

Transdisciplinary Chair in the Context of Leadership in Organizations

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Abstract: *The Transdisciplinary Chair in the Context of Leadership in Organizations is an innovative academic position that promotes the integration of multiple disciplines to address the complex challenges of leadership in the modern organizational environment. This chair seeks to transcend traditional boundaries between fields of study, encouraging collaboration among experts in corporate management, psychology, sociology, information technology, and other relevant areas to develop leaders capable of navigating and thriving in an ever-evolving business landscape. AI has played a critical role in improving the operational efficiency of organizations. The future will see an even deeper integration of this technology into the leadership context. AI will not replace leaders, but will serve as a strategic enabler, empowering them with predictive analytics, enabling more informed and faster decision-making. The future of leadership in organizations is shaping up at a rapid pace, in line with the evolution of emerging technologies, especially Artificial Intelligence (AI). The*

leadership of the future will be characterized by collaboration between humans and machines. The human skills of empathy, creativity and intuition, combined with the analytical precision and data processing capacity of AI, will create a hybrid leadership model. However, the best leaders cannot be replaced by AI, and the adversities that arise in the applicability of AI have the need to identify and improve leadership skills with a transdisciplinary approach eminent, in order to enhance and help leadership focus its cognitive energy, improve its collaborative and problem-solving skills.

Keywords: *transdisciplinary; artificial intelligent; leadership; predictive analytics; decision-making; critical thinking and systemic; multiple intelligences; team leader; soft and hard skills.*

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1. Introduction & Concepts

Leadership is considered the ability to motivate, influence, inspire, and command a group of people in order to achieve objectives. The nature and exercise of leadership have been the focus of human research throughout its history. Bernard Bass argues that “from its infancy, the study of history has been the study of leaders, what and why they did what they did”. The search for the ideal leader is also present in the field of philosophy. Plato, for example, argued in *The Republic*¹ that the ruler needed to be educated with reason, describing his ideal of the “philosopher king”. Other examples of philosophers who addressed the theme were Confucius, Lao-Tzu, and Sun-Tzu, with his “wise king”.

Leading of a group of people, transforming it into a team that generates results, is called leadership. It is the ability to motivate and influence the lead, in an ethical and positive way, so that they voluntarily and enthusiastically contribute to achieving the team’s and the organization’s objectives.

In this context, allied to virtuous leadership², the concept of which refers to a type of leadership that is based on ethical and moral values, and which seeks the common good, and starts from the principle that people are not born leaders, but are trained to become one. And that leadership is not about a style or a technique, but about one's character, and without virtues, leadership is nothing more than direction or management. Leaders must be visionaries, thinking beyond the current applications of AI and anticipating future needs and challenges. Leadership in the age of artificial intelligence is not just about staying ahead of the technological curve, but about balancing human and technological skills. Because effective leadership is based on character strengths known as virtues, such as courage, self-control, wisdom and humility, AI (artificial intelligence) can be

¹ *The Republic* Is a Socratic dialogue, authored by Plato around 375 BC, concerning justice (δικαιοσύνη), the order and character of the just city-state, and the just man. It is Plato's best-known work, and one of the world's most influential works of philosophy and political theory, both intellectually and historically. One of the most important dialogues of the ancient Greek philosopher Plato, renowned for its detailed expositions of political and ethical justice and its account of the organization of the ideal state (or city-state)—hence the traditional title of the work. See more: <https://www.britannica.com/topic/The-Republic>.

² From the book *Virtuous Leadership* by Alexandre Havard (a French lawyer who, after years of practicing law in various European countries, founded the Havard Virtuous Leadership Institute (HVLI) in 2007, with the aim of offering executives excellence programs based on the classical (universal) virtues. Since then, he has given successive seminars on virtuous leadership in cities such as Paris, Helsinki, Moscow and many others in the United States, addressing executives, educators, public men and MBA students. He also works as a consultant for major corporations around the world.), Alexandre Harvard has developed a leadership model based on *aetiology** - the philosophy of virtue - which is resonating with high-level leaders in government and various private sectors). The book explores the idea of leadership as a means of becoming a better person and leading others to a better world. It draws on the findings of ancient Greek and medieval Christian philosophers to apply them to modern leadership. The book is recommended for anyone who believes that leadership is not just about leading people, but also about becoming a better person. *Aetiology - Part of philosophy that deals with virtue and moral perfection.

used as a useful tool to enhance leadership, allowing leaders to be more proactive and strategic in their decision-making.

And, in the context of leadership, transdisciplinary leadership refers to the ability to lead teams made up of individuals from diverse backgrounds and disciplines. One study suggests that transdisciplinary leadership requires four main skills: (1) crossing boundaries, (2) systems thinking, (3) anticipatory thinking and (4) interpersonal skills, and another approach to leadership development is interdisciplinary, encompassing complexity, diversity and integration to prepare academics and executives to study and practice a different type of leadership.

2. Conceptualizing Transdisciplinary

The term transdisciplinary was mentioned for the first time by Jean Piaget¹ at the 1st International Seminar on Pluri and Interdisciplinarity in Nice in 1970, being one of the most studied concepts in recent times by several scholars in the field. On the occasion, he asked participants to reflect on the concept: *“Transdisciplinary is a scientific approach that seeks the unity of knowledge. It seeks to stimulate a new understanding of reality, articulating elements that pass between, beyond and across disciplines, in a search for understanding complexity. Furthermore, from a human point of view, transdisciplinary is an empathetic attitude of openness to others and their knowledge.”*

However, we can affirm that transdisciplinary is not tied to any discipline, and that in fact, this methodology seeks to rely on disciplines to better explain and make understanding the totality of knowledge. D’ Ambrosio² considers that: *[...] Transdisciplinary does not constitute a new philosophy. Not metaphysics. Not a science of sciences and much less, as some say, a new religious stance. Nor is it, as they insist on showing it, a fad. The essential thing about transdisciplinary lies in a stance of recognition where there is no privileged cultural space and time that allows us to judge and hierarchies - as more correct or truer - complexes of explanation and coexistence with the reality that surrounds us.*

Also looking for a definition for the transdisciplinary concept, in 1994, the Transdisciplinary Committee, linked to UNESCO, produced a letter entitled “Charter of Transdisciplinary” which in its article 3 says: *“[...] transdisciplinary*

¹ Jean William Fritz Piaget (Neuchâtel, 9 August 1896 - Geneva, 16 September 1980) was a Swiss biologist, psychologist and epistemologist, considered one of the most important thinkers of the 20th century. He advocated an interdisciplinary approach to epistemological investigation and founded Genetic Epistemology, a theory of knowledge based on the study of the psychological genesis of human thought. He is considered by many to be the leading figure in 20th-century developmental psychology. And he revolutionized the concepts of children's intelligence with conclusions that brought about a revolution in the old concepts of learning and education. See more: <https://www.britannica.com/biography/Jean-Piaget>.

² D’ Ambrosio U (1997). *Ethnomathematics and its place in the History and pedagogy of mathematics*, New York: State University of New York press, p. 9.

does not seek domination over several disciplines, but the opening of all of them is that which crosses and goes beyond them (...)". Completing this concept, article 7 of the same document gives a very precise definition of "[...] *Transdisciplinary constitutes neither a new religion, nor a philosophy, nor a new metaphysic, nor a science of sciences.*"

Piaget's 4 Stages of Development. Piaget's theory, called Piagetian theory, focuses on child development and is therefore called development theory. According to him: "*Childhood is the time of greatest creativity in a human being's life.*" Anchored in studies on human and cognitive development, Piaget's so-called cognitive theory was called "genetic epistemology" for him. His theory was fundamental to the emergence of the constructivist current and defined 4 stages for the development of *human cognitive capacity*³.

The term cognition comes from Latin and means "**to know**". The word skill is a noun that indicates the quality of a skillful person. Therefore, when we talk about cognitive skills we are not talking about memorization, but rather information that is properly understood, assimilated and comprehended, being able to train the brain to obtain or improve cognitive skills such as processing new stimuli, for example. Cognitive skills are tools of the brain that are associated with information learning processes.

Cognitive functioning is a term that refers to the human being's ability to process thoughts that should not be depleted on a large scale in healthy individuals. It is defined as "an individual's ability to perform the various mental activities most closely associated with learning and problem solving. Examples include verbal, spatial, psychomotor, and processing speed abilities." Cognition mainly refers to things like memory, the ability to learn new information, speaking, understanding written material. The brain is generally capable of learning new skills in the areas mentioned, usually in early childhood, and of developing personal thoughts and beliefs about the world. Old age and illness can affect cognitive function, causing memory loss and problems thinking of the right words when speaking or writing ("drawing a blank"). Multiple sclerosis (MS), for example, can eventually cause memory loss, inability to grasp new concepts or information, and reduced verbal fluency. Not everyone with the condition will experience this side effect, and most will retain their general intellect and ability.

According to Piaget, children go through four stages of development until they reach adolescence. These stages are related to the human beings cognitive capacity, that is, to the construction of knowledge in the psyche. Are these:

1. Sensorimotor stage (from 0 to 2 years old) - The name itself already

³ Cognitive skills, also called cognitive functions, cognitive abilities or cognitive capacities, are the skills of the mind, as opposed to other types of skills such as motor skills. Some examples of cognitive skills are literacy, self-reflection, logical reasoning, abstract thinking, critical thinking, introspection and mental arithmetic. Cognitive skills vary in processing complexity and can range from more fundamental processes such as perception and various memory functions, to more sophisticated processes such as decision-making, problem solving and metacognition.

indicates that at this stage the child's sensations and motor coordination are developed. Even though the cognition capacity is limited, at this moment, she begins to perceive the world around her, beginning to recognize objects.

2. Pre-operational stage (from 2 to 7 years old) - With the development of speech, the child begins to name the objects that surround him at the same time that he begins to have the mental capacity to remember them (mental representation). Reasoning is also beginning to be developed, although it is in its initial phase.

3. Concrete operations stage (from 7 to 11 years old) - This phase is related to the cognitive ability to concretely solve some problems. In it, the child begins to have a greater capacity for interpretation and, therefore, is able to solve some basic problems. Some concepts are internalized, for example, numbers and mathematical operations.

4. Formal operations stage (from 11 years old to 14 years old) - Already in adolescence, logical reasoning develops, and the individual begins to think for themselves, at the same time as they have the ability to create theories and reflect on the possibilities of the world. It is, therefore, a phase of autonomy.

Early Childhood – The Importance to Development. Humans generally have a high capacity for cognitive functioning once born, so almost every person is capable of learning or remembering. IQ tests and others, although these have issues with accuracy and completeness. In such tests, patients may be asked a series of questions, or to perform tasks, with each measuring a cognitive skill, such as the level of consciousness, memory, awareness, problem-solving, motor skills, analytical abilities, or other similar concepts. Early childhood⁴ is when the brain is most malleable to orientate to tasks that are relevant in the person's environment.

Physical Growth and Development. In this phase, there is significant synaptic growth and myelination of neural fibers in the brain, especially within the frontal lobes. For example, between the ages 2 and 6, the brain increases from 70% of its adult weight to 90%. The growth of the brain is followed by a surge in cognitive abilities. Around the age of 5, children start speaking properly and master their hand-to-eye coordination. It is optimal that an environment is provided that encourages physical development and allows the children to explore and try out new things. The physical development in children follows a pattern. The large muscles develop before the small muscles. The large muscles are used for walking, running and other physical activities. These are known as gross motor skills. Small muscles are used for fine motor skills such as picking up objects, writing, drawing, throwing and catching.

⁴ Early childhood is a stage in human development following infancy and preceding middle childhood. It generally includes toddlerhood and sometime afterward. Play age is an unspecific designation approximately within the scope of early childhood. Also called Preoperational for Piaget, ages 2 to 7 years old. Children are able to form thoughts without logic, but it helps give them a better understanding of the world around them.

Cognitive Growth and Development. Called the preoperational stage by Jean Piaget, this is the stage during which the child repeatedly asks, "Why?" and is used to build relationships with the child. The child cannot yet perform the abstract thinking operations. The child has to be able to see what is being talked about, because they do not understand the concepts of logic, betrayal, contemplation, etc. This means that they think literally: if a child is told that they have to go to bed because "night is falling", they will ask how can the night (literally) fall from the sky. They also see the human characteristics in every object, e.g. the table "is bad" if they accidentally hit it with their foot and it hurts. They also exhibit egocentrism; not to be confused with egoism; that being said, they do not comprehend that the other person has beliefs of their own and the children at this age think that what they think, everybody thinks. There is also a matter of perceptual centration, which causes the children to primarily see what is visually most prominent on someone/something, e.g. if a man has long hair, the child will think he's a woman.

Social-Emotional Growth and Development. This includes children understanding a sense of 'self', relationships with others and sociability. The emotional development includes expressions, attachment and personality. Children manifest fear of dark and monsters and around the age of three notices whether they are a boy or a girl and start acting that way. Boys are usually more aggressive whilst girls are more caring. However, aggression is manifested in two different ways: boys are more physically aggressive, while girls are more socially aggressive (name calling and ignoring). In this stage the individual differences become more prominent. Children who often came from lower-income families tended to express more challenges such as bullying, disruptive behaviors, and overall negative outbursts in situations. The results were gained from the National Longitudinal Survey of Youth⁵. Other factors of the mother were also examined such as their ethnicity, education level, the mother's birth age, and even how many siblings the mother had. Poverty, punishment, depression, and the idea of being a single mother are correlated to how the children behaved.

⁵ National Longitudinal Survey of Youth - is a set of surveys designed to gather information at multiple points in time on the labor market activities and other significant life events of several groups of men and women. NLS data have served as an important tool for economists, sociologists, and other researchers for more than 50 years.

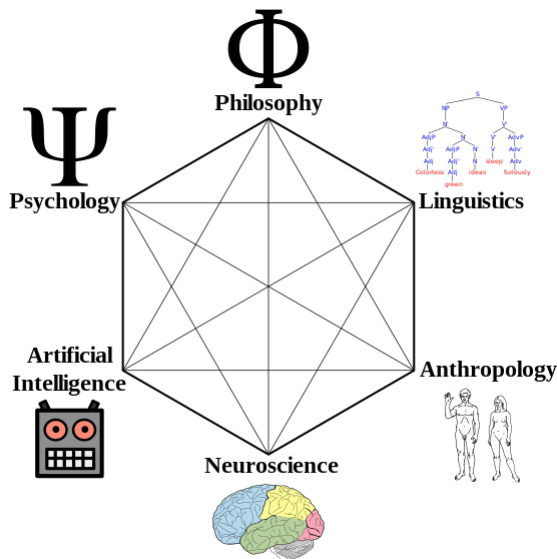


Figure.1. Illustrative figure of the fields that contributed to the birth of cognitive science, including linguistics, neuroscience, artificial intelligence, anthropology, and psychology¹. This revised adaptation more accurately reflects the image as presented by Miller by Robo CriativeCommos

3. Leadership Styles: Behavior and Motivations

To understand the term "motivation", some concepts will be presented below.

"Motivation encompasses the causes or reasons that produce a certain behavior, whatever it may be." For this author "A motivated person usually means someone who demonstrates a high degree of willingness to carry out a task or activity of any nature", according to Maximiano and "the state of mind expressed in attitudes and behaviors of an individual or group", according to Milioni¹.

Thus, in summary, motivation can be considered a force, a state of mind or a tension that drives a person, through certain behaviors, in search of satisfying needs. In other words, motivation is having "reasons for action".

¹ Miller, George A (March 1, 2003). *The Cognitive Revolution: A Historical Perspective*. *Trends in Cognitive Sciences*. 7 (3): 141–144. DOI:10.1016/S1364-6613 (03)00029-9. Printed Version ISSN 1364–6613. PMID 12,639,696. S2CID 206,129,621. Archived From the Original on November 21, 2018. "The cognitive revolution: a historical perspective." *Trends in Cognitive Sciences*. 7 (3): 141–144. DOI:10.1016/S1364-6613(03)00029-9. printed version ISSN 1364-6613. PMID 12639696. S2CID 206129621. Archived from the original on November 21, 2018.

¹ Milioni, Benedito (2013) *Liderança Prática Agindo Nas 20 Situações Críticas Para O Líder Ético*: Qualitymark.

But what are the needs? "Needs or motives are conscious or unconscious forces that lead the individual to a certain behavior," according to Chiavenato, and for Milioni, "needs are desires, expectations, desires and demands of the person"².

Chiavenato further states that "once a need is satisfied, another appears in its place, and so on, continuously and infinitely. Needs motivate human behavior, giving it direction and content."

Furthermore, for his every human need can be satisfied, frustrated or transferred. Thus "every time some satisfaction is blocked by some barrier, frustration occurs". The author adds: "When the individual tries to satisfy some need that is impossible to satisfy, through the satisfaction of another complementary or substitutive need, then compensation or transfer occurs. Thus, the satisfaction of another need appeases the more important need and reduces or avoids the frustration."

Chiavenato describe frustration can lead a person to the following reactions:

- Disorganization of behavior.
- Aggressiveness, physical, verbal or symbolic.
- Emotional reactions such as anxiety, distress, intense nervousness, insomnia, circulatory and digestive disorders.
- Alienation, apathy or disinterest in achieving frustrated goals as a form or unconscious mechanism of ego defense.

It can be seen, therefore, that an unsatisfied need is motivating for the individual, as it causes tension that will drive him in search of satisfaction that will bring the organism, once again, to the initial state of balance. However, if the individual does not have their needs met (appropriate remuneration for the position, respect from peers and superiors, for example), they do not make efforts to achieve the organization's goals/objectives, thus losing motivation for their activities, making every day of work in that organization was a hardship for him.

Workers' Behavior Is Conditioned by Social Norms and Standards.

People begin to be evaluated by the group in comparison with these norms of behavioral standards. Humanist authors focused on informal aspects of the organization (informal groups, social behavior of employees, beliefs, attitudes and expectations, motivation, etc.).

According to Chiavenato³ "The concept of social man arose, where peo-

² Chiavenato, Idalberto (2003). *Introdução À Teoria Geral Da Administração*. [S.L.]: Campus. ISBN 85-352-1348-1, p. 138.

³ Chiavenato, Idalberto (2020). *Introdução À Teoria Geral Da Administração – Uma Visão Abrangente Da Moderna Administração Das Organizações* | 10ª Ed | Atlas, p. 139. Idalberto Chiavenato is a Brazilian writer, teacher and administrative consultant. He works in the area of business administration and human resources. He is one of the best known and respected national authors in the areas of Business Administration and Human Resources. He has a degree in Philos-

ple are motivated mainly by the need for recognition, social approval and participation in the activities of the social groups in which they live". And, into⁴ states that, "with the advent of the Theory of Human Relations, a new language begins to dominate the administrative repertoire: we now talk about motivation, leadership, communication, informal organization, group dynamics, etc.". Also, for him⁵, the Human Relations Theory noted the influence of leadership on people's behavior.

Leadership Theories Can Be Classified into Three Groups:

- **Personality traits.** According to this theory, the leader possesses marked personality characteristics that qualify him or her for a role.
- **Leadership styles.** This theory points to four leadership styles: autocratic, participative, democratic and liberal.
- **Situational leadership (contingency theory).** In this theory, the leader can assume different leadership patterns according to the situation. Chiavenato also points out that "a trait is a distinctive quality or characteristic of the personality. According to this theory, a leader is someone who possesses some specific personality traits that distinguish them from other people."

Some Personality Traits That Distinguish Leaders,

- **Physical traits:** energy, personal appearance, height and weight.
- **Intellectual traits:** adaptability, aggressiveness, enthusiasm and self-confidence.
- **Social traits:** cooperation, interpersonal and administrative skills.
- **Traits related to the task:** drive for achievement, persistence and initiative.

For Maximiano⁶: "The effectiveness of the leadership style depends on its effect on the performance of the task and the satisfaction of the influenced, be it an individual or a group. If those influenced are satisfied and, at the same time, perform satisfactorily, then the style is effective."

Thus, depending on the leadership style adopted by the company, there will be people who are more or less committed to the organizational objectives,

ophy/Pedagogy, with a specialization in Educational Psychology from USP, in Law from Mackenzie University and a postgraduate degree in Business Administration from EAESP-FGV. He holds a Master (MBA) and Doctor (Ph.D.) in Administration from the City University of Los Angeles, California, USA. He was a professor at EAESP-FGV, as well as at several universities abroad.

⁴ Chiavenato, Idalberto, *op. cit.*, 2020, p. 149.

⁵ *Ibid*, p. 88.

⁶ Maximiano, Antonio Cesar Amaru (2004). *Teoria Geral Da Administração: Da Revolução Urbana À Revolução Digital*. [S.L.]: Atlas. ISBN 85-224-3672-X - (2011 – 8ª Ed), p. 347. Antonio Cesar Amaru Maximiano is Bachelor's degree (USP, 1974), master's degree (USP, 1976) and doctorate in Administration (USP, 1979). Professor of administration at the University of São Paulo from 1975 to 2017. Guest professor at Université François Rabelais (Tours, France, 2009). Member of the academic coordination team at Faculdade Pecege since 2018. <http://producao-acad.fea.usp.br/PPGA/membro-2496969804206964.html>.

as well as a climate that is more conducive to productivity, interaction, etc. Furthermore, depending on the employee's profile, whether they are more efficient or more responsible, for example, the leader can vary the leadership style adopted, adapting it to the employee or the circumstances.

Still on the subject of leadership style, Franco⁷ says that leaders can be:

- **Production or task-centred:** the leader establishes their leadership process based on centralization and rigidity, as well as personal monitoring of the tasks being carried out;
- **People-centred:** receives more consideration from individuals, as they exercise their leadership by encouraging everyone to participate in the work process and in the goals to be achieved; this helps to ensure high performance, generating a climate of greater trust and respect between leaders and subordinates.

And there are types of leaders who are required by companies in the 21st century:

- **Transformational Leader:** he can extract more motivation and performance from people than is expected of them. What's more, this leader transforms people into valuable assets for organizations.
- **Charismatic Leader:** he has, in addition to being able to persuade himself, the power to transform people's lives, creating a more interesting and enthusiastic working environment.
- **Training Leader:** your satisfaction lies precisely in cultivating people for success and has as a source of inspiration your own ability to develop people and transform them into future leaders or at least provide them with the path to do.

As can be seen, some theories state that leaders are born ready, as they have characteristics that differentiate them from other people. Others, on the other hand, state that it is possible to develop leadership and adapt it to situations and people, through different styles. But, although it is clear how important it is to know the origins of these studies, they are worthless if the leader does not know how to motivate their employees to achieve organizational objectives.

Leadership as a subject of scientific research only emerged after the 1930s, outside the field of philosophy and history. Over time, research and literature on leadership evolved from theories that described personal traits and characteristics of effective leaders, through a basic functional approach, which outlined what effective leaders should do, to a situational or contingency approach, which proposes a more flexible, adaptive style for effective leadership.

In recent years, much of this research and work has been criticized for being too narrow in scope, more concerned with explaining the behaviors of leaders face-to-face with their employees, rather than examining leaders in the larger

⁷ Franco Gandolfi is Doctor of Business Administration at Georgetown University | GU · McDonough School of Business - Working on various projects on leadership, organization development, and change management <https://www.researchgate.net/profile/Franco-Gandolfi>.

context of their organizations, paying little attention to the role of organizational leadership in terms of dealing with environmental change. It is the most important process that should be emphasized.

4. Transdisciplinary and Organizational Leadership Training

Leadership in organizations is a multifaceted concept that serves various stakeholders:

- **For Whom?** Leadership is for everyone involved with the organization, from employees and management to shareholders and customers. Effective leadership impacts all levels of an organization, fostering a positive work environment and driving success.
- **How?** Leadership is exercised through clear communication, strategic decision-making, and the ability to inspire and motivate. It involves setting goals, providing direction, and empowering individuals to grow and contribute to the organization's objectives.
- **Why?** The purpose of leadership is to guide organizations towards achieving their vision and goals. It's about creating a culture of innovation, efficiency, and adaptability in an ever-changing business landscape. Good leadership is crucial for organizational health, employee satisfaction, and overall success.

In essence, leadership in organizations is about nurturing talent, shaping future leaders, and ensuring that the organization thrives in its respective industry.

This differentiates the leader from the boss, who is the person in charge of a task or activity in an organization and who, to this end, commands a group of people, having the authority to order and demand obedience. Today's managers need not only the skills of a boss, but above all those of a leader.

AI Could Create a New Class of Functionally Illiterate. "According to AutoCognita, a Solve member⁸, and is an EdTech social enterprise with a mission to help millions of low-literacy adults learn basic literacy skills and lead a better life. Today, in the US alone there are over 36 million adults who are considered functionally illiterate. Existing literacy programs around the nation cannot scale quickly enough to help them. That's why AutoCognita took the technology route to create a scalable literacy app targeting adult learners."

AI and Digital Literacy: In the digital age, being literate extends beyond just reading and writing. Digital literacy, which includes the ability to use digital technology effectively, is becoming increasingly important. As AI becomes more

⁸ Solve is an initiative of MIT. We believe that to achieve a more sustainable and equitable future for all, we need new voices and ideas. We launch open calls for exceptional and diverse solutions to the most pressing global challenges from anyone, anywhere in the world. Selected innovators get the backing of MIT and our community of supporters to scale their impact and drive lasting change.

integrated into our daily lives, there's a risk that those who are unable to use such technology could become functionally illiterate in a digital sense.

They were functionally illiterate: They could read and write but confused the simple with the complex.

The prevalence of functionally illiterate individuals in our society is a worrisome and rising phenomenon. University of Tübingen researcher Réka Vágvölgy⁹ and her team wrote a paper in 2016 clarifying that simple illiterates “are unable to read or write”, while functional illiterates can read and write, but “are unable to use their acquired literacy skills in daily life”. For example, although the functionally illiterate can read, they cannot fill out an application, understand a tweet or written instructions, or “compare the cost of two items to choose the item that offers the best value”.

Instead of inspiring the search for new experiences and skills, this type of illiteracy may lead to a dull learning style. The result: Weakened cognitive skills that, instead of pushing the acquisition of basic literacy, favor a simpler source of information like social networks and videos.

This is why functional illiteracy is a worrisome phenomenon. It goes beyond school or job performance—functional illiteracy can create an illusion of skill acquisition.

The dangers of weak cognitive functions are further confirmed by the World Economic Forum's top five skills to have in 2022 (and remaining on the list in 2023 - Future of Jobs Report)¹⁰: analytical thinking, active learning, creativity, technology, design, and critical thinking. These skills are replacing others, such as manual dexterity, working memory, management of financial resources, technology installations, and reading/writing. Without the latest cognitive skills, the functionally illiterate lack the ability to integrate into society.

That impact has a ripple effect, adding an extra dimension to the expanding wealth gap and generating not just an underprivileged class, but a functionally illiterate underprivileged class.

Analytical and creative thinking skills take the top spots for what companies are expecting from workers right now. Self-efficacy skills, including being resilient, flexible and agile, being motivated and self-aware, and curious and committed to lifelong learning, round out the top five.

This is “in recognition of the importance of workers' ability to adapt to disrupted workplaces”, the report said. Only one technology-related skill — technological literacy — makes it into the top 10 at sixth place. The ability to

⁹ Vágvölgy, Réka – *A Review about Functional Illiteracy: Definition, Cognitive, Linguistics, and Numerical Aspects* – Publicado online Nov 10, 2016. DOI: 10.3389/fpsyg.2016.01617. Réka Vágvölgy - is a senior research scientist at the Fachbereich Sozialwissenschaften (Department of Social Sciences) at the RPTU (Rheinland-Pfalz Technical University) in Kaiserslautern, Germany. Her work focuses on developmental psychology and cognitive science.

¹⁰ In its latest “Future of Jobs” report, WEF lays out which skills are key right now, and which will become vital in the coming years. The report is based on a survey of 803 companies in 27 industry clusters in 45 different economies.

understand and work with AI and big data currently ranks 15th.

Though functional illiterates seek out simplicity, its complexity that is on the rise in our global society. In our world of data, there is incrementally more and more demand on users. In 2012, Jeanne Harris suggested on the Harvard Business Review that non-academics must understand the principles of scientific experimentation and how to apply them to business.

Essentially, there is no room for functional illiterates in a data-driven world. Ongoing research on artificial intelligence skills shows that analytical thinking and curiosity are necessary cognitive skills for working with AI. Both skills require a strong ability to reason and ask pressing questions. According to Tom Pohlmann and Neethi Mary Thomas¹¹, such questions can be divided into four groups:

- Clarifying
- Widening
- Funneling
- Adjoining

The art of asking questions seems to be a massive obstacle for functional illiterates and their weakened cognitive skills. Being able to read and write is not enough. The digital age demands sustained attention (not just selective attention) to perform tasks and contribute.

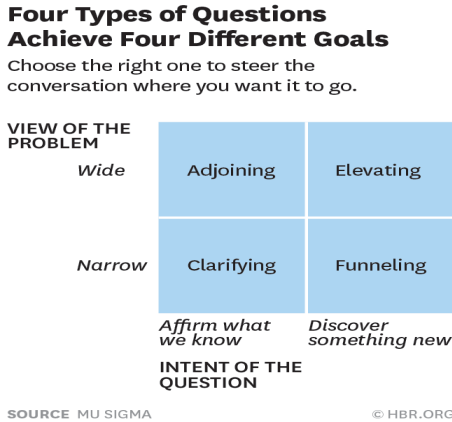


Figure 2.

Modern technologies such as YouTube afford unprecedented access to the skilled performances of other people, but merely Watching Others Perform Can Foster an Illusion of Skill Acquisition.

¹¹ Relearning the Art of Asking Questions by Tom Pohlmann and Neethi Mary Thomas, 2015 – Harvard Business Review.

Experiments¹² show the more people merely watch others perform (without actually practicing themselves), the more they nonetheless believe they could perform the skill, too. However, people's actual abilities—from throwing darts and doing the moonwalk to playing an online game—do not improve after merely watching others, despite predictions to the contrary.

5. Transdisciplinary

If we consider the rapid advancement of technology and the increasing dependence on AI systems to perform tasks that previously required human effort, there is a risk that some people will become overly dependent on these systems. This could potentially lead to a form of functional illiteracy, where individuals may have difficulty with tasks that AI normally performs for them when the technology is not available.

If, on the one hand, AI is the great driver of functional illiteracy, on the other hand, AI is also the solution that has been used to combat illiteracy, as well as being used as a powerful tool to combat traditional and digital. We need to ensure that AI and other technologies are accessible and usable by everyone, regardless of their current level of skills and knowledge. Only in this way will it be possible to prevent the emergence of a new class of functional illiteracy.

In today's complex and hyper-connected world, a transdisciplinary approach aimed at developing skills can offer many benefits:

- **Holistic Problem Solving and Understanding** refers to the ability to approach issues and challenges comprehensively, considering all relevant aspects rather than focusing only on isolated parts of a problem. Holistic problem-solving ability is a valuable skill in many contexts, from everyday life to the professional environment.

- **Greater Capacity for Creativity and Innovation** exposing individuals to different disciplines and ways of thinking stimulates creativity and innovation, as well as **Collaboration and Teamwork**. By working together, individuals learn to value approaches from diverse perspectives, communicate effectively, and improve interpersonal skills.

- **Promoting Adaptability and Resilience** by developing a broader set of skills and the ability to integrate knowledge from different disciplines, individuals become more flexible, versatile and adaptable, to navigate rapidly evolving professional scenarios.

- **Real-world Practical Application** makes it possible to bridge the gap between academic knowledge and real-world practical applications, where individuals gain a deeper understanding of how their skills and knowledge can be used.

¹² Easier Seen Than Done: Merely Watching Others Perform Can Foster an Illusion of Skill Acquisition by Michael Kardas ChicagoBooth.edu and Ed O'Brien View all authors and affiliations.

- **Systems Thinking** or systematic thinking is a conceptual framework that understands reality as a system of interconnected objects or subsystems and interdependencies of various elements within complex systems. Consequently, it tries to understand its functioning and its properties to solve a problem.

- **Career Progression** in a World of Increasing Volatility, Uncertainty, Complexity, and Ambiguity (V.U.C.A). In essence, VUCA helps organizations adapt to change by encouraging leaders to think strategically about volatility (rapid change), uncertainty (unpredictable outcomes), complexity (interlinked variables), and ambiguity (lack of clarity). Emphasizes the importance of adaptability, resilience and agility in decision-making – characteristics that are crucial to success in today's dynamic environment, as employers increasingly value individuals who can overcome disciplinary boundaries, adapt to new challenges and contribute to teams interdisciplinary.

Transdisciplinary Skills

- TD Skills are nothing new. They comprise a set of higher-order skills, abilities and dispositions that have been identified as necessary for success in today's complex, fast-changing, interdependent and technology-driven society

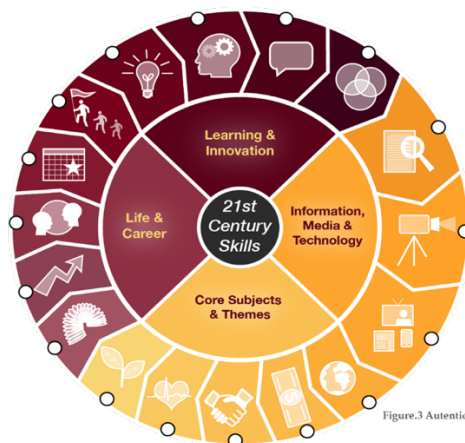


Figure.3 Authentic Learning @UMN

*TD Skills - transdisciplinary skills attributed by the author

Figure 3. Autentic Learning

Creativity, Critical Thinking, Communication and Collaboration - the 4 C. The need for continuous knowledge in information, media and ICT is a direct result of the technologies that change the way we communicate, interact and work together.

Information, Media & ICT. Although organized in slightly different ways, these individual structures are found to be "generally consistent with each other" in their emphasis on creativity and innovation, critical thinking and problem solving, communication and collaboration.

The Importance of Soft Skills. Arguably, some of the most important skills of the 21st century is those that differentiate us from the machine. Being able to live and work in today's globalized, interconnected and interdependent world requires collaboration, social and intercultural skills, adaptability and self-

regulation, productivity and accountability, leadership and responsibility. To develop these interpersonal and interpersonal skills, it is necessary to practice working collaboratively with others, explore cultural differences and perspectives, develop self-reflective practices, appreciate that all knowledge comes with lenses and deal with the complexity inherent in our diverse, interconnected and interdependent world.

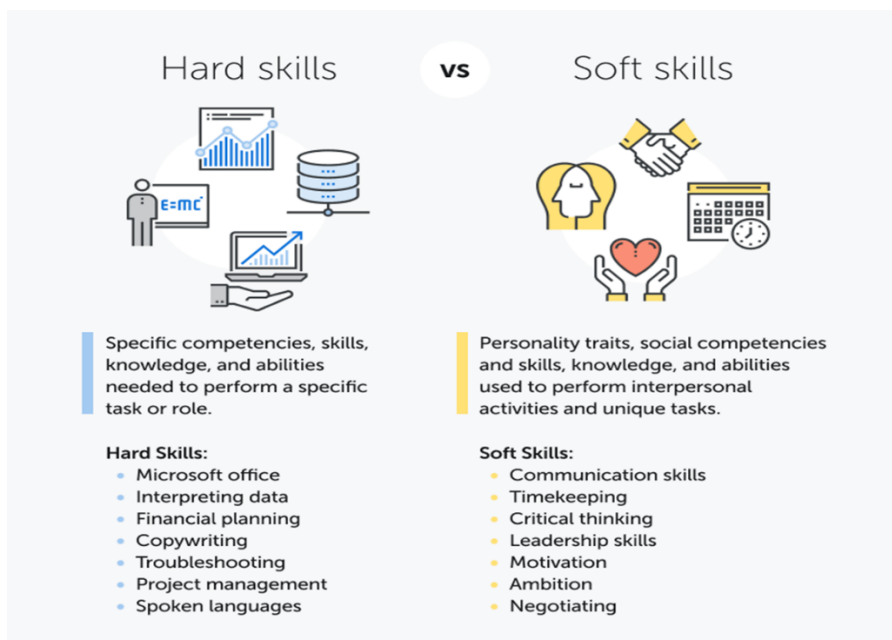


Figure 4. Uploaded by on November 27, 2021, for Ivan Andreev - <https://www.valamis.com/hub/hard-skills-vs-soft-skills>

21ST Century Themes. Finally, 21st-century themes such as global awareness, financial-economic-business-civic literacy, health literacy and environmental literacy are necessary to understand and respond to the issues faced by today's globalized, interconnected and interdependent societies.

Incorporating the 21 themes into the curriculum helps foster the systems thinking and interdisciplinary mindset that helps us understand today's complex world.

These transdisciplinary skills, or better, TD Skills¹³, are not only considered important for a successful economy and are sought by employers from university graduates entering the job market¹⁴, they are necessary for 'effective com-

¹³ TD Skills – transdisciplinary skills attributed by the author.

¹⁴ Bar-Kochva, I., Vágvölgyi, R., Dresler, T., et al. *Basic reading and reading-related language*

munity and social engagement, participatory democracy and for living meaningful and satisfying lives¹⁵.

To develop these important affective and conative skills, educators consider HOW students learn and draw on what is known about the science of learning beyond the cognitive to promote these meta-outcomes¹⁶.

6. Conclusion

In the modern business scenario, marked by rapid and simultaneous transformations, the ability to grasp and apply knowledge from multiple disciplines in different contexts is fundamental.

Organizational leaders are expected to be able to approach complex problems across multiple domains with creativity and depth, where they require a combination of disciplinary and experiential knowledge to understand these challenges and develop effective solutions whenever necessary and requested.

To do so, these leaders need to be able to exercise skills that are not new. These comprise a set of higher-order competencies, skills and dispositions that have been identified as necessary for success in today's complex, rapidly changing, interdependent and technology-driven society.

Transdisciplinary emerges as a response, as it challenges traditional knowledge management models by encouraging the integration of knowledge from different areas, creating innovative and effective solutions for the complex challenges of the business world, and allows incorporating and aligning.

Acknowledgment and Conflicts of Interest

The author declare that she has no conflicts of interest with respect to the

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¹⁶ Kardas Michael *Easier Seen Than Done: Merely Watching Others Perform Can Foster an Illusion of Skill Acquisition* — Chicagobooth.Edu and Ed O'brienview All Authors and Affiliations Volume 29, Issue 4 <https://doi.org/10.1177/0956797617740646>; Warne, Russell T. (2015). Test Review: Cognitive Abilities Test, Form 7 (Cogat7). *Journal of Psychoeducational Assessment*; Kiely, Kim (2014). *Cognitive Function*. In Michalos, Kim M. (Ed.). *Encyclopedia of Quality of Life and Well-Being Research*. Springer. pp. 974–978. [Doi:10.1007/978-94-007-0753-5_42](https://doi.org/10.1007/978-94-007-0753-5_42) 6. ISBN 978-94-007-0752-8; Schwarz-Friesel, Monika (2012). *On The Status of External Evidence in the Theories of Cognitive Linguistics*. *Language Sciences*. 34 (6): 656–664. [Doi: 10.1016/J.Langsci.2012.04.007](https://doi.org/10.1016/J.Langsci.2012.04.007).

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