	FLIP CLS	32	15	0.607	ns	1	ns

A significant difference ($p < 0.05$) was observed for both questionnaires 1 and 2 between the "Active Learning" and "Educational Game" pedagogies. Students who participated in these pedagogies indeed showed a significantly lower motivation score than those in active learning. No difference was observed between the "Flipped Classroom" modality and the other two. However, for questionnaire 3, no significant difference was observed between the types of pedagogies applied.

Finally, we conducted the student's t-test in relation to previous professional experience, to verify if verifying the time spent in the company (the duration of internships) could identify significant deviations in the average. However, as in the case of different campuses, this element did not show significant differences.

The only notable effect observed on the motivation score is related to the type of pedagogy applied, particularly during the first two evaluation periods (at the beginning and in the middle of the course).

Students who received the 'Active Learning' pedagogy show a significantly higher level of motivation than those who received the 'Educational Game' pedagogy. Given the number of participants, there was no difference between the 'Flipped Classroom' pedagogy and the other two. Regarding other characteristics, no difference in motivation among students was observed.

11.2.5.1 Major Finding and Conclusion in Student T-Test.

The student's t-test analysis contributes to validating Hypothesis 1 by demonstrating how different educational practices impact learning motivation. The findings indicate that Active Learning pedagogy significantly enhances student motivation compared to Educational Games, highlighting the effectiveness of this teaching method. However, no significant differences were observed based on campus location or professional experience, suggesting that these factors do not significantly influence learning motivation within this sample.

This validates the measurement tool and supports its use in identifying key factors that drive student engagement and motivation in educational settings. Further research with larger and more diverse samples could provide additional insights and strengthen the validity of these findings.

11.2.6 Conclusions on Hypothesis 1.

The purpose of Hypothesis 1 was to determine whether the creation of a tool for measuring learning motivation, utilizing different scientific approaches, allows for the identification of constructs that most significantly contribute to learning motivation. Through a rigorous validation process incorporating psychometric validation, structural equation modeling (SEM), and Student's t-test analysis, we aimed to evaluate the effectiveness and reliability of our measurement tool.

Psychometric Validation

The psychometric validation process involved several critical steps to ensure the reliability and validity of the measurement instruments. Descriptive statistics provided a foundational understanding of the data distribution and helped identify any evident issues with item responses. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were employed to assess the dimensionality and structural validity of the constructs.

The results from the psychometric validation revealed that Questionnaire 1 and 3 demonstrated acceptable levels of internal consistency and structural validity, with Cronbach's Alpha and McDonald's Omega values indicating good reliability. Questionnaire 2, however, showed issues with reliability and dimensionality. The removal of the problematic item META1 improved its reliability but not sufficiently to meet robust standards.

Overall, the psychometric validation indicated that while the measurement tool has a solid theoretical foundation, some areas require improvement, particularly in enhancing the reliability of Questionnaire 2.

Structural Equation Modeling (SEM)

SEM was employed to validate the theoretical model by examining the relationships between latent variables and observed data. The basic model, despite facing initial issues due to low respondent numbers and problematic items, underwent refinement through the removal of the Expectancy (EXP) item and subsequent adjustments.

The analysis through SEM provided insights into the complex interplay between various psychological constructs and their manifestations in observed data. While the refined models showed improvements in fit indices, they did not fully meet the conventional thresholds for a good fit. This suggests that further refinement and adjustments are necessary to achieve an optimal representation of the theoretical constructs.

Despite these challenges, SEM confirmed that the measurement tool can adequately represent the theoretical framework, with the relationships between constructs being generally well-aligned with empirical data.

Student's t-Test Analysis

The student's t-test was conducted to compare motivational constructs across different groups, such as teaching methods and campus locations. The analysis aimed to

determine if significant differences in learning motivation exist based on these variables.

Key findings from the t-test analysis included: Active Learning pedagogy significantly enhanced student motivation compared to Educational Games, indicating the effectiveness of Active Learning in fostering higher motivation levels.

No significant differences were observed between students from different campuses or based on previous professional experience, suggesting these factors do not significantly impact learning motivation within the sample.

The t-test analysis provided empirical support for the hypothesis that different educational practices impact learning motivation, highlighting the importance of pedagogical approaches in influencing student engagement.

The comprehensive analysis combining psychometric validation, SEM, and Student's t-test supports Hypothesis 1. The creation of a tool for measuring learning motivation using different scientific approaches has allowed us to identify constructs that significantly contribute to learning motivation. The psychometric validation ensured the reliability and validity of the measurement tool, while SEM provided a robust theoretical framework, and the t-test analysis highlighted the practical implications of different teaching methods.

While some areas, particularly in Questionnaire 2, require further refinement, the overall findings affirm the effectiveness of the measurement tool in identifying key motivational constructs. Future research should focus on expanding the sample size and diversity to enhance the generalizability of the results and further refine the measurement tool to ensure its robustness across various educational contexts.

11.3 Hypothesis 2: Theoretical Constructs on Learning Motivation that Exhibit Similar Characteristics Show the same Performance during the Learning Process

The second research hypothesis suggests that if constructs are grouped based on specific criteria, they will tend to measure learning motivation in a similar manner, as

they are connected by causal relationships that influence their performance. This exercise of "condensing" clusters within a broader theoretical framework, independent of their original theories, anticipates a crucial theme in this research: beyond individual motivational components, there may exist a class of constructs unified by the same causal purposes that exhibit similar behavior.

In descriptive analysis we have seen that certain theoretical constructs tend to have a relatively fixed position in students' perceptions. For example, Mindset always appears to be one of the most perceived elements by students, while they consider Effort and Metacognition to be less prominent.

A further step toward identifying the most relevant construct or constructs in the learning process is to conduct a cluster analysis of constructs. In this regard, as we have seen earlier, we proposed to group constructs based on certain distinctive criteria.

Self-Belief (Belief): This represents the beliefs and values regarding how a person approaches learning (Mindset), their own abilities (Self efficacy), the purpose of learning (Mastery Goal), and the expectation of an outcome (Expectancy).

Content of Learning (Content): This represents the idea one has about the interest generated by the course materials (Interest), the assessment of the course's utility (Value), and the internalization of the content as important to the individual (Intrinsic motivation).

Determinants of Learning (Determinants): These represent the elements that can make a course more motivating, such as the need for skills (Competence), autonomy of choice (Autonomy), and the relational experience in the classroom (Relatedness).

Modes of Learning (Self-Regulation): These represent process and self-regulation elements of the student, such as the effort to pay attention and assess learning strategies (Metacognition), the ability to prioritize the course (Effort), and the definition and evaluation of learning goals (Goal).

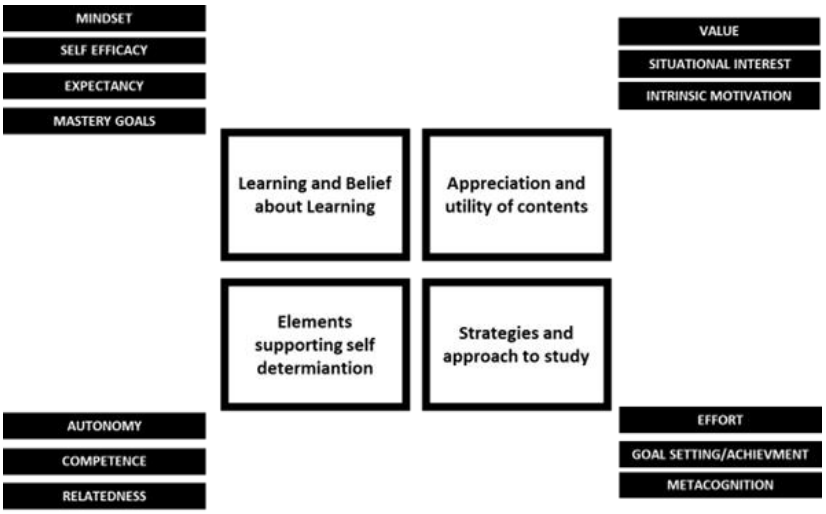

Figure 29: Group of Theoretical Constructs.

The results were then grouped according to the clusters defined and shown in Figures 29. The number of questions is comparable: Self Belief (6 questions), Content (6 questions), Determinants (5 questions), and Self-Regulation (5 questions).

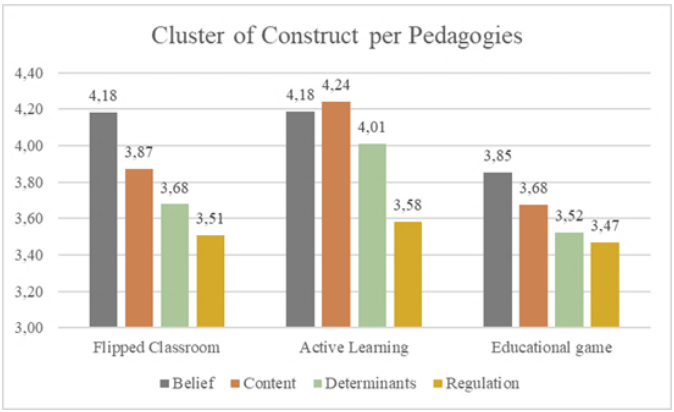

Figure 30 Constructs' results grouped by Teaching Methods

In Figure 30, we can observe that the constructs related to Beliefs and Values about learning and personal abilities consistently receive high scores. They represent the motivational elements in Managing Learning (Flipped Classroom) and Master Game (Educational Game) and are only marginally surpassed by the Content Cluster in the Well Being (Active Learning). The overall average across pedagogies is 4.07.

In the cluster named "Belief," we find the presence of a growth mindset, an orientation toward the acquisition of skills, the belief in succeeding in the learning journey, along

with high expectations for the course's successful outcome. These four constructs generally obtain very high scores, signaling the importance of predisposition, personal interest, and expectations toward an outcome.

The perception and value of content play a very important role. This cluster consistently ranks just behind the Belief Cluster and even surpasses it in the Active Learning pedagogy, which appears to be the most effective approach for conveying the message. The average for this cluster is 3.93. Where the content cluster is high, the highest perceptions of other clusters also occur, seeming to indicate that content may have a "pulling" effect on other motivational dimensions as well. In this cluster, the responses appear to be correlated with each other, as demonstrated in the descriptive analysis regarding interest, value, and intrinsic motivation.

As seen in the table, it consistently holds the second position among the four groupings, except in Well-being, where the treated content appears to have the most significant impact on the perception of the entire course.

In this cluster, we find the interest and value of what has been learned, as well as the willingness to undertake similar paths again. It is noteworthy that these constructs have exhibited a positive correlation with each other, indicating how they mutually reinforce each other on a motivational level.

The Determinants Cluster consistently ranks third. Generally, since the results of the Competence construct are very similar across different pedagogies, it is the Relatedness and Autonomy constructs that influence the results. The low score for Autonomy in Educational Game was only partially compensated by the Relatedness result, partly because competence was perceived as very low. In Flipped Classroom, a similar dynamic was observed but with slightly higher scores. In contrast, in Well-being, an elective course, both Relatedness and Autonomy allowed this cluster to position itself closely behind those described earlier. In this set of constructs, it is not feasible to determine a uniformity of performance. Instead, it emphasizes the influence that the construct of Autonomy has on other motivational elements.

Self-regulation appears weak in all courses. Although the detailed analysis previously conducted highlighted some exceptions, it is evident that maintaining attention, managing goals, and making it an organizational priority to follow the course do not represent strengths in terms of motivation in any pedagogical approach. Certainly, the

courses we analyzed exhibited highly heterogeneous characteristics in terms of intensity, duration, and variety. It is quite reasonable that the metacognitive approach, perception of effort, and the definition of learning objectives do not achieve high scores nor display uniformity in results.

The conclusions we can draw from this initial analysis are that students are convinced of the utility of learning and their own abilities. Content remains a determining factor, and the Well-being pedagogy seems to be the most suitable for conveying the message effectively. Supportive elements contribute to the extent that they are genuinely used in the pedagogy (e.g., group work vs. Relatedness). The methodological approach to learning, self-management, maintaining attention, and priorities are unanimously identified as areas of weakness.

11.3.1 Conclusion on Hypothesis 2

The hypothesis that all constructs within a cluster have similar performance cannot be validated as a whole. Performance alone does not seem to be the only element to measure the homogeneity of clusters.

The constructs expressing the usefulness of learning and the beliefs in its utility for personal development have shown great uniformity in results, consistently appearing as the most valued constructs by learners. The perception of the value and usefulness of what is learned are correlated. An interesting topic appears both useful and enjoyable to learn. Regardless of being the most favored cluster among students, the elements within it move in the same direction.

In the same, albeit opposite, direction, the constructs related to self-regulation of learning also move. Here, the hypothesis seems to be confirmed, highlighting a general difficulty in approaching learning in a structured manner, which also has a negative impact on the effort required to complete it. In self-determination, the constructs are significant but do not appear to be correlated. Autonomy emerges as a discriminating factor for the enjoyment of learning, even outside the realm of self-determination.

Considerations on the homogeneity of clusters open up interesting reflections, especially regarding improvement actions. On one hand, it is clear that emphasizing the value of what is being taught and the personal usefulness that can be derived from

it are pillars of motivation. On the other hand, but in the opposite direction, there is an equally important need to provide more structure to learners as they tackle new subjects and competencies.

11.4 Hypothesis 3: Technology, Teaching Methods, and Organization Influence Students' Motivation to Learn

In contemporary education, the interaction between technology, teaching methods, and course organization has become a focal point for its potential impact on student motivation and learning outcomes. This section aims to validate the hypothesis that these three elements—technology, teaching methods, and organization—significantly influence students' motivation to learn. Through comparative analyses and statistical evaluations, data from three different instructional methods—Flipped Classroom, Active Learning, and Educational Games—will be examined to illustrate the effects of these elements on learner motivation.

In the chapter 9, where we discussed the experimental setting for measuring motivation, we described the characteristics of the courses and the teaching methodologies used. Tables 9.1, 9.2 and 9.3 contain the main features, which we describe below, as they provide useful information for linking specific course components with the observed variations in motivation.

Flipped Classroom:
Gender Composition: Predominantly female (71%).
Enrollment: Elective course with high voluntariness, although administrative constraints were present.
Duration: Spanning over four months with 13 weekly lessons.
Technology Use: Extensive usage both in-class (11 hours) and out-of-class (22 hours).
Variety of Activities: High, featuring different pedagogical approaches each week.

Active Learning:

Gender Composition: Balanced gender distribution.

Enrollment: Elective course with high voluntariness.

Duration: Intensive one-week course with daily lessons averaging four hours.

Technology Use: Moderate in-class usage (5 hours).

Variety of Activities: High, with multiple activities incorporated in each session.

Educational Games:

Gender Composition: Predominantly male (62%).

Enrollment: Mandatory course.

Duration: One-week duration with daily lessons averaging four hours.

Technology Use: High, focusing on a single platform for 17 hours.

Variety of Activities: Low, characterized by repetitive activities and a final presentation.

11.4.1 Student Perception of Technology, Teaching Method and Course Organization

The tables 11.16 and 11.17 offer a comprehensive view of the impact of technology and teaching methods on student motivation across three instructional methods: Flipped Classroom, Active Learning, and Educational Games.

Table 11-16 Overall comparative analysis

		Flipped Classroom learning	Active Learning	Educational Games
Overall scores	Technology	4	3.99	3.77
	Teaching methods	3.95	4.20	3.49
	Course organization	4	4.21	3.59

Table 11-17 Motivation evolution over the time per teaching Methods

Surveys conducted during course		Flipped class	Active Learning	Educational Game	Total
Survey in the mid of the course	Technology	4.27	3.97	3.64	3.93
	Teaching methods	3.91	4.11	3.27	3.92
	Course organization	3.91	4.11	3.50	3.96
Survey in the end of the course	Technology	3.67	4.00	3.94	3.96
	Teaching methods	4.00	4.30	3.76	4.17
	Course organization	4.11	4.33	3.71	4.19

By analyzing the results from mid-course and end-course surveys, as well as the overall scores, we can discern key trends and correlations between these instructional elements and student motivation. The main findings can be summarized as follows:

The Flipped Classroom method initially benefits from high technology integration and varied teaching methods, but maintaining student engagement requires ongoing innovation. While technology use starts strong, scores decrease towards the end of the course, suggesting the need for continuous updates and new tools. The steady improvement in teaching methods scores shows that students appreciate diverse pedagogical techniques, highlighting the importance of a dynamic and interactive learning environment. Consistently high scores in course organization confirm that a well-structured curriculum is essential for sustaining motivation throughout the course.

Active Learning emerges as the most effective method for maintaining high student motivation. The balanced and varied use of technology, combined with interactive and participatory teaching methods, keeps students engaged and motivated. The improvement in technology scores from mid-course to end-course suggests that using various tools—like videos, music, and smartphones—continues to support effective learning. High scores in teaching methods reflect the success of Active Learning's approach, which includes multiple activities per session, creating an engaging and immersive learning environment. Increasing scores in course organization demonstrate the importance of a well-structured, dynamic framework that supports active learning and maintains high motivation levels.

Educational Games show potential but need significant improvements in teaching methods and course organization to fully leverage the motivational benefits of game-based learning. While technology scores improve towards the end of the course, the low variation in technological tools, mainly focused on repetitive gameplay on a single platform, limits overall effectiveness. Despite some improvement, teaching methods scores remain the lowest among the three instructional methods, indicating a need for more diverse and engaging strategies within the game-based format. Moderate course organization scores suggest that enhancing the structure and variety of the learning experience is essential for better supporting student motivation (Figure 31, 32 & 33).

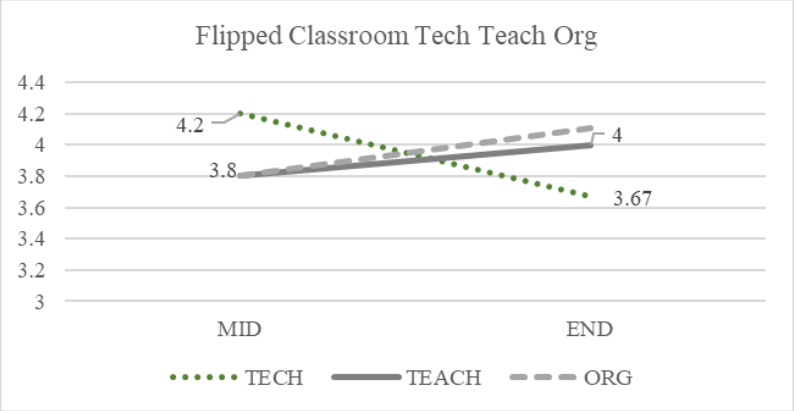

Figure 31: Perception of Technology, Teach. methods and Organisation in Flipped Classroom.

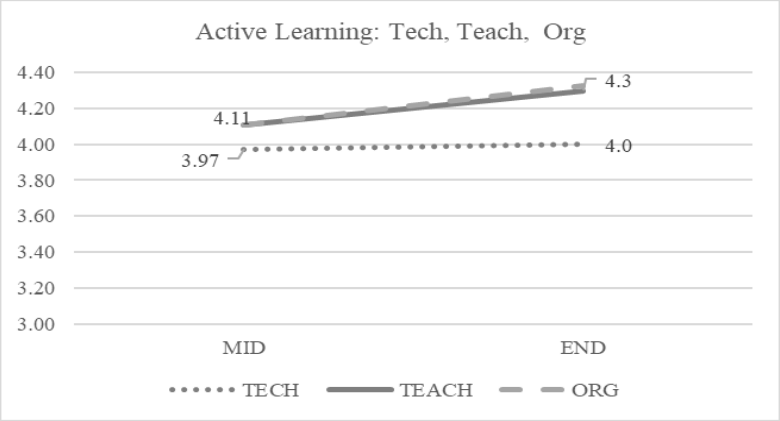

Figure 32: Perception of Technology, Teach. methods and Organisation in Active Learning.

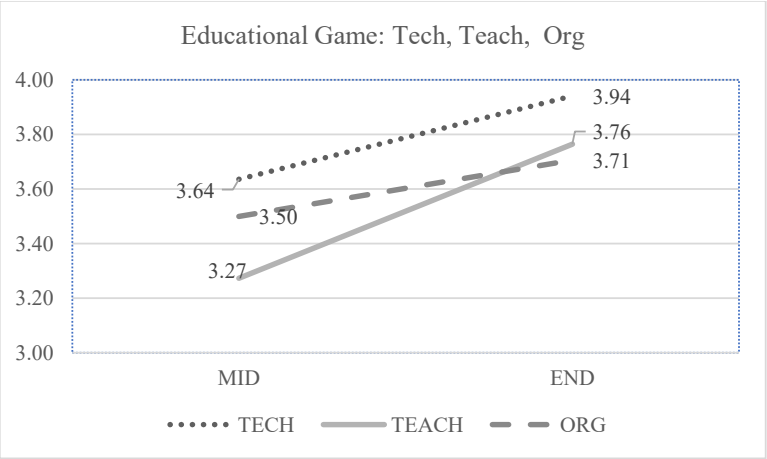

Figure 33: Perception of Technology, Teach. methods and Organisation in Educational Game.

In the graphs above, two recurring elements can be visually appreciated. Firstly, in all three methodologies used, the perception of teaching methods and course organization go hand in hand, whether they are considered superior to technology or less interesting than the technological solution. Conversely, technology does not reflect the same perception that students have of the other two elements. It is interesting to note that prolonged use of technology seems to tire students. In the case of the Flipped Classroom, there is a sharp decline in satisfaction after nearly four months of use, while, conversely, organization and teaching methods seem to be more appreciated. In Active Learning and Educational Games, significant differences in perception can be observed.

Regarding technology, it is notable that even where it is by far the most appreciated, its maximum score does not reach 4.00, falling below the average scores of the other dimensions analyzed. This could suggest that while technology is appreciated by students, its contribution compared to teaching methods and course organization is marginal.

This is further confirmed by observing the lower appreciation for a dynamic that is undoubtedly interesting and engaging (simulation game) but develops repetitively only on one platform. Notably, course organization and teaching methods are rated better at the end of the educational game, precisely when the game platform is abandoned in favor of public presentation of game strategies and debate.

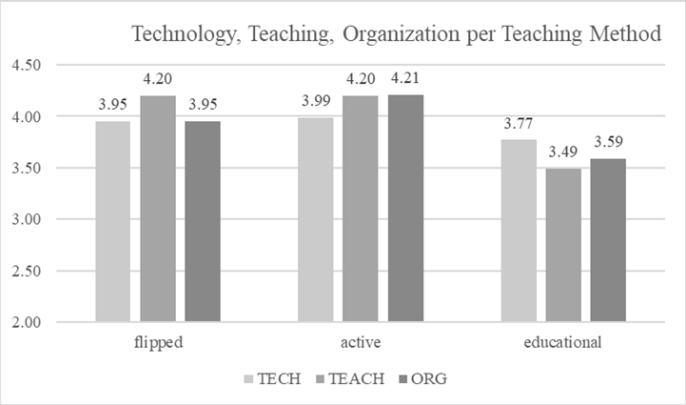

Figure 34 Technology, Teaching Methods and Organization per Course.

11.4.2 Constructs Appreciation in each Teaching Method

Flipped Classroom

In this pedagogy, the questions related to Mindset and Self-efficacy are the ones that achieve the highest scores, as evident in Table 11.18. We find the responses to these four questions among the top five highest scores in Flipped Classroom. Conversely, the question about effort ranks last with a significantly lower score compared to the other questions. Questions related to learning strategy and attention level (Metacognition) are also rated significantly below the average of the other questions.

Table 11-18 Score per question in Flipped Classroom

FLIPPED CLASSROOM SCORE PER CONSTRUCT/QUESTION							
Item	Construct	Question	Score	Item	Construct	Question	Score
3	Mindset	1	4.40	9	Expectancy		3.82
12	Value	2	4.36	15	Goal	1	3.82
7	Mindset	2	4.33	20	Relatedness	2	3.78
6	Self Efficacy	1	4.27	13	Relatedness	1	3.73
8	Self Efficacy	2	4.13	22	Intrinsic		3.67
11	Mastery Goal		4.00	1	Value	1	3.60
18	Goal	2	4.00	2	Autonomy		3.60
10	Interest	2	3.91	19	Metacognition	2	3.56
16	Value	2	3.89	5	Comptence	1	3.53
21	Comptence	2	3.89	14	Metacognition	1	3.36
4	Interest	1	3.87	17	Effort		2.78

The constructs that hold greater relevance (Figure 35) in this pedagogy are related to the belief that the value of learning can contribute to intellectual development (Mindset) and that the student themselves believes they are capable of succeeding in the academic course (Self-efficacy). In contrast, Effort and Metacognition are the

constructs with the lowest scores. Even the autonomy of course choice (assessed at the beginning of the program) is rated below average. It is worth noting that at the same time when low autonomy of choice was evaluated, the initial judgment of the course's value was also negatively affected (3.60).

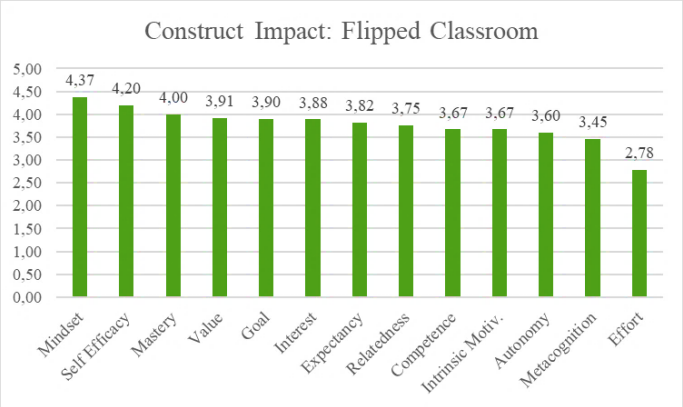

Figure 35 Score per construct in Flipped Classroom

Active Learning

In this pedagogy, the responses to the questions are significantly higher compared to other pedagogies. As seen in Table 11.19, a total of 12 questions achieves a score of 4 or higher, compared to the 7 in the Flipped Classroom course and only 5 in the Educational Game course. The questions related to Mindset receive high scores. In contrast to what we observed in the previous course, participants in this pedagogy believe that choosing the course was an autonomous decision (4.36), and the initial assessment of the course's value also receives a high score (4.20).

A specific aspect of this pedagogy is that students rate their ability to maintain attention (Metacognition 1, score 2.86) as well as their orientation towards setting learning goals (3.49) as relatively low.

Table 11-19 Score per question in Active Learning

ACTIVE LEARNING SCORE PER CONSTRUCT/QUESTION							
Item	Construct	Question	Score	Item	Construct	Question	Score
7	Mindset	2	4.46	22	Intrinsic		4.00
3	Mindset	1	4.43	6	Self Efficacy	1	3.99
12	Value	2	4.38	18	Goal	2	3.97
8	Self Efficacy	2	4.38	21	Comptence	2	3.97
2	Autonomy		4.36	9	Expectancy		3.93
10	Interest	2	4.32	13	Relatedness	1	3.81
20	Relatedness	2	4.31	11	Mastery		3.78
4	Interest	1	4.28	17	Effort		3.67
16	Value	2	4.23	5	Comptence	1	3.64
1	Value	1	4.20	15	Goal	1	3.49
19	Metacognition	2	4.03	14	Metacognition	1	2.86

As previously discussed, it is not surprising to find that the Mindset construct is the most prominent in Active Learning. What is significant are the constructs that follow. In this pedagogy, both value and interest, which are content-oriented constructs, receive significantly high scores. Additionally, intrinsic motivation, evaluated at the end of the course, achieves a higher score and positioning than in other pedagogies. Influenced by difficulties in maintaining attention (Metacognition 1), the Metacognition construct is ranked lower in the graph, even though study strategies (Metacognition 2) receive a relatively high score (4.03).

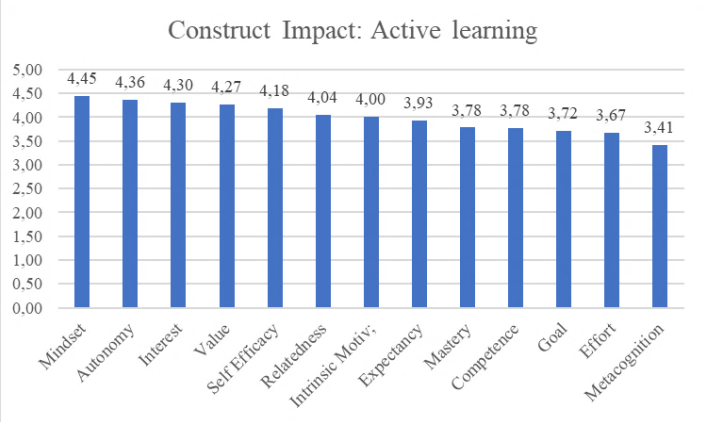

Figure 36 Score per construct in Active Learning

Educational Game

The course based on Educational Games is conducted in groups, and student assessment (except for absenteeism penalties) is based on group performance. It is also a repetitive course where students play on the digital platform daily, except for the final session where groups are required to present their business strategy. This interconnection between the course and the working group is clearly evident in the analysis of responses.

The highest scores are related to relatedness, emphasizing the relationship with the group. In contrast, autonomy is the element judged more negatively. As we have already observed in the Flipped Classroom course, aligned with the judgment on autonomy is also the perception of the course's value assessed at the beginning of the course.

Table 11-20 Score per question in Educational Game.

EDUCATIONAL GAME SCORE PER CONSTRUCT/QUESTION			
Item	Construct	Question	Score
20	Relatedness	2	4.25
3	Mindset	1	4.13
7	Mindset	2	4.13
13	Relatedness	1	4.10
16	Value	3	4.06
19	Metacognition	2	3.94
22	Intrinsic		3.88
11	Mastery		3.81
8	Self Efficacy	2	3.81
10	Interest	2	3.77
4	Interest	1	3.68

Item	Construct	Question	Score
6	Self Efficacy	1	3.61
21	Comptence	2	3.56
9	Expectancy		3.50
18	Goal	2	3.50
1	Value	1	3.48
12	Value	2	3.38
15	Goal	1	3.38
14	Metacognition	1	3.33
17	Effort		3.28
5	Comptence	1	3.19
2	Autonomy		3.06

In confirmation of what was mentioned earlier, the construct of motivation that appears to be most important for students is relatedness. Unlike other courses, this is the only case where the highest construct is not Mindset, although Mindset still achieves a very high score (Figure 37). It is noteworthy that individual belief in contributing (Self efficacy) carries less weight here compared to other courses. In a negative sense, in addition to the previously discussed dimension of autonomy, competencies (both initial and acquired) are rated with a low score. Finally, for the level of continuous involvement and discussions on strategies to be undertaken, metacognition receives a relatively higher score compared to other courses.

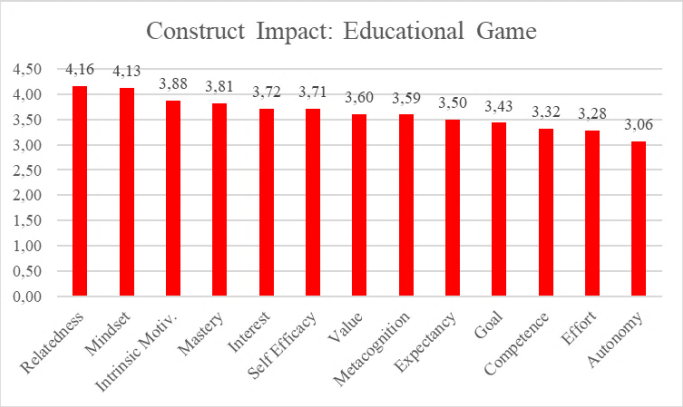

Figure 37 Score per construct in educational game.

11.4.3 Individual Motivation and Technology, Teaching Methods and Organization

In the three tables below (11.21), we compare the scores of individual motivations across three surveys with the scores collected for the three external elements (i.e., those beyond the individual learner's control): technology used in the course, the teaching method applied, and course organization.

The focus of this analysis is to verify whether there are similar behaviors between motivation, technology, teaching methods, and course organization.

Table 11-21: Comparing Motivation vs Tech, Teach. Methods and Organization

	FLIPPED CLASSROOM						
	Q1	Q2	Q3	Q3 VS Q2		Q3 VS Q1	
Motivation	4.01	3.86	3.65	-0.21	-5%	-0.36	-9%
Technology	N/A	4.27	3.67	-0.6	-14%		
Teaching	N/A	3.91	4	0.09	2%		
Organization	N/A	3.91	4.11	0.2	5%		

	ACTIVE LEARNING						
	Q1	Q2	Q3	Q3 VS Q2		Q3 VS Q1	
Motivation	4.24	3.86	4.03	0.17	4%	-0.21	-5%
Technology	N/A	3.97	4	0.03	1%		
Teaching	N/A	4.11	4.3	0.19	5%		
Organization	N/A	4.11	4.33	0.22	5%		

	EDUCATIONAL GAME						
	Q1	Q2	Q3	Q3 VS Q2		Q3 VS Q1	
Motivation	3.69	3.61	3.78	0.17	5%	0.09	2%
Technology	N/A	3.64	3.94	0.3	8%		
Teaching	N/A	3.27	3.76	0.49	15%		
Organization	N/A	3.5	3.71	0.21	6%		

In the Flipped Classroom course, a decline in motivation is observed alongside a decrease in the perception of technology. This trend is evident in the last two surveys and reflects the overall drop in motivation for this teaching method. It's important to note that this course has a high workload outside the classroom, with technology playing a significant role in these supplementary activities.

In the Active Learning course, a notable dip in motivation was observed midway through, followed by a recovery in the final part of the course. Similarly, the appreciation for teaching methods and course organization increases towards the end,

mirroring the rise in motivation. This course, being the most appreciated, receives high scores overall, regardless of the average appreciation for technology.

Technology is most appreciated in the course where it is used the most: during the educational game. It is valued throughout the course, particularly when the technological platform is set aside in favor of tools for presenting game strategies. It seems that the digital element alone did not prevent the educational game from being perceived as the least motivating among the three courses.

11.4.4 Conclusions on Hypothesis 3

From these observations, we can draw several conclusions. Teaching methods perform comparably to course organization in terms of student appreciation, which leads to higher motivation levels. While technology can be the most engaging element in the classroom, it does not match the effectiveness of teaching methods and course organization. As seen in our analysis, providing instructions and guiding students can compensate for the fragility of self-regulated learning processes. Moreover, active teaching methods can enhance student engagement, thereby increasing the interest and value of what is learned.

The strong relationship between organization and teaching methods is further confirmed by the high correlation (0.77) between these two elements, as well as their mirrored behavior across all three evaluated teaching methods.

Table 11-22: Correlation amongst Technology, Teaching methods and Organization.

	TECH	*TEACH*	*ORG*
TECH	1		
TEACH	0.42	1.00	
ORG	0.40	0.77	1

The interplay between technology, teaching methods, and course organization is crucial in shaping student motivation. The Flipped Classroom method requires continuous innovation in technology use to maintain student engagement. Active Learning thrives on a balanced and highly interactive approach, resulting in sustained high motivation levels. Educational Games, on the other hand, need greater diversity in teaching

methods and a more structured course organization to fully leverage their motivational potential.

It's not the amount of technology used that makes the difference, but rather the best results are achieved where there is significant variance in teaching methods. This was evident throughout the Active Learning course, at the beginning of the Flipped Classroom course, and in the initial phase of the Educational Game. Excessive technological exposure can be counterproductive. This is reflected in the extra technological workload required by the Managing Learning course (Flipped Classroom) and the high percentage of time spent on the platform during the Master Game (Educational Game). While it is essential to incorporate instructional design elements and avoid generalizations between specific courses and teaching methods, it remains true that an over-reliance on a single element (technology) can initially be interesting but ultimately counterproductive for course effectiveness.

11.5 Evolution of Motivation Over Time

11.5.1 Evolution Of Motivation During the Course

The assessment of theoretical constructs across the three surveys, reveals a non-linear trend in student motivation. The analysis shows that while some constructs remained relatively stable over time, others demonstrated significant fluctuations.

In the "Flipped Classroom" course, there was a notable improvement in student motivation at the mid-term point, (Q1 3.60, Q2 4.36, Q3 3.89). This trend suggests that the extended duration of the course and the interval between observations might have positively influenced student engagement.

Conversely, the "Wellbeing & Work-Life Balance" and "Master Educational Game" courses, characterized by more condensed formats, showed different patterns. While the Active Learning approach in "Wellbeing & Work-Life Balance" maintained a relatively stable motivation level (Q1 4.20, Q2 4.38, Q3 4.23), the "Master Educational Game" course exhibited lower initial evaluations, which improved towards the end (Q1 3.44, Q2 3.45, Q3 4.05).

The fluctuations in the "Flipped Classroom" course, particularly the mid-term increase in motivation, are further emphasized when compared to the more consistent trends observed in the other two courses. It's notable that the "Flipped Classroom," unlike the other courses, had a much longer duration with observation intervals of up to 45 days, which could account for the significant deviations observed.

Research on motivation in Flipped Classrooms, such as studies by Abeysekera and Dawson (2015) and Bergmann and Sams (2012), suggests that the course duration can significantly impact student motivation, requiring careful instructional design and engagement strategies.

The increase in motivation observed in the "Master Educational Game" during the final session, coincides with the cessation of technology use and a shift in course activity. This observation aligns with the findings by Steinkuehler & Duncan (2008) and Rosen et al. (2013) on the motivational impact and potential risks associated with technology in educational settings.

These insights, highlight the complexity of student motivation in different educational settings. The subsequent analysis will continue to explore these dynamics, examining how various pedagogical approaches and the use of technology influence student engagement and motivation over time.

11.5.2 Constructs Results over the Time

As we have seen, the measurement of motivation is carried out in three phases. Evidently, perceptions, information available, and those of the learner are not the same when assessed in the introductory, mid-term, or final phases. The opening questionnaire deserves a separate discussion.

For this reason, the initial questionnaire tends to analyze the "predisposition" to student learning. By this term, we mean those factors or beliefs that influence the evaluating subject. Does the student believe that learning can influence their intelligence? Does the student believe that effort, rather than innate abilities, is the foundation of personal success? Does the student want to learn to demonstrate something or to acquire a skill? Finally, is the student convinced that they will be able to perform well in this course?

These underlying elements correspond to the constructs of Mindset, Mastery Goal orientations, and Self-efficacy, providing an interesting overview of the student's predisposition to learning.

The response we can obtain from the data collected in this initial phase is that students in all the courses we have analyzed are highly oriented toward these dimensions. Mindset and Mastery Goal orientation are consistently identified as the most prevalent elements in this phase.

From a conceptual standpoint, we have seen that the two theories share commonalities, if nothing else, by having the same author, Carol Dweck, who can claim authorship, either in whole or in part, of the content. Therefore, students appear convinced of the importance of learning and the willingness to acquire skills. The belief in being able to succeed in the course is also significantly high, which, as research has demonstrated, represents an important predictor of respondent performance.

In this initial phase, there is less information available regarding the course content for evaluation. Initial interest can be sparked by limited information, while the perception of value requires a more complex analysis. Consequently, interest appears to be more present than value in all courses, precisely due to its transient nature.

Interest is an element already present, although it needs to be confirmed over time. The perceived value of what must be learned does not yet appear relevant, except for the Well-being course (AL), which, as one can imagine, may seem to have a more significant impact on an individual's life compared to the other two courses.

The theme of the autonomous choice of the course is also interesting. The results provide feedback in line with the factual situation. The mandatory course (Master Game, EG) is rated the lowest in terms of autonomy, while the most highly rated is Well-being, which is an elective course. It is worth noting that the other elective course on Learning had a significantly lower rating despite being voluntarily chosen by students. In this case, some factual elements may have influenced the evaluation. Many students were bothered by the Saturday morning schedule and repeatedly expressed a desire to change the course due to the timing. However, the school rules did not allow for changing courses once classes had started.

The perceived level of skills at the beginning of the course is generally lower than other constructs. This could mean, at least for elective courses, that students' choice has

genuinely aimed at an area of improvement. It is more challenging to define whether the low level of skills regarding the BEG refers to the game's mechanisms (which require skills) or an alleged lack of competence given the vagueness of the course title. The final considerations regarding the initial assessment are predominantly oriented towards a strong self-perception, in terms of efficacy and the ability to develop skills. Concerning the course content, there is a greater inclination to assess interest rather than to emphasize the value of the course. In this phase, it is not possible to provide an evaluation of the learning process, and the initial data regarding the value of the free choice of the course will be further explored in subsequent stages.

The data obtained in the second questionnaire move away from individual perceptions of learning abilities but continue to assess perceptions of content, organizational aspects, and the learning process. Regarding the course content, situational interest remains at the same high levels as in the first phase, confirming that the initial feelings of curiosity are sustained as the course progresses. The consolidation of interest brings about increased awareness of the content and, consequently, its value. The value, therefore, appears to strengthen when interest is maintained over time, although it is worth noting that, for the EG, the increases are marginal. In the case of the FL, it is noteworthy that, over a month and a half into the course, the increase has marked a substantial rise.

The theme of metacognition and reflection on the adopted learning strategies is introduced at this stage of the educational journey. These methodological and somewhat self-regulatory aspects of conscientiousness are clearly more fragile than other elements supporting learning. The case of metacognitive aspects in the Active Learning course is evident, providing a score significantly worse than all others collected in all questionnaires. In general, the constructs analyzed halfway through the course demonstrate a decline compared to the initial motivation. It would be hasty to attribute the decline exclusively to the self-regulation factor because other constructs present in the first questionnaire also show a decline.

12 CONCLUSIONS: MAJOR FINDINGS, LIMITATIONS, FUTURE DEVELOPMENT AND PRACTICAL APPLICATIONS

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12.1 REFLECTIONS FOR REINFORCING THE CREDIBILITY OF THE STUDY

In this final chapter of the research, before addressing the conclusions, we will reflect on major findings of this research, the limitations that have emerged in the present study, identify areas for future development, and propose practical applications in management science. This reflection is essential for reinforcing the credibility of the study and evaluating its internal and external validity.

Internal validity refers to the extent to which the results of the study can be attributed to the variables examined rather than to external factors. External validity, on the other hand, concerns the generalizability of the results to other contexts and populations. Understanding these aspects helps determine how representative and applicable the results are in different situations.

While, as we shall see, this research requires significant methodological improvements, we believe that the overall approach is valid and can serve as a precursor to further in-depth studies. This process of identifying unexplored or underexplored areas can

stimulate additional research, contributing to a more comprehensive and detailed understanding of the phenomenon studied.

Finally, we will propose some practical suggestions and actions that educators, policymakers, and other stakeholders can use to implement strategies being aware of the potential limitations and optimal conditions for applying the results.

12.2 LEARNING WHY TO LEARN: MAJOR FINDINGS

This thesis aims to analyze the elements that support the motivation to learn. In doing so, we start from a sense of urgency. The world is accelerating and requires constant updating of skills, without which there is a real risk of losing professional competitiveness in the job market.

To achieve this, lifelong learning is necessary. However, learning is changing in both the production and circulation of content and the learning experience itself. This change impacts all stakeholders involved. This transformation brings with it reflections on the capacity to embrace and adapt to new technology. The experience is becoming increasingly individual and sometimes isolated, transforming the classic role of the learner.

We refer to pedagogy when a teacher instructs a child, and we talk about andragogy when a teacher guides adults through a learning experience. Today, we speak of heutagogy to describe autonomous learning experiences in which individuals feel capable of identifying content and learning paths.

This research aimed to analyze the individual's motivation to learn in light of the growing need to acquire and update their competencies and skills. The major findings that emerged are as follows.

Hypothesis 1

The development of a measurement system that considers different theoretical approaches is certainly improvable, but the results provided are still interesting. The constructs that share the perception of each individual's success in learning (growth mindset, self-efficacy, mastery goal, and expectancy constructs) appear to be the pillars of motivation, particularly the questions on self-efficacy and growth mindset constructs.

Growth mindset, as we recall, pertains to the belief that learning will improve our intelligence, allowing us to grow, while self-efficacy relates to the confidence, we have in our ability to learn and is a predictor of performance.

Perception of content is equally important, starting from the initial impression. If a course interests and intrigues us (interest), we will tend to increase the value (value) we assign to the content. If this interest persists, we will consider ourselves intrinsically motivated and will want to participate in similar courses (intrinsic motivation).

Autonomy is the most important construct of self-determination in supporting motivation. The perception that what we do is the result of our own choice and not imposed impacts the Value and Interest of the contents. Somehow, if it is our choice, what we learn will seem more useful and enjoyable.

Individual abilities to support learning by choosing correct strategies and defining clear steps (metacognition and goal setting) appear fragile, which seems to have a negative effect on the effort one is willing to make. Therefore, self-regulation issues need to be strengthened as they do not support motivation adequately.

Hypothesis 2

The constructs related to personal perception of learning and the value we assign to what we need to learn primarily support motivation. Learning is an ongoing process (growth mindset) with the goal of acquiring skills (goal orientation). We are capable of completing this process (self-efficacy), and it will yield excellent results (expectancy). Supporting these beliefs means supporting the motivation to learn.

Hypothesis 2 also serves to prioritize the actions to be taken. Are there theoretical constructs that have a greater impact or, conversely, require more focus? As mentioned, emphasizing the importance of learning and strengthening the individual's belief in their own ability to achieve a result, and secondly, making the content interesting, will increase the perception of its usefulness and the enjoyment of learning it.

Hypothesis 3

Technology, teaching methods, and organization impact the motivation to learn. Their impact is not linear. Excessive use of technology, either in terms of the number of hours (Flipped Classroom) or the percentage of time compared to the course (Educational Game), has a counterproductive effect; the best results appear where the use of

technology is diversified and not excessive. The same can be said for the appreciation of teaching that uses multiple stimuli, including multimedia, to keep the audience engaged. For this reason, the Active Learning approach seems to achieve the best satisfaction and results.

The following pages will explore these major findings in more detail, examining their implications and practical uses. Future developments and management practices are closely connected to these insights, offering ways to boost learning motivation. The encouraging results from this research indicate many opportunities for further study and improvement.

12.3 RESEARCH LIMITATIONS

12.3.1 Sample Size and Composition

The study was conducted with a sample of 139 fifth-year students from a business school in France. As previously discussed in the validation of Hypothesis 1, this relatively small and homogeneous sample limits the generalizability of the results. As emphasized by Creswell and Creswell (2017), "a small sample size can reduce the statistical power of the study and limit the generalizability of the results." This suggests that researchers should consider using larger and more diverse samples to enhance the robustness of their conclusions. Furthermore, as noted by Patton (2002), homogeneous samples, composed of participants with similar characteristics, can limit the study's ability to represent the diversity of the general population, thereby reducing the external validity of the study.

For these reasons, it is necessary to improve the sample size and composition to enhance the study's validity. As we have observed, a sample that is too small may not provide the necessary statistical power to detect significant effects, while a sample that is too homogeneous may not reflect the diversity of the target population, negatively influencing the generalizability of the results.

12.3.2 Contextual Limitations

The research was conducted in a limited context. Although IESEG Business School is a renowned institution within the French educational landscape, it remains confined to the scope of French business schools. As a result, it may not fully capture all the dynamics of learning motivation present in other educational contexts or industrial sectors. Contextual constraints refer to the limits imposed by the specific characteristics of the study environment, such as the educational or professional setting, which can influence the research results (Stake, 1995).

The specific teaching methods examined (Flipped Classroom, Active Learning, Educational Games) may not be exhaustive. Considering other pedagogical approaches used in different fields or levels of education would reduce the limitations arising from examining a specific context. These limitations highlight the necessity of replicating studies in diverse settings to confirm the results (Yin, 2009.

Even within the same business school, varied contexts could be analyzed, such as including Executive MBA programs, where participants have substantial professional experience and could add value to studies in Management Science. However, this might reintroduce the limitation of a too-small sample size, as discussed in the previous point.

12.3.3 Cultural Factors

The cultural context of the participants, primarily French business school students, might influence their responses and experiences with different teaching methods and technologies. Intercultural studies are necessary to understand how cultural factors impact the motivation to learn and the effectiveness of various pedagogical approaches. Cultural factors refer to the cultural characteristics that influence how people learn and behave. According to Hofstede (2016), cultural differences can determine how students interpret and respond to teaching methods, thereby affecting their motivation to learn. Triandis (1995) emphasized the importance of understanding these cultural variables to develop effective educational approaches that are culturally sensitive. Although the sample included students of different nationalities, this intercultural analysis was not

highlighted, as most non-French respondents were in the Learning course, whose number of respondents was not considered significant.

In summary, it is crucial for future research to conduct intercultural studies to understand how cultural factors influence the motivation to learn and the effectiveness of various pedagogical approaches.

12.3.4 Self-Reported Data Bias

Data collection in this research was conducted through self-reported questionnaires. Self-reported data are information provided directly by participants about themselves. This method can expose the research to response bias. Response bias occurs when participants may be inclined to respond in a socially desirable manner rather than honestly, with a tendency to see themselves from the audience's perspective (Wells, Clark, & Ahmad, 1998).

According to Podsakoff et al. (2003), to mitigate the effects of biases associated with self-reported data, data triangulation methods should be used. In addition to the aforementioned social desirability bias, where participants tend to provide responses, they believe are socially acceptable, there is also memory bias, where participants may not accurately recall their past experiences. This could lead to confounding, resulting in an underestimation or overestimation of the evaluated outcomes. Future studies should incorporate a combination of quantitative and qualitative methods, including observational data and interviews, to triangulate the results (Hammerton & Munafò, 2021).

12.3.5 Temporal Limitations

An additional point of consideration concerns the administration of the questionnaires. As we have illustrated, three sets of questions were administered to students at three different times (beginning, middle, and end of the course), which might not provide a complete picture of fluctuations in motivation over time. Cross-sectional studies, like the one utilized, focus on a specific moment in time, providing a "snapshot" rather than a dynamic view. In contrast, longitudinal studies follow participants over extended

periods, observing variations in behaviors and perceptions (Tashakkori & Teddlie, 2003).

Singer and Willett (2003) emphasize that longitudinal studies provide more robust and reliable data for analyzing changes over time compared to cross-sectional studies, which might miss critical information about change processes. Longitudinal studies allow researchers to track how motivation evolves in response to various educational interventions, providing a deeper understanding of the dynamics at play.

A future application of longitudinal studies would thus allow for a more comprehensive understanding of how motivation evolves over time in response to different educational interventions.

12.4 FUTURE DEVELOPMENTS OF THE RESEARCH

Numerous potential developments stem from this research. We can differentiate future developments into three dimensions: strengthening and consolidating the current research results, identifying new research directions, and pinpointing specific areas for further exploration.

12.4.1 Strengthening and Consolidating the Current Research Results

In light of the research limitations, it is necessary to reinforce the scientific method adopted to achieve a more robust psychometric evaluation of the tool used. Additionally, the concept of individual motivation to learn can be expanded through an analysis that further explores the acceptance of technology and the teaching methods utilized. These considerations remain within the initially identified scope.

Broad topics that can be addressed include the "how" and "what" of learning. The starting point of this research was dedicated to verifying the variation in motivation among individuals during the learning process. This focus remains on the individual within the learning journey.

12.4.2 New Directions in the Theme of Learning Motivation

In this research, we included variables related to technology, teaching methods, and course organization in Hypothesis 3 to verify if the perception of these variables impacts the motivational level of students. These variables pertain to the course modalities that are beyond the learner's control. Using a similar approach, we can investigate whether there are motivational differences in studying soft or hard skills and verify what motivates students during the course. Here, the focus shifts to the "content" dimension to study. It is not about the perception of what is learned but the differentiation of motivational levels based on the type of content.

Another direction that the research could take is focusing on the characteristics of the learner (the "Who"). We have seen that the sample composition needs refinement, but segmenting the type of learners, whether they are in companies or educational institutions, involving interns with significant professional experience, could undoubtedly be beneficial.

Reflecting on the characteristics of the individual learner leads us, at the conclusion of this research, to address a theme mentioned at the beginning: how generations face technological evolution and the emergence of new skills required by the labor market. How do age (the "when") and the level of acquired education influence the ability to successfully undertake upskilling and reskilling courses? Is there a relationship between the awareness of acquiring new skills and the motivation to learn? It could be interesting to verify this among employed individuals and those actively seeking employment.

Lastly, we consider the “where". Is there a difference in individual learning in different business models? What are the motivational ingredients in public companies, the manufacturing sector, technology, services, and consulting? We know that there are professions for which continuous updating is indispensable, even before the technological acceleration, such as the medical profession. Other professions have varied degrees of professional development needs and a lesser sense of necessity. Focusing on this topic could help understand how some professions maintain the urgency for professional development compared to others.

12.4.3 Specific Developments in the Theme of Learning Motivation

In a world where skills and training needs are constantly evolving, capturing the learner's attention is crucial. The "why" of learning today is often highlighted within the first few seconds of an online course. This should reinforce concepts of need, value, and interest in the subject matter. It would be interesting to understand whether courses that explain the "why" at the beginning achieve better results in terms of both effectiveness and satisfaction.

Training needs are discussed between managers and employees as part of the performance evaluation process. Sometimes, these needs are presented as tools to bridge a gap, while other times they are framed as development tools for future positions. The topic is often addressed alongside performance. Some companies, however, tend to separate the performance process from resource development, identifying a distinct moment for the latter. Training is then addressed from a growth perspective and as part of comprehensive feedback to the employee. The question we would like to address is whether separating the two processes and explaining the training needs has a significant impact on the motivation to learn. The author believes it does, as it relates to the needs and self-determination of the individual.

Finally, a consideration on skill acquisition in processes where motivation may be partial or inconsistent. It has been noted how statistics indicate that the completion rate of online training courses is lower compared to in-person courses. An interesting analysis would be to understand whether the decision to abandon an online course is due to the perception of having acquired the necessary skills or other factors. This reflection could lead to rethinking training measurement systems, not based on course completion but on the skills acquired.

12.5 PRACTICAL APPLICATIONS

The practical applications derive from the major findings discussed at the beginning of this chapter. Many interesting points have emerged: on one hand, the importance and interconnection between growth mindset and self-efficacy; on the other, the perception

of content that amplifies its value and motivation from the start. We have described the benefits of feeling autonomous in choosing the course, but also the challenges in implementing structured actions that support motivation.

All this pertains to actions that support individual motivation, and in this regard, we will discuss some practices that can support these findings. We will then move on to consider what interventions can be made in training design to support learning.

We will provide some guidelines that can be useful for those who design policies or training interventions. Finally, we will reflect on how the organization can act to support the motivation of individuals.

So, what actions should be taken to increase the motivation to learn among individuals in both academic and professional settings? To answer this question in light of the study conducted, we will adopt a bottom-up approach, starting with the individual and their needs, focusing on the value of the content and how it is presented, and involving the organization to make the need for learning a part of the corporate culture.

12.5.1 Individual Motivation to Learn

12.5.1.1 Supporting a Growth Mindset and Self-Efficacy: the Role of the Manager and "Not Yet" Feedback

If a company implements training interventions aimed at creating awareness of lifelong learning, it means conveying a message that skills are not acquired through a single act but through a continuous interest approach. Learning is a lifelong journey.

Managers play a crucial role in this process. They must be able to explain the reasons for participating in training interventions and provide constructive feedback, signaling that the learner is on the right path. The concept of "Not Yet" feedback, which emphasizes that while a skill may not have been mastered yet, it can be achieved with time and effort, supports a growth mindset. This type of feedback fosters resilience and continuous improvement, encouraging individuals to persist in their learning endeavors.

Individuals need to be directed towards continuous skill development and encouraged in the progress they are making. Constructive feedback that can balance what has been

achieved with what is yet to be done is essential. Carol Dweck emphasizes in her scripts the importance, especially in primary education, of refraining from judgments about individuals and instead focusing on the journey undertaken and what remains to be accomplished. (Dweck, 2010).

This approach should also be employed in adults, both in higher education institutions and in the workplace. Constructive feedback employs terms like "not yet" to convey that learning is a process, and the goal (which will be reached) is only a matter of time and effort.

In this context, the role of the Manager becomes essential. Too often, the learning process focuses on the learner, the instructor, and the event organizer, without considering the role of the learner's manager. Knowing how to illustrate the reasons for a training intervention and giving constructive signals that the learner is on the right path provides the necessary motivation to build confidence in the learning journey.

12.5.2 Promoting the Value and Interest of Contents to be Learnt

Today, both in corporate training and in universities, there is a tendency to bring too many contents into the classroom because they are considered important and urgent. However, this is not an approach aimed at strengthening motivational aspects; on the contrary, it is a boomerang, as contents require teaching methods and organization.

12.5.2.1 Generating Interest in Learners

What matters is capturing people's attention to the content, fostering interest and curiosity. It's not about trivializing the value of teaching into mere marketing but finding tools that spark the interest of learners.

If we observe today's training offerings on major platforms like LinkedIn Learning, Coursera, or Udemy, we can see that each educational path is introduced by a brief teaser explaining why the course people are about to take is important. The dynamics these platforms follow are aimed at arousing interest in learners, encouraging them to embark on the learning journey. While these brief introductions don't guarantee the entire course will be completed, they still stimulate further exploration. They work on the initial interest dimension, which will gradually be consolidated.

In both schools and businesses, it becomes necessary to change models of educational offerings, enabling those who choose to have greater awareness of the utility of the skills (both hard and soft) they will acquire. The generation of teasers or promotional trailers about the main content could convey a message that qualifies both the academic and professional quality of the content. This would further promote corporate (or educational) learning platforms to generate curiosity about the modules contained within or to allow people to enroll if in-person training is planned.

12.5.2.2 Fostering Autonomous Choices

Interest generates a choice, and the perception that the choice of content appears as an autonomous decision of individual is a significant step that contributes to the effectiveness of learning. As we have seen, feeling like the author of the choice, rather than feeling obliged to choose, entails numerous advantages. Firstly, it increases interest in the content, thereby enhancing its importance and utility. An interested person will find learning more enjoyable and will be less tempted to abandon it, as they are motivated.

Technology, particularly A.I., can provide intriguing solutions by offering a sense of control and autonomous content choice for the learner. For instance, LinkedIn Learning employs an algorithm to suggest potential courses that align with the learner's interests. It operates both as a reinforcement of previously acquired skills and in terms of providing a sense of control over one's choices (Spirgi & Tronsberg, 2022). Achieving similar results in corporate Learning Management Systems (LMS), even with sophisticated A.I. algorithms, is more complex. If the information provided to the algorithm (such as the content of each module) is not adequately supplied or if the quantity of courses integrated into the system does not reach a relevant critical mass, the potential of A.I. cannot be fully appreciated by the collaborator or student.

Recognition and appreciation tools for the choice would be desirable. Offering digital badges or congratulatory emails for choosing the course are certainly more motivating than a mere confirmation email. Moreover, they represent tools to confirm the importance of learning for the institution or company, in line with the principles of Lifelong Learning.

12.5.3 Designing Training Interventions to Support Motivation

12.5.3.1 Teaching Methods

The study has shown how the variety of pedagogies used has been perceived as a stimulus by students. Forms of Active Learning are also utilized in the Flipped Classroom, where the interaction between students and professors occurs in an experiential context. The experience relies on variety, even though in the long run, this has been considered too demanding. Taking into account that the duration of the course should be considered a potentially critical element, attention shifts to the pedagogical design of courses.

This theme represents a real challenge since most courses still appear to be structured in a classic, didactic manner with limited use of engaging tools. An interesting journey has begun, and the significant resources that companies can deploy to involve training professionals have not generated a culture of pedagogical innovation. Conversely, simulation games, innovative pedagogies (such as Flipped Classrooms), and digital interaction tools are used significantly in schools, especially in business schools, preparing students with more sophisticated tools than those they will encounter in the corporate world.

This prompts a broader reflection. The possibility of intensifying knowledge exchanges. While business schools are always seeking industry testimonials to integrate into their programs, companies must take an interest in the new pedagogies introduced in educational institutions. Gamification dynamics, for example, represent a tool supporting learning motivation and should therefore be considered central in the development of future pedagogies.

12.5.3.2 Adoption and Calibration of Technology in Learning

The variation of especially digital pedagogies can help engage, particularly in the business setting, the new generations of professionals. Multisensory learning models illustrated by Gardner (1993) such as multiple intelligences have been widely debated regarding the real effectiveness of individual sensory preferences in learning. Regardless of this discussion, which goes beyond the core of numerous debates on the

actual effectiveness of individual sensory preferences, these approaches remain essential in defining that multisensorial exists and how it can have valid effects on the class by keeping attention alive. In this sense, Fleming & Mills' (1992) VARK model appears less contested than Gardner's work, defined as a neuromyth (Geake, 2008; Howard-Jones, 2014; Rogers & Cheung, 2020).

We can, therefore, set aside the issue of individual sensory preferences because the recommendation is to use them all to increase engagement and, consequently, attention. The theme of varying pedagogical tools appears central. Technology, although appreciated, appears more fragile in terms of appreciation if does not change. As seen in the case of the Educational Game, the constant use of the same technology (simulation platform) for several consecutive days did not contribute to the appreciation and motivation of the course. On the contrary, motivation increased when students abandoned the gaming platform to give a final presentation on the game strategy used.

Today, rather than pursuing theories on multisensory learning, the focus is on the multimedia approach to learning as theorized by Mayer (2009). This approach enhances engagement, comprehension, active learning, and supports memory processes. Mayer's theory suggests that combining text, images, video, and audio can significantly improve the learning experience and outcomes by catering to different learning styles and providing multiple channels for information processing.

That finding requires a substantial change in approach. When we design interventions, we should use multiple tools to vary the pace of study, sensory stimuli, in such a way as to maintain motivation, attention, and, of course, the interest of participants.

12.5.4 Help Learners to Learn (Reinforce Self-Regulation)

If the research underlying this thesis can be summarized as learning why to learn, we have also analyzed some theoretical constructs that concern the ways of learning, what we can define as learning how to learn. In the earlier chapters of this book, a digital product, a MOOC, was mentioned, which was highly successful due to its attractiveness and the fact that it was completely free. It consisted of a series of video lessons on the theme "Learning How to Learn." The fact that such a theme attracted millions of people

to follow its lessons demonstrates how a study method appears as important as the motivation to study. This is also considering the fact that the older generations, in particular, have a greater need to find the best ways to reform their skills and not lose professional competitiveness.

Business schools are adopting tools to favor the learning modalities for students. Applications for peer assessment, spaced repetition for memorization have recently been introduced to make the memorization of concepts easier, using principles connected to the science of learning. Tools of this kind are more readily accepted in a business school compared to a workplace. They require discipline, concentration, and a goal-oriented learning approach, which is undoubtedly more identifiable in an educational institution than in a workplace. They may contribute to reduce the perception of effort required, making the learning process more “user friendly”.

In companies, it is necessary to act simultaneously on motivation and learning modalities, reinforcing, as mentioned earlier, the sensitivity to lifelong learning as an indispensable element of every professional career, akin to the growth mindset inherent in each individual. However, initiatives to raise awareness about professional development need to incorporate new pedagogies, new technologies, and tools to facilitate the cognitive process, also acting on the conscientiousness, perseverance, and resilience of learners.

12.5.5 Promote Motivation to Learn within the Organization

12.5.5.1 Promote the Culture of Lifelong Learning, Upskilling, and Reskilling

In the initial chapters of this research, we discussed the increasing needs that a rapidly transforming world imposes on society, academia, and the workforce. In the face of this sudden change and future uncertainty, individuals must understand that the responsibility to be prepared is primarily theirs because it is connected to their market value.

People no longer study solely for a degree and a career, as previous generations did, but must continually update their skills (upskilling) on new technologies and processes. This is, first and foremost, a message of awareness of the need (the "why") that applies

to everyone, especially professionals over 40 years old in the workplace who still have a long professional life ahead of them.

For this reason, companies should reinforce, through general and cultural interventions, the urgency of developing a Lifelong Learning mindset. Training interventions should be designed for everyone and can serve as an introduction to potential upskilling and reskilling paths.

The message must remain constructive and encouraging. Artificial intelligence will automate processes but will also create jobs. The current discussion should not focus on the fear of Chat GPT but on the job opportunities it can create.

12.5.5.2 Attention to Generation Gap

Increasingly HR priorities are addressing how to attract and retain talents from the new generations. This theme appears crucial today for acquiring skills that, especially in corporations, slower to adapt than start-ups, tend to be lacking. These generations now enter the job market prominently, aided by a high demand for labor, and are particularly sought after for their new skills. However, what seems to be underestimated is the vast majority of employees over 40 who have stopped studying for over a decade and are not ready to engage in new professional roles, or who still do not understand that lifelong learning is crucial for them as they are still far from potential retirement.

These generations need to prepare for change, be exposed to reverse mentoring programs with new skills, and be reassured that they will not become obsolete too soon.

12.5.5.3 Growth Mindset as Cultural Value in the Organization

The theme of learning and organization has been widely debated in recent decades through the works of eminent authors such as Senge and Argyris. The relevance of learning is seen both through virtuous processes within the organization and through the role of the leader and their ability to shape the organization around learning. However, it seems that further reflections and actions can be proposed beyond the direct manager's role to that of the leader.

The autonomy of learning choice is linked to perceiving training needs as one's own. Consequently, managerial intervention that can explain the meaning and purpose of training will inherently motivate participants to learn, resulting in tangible benefits.

The ongoing change that all organizations are experiencing appears as another important scenario for the application of what has been discussed in this thesis. Change brings moments of resistance often associated with loss. Having leadership skills in managing change will make individuals with these skills reluctant to adopt new solutions, as their competence-based leadership would be compromised.

It follows that resistance revolves around reasons related to possessed competencies. Learning thus appears as one of the most important solutions for change management and for corporate well-being management.

In the last decade, there has been a growing focus on personal well-being both within and outside of companies. Technological acceleration, social and climatic changes, generational and value differences are creating a complex and fragile world. Human beings are an integral part of this fragility, as more and more adjustments are required. Paradoxically, in an increasingly connected world, individuals are expected to find within themselves the tools to cope with this vulnerability.

Self-motivation and self-management represent the two pillars that enable facing change with energy and method. As discussed, various theories contribute to achieving this. Notably, the theoretical principles of self-determination by Deci and Ryan, and self-regulation by Zimmerman and Pintrich, provide a solid and comprehensive methodological framework for future interventions.

Focusing on communication and content valorization will ensure greater engagement and persistence. These concepts should not remain abstract principles; it's time for human resources and training departments to understand that sensitivity to ongoing transformation, mindset, and learning techniques must be integral parts of corporate training catalogs.

In recent years, a very positive example of cultural change towards learning has been carried out. The transformation of Microsoft from a product company (downloadable software) to a pay-per-use service company (cloud-based business services). Satya Nadella, the CEO who instilled this change in the structure of a trillion-dollar giant, operated on the idea of continuous change, abandoning the notion of looking

distrustfully at the "not invented here" typical of the Seattle giant (Ibarra & Rattan 2019). Nadella's approach has been seen as an example of applying the principles of the Growth Mindset to the modern corporate organization, making it capable of transforming itself successfully in a short span of a few years. A transformation recognized by the theorist of the Growth Mindset, Carol Dweck, along with Microsoft's Chief People Officer, Kathleen Hogan (2016).

The major point of connection that we can glimpse between management sciences and motivation to learn is well summarized on Microsoft's online page dedicated to the philosophy of the corporate Mindset.

A fixed mindset limits personal outcomes by plunging people into a sea of self-doubt. It is a self-fulfilling prophecy that curtails business growth and should never fester anywhere in a business. The 1930s children's book, The Little Engine That Could, teaches readers that anything can be accomplished with an optimistic attitude and determination. This concept is reinforced with the little train chugging up a mountain saying – I think I can, I think I can – I know I can! A growth mindset does the same thing – only better. In business, it encourages employee improvement and doesn't pigeon-hole people with preconceived notions of what they can or can't do. Unlike a fixed mindset, this positivity encourages novelty, which is key to success in business today. A growth perspective empowers employees by clearly defining an objective, business goals, and letting team members run with the challenge. (Microsoft, 2021)

The simplicity and positivity with which the message is conveyed seem the best conclusion for this practical application of Learning Why To learn. The world is constantly changing, but it is up to us to understand that how to prepare for this journey, and it will lead us to discover always new things.

12.5.6 Summary of Proposed Managerial Practices

We believe it is useful to conclude this chapter by providing a summary of the proposed managerial actions and linking them both to the theoretical constructs proposed in this thesis and to the actors responsible for implementing them (Table 12.1).

Table 12-1 Overview of Managerial Practices

	Theorethical reference	Beneficiary	Main action	Responsibility
Improve Motivation via Managerial Feedback	Growth Mindset, Self-Efficacy	Individuals	Feedback Quality	Managers, HR, Professors
Fostering Autonomous Choices.	Autonomy, Value, Interest	Individuals	Artificial Intelligence suggestions	Learning Dept., Manager
Generating Interest in Learners	Interest, Value	Individuals	Marketing of Learning Initiatives	Learning Departement, Trainers
Teaching Methods Innovation	Andragogy, Teaching Methods	Learners (all)	Innovative Teaching Methods	Learning Department, Schools
Calibration Of Technology In Learning	Multimedia approach in learning	Learners (all)	Diversify activities, Blended Learning	Instructional Designer, Pedagogical Dept. In School
Help Learners to Learn	Metacognition, Goal settings	Individuals	Dedicated Learning Programs	Learning Dept, Individuals, Schools
Promote Culture of Lifelong learning	Learning Why to learn	Individual, Managers, Leaders	Awareness Training Program	General Management, HR
Attention to Generation Gap	Self efficacy, Growth Mindset	Individuals over 45 y.o.	Employability awareness training, Self efficacy	HR, Learning Dept.
Growth Mindset as Cultural Value in the Organization	Growth Mindset	Individual, Managers, Leaders	Organization Culture	General Management, HR, Schools

The proposal of these interventions follows a bottom-up logic, starting from the individual and their beliefs (individual level), being attracted by proposed content (content offering and valorization), participating in courses that keep interest alive (teaching methods), knowing how to prepare to perform at their best (self-regulation). All of this must take place within an organization that considers continuous learning a priority for its employees (lifelong learning) and integrates these concepts into its business model (growth mindset within the organization). With full awareness that within the company there are people who have been trained in different eras and have different needs.

12.6 CONCLUSIONS

At the outset of this work, we posed a question: What drives people to learn? We have examined the scientific literature and attempted to take a holistic approach to the various perspectives proposed. The many limitations of this research, most notably the psychometric validity to be reinforced, highlight areas that need further consolidation. Nevertheless, we believe that the study possesses intrinsic validity. It seeks to identify the various elements that motivate us to learn. When students enter a classroom, they bring with them a certain degree of motivation, whether large or small. What comprises

this motivation? Is it how they perceive the subject matter or the usefulness they think it holds for their future? Do they believe they can achieve good grades, or are they convinced that they would grow through the new skills they acquire?

The subject matter to be learned is the same for everyone, but the method of learning may vary, though we do not know this yet. Motivation, however, has already formed and will fluctuate over time. Initial perceptions may diminish or grow stronger. Perhaps the material proves too difficult, causing expectations to wane, or the instructor and teaching methods do not meet expectations. Conversely, motivation may increase as students develop a passion for the subject, something they did not anticipate at the outset.

Throughout this multi-year journey spanning hundreds of pages, we have come to understand that constructs based on the value of education appear to be the most solid. Believing that learning is important is the primary factor in maintaining high motivation to learn. The way things are taught, and the technology used also have an impact, especially if the interactive contributions are varied. This is an area that needs further exploration; it was the only external element to motivation that we incorporated.

The road ahead is long, and the journey has just begun. There are many aspects to refine and explore further, but we believe that a deeper reflection within organizations on not just what and how to learn, but why it is useful, is indispensable.

We need to work on individuals and their awareness, have managers who can encourage them along the way, design well-structured and interactive modules, and foster an organizational culture that promotes the desire to learn and challenge the status quo as a core value.

In a rapidly advancing world, learning is not a choice; it is the path to maintaining one's competitive professional value. If we learn the logic of artificial intelligence, we will ensure that machines understand our logic, not the other way around.

Our research reveals that "Learning Why to Learn" is not merely an enhancement but an essential axis for modern companies. As the world introduces new technologies, behaviors, and mindsets, continuous growth and adaptation become paramount. This is a theme from which no one can escape.

Whether we are addressing seasoned professionals or new business school graduates, a crucial shift is needed. We must view skill acquisition as a journey with a constantly

moving horizon. The desire and individual motivation to keep traveling this path are the essential propellants for tomorrow's professionals.

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15 List of Annex

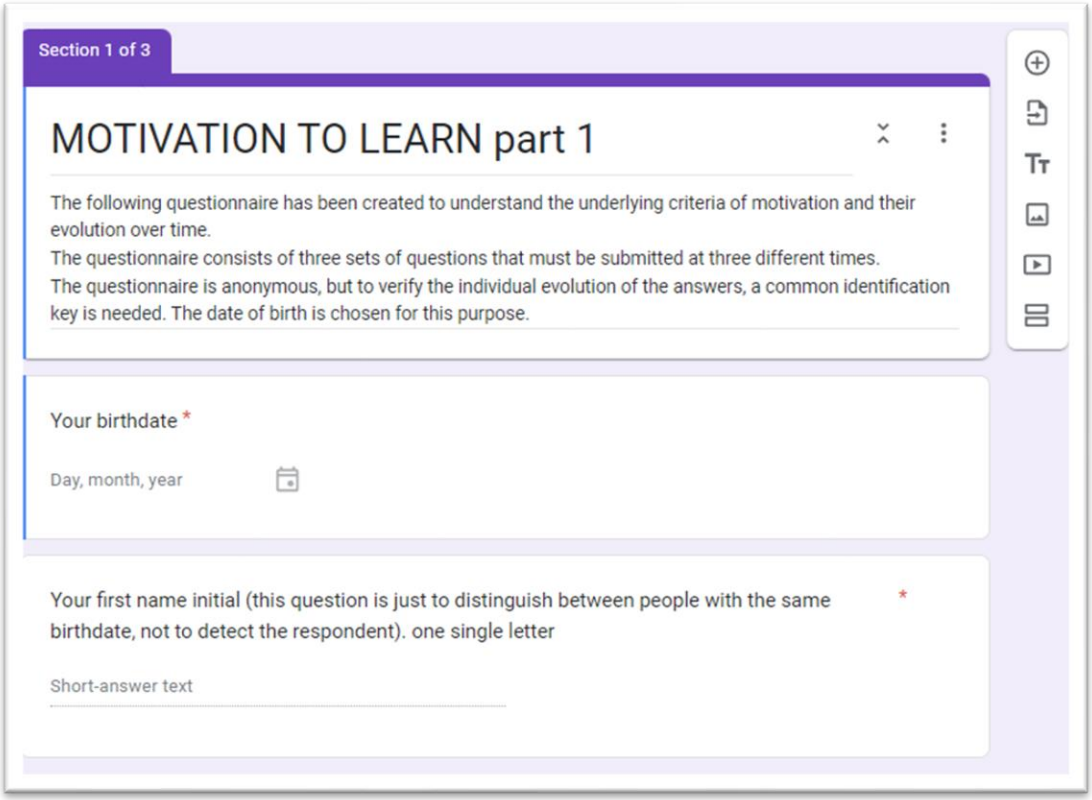
1. List of Questions
2. Motivation to Learn. Questionnaire 1.
   Respondent key identification number and personal data.
   8 questions to be submitted at the beginning of the course.
3. Motivation to Learn. Questionnaire 2.
   7 questions to be submitted at the mid-course (Motivation)
4. Motivation to Learn. Questionnaire 3.
5. List of questions and bibliographic references
6. Selection of question on motivation to learn (sample database)
7. Data collection. General data. All responses per each Pedagogy

1- List of Questions

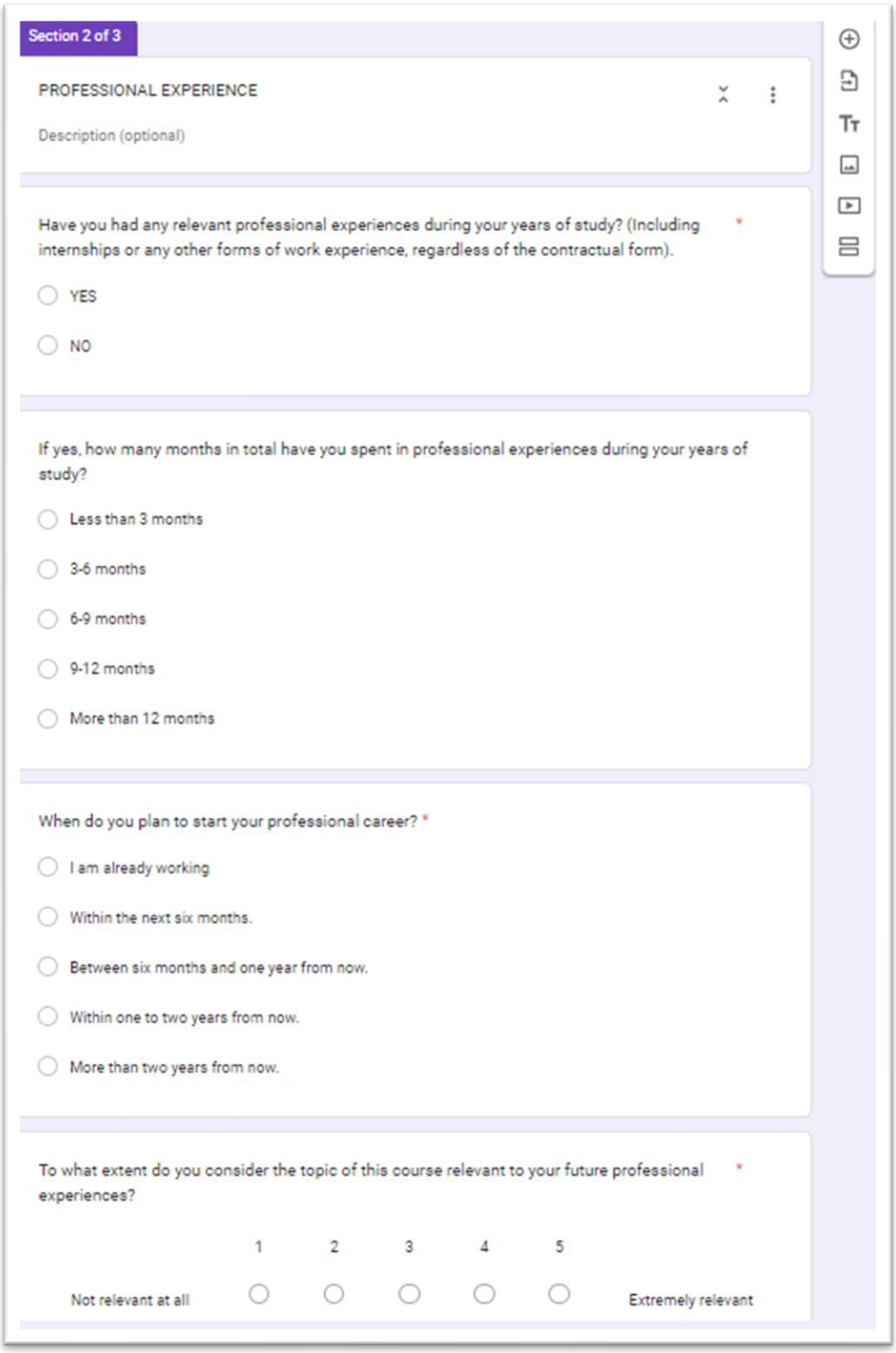
Question 1: “I consider the topic of this course relevant to my future professional experiences"
Question 2: "I believe that my intelligence and abilities can be developed with effort and practice."
Question 3: "I enjoy learning new things and exploring different ideas."
Question 4: "I think that the topic of the course is very interesting."
Question 5 : " I participate in this course because I want to."
Question 6: "I expect to perform well in this course."
Question 7: "I consider myself proficient in this activity."
Question 8: " I can always manage to solve difficult problems if I try hard enough"
Question 9: "I find the topic covered in this subject interesting."
Question 10: "I anticipate achieving an excellent grade in this class."
Question 11: "In a class like this, I prefer course material that challenges me, enabling me to acquire new knowledge."
Question 12: "I recognize the importance of studying this subject."
Question 13: "I experience a sense of belonging and acceptance within my study group."
Question 14 (Reverse): "I often find myself thinking of other things during class, causing me to miss important points.”
Question 15: "I establish goals to effectively manage my study time for this course."
Question 16: "I believe the knowledge gained in this course can be applied to other courses."
Question 17 Reverse: "I lack sufficient time to dedicate to my [insert class subject] class due to other commitments."
Question 18: "I engage in regular self-reflection regarding my goal attainment and performance evaluation in this course."
Question 19: "I regularly evaluate the effectiveness of my study strategies for comprehending the course material."
Question 20: "I find value and meaning in acquiring new knowledge through participation in a group setting."
Question 21: "I feel competent and capable after engaging in an activity for a certain period."
Question 22: "I would willingly engage in the activity again based on its perceived value."

2- Motivation to Learn. Questionnaire 1 (Google Form)

Respondent key identification number and personal data.



Questions about studies



Section 2 of 3

PROFESSIONAL EXPERIENCE

Description (optional)

Have you had any relevant professional experiences during your years of study? (Including internships or any other forms of work experience, regardless of the contractual form). *

- YES
- NO

If yes, how many months in total have you spent in professional experiences during your years of study?

- Less than 3 months
- 3-6 months
- 6-9 months
- 9-12 months
- More than 12 months

When do you plan to start your professional career? *

- I am already working
- Within the next six months.
- Between six months and one year from now.
- Within one to two years from now.
- More than two years from now.

To what extent do you consider the topic of this course relevant to your future professional experiences? *

	1	2	3	4	5	
Not relevant at all	○	○	○	○	○	Extremely relevant

8 questions to be submitted at the beginning of the course. (Google Form)

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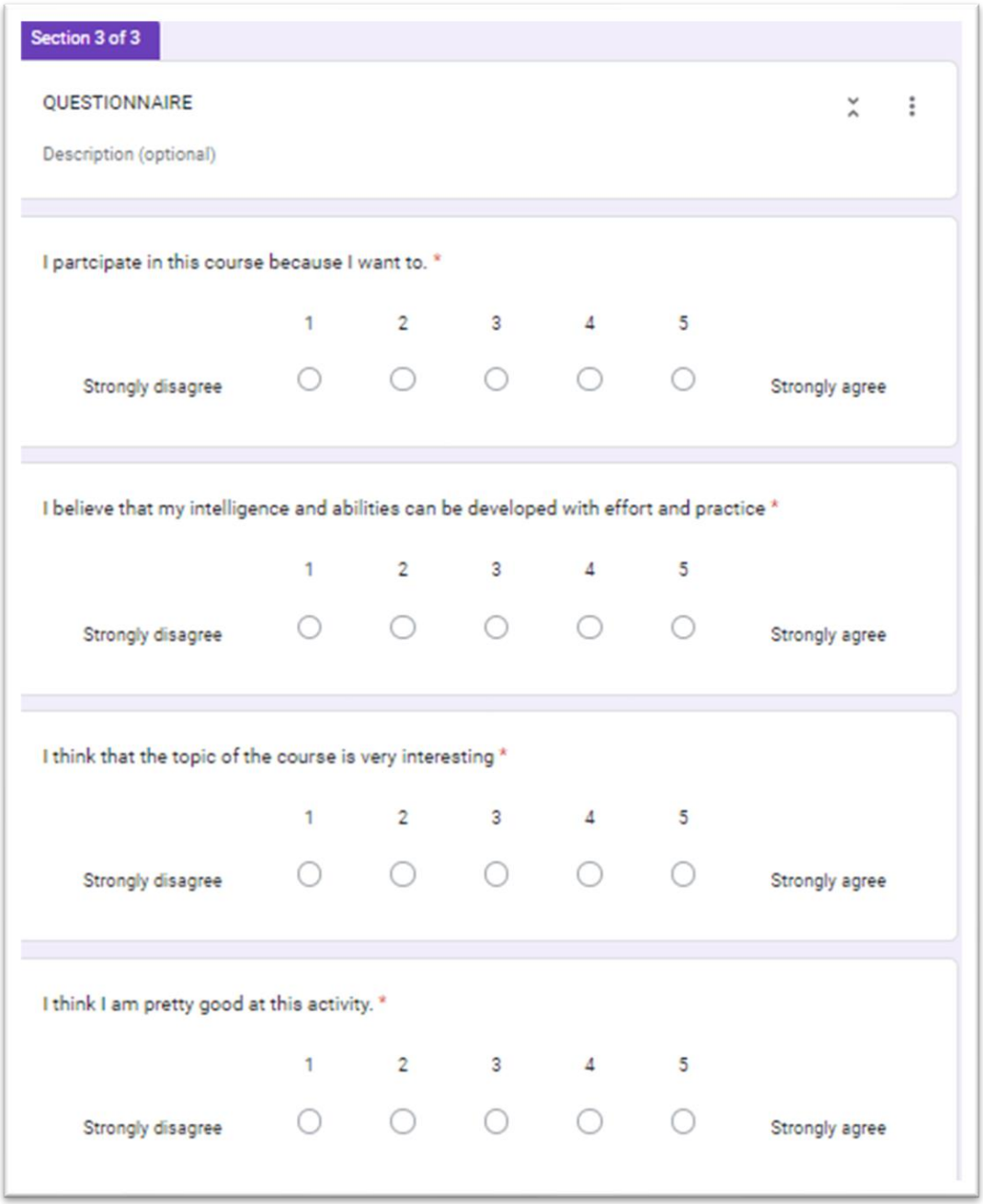
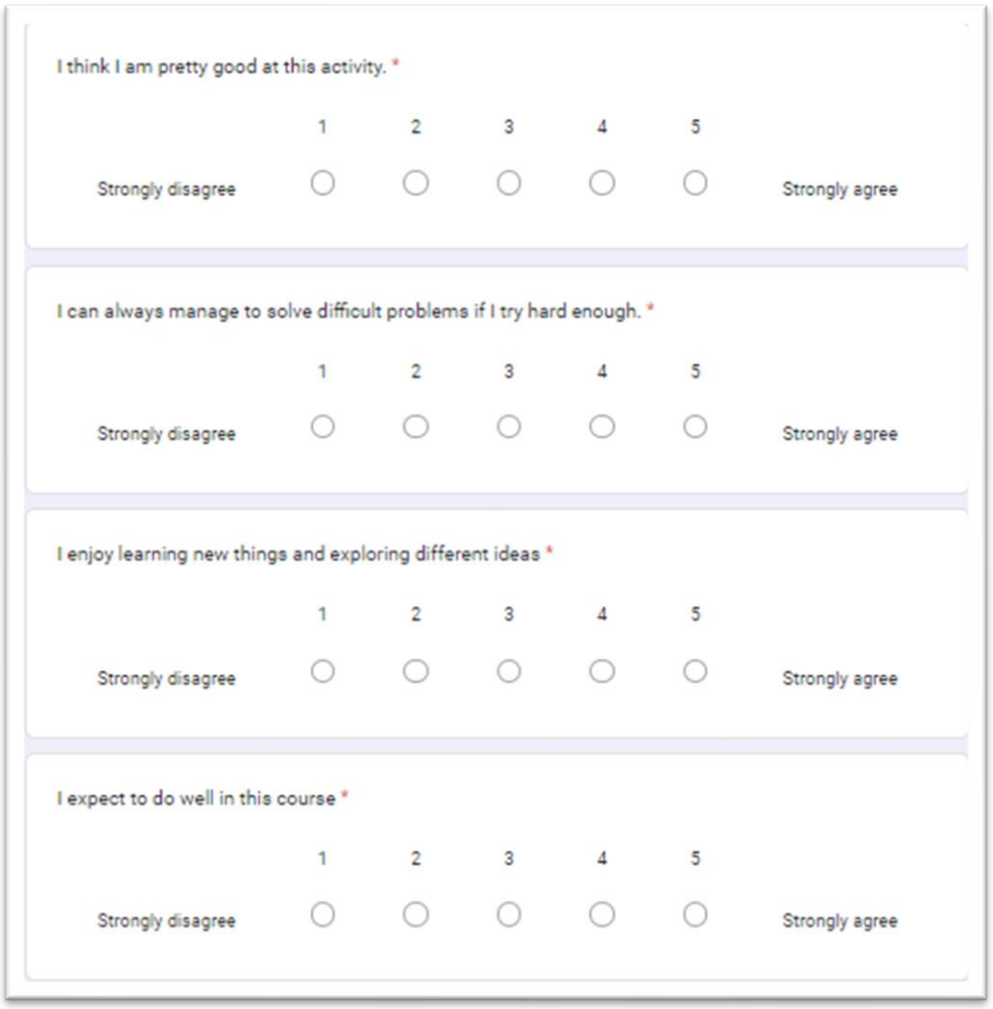




I think I am pretty good at this activity. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I can always manage to solve difficult problems if I try hard enough. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I enjoy learning new things and exploring different ideas *

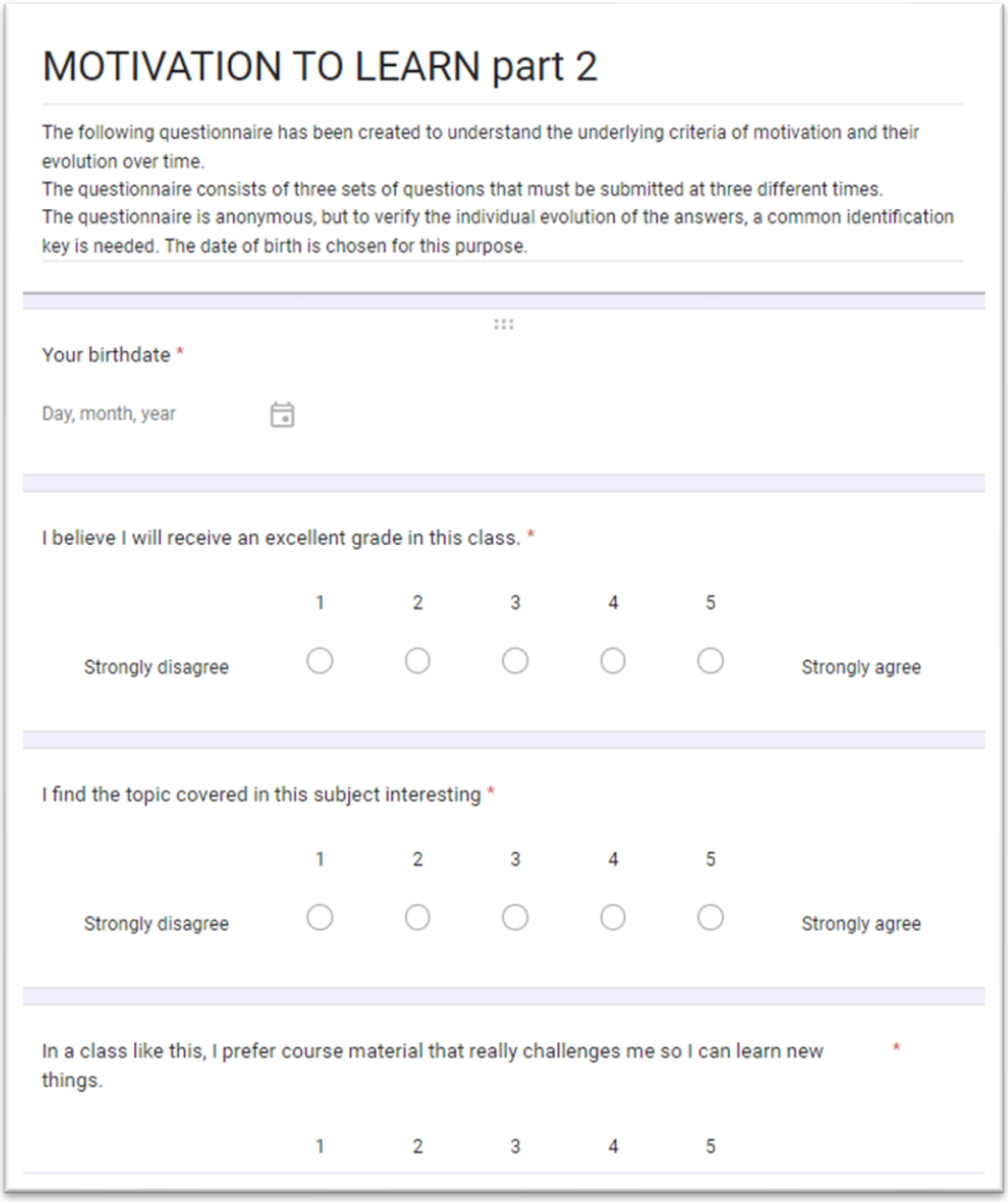
	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I expect to do well in this course *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

3- Motivation to Learn. Questionnaire 2.

7 questions to be submitted at the mid-course



MOTIVATION TO LEARN part 2

The following questionnaire has been created to understand the underlying criteria of motivation and their evolution over time.
The questionnaire consists of three sets of questions that must be submitted at three different times.
The questionnaire is anonymous, but to verify the individual evolution of the answers, a common identification key is needed. The date of birth is chosen for this purpose.

Your birthdate *

Day, month, year

I believe I will receive an excellent grade in this class. *

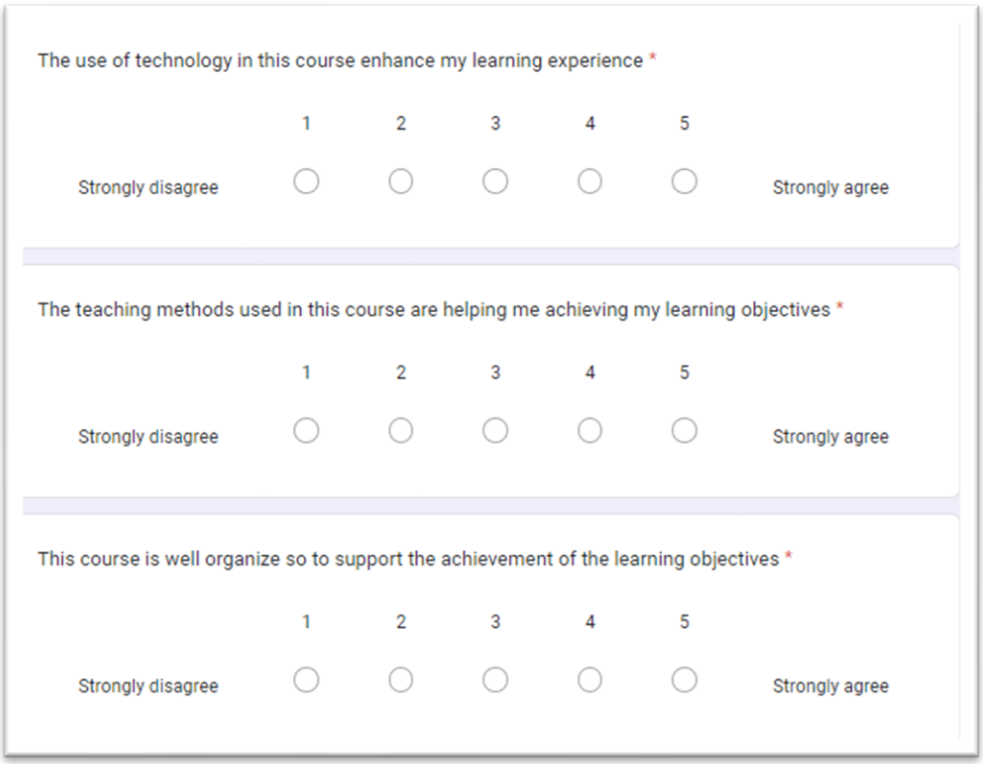
	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I find the topic covered in this subject interesting *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

In a class like this, I prefer course material that really challenges me so I can learn new things. *

1	2	3	4	5



The use of technology in this course enhance my learning experience *

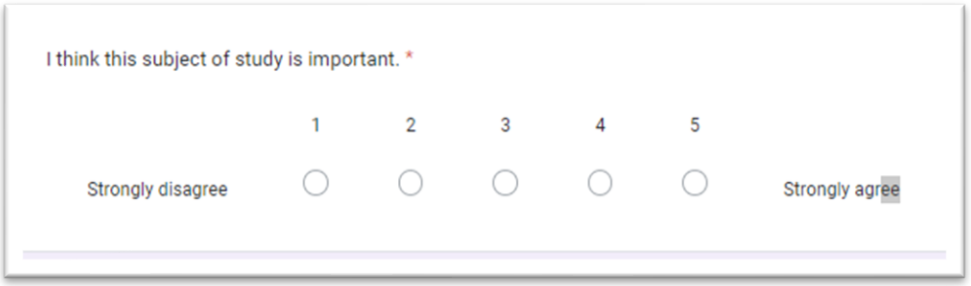
	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

The teaching methods used in this course are helping me achieving my learning objectives *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

This course is well organize so to support the achievement of the learning objectives *

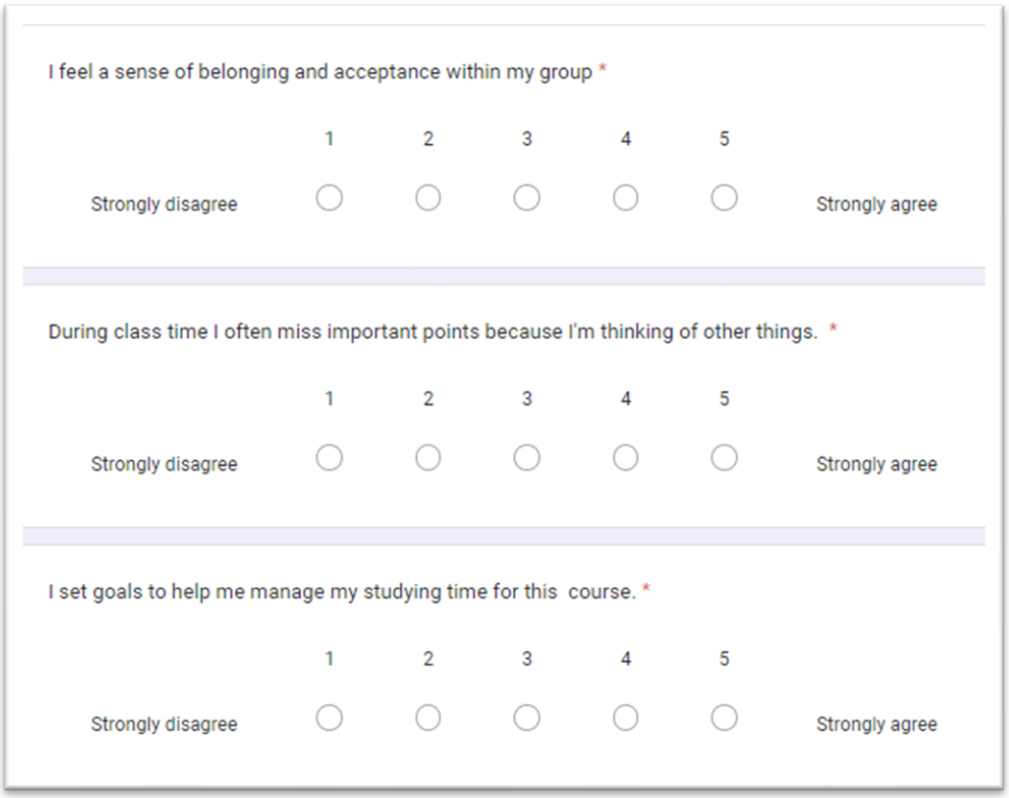
	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree



I think this subject of study is important. *

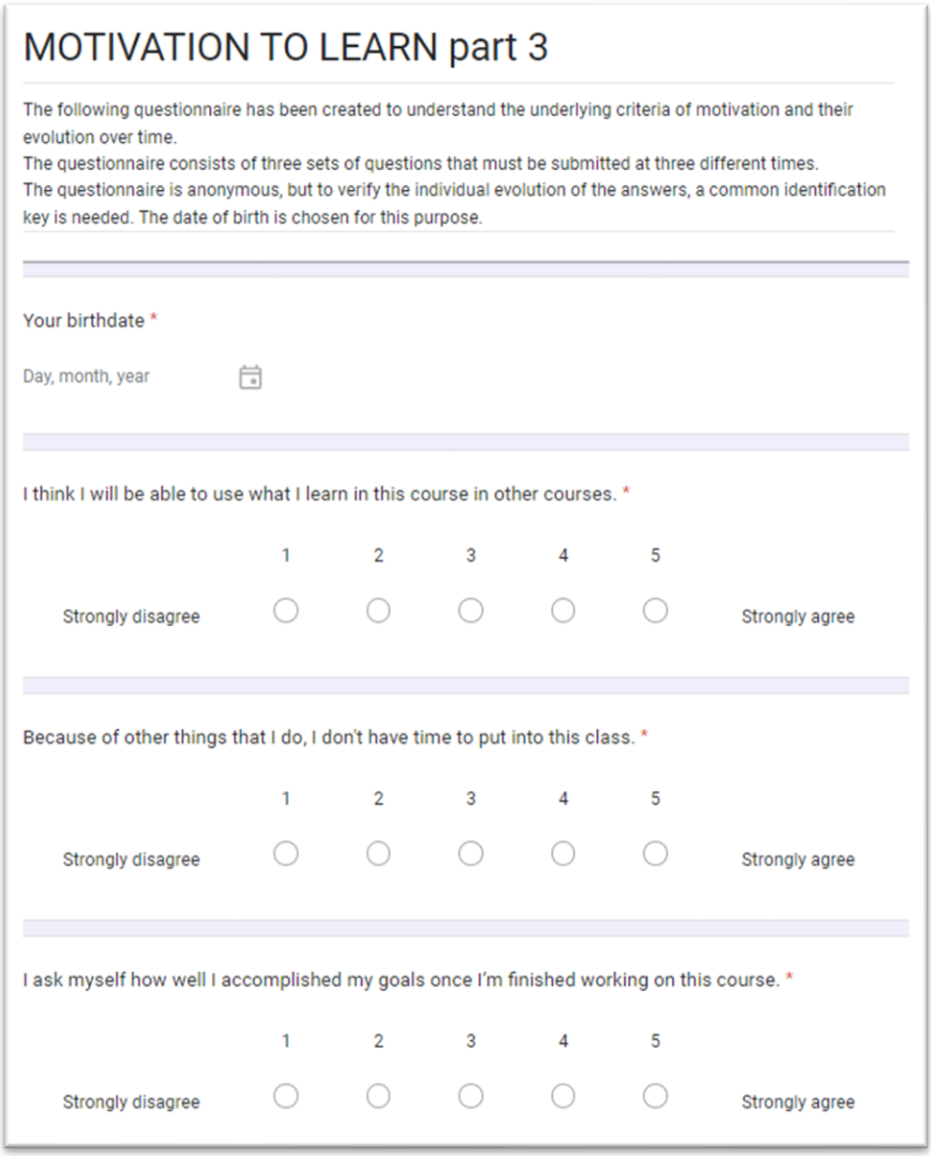
	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

3 questions to be submitted at the mid-course (Technology, Teaching Method, Course Organization)



4- Motivation to Learn. Questionnaire 3.

7 questions to be submitted at the end of the course



MOTIVATION TO LEARN part 3

The following questionnaire has been created to understand the underlying criteria of motivation and their evolution over time.
The questionnaire consists of three sets of questions that must be submitted at three different times.
The questionnaire is anonymous, but to verify the individual evolution of the answers, a common identification key is needed. The date of birth is chosen for this purpose.

Your birthdate *

Day, month, year

I think I will be able to use what I learn in this course in other courses. *

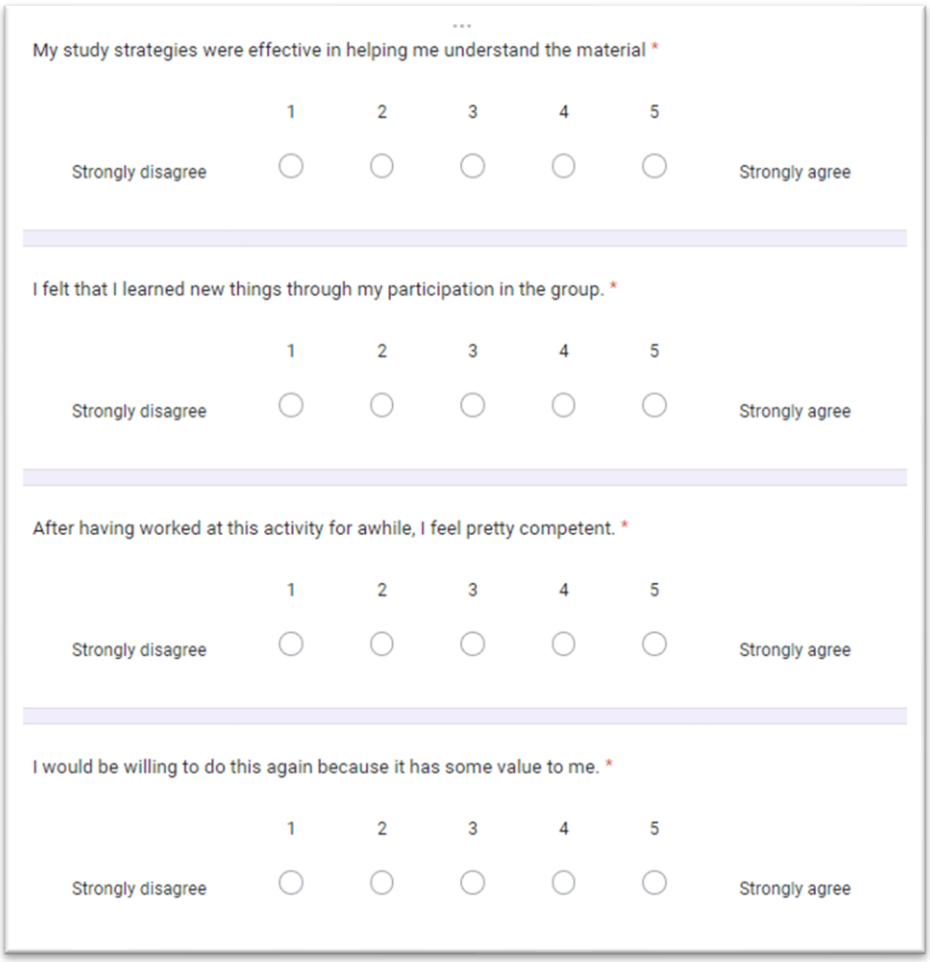
	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Because of other things that I do, I don't have time to put into this class. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I ask myself how well I accomplished my goals once I'm finished working on this course. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree



My study strategies were effective in helping me understand the material *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I felt that I learned new things through my participation in the group. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

After having worked at this activity for awhile, I feel pretty competent. *

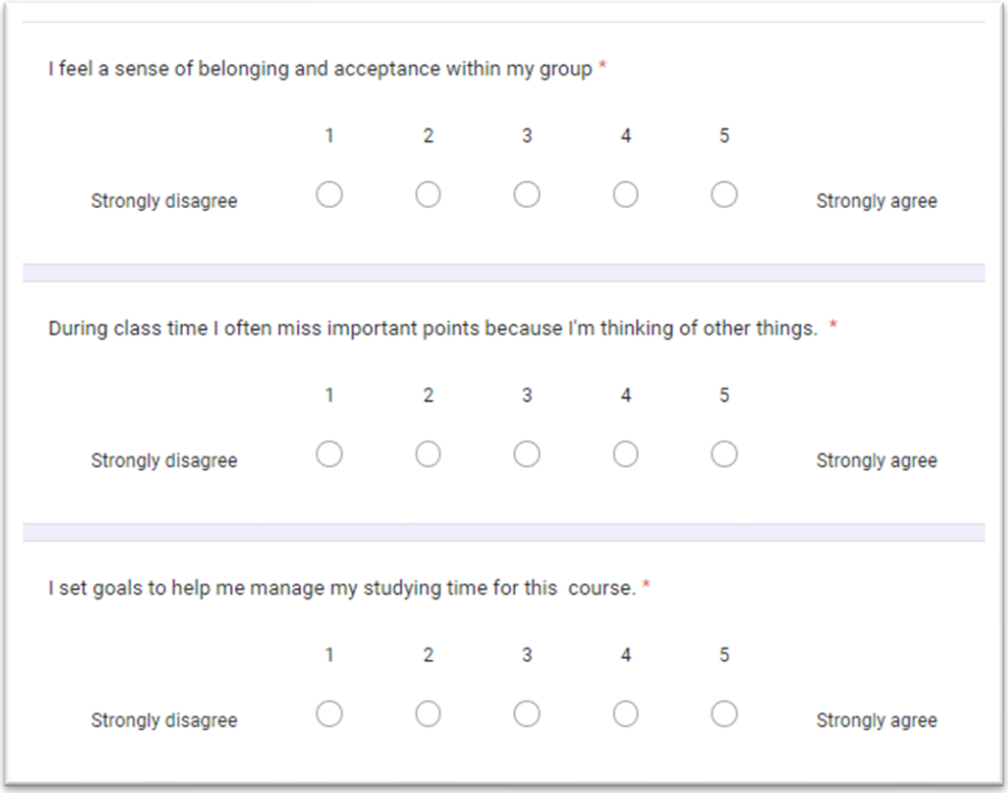
	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I would be willing to do this again because it has some value to me. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

Motivation to Learn. Questionnaire 3.

3 questions to be submitted at the mid-course



I feel a sense of belonging and acceptance within my group *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

During class time I often miss important points because I'm thinking of other things. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

I set goals to help me manage my studying time for this course. *

	1	2	3	4	5	
Strongly disagree	○	○	○	○	○	Strongly agree

5- List of questions and bibliographic references.

Question 1: “I consider the topic of this course relevant to my future professional experiences"

Theoretical Framework: The query delves into the value aspect by assessing an individual's perception of the course content's relevance Expectancy-Value Theory (EVT) posits that motivation is influenced by two primary factors: expectancy and value. Expectancy pertains to individuals' confidence in their ability to excel in a task, while value relates to the subjective significance and relevance they attribute to the task or activity. The following to their future career.

Alternative Query: "I am confident that the knowledge and skills I gain from this course will contribute to my future career growth" or "I can readily connect the course material to my upcoming professional pursuits."

The inclination to regard the course's subject matter as applicable to one's future professional journey signifies that the individual assigns value to the knowledge and skills acquired through the course. This perception of relevance can have a positive impact on motivating individuals. In line with EVT, a higher perceived value of a task or subject often results in heightened motivation to engage with it.

When individuals acknowledge the course content's value for their prospective professional endeavors, it implies an anticipation of tangible benefits stemming from acquiring knowledge and proficiencies in that specific field. This perspective aligns with EVT's value component, underscoring personal recognition of the course content's significance and its potential real-world implications.

Question 2: "I believe that my intelligence and abilities can be developed with effort and practice."

Source: The question is rooted in the concept of mindset, which is derived from the influential research conducted by Dweck and Leggett (1988) in their landmark study titled "A social-cognitive approach to motivation and personality," published in the journal Psychological Review. This study examines how individuals' beliefs about the malleability of their intelligence and abilities impact their motivation and performance.

Theoretical background: this question is crucial for understanding the construct of mindset. It assesses individuals' beliefs regarding the potential for growth and development of their abilities through sustained effort and practice. Having a growth mindset, characterized by the belief in the capacity for improvement, has been linked to increased motivation, resilience, and academic achievement.

Alternative Question: "I believe that my intelligence and abilities are fixed traits that cannot be significantly changed." The alternative question taps into the concept of a fixed mindset, which contrasts with a growth mindset. It reflects the research conducted by Dweck and her colleagues and is consistent with the idea that individuals with a fixed mindset believe that their intelligence and abilities are innate and unchangeable.

Other Sources/Questionnaires: In addition to Dweck and Leggett's work, Carol Dweck's book "Mindset: The New Psychology of Success" provides a comprehensive exploration of mindset and its implications. Moreover, the "Implicit Theories of Intelligence Scale" developed by Dweck, and her colleagues (1998) is a widely used questionnaire that measures individuals' beliefs about the malleability of intelligence. Another relevant source is the "Achievement Goal Questionnaire" by Elliot and McGregor (2001), which assesses individuals' goal orientations, including mastery goals associated with a growth mindset.

By incorporating these additional sources and alternative questions, researchers can gain a more comprehensive understanding of mindset and its various dimensions.

Question 3: "I enjoy learning new things and exploring different ideas."

Source: Elliot, A. J., & McGregor, H. A. (2001). A 2×2 achievement goal framework. Journal of Personality and Social Psychology, 80(3), 501-519.

Theoretical Background: The idea that those with a mastery goal orientation are drawn to challenges and strive for their own improvement is integral to this inquiry, which focuses on the concept of mindset and the pleasure of learning. Those with a mastery-oriented attitude focus on honing their skills, striving for improvement, and gaining new knowledge which results in a heightened sense of pleasure and satisfaction while learning.

Importance: This question holds significance as it assesses individuals' goal orientation and their intrinsic motivation towards learning. Understanding individuals' goal orientations provides valuable insights into their preferences, strategies, and levels of engagement in the learning process. It can also inform educators and practitioners in designing instructional practices and interventions that foster a mastery-oriented mindset, thus enhancing the overall joy of learning.

Alternative Questions: "I find satisfaction in acquiring new knowledge and exploring diverse perspectives." or "I actively seek out opportunities to learn and broaden my understanding."

Other Sources/Questionnaires: Apart from the achievement goal framework established by Elliot and McGregor, the Motivated Strategies for Learning Questionnaire (MSLQ) created by Pintrich and his peers in 1991 is a noteworthy source when it comes to examining achievement goal orientations. Moreover, researchers have taken a look at achievement objective orientations in a variety of educational situations, like the classroom goal structures suggested by Ames (1992) and the 3 × 2 achievement goal model proposed by Elliot and Murayama (2008), delivering alternative views on the concept.

Question 4: "I think that the topic of the course is very interesting."

Source : Linnenbrink-Garcia, L., Rogat, T. K., & Hulleman, C. S. (2010). Measuring situational interest in academic domains. Educational and Psychological Measurement, 70(4), 647-671.

Theoretical Background: The idea of situational interest relates to the current fascination and intrigue felt toward a particular issue. Individuals' personal appraisal of their interest in the topic and their involvement with it is exemplified by situational interest.

Importance: Assessing individuals' perception of the topic's interest in a course is crucial for understanding their level of engagement and motivation. Interest plays a significant role in influencing students' attention, motivation, and depth of learning. By evaluating students' interest, educators can tailor instructional strategies, content, and activities to enhance engagement and create a more captivating learning environment.

Alternative Questions: "I find the subject matter of the course captivating and compelling." "The topic of the course sparks my curiosity and makes me want to learn more."

Other Sources/Questionnaires: Besides Linnenbrink-Garcia et al.'s study on situational interest, there are other sources and questionnaires that have explored the construct of interest in academic domains. For example, the Intrinsic Motivation Inventory (IMI) developed by Deci and colleagues (1994) includes subscales related to interest, providing a comprehensive assessment of individuals' intrinsic motivation and interest in learning.

Question 5 : " I participate in this course because I want to."

Source : Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Springer Science & Business Media.

Theoretical Background: The self-determination theory suggests that autonomy is an integral part of intrinsic motivation, and this question is based on such principles. It concentrates on the idea of autonomy, which is the freedom to make choices and the eagerness to take part in a task or activity.

Importance: Assessing individuals' perception of autonomy in their participation in a course is essential for understanding their level of intrinsic motivation and engagement. Acknowledging the impact of autonomy can help design instruction and strategies that give people the chance to learn on their own, helping them to feel ownership and interest in the course. As individuals have the ability to make decisions and take charge of their learning, they are more likely to have a sense of purpose and be involved in the course.

Alternative Questions: "I feel empowered to make choices and decisions regarding my learning in this course." " I feel a sense of autonomy and choice in participating in this course "

Other Sources/Questionnaires: Apart from Deci and Ryan's research on intrinsic motivation and self-determination, there are other sources and surveys that look into the concept of autonomy and self-determination in the education space. The SRQ-A, created by Ryan and Connell (1989), is an instrument utilized to measure different facets of self-regulation, including autonomy, relatedness, and mastery.

Question 6: "I expect to perform well in this course."

Source: Pintrich et al. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). National Center for Research to Improve Postsecondary Teaching and Learning.

Theoretical Background: This question pertains to the construct of self-efficacy, a concept rooted in social cognitive theory and popularized by Albert Bandura. Self-efficacy refers to an individual's belief in their capability to successfully accomplish a specific task or attain desired outcomes. In the context of learning, self-efficacy signifies a student's confidence in their ability to excel in a particular course or academic endeavor.

Importance: An evaluation of one's own competency is of great importance in comprehending people's inspiration and educational results. If learners have faith in their capabilities, they are more probable to set lofty objectives, put in hard work, remain motivated in the face of difficulties, and utilize efficient studying techniques..

In contrast, lack of self-confidence can have a negative effect on motivation, leading to lack of interest and poor performance. By recognizing students' self-efficacy beliefs, teachers can give specific help, feedback, and assistance, encouraging their assurance and overall educational achievement.

Alternative Questions: "I am confident in my capacity to excel in this course," or "I believe I possess the requisite skills and knowledge to thrive in this course."

Additional Sources/Questionnaires: Beyond the work of Pintrich et al. (1991) and the Motivated Strategies for Learning Questionnaire (MSLQ), other sources and questionnaires are designed to measure self-efficacy in educational contexts. For example, the Generalized Self-Efficacy Scale (GSE) developed by Schwarzer and Jerusalem (1995) assesses individuals' beliefs in their competence to handle diverse demanding situations. Moreover, Bandura's Self-Efficacy Scale (1997) is widely utilized to gauge self-efficacy beliefs across various domains, including education.

Question 7: "I consider myself proficient in this activity."

Source : Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Springer Science & Business Media.

Theoretical Background: This question delves into the construct of self-perceived competence, grounded in self-determination theory. Self-perceived competence pertains to an individual's subjective perception of their capability to proficiently execute a specific task or engage in an activity. This perception closely aligns with intrinsic motivation, as individuals who feel competent in a particular domain are more likely to willingly participate in the activity, experiencing a sense of satisfaction and enjoyment.

Importance: The evaluation of how individuals view their own capability is extremely important in understanding their enthusiasm, involvement, and achievements. When individuals possess a strong sense of self-perceived competence, they are more prone to approach tasks with confidence, persistence, and enthusiasm. Inversely, if an individual believes they are not competent, their motivation will be weakened and could lead to avoidance of activities. It is important for educators to

be aware of their students' self-perceived abilities so they can customize instruction, offer proper assistance, and foster a feeling of achievement and internal motivation. Alternative Questions: "I believe I possess the necessary skills and knowledge to excel in this activity," and "I am confident in my ability to carry out the tasks required for this activity."

Additional Sources/Questionnaires: In addition to Deci and Ryan's work (1985) and their self-perceived competence question, other sources and questionnaires assess self-perceived competence across various domains. For instance, Harter's Competence Motivation Theory (1981) encompasses measures of self-perceived competence in different areas, such as academic, social, and physical competence. Additionally, the Perceived Competence Scale developed by Nicholls (1984) is widely employed to assess individuals' self-perceived competence in achievement settings.

Question 8: " I can always manage to solve difficult problems if I try hard enough"

Source: Zimmerman, B. J. (2000). Self-Efficacy: An essential motive to learn. Contemporary Educational Psychology, 25(1), 82-91.

Theoretical Background: This question is rooted in the concept of self-efficacy, which emphasizes an individual's belief in their capability to perform specific tasks and achieve desired outcomes. Self-efficacy plays a significant role in motivation and learning, as individuals who possess higher levels of self-efficacy are more likely to set challenging goals, persist in the face of difficulties, and engage in effective problem-solving strategies.

Importance: Assessing an individual's self-efficacy in problem-solving is essential for understanding their motivation and learning potential. When individuals believe in their problem-solving abilities, they approach challenges with confidence and are more likely to engage in effortful thinking, strategic planning, and perseverance. On the other hand, low self-efficacy can hinder problem-solving skills and lead to avoidance or ineffective strategies. Identifying individuals' self-efficacy beliefs can inform instructional practices that promote self-efficacy development, provide appropriate support, and enhance problem-solving skills.

Alternative Questions:"I am confident in my ability to find solutions to problems in this activity." or "I believe I can overcome challenges and obstacles through persistent effort in this activity."

Other Sources/Questionnaires: In addition to Zimmerman's work (2000) and the self-efficacy question related to problem-solving, there are other sources and questionnaires that assess self-efficacy beliefs in various domains. For example, Bandura's General Self-Efficacy Scale (GSES) is a widely used measure of individuals' beliefs in their ability to cope with a range of challenging situations. The Mathematics Self-Efficacy Scale developed by Usher and Pajares (2009) specifically focuses on self-efficacy beliefs related to mathematical problem-solving.

Question 9: "I find the topic covered in this subject interesting."

Source: Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. Educational psychologist, 41(2), 111-127.

Theoretical Background: This question draws upon the concept of interest development and aligns with the four-phase model proposed by Hidi and Renninger (2006). The four-phase model describes the progression of interest from situational interest, which arises from immediate curiosity and fascination to individual interest, which represents a more sustained and personally meaningful engagement with a specific topic. This question aims to assess an individual's level of situational interest in the topic covered in the subject.

Importance: Understanding an individual's interest in a subject is crucial for promoting engagement, motivation, and deep learning. When individuals find a topic personally interesting, they are more likely to invest time and effort in understanding it, explore related ideas, and seek out additional resources. Assessing interest can inform instructional design and strategies to make the subject matter more captivating and relevant to students' personal experiences.

Alternative Questions: "The topic covered in this subject holds my interest."and "I am curious and fascinated by the content of this subject."

Other Sources/Questionnaires: Alongside Hidi and Renninger's four-phase model (2006), there are other sources and questionnaires that explore interest development and measure personal interest. For instance, the Situational Interest Scale developed by Schraw and Lehman (2001) assesses the immediate curiosity and engagement experienced in a particular learning situation. Additionally, the Interest-Arousal-Schema (IAS) questionnaire developed by Renninger and Hidi (2016) captures different dimensions of interest, including individual interest, curiosity, and subjective value.

Question 10: "I anticipate achieving an excellent grade in this class."

Source: Pintrich et al. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). National Center for Research to Improve Postsecondary Teaching and Learning.

Theoretical Background: This question draws from the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich et al. (1991). It centers on the construct of expectancy, reflecting an individual's belief or anticipation of the grade they will attain in a course. Expectancy is a pivotal motivational factor, influencing goal setting, effort, and persistence. Students with positive expectancy tend to set ambitious goals, invest effort, and employ effective learning strategies.

Importance: Assessing an individual's expectancy regarding their course grade offers valuable insights into their motivation and academic engagement. High expectancy beliefs drive students to approach tasks confidently and determinedly, positively affecting their learning outcomes. Conversely, low expectancy beliefs may hinder motivation and lead to reduced effort. Understanding students' expectancy beliefs informs instructional practices, interventions, and support mechanisms that nurture a positive motivational climate and enhance academic performance.

Alternative Questions: "I am confident in my capacity to attain a high grade in this course," or "I expect strong academic performance in this course."

Additional Sources/Questionnaires: Beyond the MSLQ, other questionnaires and sources explore the construct of expectancy and its motivational role. Eccles and Wigfield's (2002) Expectancy-Value Theory offers a comprehensive framework linking expectancy beliefs and task values. The Academic Motivation Scale (AMS) developed by Vallerand et al. (1992) includes items assessing expectancy beliefs related to academic performance.

Question 11: "In a class like this, I prefer course material that challenges me, enabling me to acquire new knowledge."

Source: Pintrich et al. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). National Center for Research to Improve Postsecondary Teaching and Learning.

Theoretical Background: This question originates from the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich et al. (1991). It specifically addresses the construct of preference for challenging course material and the eagerness to acquire new knowledge. This aligns with the concept of mastery goal orientation, emphasizing the pursuit of knowledge, skill development, and a profound grasp of the subject matter. A mastery-oriented approach propels individuals to embrace challenging tasks in their quest for enhanced competence.

Importance: Assessing individuals' preference for challenging course material and their enthusiasm for learning new things unveils insights into their goal orientation and intrinsic motivation. Students favoring challenges and possessing a thirst for learning are more likely to employ deep learning strategies, actively seek growth opportunities, and persevere in the face of difficulties. Understanding students' goal orientations guides instructional practices, curriculum design, and support systems, fostering a mastery-oriented learning environment that nurtures engagement, curiosity, and lifelong learning.

Alternative Questions: "I see value in tackling demanding course material to expand my knowledge and skills," or "I am motivated to learn new concepts and embrace demanding academic tasks."

Other Sources/Questionnaires: Alongside the MSLQ, other sources and questionnaires delve into the construct of mastery goal orientation and related concepts. Carol Dweck's work, particularly her book "Mindset: The New Psychology of Success," delves into the growth mindset and its influence on motivation and achievement. The Achievement Goal Questionnaire (AGQ) developed by Elliot and colleagues (2005) assesses diverse goal orientations, including mastery goals.

Question 12: "I recognize the importance of studying this subject."

Source: Barron, K. E., Hulleman, C. S., Getty, S. G., & Taylor, J. (2017). Expectancy-value-cost survey of student motivation: User guide. Charlottesville, VA: The Motivate Lab.

Theoretical Background: This question is grounded in the Expectancy-Value Theory and is adapted from the Expectancy-Value-Cost Survey of Student Motivation by Barron et al. (2017). It gauges individuals' perceptions of the importance and value they ascribe to the subject of study. The Expectancy-Value Theory posits that motivation is shaped by beliefs about the likelihood of success (expectancy) and the subjective value assigned to the task or goal. Here, the question captures the subjective value component.

Importance: Assessing individuals' perceptions of the importance and value of the subject of study unveils insights into their motivational orientation and commitment to the learning process. When students perceive a subject as important and valuable, they are more inclined to adopt deep learning strategies, invest effort, and persevere in their academic pursuits. Understanding students' beliefs about the significance of the subject informs instructional practices, curriculum design, and interventions aimed at enhancing student motivation and engagement.

Alternative Questions: "I acknowledge the relevance and significance of the course material in relation to my academic and personal aspirations," or "I believe the subject of study holds practical value and warrants investment of time and effort."

Other Sources/Questionnaires: Apart from the Expectancy-Value-Cost Survey of Student Motivation, other sources and questionnaires delve into the construct of perceived importance and value of the subject. The Intrinsic Motivation Inventory (IMI) developed by Deci and colleagues (1994) assesses various dimensions of intrinsic motivation, including perceived importance and value of the activity.

Question 13: "I experience a sense of belonging and acceptance within my study group."

Source : Ryan, R. M., & Deci, E. L. (2017). Self-Determination Theory: Basic psychological needs in motivation, development, and wellness. Guilford Press.

Theoretical Background: This question is rooted in Self-Determination Theory (SDT) and is drawn from the work of Ryan and Deci (2017). Its purpose is to gauge individuals' subjective feeling of belongingness and acceptance within their study group. According to SDT, a sense of belonging and connection with others constitutes fundamental psychological needs that contribute to intrinsic motivation, well-being, and optimal functioning. This question aligns with the need for relatedness, which underscores the importance of positive social relationships and the sense of being valued and embraced by others.

Importance: Evaluating an individual's sense of belonging and acceptance within their study group is pivotal for comprehending their motivational experiences and well-being in educational environments. When students perceive inclusion and acceptance, they tend to engage more collaboratively in learning, seek support, and feel secure and socially integrated. This, in turn, positively influences motivation, perseverance, and overall satisfaction with the learning journey. The assessment of belongingness can inform educators and institutions about the efficacy of social support structures, group dynamics, and interventions aimed at fostering a sense of community and inclusiveness.

Alternative Questions: "I feel acknowledged and valued by my peers within the study group" and "I believe my study group offers a supportive and embracing atmosphere."

Other Sources/Questionnaires: Beyond the work of Ryan and Deci (2017), additional sources and questionnaires have delved into the construct of belongingness and relatedness in academic settings. The Classroom Community Scale (Rovai, 2002) measures students' perceptions of social connectedness and community within the classroom context. The Psychological Sense of School Membership (Goodenow, 1993) questionnaire evaluates students' sense of belonging and identification with their school.

Question 14 (Reverse): "I often find myself thinking of other things during class, causing me to miss important points."

Source: Pintrich et al. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). National Center for Research to Improve Postsecondary Teaching and Learning.

Theoretical Background: This question is derived from the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich and colleagues (1991). It aims to gauge individuals' self-perceived ability to maintain focus and attention during class. This aligns with the effort and engagement component of learning, as distractions and lapses in concentration can hinder the effective absorption of vital information. The question provides insights into students' self-regulation skills and their capability to actively participate and remain attentive during instructional activities.

Importance: Grasping students' level of focus and attention during class is pivotal for effective learning and academic achievement. Sustained concentration enables students to fully interact with the content, actively participate in discussions, and comprehend intricate concepts. Moreover, it is linked to the development of metacognitive strategies and self-regulation skills. The evaluation of students' perception of their attentional abilities can help uncover potential learning barriers, such as distractions or difficulties in maintaining sustained focus. This information guides instructional approaches, classroom management tactics, and interventions aimed at promoting active engagement and minimizing distractions.

Link to Metacognition in SRL:: The ability to monitor and regulate one's attention, as reflected in this question, is closely related to metacognition in Self-Regulated Learning (SRL) (Flavell, 1979; Schraw & Moshman, 1995). Metacognition involves awareness and control of one's cognitive processes, including attention. Students who recognize when their attention wavers and take steps to refocus are engaging in metacognitive processes. They are not only aware of their cognitive state but are actively managing it to enhance their learning experience (Efklides, 2011). Therefore, this question provides valuable insights into how students employ metacognitive strategies to optimize their learning by managing their attention.

Alternative Questions: "I encounter challenges in maintaining focus during class" and "External stimuli often divert my attention during class."

Other Sources/Questionnaires: Alongside the MSLQ by Pintrich et al. (1991), other sources and questionnaires have explored the construct of focus and attention in the classroom. The Attention Deficit Hyperactivity Disorder Rating Scale (ADHD-RS-IV) is commonly employed to assess attention difficulties and hyperactivity in children and adolescents. The Classroom Attention Scale (CAS) developed by DuPaul et al. (2002) measures students' self-reported attention and concentration within the classroom context.

Question 15: "I establish goals to effectively manage my study time for this course."

Source: Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. Journal of Educational Psychology, 81(3), 329–339. doi:10.1037/0022-0663.81.3.329.

Theoretical Background: This question is rooted in self-regulated learning theory, as elucidated in Zimmerman's (1989) article "A social cognitive view of self-regulated academic learning." It seeks to evaluate individuals' self-perception of their use of goal setting to efficiently manage their study time. Self-regulated learning encompasses learners actively setting goals, monitoring progress, and adapting learning strategies to achieve academic success. Goal setting plays a pivotal role within self-regulated learning, aiding individuals in prioritizing tasks, charting a course for study, and allocating time and resources judiciously.

Importance: The ability to set specific goals for managing study time efficiently is paramount for academic achievement. Clear objectives enhance students' focus, organization, and time management competencies. Goal setting fosters self-awareness, self-reflection, and self-monitoring, enabling learners to track their progress and adjust study routines as needed. It empowers students to take charge of their learning journey and cultivate a proactive approach toward academic tasks. Evaluating individuals' perception of their goal-setting practices offers insights into their self-regulated learning abilities, guiding interventions and strategies to promote effective time management and study habits.

Alternative Questions: "I establish achievable and realistic goals for my study sessions" or "I regularly review and modify my goals to ensure efficient time management."

Other Sources/Questionnaires: In addition to Zimmerman's (1989) work, other sources and questionnaires have delved into the construct of goal setting and self-regulated learning. The Goal setting and Progress Monitoring Scale (GSPMS) developed by Schunk et al. (2008) assesses students' goal-setting and progress monitoring behaviors in academic contexts. The Motivated Strategies for Learning Questionnaire (MSLQ) by Pintrich et al. (1991) also encompasses items related to goal setting as part of its comprehensive assessment of self-regulated learning strategies.

Question 16: "I believe the knowledge gained in this course can be applied to other courses."

Source: Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. Journal of Educational Psychology, 81(3), 329–339. doi:10.1037/0022-0663.81.3.329.

Theoretical Background: This question emanates from Zimmerman's (1989) article titled "A social cognitive view of self-regulated academic learning." Its aim is to gauge individuals' belief in the transferability of acquired knowledge from the present course to other contexts or courses. According to self-regulated learning theory, learners actively engage in the process of acquiring knowledge and skills, forming connections between diverse learning experiences to enhance understanding and application of acquired material. The belief in the transferability of learning underscores the value and utility individuals attribute to the knowledge and skills garnered from the course.

Importance: Assessing individuals' belief in the transferability of their learning has significant implications for motivation, engagement, and metacognitive awareness. When students perceive that their learning is broadly applicable, they are more inclined to adopt deep processing, establish connections with prior knowledge, and undertake transfer tasks. This belief augments learners' motivation, as they recognize the practical worth of what they are learning and how it can benefit them across various contexts. Additionally, acknowledging the transferability of learning nurtures a more holistic and interconnected comprehension of the subject matter, facilitating lasting retention and meaningful application.

Alternative Questions: "I can apply the knowledge and skills acquired in this course to real-world situations" and "I perceive the relevance of the course content in other subjects or disciplines."

Other Sources/Questionnaires: Alongside Zimmerman's (1989) work, other sources and questionnaires have explored the construct of learning transferability. The "Transfer Climate Inventory" devised by Gijbels et al. (2005) gauges students' perceptions of the transfer climate in their learning environment, encompassing their beliefs about the transferability of learning outcomes. The "Learning Transfer System Inventory" by Holton et al. (2007) evaluates factors that influence learning transfer, encompassing individuals' beliefs and expectations concerning transferability.

Question 17 Reverse: "I lack sufficient time to dedicate to my [insert class subject] class due to other commitments."

Source: Barron, K. E., Hulleman, C. S., Getty, S. G., & Taylor, J. (2017). Expectancy-value-cost survey of student motivation: User guide. Charlottesville, VA: The Motivate Lab.

Theoretical Background: This question stems from the "Expectancy-Value-Cost Survey of Student Motivation," developed by Barron et al. (2017). Its purpose is to examine individuals' perception of time availability and their willingness to allocate effort toward the class subject. This question addresses the motivational aspect of effort, acknowledging potential competing demands and time constraints that students may encounter. By gauging individuals' views on time availability, the question offers insights into their perception of the feasibility of allocating time and effort to the class subject.

Importance: Grasping students' perception of time availability and their willingness to allocate effort is pivotal for analyzing motivational factors that influence engagement and achievement. Students' beliefs regarding time availability and effort required for a class subject can impact their motivation,

task persistence, and overall investment in learning. By acknowledging potential competing demands and limited time resources, educators can offer support and design instructional strategies that optimize students' time management and enhance their motivation.

Alternative Questions: "Considering my other responsibilities, I feel I can allocate sufficient effort to this class subject" or "I am confident in my ability to manage my time effectively for this class subject."

Other Sources/Questionnaires: In addition to Barron et al.'s (2017) work, other sources and questionnaires have explored the concept of time availability and effort allocation in motivation research. The "Academic Motivation Scale" developed by Vallerand et al. (1992) assesses different aspects of academic motivation, including time management and effort investment. The "Perceptions of Time Management Skills Inventory" by Britton and Tesser (1991) measures individuals' perceptions of their time management skills and strategies.

Question 18: "I engage in regular self-reflection regarding my goal attainment and performance evaluation in this course."

Source: Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. Journal of Educational Psychology, 94(2), 249-259.

Theoretical Background: This question draws from the research conducted by Mokhtari and Reichard (2002) in their study titled "Assessing students' metacognitive awareness of reading strategies." It aims to evaluate individuals' metacognitive awareness concerning goal attainment and self-evaluation of performance in the course. Metacognitive awareness involves monitoring and evaluating one's progress toward goals, encompassing reflection on goal attainment and performance assessment.

Importance: Understanding students' metacognitive awareness and their ability to engage in self-reflection regarding goal attainment and performance evaluation is pivotal for promoting effective learning and improvement. Metacognitive awareness plays a significant role in self-regulated learning, enabling students to monitor progress, identify strengths and weaknesses, and adjust learning strategies. By assessing individuals' reflection on goal attainment and self-assessment, educators gain insights into students' metacognitive processes, enabling targeted support to enhance metacognitive skills and academic performance.

Alternative Questions: "I regularly evaluate my progress toward the goals I set for myself in this course" and "I actively reflect on my learning and assess my performance to enhance my progress in this course."

Other Sources/Questionnaires: Beyond the study by Mokhtari and Reichard (2002), other sources and questionnaires have explored metacognitive awareness and self-assessment in educational research. The "Metacognitive Awareness Inventory" developed by Schraw and Dennison (1994) assesses individuals' awareness and use of metacognitive strategies. The "Self-Regulated Learning Self-Report Scale" by Cleary and Chen (2009) measures students' self-assessment of their self-regulated learning skills.

Question 19: "I regularly evaluate the effectiveness of my study strategies for comprehending the course material."

Source: Pintrich et al. (1991). A manual for the use of the motivated strategies for learning questionnaire (MSLQ). National Center for Research to Improve Postsecondary Teaching and Learning.
Theoretical Background: This question is derived from the work of Pintrich, and colleagues (1991) as presented in their manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ is designed to assess diverse aspects of motivation and learning strategies. This question particularly addresses metacognition, which encompasses an individual's ability to reflect on and regulate their learning processes. By assessing the effectiveness of their study strategies in comprehending course material, students engage in metacognitive monitoring and make adjustments to optimize learning.
Importance: Evaluating the effectiveness of study strategies in understanding course material is vital for fostering metacognitive awareness and effective learning. Metacognition empowers individuals to reflect on their learning processes, evaluate strategies, and make informed choices about study approaches. By regularly assessing the effectiveness of their study strategies, students identify which methods work best for them, make necessary adjustments, and enhance overall learning outcomes. Educators can also benefit from this information to offer guidance and support to students in developing effective study strategies.
Alternative Questions: "I frequently assess the efficiency of my study techniques in comprehending the content of this course" or "I routinely reflect on the success of my learning strategies in grasping the material covered in this course."
Other Sources/Questionnaires: In addition to the work of Pintrich et al. (1991) and the MSLQ, other sources and questionnaires have explored metacognition and the evaluation of study strategies. The "Metacognitive Awareness Inventory" developed by Schraw and Dennison (1994) assesses individuals' metacognitive awareness, including their monitoring and regulation of learning strategies. The "Learning and Study Strategies Inventory" (LASSI) by Weinstein et al. (1987) measures various dimensions of students' learning and study strategies.

Question 20: "I find value and meaning in acquiring new knowledge through participation in a group setting."

Source : Ryan, R. M., & Deci, E. L. (2017). Self-Determination Theory: Basic psychological needs in motivation, development, and wellness. Guilford Press.
Theoretical Background: This question is rooted in the work of Ryan and Deci (2017) as presented in their book "Self-Determination Theory: Basic psychological needs in motivation, development, and wellness." Self-Determination Theory highlights three psychological needs: autonomy, competence, and relatedness. This question specifically relates to the need for relatedness, emphasizing the importance of social interactions and connections with others in fostering motivation and learning. By

perceiving the acquisition of new knowledge through group participation as valuable and meaningful, individuals fulfill their need for relatedness.

Importance: Exploring an individual's perception of learning and gaining new knowledge through group participation is essential for understanding the role of social interactions in motivation and learning. When individuals experience a sense of belonging and connectedness within a group, they are more likely to be motivated, engaged, and receptive to learning from others. This question aids in assessing the extent to which individuals recognize the worth of collaborative learning and appreciate the contributions of group interactions to their knowledge acquisition.

Alternative Questions: "I find that engaging in group activities enriches my learning and acquisition of new knowledge" or "I believe that learning through group participation provides me with valuable insights and perspectives."

Other Sources/Questionnaires: In addition to Ryan and Deci's (2017) work on Self-Determination Theory, other sources and questionnaires have explored the role of social interactions and relatedness in learning. The "Classroom Community Scale" developed by Rudasill et al. (2010) assesses students' perceptions of their classroom community and its impact on motivation and engagement. The "Group Learning Environment Scale" by Fraser et al. (1999) measures students' perceptions of the social climate within their learning groups

Question 21: "I feel competent and capable after engaging in an activity for a certain period."

Source : Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Springer Science & Business Media.

Theoretical Background: This question is based on the work of Deci and Ryan (1985) as presented in their book "Intrinsic motivation and self-determination in human behavior." Intrinsic motivation and self-determination theory emphasize three psychological needs: autonomy, competence, and relatedness. The question focuses on the need for competence, which encompasses an individual's perception of their own capability and effectiveness in a specific activity. According to the theory, feeling competent and capable enhances intrinsic motivation.

Importance: Analyzing someone's feeling of capability after taking part in an activity is essential to comprehend the effect of proficiency on inspiration. When people consider themselves to be able, they will more likely experience a sense of mastery, delight, and internal motivation. This query helps measure how confident people feel in their capabilities and the effect that has on their drive to keep taking part in the activity.

Alternative Questions: "I believe that I possess the necessary skills and abilities to excel in this activity" or "I feel self-assured in my competence to perform well in this activity."

Other Sources/Questionnaires: In addition to Deci and Ryan's (1985) work, other sources and questionnaires have explored the relationship between competence and intrinsic motivation. Harter (1982) crafted the "Perceived Competence Scale" which evaluates an individual's belief in their abilities in multiple areas and the effect it has on their motivation and success. Balaguer et al. (1996) designed

the "Competence-Relatedness-Autonomy in Sport Scale" to monitor athletes' views on their competency, relatedness, and autonomy in sports.

Question 22: "I would willingly engage in the activity again based on its perceived value."

Source : Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Springer Science & Business Media.

Theoretical Background: This question is rooted in the work of Deci and Ryan (1985) as presented in their book "Intrinsic motivation and self-determination in human behavior." Intrinsic motivation theory emphasizes internal factors driving behavior, such as enjoyment, interest, and personal satisfaction. The question specifically addresses the perceived value of an activity and its impact on an individual's willingness to engage in it again. According to the theory, when individuals find an activity valuable and intrinsically rewarding, they are more likely to be motivated to continue participating.

Importance: Evaluating an individual's willingness to participate in an activity again based on its perceived value is crucial for understanding the influence of intrinsic motivation on sustained engagement. When individuals perceive value and enjoyment in an activity, they are more likely to exhibit persistence, enthusiasm, and a desire to continue participation. This question aids in assessing the extent to which individuals view an activity as meaningful and enjoyable, thereby informing strategies to enhance intrinsic motivation and foster sustained engagement.

Alternative Questions: "I consider the activity highly valuable and would gladly partake in it again" or "Given the value I attribute to the activity; I would willingly engage in it once more."

Other Sources/Questionnaires: In addition to Deci and Ryan's (1985) work, other sources and questionnaires have explored the correlation between intrinsic motivation and the willingness to engage in activities. The "Intrinsic Motivation Inventory" developed by Ryan (1982) assesses individuals' levels of intrinsic motivation across different domains and activities. The "Interest-Enjoyment Scale" by Schraw et al. (2006) measures individuals' interest and enjoyment in specific tasks and activities.

6- Selection of question on motivation to learn (sample database)

SURVEY	KEYWORD	THEORY	Y/N	QUESTION
MSLQ	intrinsic	MASTERY	YES	1. In a class like this, I prefer course material that really challenges me so I can learn new things.
MSLQ	intrinsic	MASTERY	YES	16. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.
MSLQ	intrinsic	MASTERY	YES	22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.
MSLQ	intrinsic	MASTERY	YES	24. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade
MSLQ	extrinsic	PERFORMANCE	YES	7. Getting a good grade in this class is the most satisfying thing for me right now.
MSLQ	extrinsic	PERFORMANCE	YES	11. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.
MSLQ	extrinsic	PERFORMANCE	YES	13. If I can, I want to get better grades in this class than most of the other students.
MSLQ	extrinsic	PERFORMANCE	YES	30. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.
EVCT	Effort	EFFORT	YES	4. My [insert class subject] classwork requires too much time.
EVCT	Effort	EFFORT	YES	6. Because of other things that I do, I don't have time to put into my [insert class subject] class.
EVCT	Effort	EFFORT	YES	8. I'm unable to put in the time needed to do well in [insert class subject].
EVCT	Effort	EFFORT	YES	10. I have to give up too much to do well in [insert class subject].
MSLQ	Effort	EVT	YES	37. I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do. (REVERSED)
MSLQ	Effort	EVT	YES	48. I work hard to do well in this class even if I don't like what we are doing.
MSLQ	Effort	EFFORT	YES	60. When course work is difficult, I give up or only study the easy parts. (REVERSED)
MSLQ	Effort	EVT	YES	74. Even when course materials are dull and uninteresting, I manage to keep working until I finish
IMI STD	Effort	EFFORT	YES	I put a lot of effort into this.
IMI STD	Effort	EFFORT	YES	I didnÕt try very hard to do well at this activity. (R)
MSLQ	self efficacy	SELF EFFICACY	YES	5. I believe I will receive an excellent grade in this class.
MSLQ	self efficacy	SELF EFFICACY	YES	6. I'm certain I can understand the most difficult material presented in the readings for this course.
MSLQ	self efficacy	SELF EFFICACY	YES	12. I'm confident I can understand the basic concepts taught in this course.
MSLQ	self efficacy	SELF EFFICACY	YES	15. I'm confident I can understand the most complex material presented by the instructor in this course.
MSLQ	self efficacy	SELF EFFICACY	YES	20. I'm confident I can do an excellent job on the assignments and tests in this course.
MSLQ	self efficacy	EXPECTANCY	YES	21. I expect to do well in this class.
MSLQ	self efficacy	EXPECTANCY	YES	29. I'm certain I can master the skills being taught in this class.
MSLQ	self efficacy	EXPECTANCY	YES	31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class
MSLQ	anxiety	NA	NO	3. When I take a test I think about how poorly I am doing compared with other students.
MSLQ	anxiety	NA	NO	8. When I take a test I think about items on other parts of the test I can't answer.
MSLQ	anxiety	NA	NO	14. When I take tests I think of the consequences of failing.
MSLQ	anxiety	NA	NO	19. I have an uneasy, upset feeling when I take an exam.
MSLQ	anxiety	NA	NO	28. I feel my heart beating fast when I take an exam
MSLQ	ripetere	NA	NO	39. When I study for this class, I practice saying the material to myself over and over.
MSLQ	ripetere	NA	NO	46. When studying for this class, I read my class notes and the course readings over and over again.
MSLQ	ripetere	NA	NO	59. I memorize key words to remind me of important concepts in this class.
MSLQ	ripetere	NA	NO	72. I make lists of important terms for this course and memorize the lists
MSLQ	elaborazione	NA	NO	53. When I study for this class, I pull together information from different sources, such as lectures, readings, and discussions.
MSLQ	elaborazione	NA	NO	62. I try to relate ideas in this subject to those in other courses whenever possible.
MSLQ	elaborazione	NA	NO	64. When reading for this class, I try to relate the material to what I already know.
MSLQ	elaborazione	NA	NO	67. When I study for this course, I write brief summaries of the main ideas from the readings and the concepts from the lectures.
MSLQ	elaborazione	NA	NO	69. I try to understand the material in this class by making connections between the readings and the concepts from the lectures.
MSLQ	elaborazione	NA	NO	81. I try to apply ideas from course readings in other class activities such as lecture and discussion
MSLQ	organizzazione	SRL	NO	32. When I study the readings for this course, I outline the material to help me organize my thoughts.
MSLQ	organizzazione	SRL	NO	42. When I study for this course, I go through the readings and my class notes and try to find the most important ideas.
MSLQ	organizzazione	SRL	NO	49. I make simple charts, diagrams, or tables to help me organize course material.
MSLQ	organizzazione	SRL	NO	63. When I study for this course, I go over my class notes and make an outline of important concepts
MSLQ	critical thinking	NA	NO	38. I often find myself questioning things I hear or read in this course to decide if I find them convincing.
MSLQ	time and study	SRL	NO	70. I make sure I keep up with the weekly readings and assignments for this course.
MSLQ	time and study	ORGANIZ	YES	73. I attend class regularly.
MSLQ	Effort	ORGANIZ	YES	77. I often find that I don't spend very much time on this course because of other activities. (REVERSED)
MSLQ	time and study	SRL	NO	80. I rarely find time to review my notes or readings before an exam. (REVERSED
IMI STD	Effort	EVT	YES	I tried very hard on this activity.
IMI STD	value	VALUE	YES	It was important to me to do well at this task.
IMI STD	Effort	EVT	YES	I didnÕt put much energy into this. (R)
GSE SEFF	Effort	SELF EFFICACY		6. I can solve most problems if I invest the necessary effort.
MSLQ	peer learning	NA	NO	34. When studying for this course, I often try to explain the material to a classmate or a friend.
MSLQ	peer learning	NA	NO	45. I try to work with other students from this class to complete the course assignments.
MSLQ	peer learning	NA	NO	50. When studying for this course, I often set aside time to discuss the course material with a group of students from the class
MSLQ	help seeking	NA	NO	40. Even if I have trouble learning the material in this class, I try to do the work on my own, without help from anyone. (REVERSED)
MSLQ	help seeking	NA	NO	58. I ask the instructor to clarify concepts I don't understand well.
MSLQ	help seeking	NA	NO	68. When I can't understand the material in this course, I ask another student in this class for help.
MSLQ	help seeking	NA	NO	75. I try to identify students in this class whom I can ask for help if necessary
IMI STD	Interest	INTEREST	YES	I enjoyed doing this activity very much
IMI STD	Interest	INTEREST	YES	This activity was fun to do.
IMI STD	Interest	INTEREST	YES	I thought this was a boring activity. (R)
IMI STD	Interest	INTEREST	YES	This activity did not hold my attention at all.(R)
IMI STD	Interest	INTEREST	YES	I would describe this activity as very interesting.
IMI STD	Interest	INTEREST	YES	I thought this activity was quite enjoyable.
IMI STD	Interest	INTEREST	YES	While I was doing this activity, I was thinking about how much I enjoyed it.
IMI STD	Competence	COMPETENCE	YES	I think I am pretty good at this activity.
IMI STD	Competence	COMPETENCE	YES	I think I did pretty well at this activity, compared to other students.
IMI STD	Competence	COMPETENCE	YES	After working at this activity for awhile, I felt pretty competent.

7- Data collection. General data. All responses per each Pedagogy

ID STUDE	TOPIC		VALUE	AUTONOM	MINDSET	INTEREST	COMPET	SEFF	MASTERY	MINDSET	SEFF/EXP	SEFF/EXP	INTEREST	MASTERY	VALUE	RELATED	METACOG	GOAL	VALUE	EFFORT	GOAL	METACOG	RELATED	COMPET	NTRI:INTER
1979	FLIPPED CLASSROOM		3	5	5	5	4	4	4	4	5	5	5	3	5	3	3	5	5	5	5	3	5	5	5
2	FLIPPED CLASSROOM		3	2	4	4	3	4	5	5	5	4	4	4	4	5	2	3	3	2	4	3	4	4	3
	FLIPPED CLASSROOM		4	4	4	3	3	4	4	4	4	5	4	3	3	4	4	3	4	4	4	4	4	4	4
	FLIPPED CLASSROOM		4	3	3	3	3	3	3	3	3	3	1	4	3	2	2	4	3	1	3	3	3	3	3
	FLIPPED CLASSROOM		2	4	4	4	5	5	5	5	3														
	FLIPPED CLASSROOM		4	5	5	5	5	5	5	5	5	1	4	4	5	3	4	4	5	1	4	4	4	4	4
	FLIPPED CLASSROOM		4	5	5	4	5	5	5	5	5	4	5	5	5	5	3	4							
	FLIPPED CLASSROOM		3	3	3	3	3	2	3	3	3														
	FLIPPED CLASSROOM		3	2	5	4	2	4	4	4	5	4	5	4	3	2	4	3	1	4	3	3	4	4	4
	FLIPPED CLASSROOM		4	4	5	4	3	4	4	4	4														
	FLIPPED CLASSROOM		3	3	4	2	2	4	4	4	3	3	3	3	4	3	4	4	3	4	3	4	2	3	2
	FLIPPED CLASSROOM		4	5	5	5	3	5	5	5	4	5	4	4	5	4	4	4	5	5	5	4	5	5	5
	FLIPPED CLASSROOM		4	2	4	2	5	5	5	5	5														
	FLIPPED CLASSROOM		5	4	5	5	4	5	5	5	4	3	5	5	5	4	4	3	4	2	4	4	4	3	3
	FLIPPED CLASSROOM		3	3	5	5	3	5	4	4	5	4	4	4	5	5	3	4							
	ACTIVE LEARNING		5	5	5	5	3	3	4	4	5	4	5	5	5	4	4	4	5	4	4	5	4	4	4
	ACTIVE LEARNING		5	5	5	5	4	4	5	5	5	5	5	3	5	4	5	3	5	3	3	4	3	3	5
	ACTIVE LEARNING		5	5	5	4	4	4	5	5	5	4	5	4	4	3	4	3	4	5	4	4	4	4	4
	ACTIVE LEARNING		4	5	5	5	3	4	4	4	5	4	5	3	4	4	3	4	4	2	4	4	3	3	5
	ACTIVE LEARNING		5	5	5	4	5	5	5	5	5	5	5	5	5	1	5	5	1	5	5	5	5	5	5
	ACTIVE LEARNING		5	5	5	5	5	5	5	5	4								5	5	5	5	5	4	4
	ACTIVE LEARNING		5	5	5	4	4	4	4	4	4	4	4	4	4	2	3	3	4	2	4	4	4	3	2
	ACTIVE LEARNING		5	5	4	4	3	4	4	4	4														
	ACTIVE LEARNING		4	3	4	4	2	2	4	4	4								3	4	4	3	4	3	2
	ACTIVE LEARNING		3	5	4	4	3	5	5	5	5	4	4	4	4	3	3	3	5	3	4	4	4	4	3
	ACTIVE LEARNING		4	4	4	4	3	3	5	5	4	3	4	3	4	3	3	4	3	4	4	4	4	3	3
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	ACTIVE LEARNING		3	5	4	4	4	5	5	5	4	3	4	2	4	5	5	4	3	4	4	4	4	4	4
	ACTIVE LEARNING		4	4	4	4	4	4	5	5	4	3	4	4	5	4	4	4	4	4	4	4	4	4	4
	ACTIVE LEARNING		4	5	4	4	3	4	4	4															
	ACTIVE LEARNING		5	5	5	5	4	3	4	4	3	3	5	4	5	3	3	4	3	2	2	4	4	4	2
	ACTIVE LEARNING		4	5	5	5	5	5	5	5	5	4	5	4	5	2	5	4	5	5	5	5	5	5	5
	ACTIVE LEARNING		5	4	5	4	4	4	5	5	4	5	4	3	5	2	2	5	4	2	5	4	5	5	4
	ACTIVE LEARNING		4	4	5	5	5	5	5	5	3	4	4	4	5	2	3	5	1	5	5	5	5	5	4
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	ACTIVE LEARNING		4	5	5	4	4	5	5	5	5														
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	ACTIVE LEARNING		4	4	4	4	4	4	4	4	4														
	ACTIVE LEARNING		5	5	5	5	3	5	4	4	4														
	ACTIVE LEARNING		4	3	5	4	4	5	4	4	5	4	4	4	4	3	4	3	4	4	5	4	4	4	4
	ACTIVE LEARNING		5	4	4	4	3	3	5	5	4	4	4	4	5	4	3	4	4	4	5	4	4	4	4
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	ACTIVE LEARNING		4	4	5	4	4	4	5	5	5	4	4	4	5	4	2	3	4	4	5	5	4	4	5
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	ACTIVE LEARNING		3	1	3	3	3	4	4	4	5														
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	BUSINESS GAME		2	3	3	2	2	4	4	4	3	3	2	5	5	4	3	2	4	3	4	2	4	3	2
	BUSINESS GAME		4	3	4	4	4	4	5	5	5								4	4	4	4	4	4	4
	BUSINESS GAME		3	3	3	3	3	3	3	3	3														
	BUSINESS GAME		2	2	4	2	3	4	4	4	3	4	4	3	4	4	4	4							
	BUSINESS GAME		3	3	4	3	4	4	4	4	4	2	3	3	3	3	5	3	4	4	4	4	5	4	4
	BUSINESS GAME		3	3	4	4	3	4	5	5	4	4	4	4	4	4	4	4	3	4	3	4	4	4	4
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	BUSINESS GAME		3	2	5	2	3	5	5	5	5	4	4	5	5	4	5	3							
	BUSINESS GAME		3	3	3	3	3	3	3	3	3								3	2	4	3	4	3	4
	BUSINESS GAME		4	4	5	4	4	4	4	4	3	5	5	4	5	1	5	2	2						
	BUSINESS GAME		4	3	5	4	3	4	5	5	4	3	4	5	4	5	3	4	5	5	4	5	5	5	5
	BUSINESS GAME		4	3	4	5	3	3	3	3	5														
	BUSINESS GAME		4	5	5	5	5	2	4	4	5	3	4	5	1	4	1	5	4	2					
	BUSINESS GAME		4	4	4	4	2	4	4	4	2	3	4	4	5	4	4	2							
	BUSINESS GAME		3	2	5	3	2	3	3	3	3	3	4	3	5	4	3	4	4	4	2	4	4	2	3
	BUSINESS GAME		4	3	5	5	3	3	5	5	3	4	4	2	1	1	5	1							
	BUSINESS GAME		1	1	4	1	2	4	5	5	3	3	2	4	2	5	2	3							
	BUSINESS GAME		3	3	4	4	3	4	4	4	4	4	4	4	4	4	3	3	4	2	4	5	5	4	4
	BUSINESS GAME		4	2	4	4	3	4	4	4	3	4	4	4	4	4	3	4	5	1	4	4	4	3	4
	BUSINESS GAME		4	4	5	5	3	4	5	5	5														
	BUSINESS GAME		4	3	3	3	4	4	4	4	3														
	BUSINESS GAME		4	3	3	3	2	3	3	3	3	3	3	3	3	4	3	3	4	3	4	3	3	3	2
	BUSINESS GAME		3	3	5	4	3	4	5	5	4														
	BUSINESS GAME		4	3	4	5	4	4	5	5	4	4	4	4	3	3	5	3	3	4	4	4	4	4	4
	BUSINESS GAME		3	2	4	3	2	4	4	4	4								4	3	4	4	4	3	4
	BUSINESS GAME		3	3	5	4	4	5	5	5	4	3	3	4	1	3	1	5	4	2					
	BUSINESS GAME		4	3	4	4	4	5	2	4	4	4	4	4	4	4	3	4							
	BUSINESS GAME		2	2	4	2	2	3	3	3	5	2	4	3	4	5	3	4	4	4	2	3	4	4	4

16 List of Acronyms

AGQ	Achievement Goal Questionnaire
ALP	Active Learning Pedagogy
BEG	Business Educational Game
COOC	Corporate Open Online Course
EVT	Expectancy Value Theory
FCP	Flipped Classroom Pedagogies
GOT	Goal Orientation Theory
IMI	Intrinsic Motivation Inventory
LMS	Learning Management System
MOOC	Massive Open Online Course
MSLQ	Motivated Strategies for Learning Questionnaire
OECD	Organization for Economic Co-operation and Development
RCT	Randomized Controlled Trials
SDT	Self Determination Theory
SEM	Structural Equation Model
SRT	Self-Regulation Theory
STEM	Science, Technology, Engineering Mathematics
T.A.M.	Technology Acceptance Model
TPAC	Technological Pedagogical Content Knowledge
UTAUT	Unified Theory of Acceptance and Use of Technology
VARK	Visual, Auditory, Reading/Writing, and Kinesthetic.
VR	Virtual Reality
WEF	World Economic Forum
WHO	World Health Organization

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Résumé (1700 caractères) :

APPRENDRE POURQUOI APPRENDRE.

Définition d'un outil de mesure de la motivation à l'apprentissage : Identification des concepts clés et impact de la technologie, des méthodes d'enseignement et de l'organisation des cours sur les apprenants

Dans un monde en constante évolution, l'apprentissage humain occupe une place centrale. La demande de nouvelles compétences nécessite une forte propension à apprendre. La motivation individuelle devient essentielle pour acquérir les compétences nécessaires sur le marché. Cette recherche vise à définir un système de mesure de la motivation individuelle à apprendre, utilisant diverses approches théoriques existantes et à vérifier si les construits théoriques avec des fonctions similaires performent de manière similaire pendant l'apprentissage. Enfin, elle examine si l'outil de mesure et la motivation sont affectés par différents niveaux d'utilisation de la technologie, des méthodes d'enseignement et de l'organisation des cours.

Sept théories sur la motivation à apprendre ont été identifiées, conduisant à 13 construits théoriques. Le système de mesure comprend 22 questions réparties en trois questionnaires à administrer au début, au milieu et à la fin d'un cours. La recherche a été menée dans une école de commerce en France et les 139 répondants étaient inscrits dans trois cours utilisant différentes approches pédagogiques : apprentissage actif, classe inversée et jeux éducatifs. L'analyse des données identifie les valeurs d'apprentissage, un état d'esprit de croissance et l'auto-efficacité comme des éléments clés soutenant la motivation. La validité de l'outil de mesure est prometteuse mais nécessite des améliorations dans le questionnaire de mi-parcours. Bien que l'utilisation de la technologie soit appréciée, elle n'est pas un facteur décisif ; une utilisation intensive de la technologie sans variation n'est pas valorisée par les étudiants.

Descripteurs :

Apprentissage, Motivation, Compétences, Théorie de l'apprentissage, Technologie éducative, Méthodes pédagogiques, Auto-efficacité, État d'esprit de croissance, Échelle de Likert, Analyse des données.

Title and Abstract (1700 characters):

LEARNING WHY TO LEARN

Definition of a Tool for Measuring Learning Motivation: Identifying Key Constructs and the Impact of Technology, Teaching Methods, and Course Organization on Learners.

In a constantly changing world, human learning takes center stage. The demand for new competencies requires a strong propensity to learn. Individual motivation becomes essential to acquire the necessary skills in the market. This research aims to define a system for measuring individual motivation to learn, using various existing theoretical approaches and to verify if theoretical constructs with similar functions perform similarly during learning. Finally, it examines whether the measurement tool and motivation are affected by different levels of technology use, teaching methods, and course organization.
Seven theories on learning motivation have been identified, leading to 13 theoretical constructs. The measurement system includes 22 questions distributed in three questionnaires administered at the beginning, middle, and end of a course. The research was conducted at a business school in France, and the 139 respondents were enrolled in three courses using different pedagogical approaches: active learning, flipped classroom, and educational games. Data analysis identifies learning values, a growth mindset, and self-efficacy as key elements supporting motivation. The validity of the measurement tool is promising but requires improvements in the mid-course questionnaire. Although technology use is appreciated, it is not a decisive factor; intensive use of technology without variation is not valued by students.

Keywords:

Learning, Motivation, Skills, Learning theory, Educational technology, Teaching methods, Self-efficacy, Growth mindset, Likert scale, Data analysis.

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