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ZOOM IN, ZOOM OUT:

THE IMPACT OF THE COVID-19 PANDEMIC IN THE CLASSROOM

DISSERTAÇÃO APRESENTADA À ESCOLA BRASILEIRA DE ADMINISTRAÇÃO PÚBLICA E DE EMPRESAS PARA OBTENÇÃO DO TÍTULO DE MESTRE

MANUELA FORTES LORENZO
Rio de Janeiro - 2020

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Dissertação apresentada à Escola Brasileira de Administração Pública e de Empresas para a obtenção de grau de mestre.

Orientador: Prof. Luiz Antonio Joia

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MANUELA FORTES LORENZO

"ZOOM IN, ZOOM OUT: THE IMPACT OF THE COVID-19 PANDEMIC IN THE CLASSROOM".

Dissertação apresentado(a) ao Curso de Mestrado em Administração do(a) Escola Brasileira de Administração Pública e de Empresas para obtenção do grau de Mestre(a) em Administração.

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Nos termos da Lei nº 13.979 de 06/02/20 - DOU nº 27 de 07/02/20 e Portaria MEC nº 544 de 16/06/20 - DOU nº 114 de 17/06/20 que dispõem sobre a suspensão temporária das atividades acadêmicas presenciais e a utilização de recursos tecnológicos face ao COVID-19, as apresentações das defesas de Tese e Dissertação, de forma excepcional, serão realizadas de forma remota e síncrona, incluindo-se nessa modalidade membros da banca e discente.

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"Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less."

- Marie Curie.

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RESUMO

Debates acadêmicos sobre a avaliação do ensino mediado por tecnologia (EMT) ocorrem há décadas, com resultados inconclusivos. Em 11 de março de 2020, a Organização Mundial da Saúde declarou o COVID-19 como uma pandemia a ser confrontada pela humanidade. Dessa forma, o isolamento social virou regra na maior parte dos países, e, consequentemente, as aulas presenciais foram alteradas para aulas mediadas por tecnologias de informação e comunicação (TIC). Dadas essas condições, este trabalho busca investigar os fatores necessários para que cursos mediados por tecnologias consigam atingir seus objetivos pedagógicos, no contexto da educação em Administração. Além disso, o estudo examina como matérias que desenvolvem *hard skills* e *soft skills* se diferenciam em um contexto mediado por tecnologia. Por opção, os cursos EMT foram avaliados pelo ponto de vista de sua abordagem pedagógica e design instrucional - em outras palavras, em relação à sua opção pedagógica, especificamente instructivismo/behaviorismo ou constructivismo/cognitivismo. Uma turma de graduação da melhor escola de Administração do Brasil foi examinada. Os resultados mostram que a competência digital do professor sobre a tecnologia utilizada e a disponibilidade de suporte metacognitivo no ambiente digital são fatores significantes para que os cursos possam atingir seus objetivos pedagógicos com sucesso. Por fim, o estudo revelou que as disciplinas de *hard skill*, quando migradas para ambientes mediados por tecnologias, tem uma probabilidade maior de fracassar ao completar seus objetivos educacionais do que disciplinas *soft skill* quando sujeitas a mesma migração. Em suma, o conteúdo importa.

Palavras-chave: Aprendizado Mediado por Tecnologia; Estudo Online; *E-Learning*; Avaliação; *Hard Skills*, *Soft Skills*, Pandemia do COVID-19

ABSTRACT

Academic debate about technology-mediated learning (TML) evaluation has been conducted for decades with inconclusive results. On March 11, 2020, the World Health Organization declared COVID-19 to be a pandemic to be confronted by humanity. That way, social isolation has become the norm in most countries, with the consequent replacement of face-to-face classes by classes mediated by information and communication technology (ICT). Within these conditions, this work sets out to investigate the factors necessary for courses mediated by technology to attain their pedagogical objectives, in the context of management education. Besides, the study examines how subjects that develop hard and soft skills differ in a technology-mediated setting. One opted to evaluate the TML courses from the standpoint of their pedagogical approach and instructional design - in other words, in relation to their pedagogical option, namely instructivism/behaviorism or constructivism/cognitivism. One undergraduate class in Brazil´s best Administration course was examined. The results show that the professors' digital competence on the technological platform and the metacognitive support available in the digital environment are significant factors for the courses to attain their pedagogical objectives successfully. More importantly, the study revealed that hard skill disciplines, when they migrate to technology-mediated environments, are more likely to fail to achieve their educational goals than soft skill disciplines subject to the same migration. In short, content matters.

Keywords: Technology-Mediated Learning; Online Learning; E-Learning; Assessment; Hard Skills, Soft Skills, COVID-19 Pandemic

CONTENTS

1. INTRODUCTION

Technology-mediated learning (TML) has become a major part of management education (Mintu-Wimsatt, 2001), particularly regarding the delivery of Master in Business Administration (MBA) programs (Kim el al., 2005) and in corporate training (Joia & Costa, 2008; Joia & De Lima, 2012). In response to recent technological advances and the trend towards flexible learning in education, higher educational institutions have leveraged on the advantages presented by these new technologies and the Internet to enhance education (Maphalala & Adigun, 2021). However, despite the trend towards online programs even among Association for Advance Collegiate Schools of Business (AACSB) member schools, TML courses continues to be seen as having lower quality regardless of research evidence to the contrary (Redpath, 2012).

Since the 1990s, education witnessed a dramatic increase in the development of technology-based teaching and learning (Alavi & Leidner, 2001). Even before the pandemic, the global e-learning market was expected to reach $336.98 billion by 2026, at a compound annual growth rate (CAGR) of 9.1% from 2018 to 2026 (Syngene Research, 2019). The global corporate online learning market is also expected to grow to $50 billion by 2026, with an annual growth rate of 15% from 2020 to 2026 (Statistics Market Research Consulting, 2019). These numbers probably will be updated considering the impacts and disruption power of COVID-19 Pandemic.

The evolution of a pandemic is one of the most dangerous and complex problems for society, and its management and mitigation by the government are, for this very reason, challenging (Castillo-Chavez et al., 2015). This issue can be confirmed by the severe pandemics that humanity has faced throughout its history, such as the Spanish flu in 1917, the Hong Kong flu (H3N2) in 1968, and the swine flu (H1N1) in 2009.

In December 2019, the city of Wuhan, the capital of China's Hubei province, became the center of a pneumonia outbreak of unknown cause. On January 7, 2020, Chinese scientists isolated a new virus – severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) – among patients with symptoms of pneumonia. This virus was called coronavirus disease 2019 (COVID-19) in February 2020 by the World Health Organization (WHO), which decreed COVID-19 as a pandemic to be confronted by the whole of humankind on March 11, 2020.

In view of this pandemic, social isolation has become the norm in most nations, with the consequent suspension of face-to-face classes or their replacement by classes mediated by information and communication technology, which has altered the routine of thousands of students worldwide. Online learning emerged as a safe and viable option for education continuity in this context. Information and Communication Technology (ICT), although crucial to the viability of education in the pandemic period, does not offer a guarantee of success to those who adopt it, as it must be associated with pedagogical and didactic aspects related to the subject taught (Nel, 2017). Furthermore, researchers have called for further research to investigate the factors responsible for e-learning success (Al-Fraihat et al., 2019).

Investigation into the success of ICT implementation in learning environments remains a popular topic (Chou, 2005; Wan & Fang, 2006; Bitzer et al., 2014), although no clear conclusion has been reached on how to evaluate its effectiveness (Wan & Fang, 2006; Baldwin et al., 2018; Söllner et al., 2018). Indeed, evaluation of e-learning systems is vital to ensure successful delivery, effective use, and positive impacts on learners (Al-Fraihat et al. (2019). Online teachers are conscious of the fact that strategies used in face-to-face classrooms cannot be fully replicated in an online environment (Berry, 2019). Nonetheless, instructors still had doubts about how to promote student engagement in online environments (Henrie et al., 2015) as well as how ICT-mediated courses in higher education impact student commitment to them (Dumford & Miller, 2018).Thus, the first objective of this thesis is to identify the key success factors in the introduction of ICT in courses that were formerly face-to-face and that changed – from one moment to the next and due to the pandemic of COVID-19 – to be mediated by ICT by means of the Zoom platform.

In addition to this, due to the novelty of TML, considerable uncertainty prevails regarding the subject matter and content type best suited to be delivered in the digital environment (Arbaugh & Benbunan-Finch, 2006). As far as in known, still today no study have examined the impact of content on online courses outcomes. Therefore, the second objective of this thesis is to verify the impact of the introduction of ICT on hard skill courses and soft skill courses, in order to verify if the type of course has a significant influence upon the attainment of the objectives of the courses mediated by technology. That way, the research question of this work is: What are the key success factors in

courses mediated by Information and Communication Technology of hard skill and soft skill content? In other words: Does content matters when evaluating TML courses?

Finally, this study aims to contribute to the literature on management education, investigating whether the type of content (hard skill or soft skill) affects the achievement of the objectives proposed by a discipline. An undergraduate class of the best Business Administration course in the country was examined, using an adaptation of Reeves' model (Reeves & Reeves, 1977) to analyze the different pedagogical dimensions involved in the online teaching-learning process.

This thesis is structured in the following manner: after this introduction, the theoretical background and framework used are described. Three interrelated issues, namely psychology, education and ICT, are explored. The methodological procedures adopted in the work are then outlined in order to present the results obtained subsequently. The discussion of these results is analyzed in order to conclude in the last section with the contributions, and implications of this research, as well as its limitations and further steps.

2. THEORETICAL BACKGROUND

Online learning has become an important component of education worldwide. However, some theoretical approaches associated with the teaching-learning process are generally absent when defining online learning (Singh & Thurman, 2019). In fact, learning theories, pedagogical approaches, cognition and instructional design are often overlooked when defining online learning.

That way, in order to answer the research question of this thesis, it is necessary to outline some important aspects of the theoretical background, namely the main pedagogical approaches and the instructional design associated with the utilization of ICT in the classroom, the TML concept, the evaluation models of ICT-mediated courses, and the influence of the characteristics of TML courses contents in the attainment of the learning objectives of said courses. In sum, to analyze the theoretical aspects related to the introduction of ICT and distance learning in higher education, it is necessary to address three interrelated issues: psychology, education and ICT.

2.1. ICT in the Classroom

2.1.2. Pedagogical Approaches

Online teaching introduces challenges to teachers and instructors that are very distinct from what they are used to in face-to-face learning. Thus, researchers have long emphasized the need for different pedagogical principles for online learning (Huang, 2002; Cercone, 2008), as the traditional learning theories were developed considering formal in situ education. However, it is crucial to understand the basic learning theories´ assumptions including their implications for instruction and evaluation in distance education.

Two paradigms associated with pedagogical approaches in the classroom became very influential from the 20$^{th.}$ century onwards. In addition to including an overview of how the learning process is achieved, these paradigms offer an insight into the nature of knowledge itself - in other words, if knowledge exists in an absolute form or if it is something that is constructed and relative. These two paradigms are traditionally referred to as “instructivism/behaviorism” and “constructivism/cognitivism” (Wilhelmsen et al., 1998; Joia & Costa, 2008; Joia & De Lima, 2012). Although learning theories typically are divided into two categories, namely behaviorism and cognitivism, constructivism can

also be considered as a third category (Ertmer & Newby, 1993). Constructivism and cognitivism may overlap. However, they are distinctive enough to also be treated as separate approaches to understanding and describing learning.

The instructivism / behaviorism approach is intrinsically objectivistic, assuming that there is one true and correct reality that exists independent of humans (Lakoff, 1987). Learning is achieved via theoretical models and abstract symbols in order to represent this reality. Thus, there is only one correct understanding of any topic and instruction should be designed to effectively transfer knowledge into the learner's head (Vrasidas, 2000). In the late 1950s, learning theories began to make a shift away from the use of behavioral models to an approach that relied on the cognitive sciences, known as cognitivism (Ertmer & Newby, 1993). Accordingly, over time, this basic objectivistic assumption started to be challenged and a new theory named constructivism arose (see Piaget, 1970; Blumer, 1969; Kuhn, 1996; von Glasersfeld, 1989; and Vygotsky, 1978), which holds that knowing is a process of actively interpreting and constructing individual knowledge representations (Jonassen, 1991). Despite existing a real world that sets boundaries to what one can experience, reality is local and can be multiple (Vrasidas, 2000). Knowledge does not exist independent of the learner's meaning, being the result of an interpretive process based on the person´s experiences, understanding and imagination (Cobb, 1994; Jonassen, 1992).

In this study, two paradigm approaches to the learning theories was chosen (see Joia, 2001). The core distinction between them - instructivism/behaviorism and constructivism/cognitivism - lies in the concept of knowledge per se. In the former, knowledge is passive – automatic responses to external factors – whereas in the latter, knowledge is perceived as an entity constructed by each student over the learning process. Knowledge seen from the constructivist/cognitivist standpoint does not have absolute characteristics as it does in the instructivist/behaviorist standpoint and cannot therefore be simply handed down from one person to another (Wilhelmsen et al., 1998; Joia & Costa, 2008; Joia & De Lima, 2012).

In the context of this work, the central aspects of instructivism/behaviorism are the concepts that the student needs to adapt to the environment and that learning is a passive process in which no explicit treatment or interest is ascribed to the mental processes. In the case in question, the student simply responds to the demands of the environment by

means of stimuli (Boghossian, 2006). Knowledge is therefore understood as an absolute and immutable concept as stated by Skinner (1968) and Wilhelmsen et al. (1998), among others. Therefore, the instructivist/behaviorist paradigm is suited to a given training program, as long as it has clearly defined objectives and that the ensuing results can be clearly measured. A good example of this is the training videos that the U.S. army used in World War Two for repetitive tasks such as assembling a rifle (Rosemberg, 2001, p.20).

Theorists of constructivism/cognitivism are of the opinion that learning is an active process, which is a theory not espoused by theorists of instructivism/behaviorism. Indeed, constructivism/cognitivism is based on the concept that students develop their own views of knowledge, as opposed to the notion that teachers hand down information and knowledge to their students (see, for example, Piaget & Cook, 1952 and Papert, 1993). According to Arghode et al. (2017), unlike behaviorism, which focus on knowledge acquisition, constructivism focuses on knowledge construction. Constructivist/cognitivist proponents are of the opinion that the learning plan should always place emphasis on the student, and not on the content and format of the program, or the ideas of the instructor (Joia & Costa, 2008; Joia & De Lima, 2012). In this manner, a transition is made from a model in which the instructor is the focus of the teaching program (instructivism/behaviorism) to a model in which the student is an active participant in the course (constructivism/cognitivism).

Finally, as emphasized by Snelbecker (1983), instructors cannot afford the luxury of restricting themselves to only one theoretical position and should select the principles that seem to be of value for one's particular educational purpose. For instance, educators can design online activities that create a response cycle in learners and emphasize a sequence of several steps in designing instruction (Vrasidas, 2000), following the behaviorism approach (Arghode et al., 2017). At the same time, successful learning cannot take place without students' efforts and willingness to learn and apply the concepts as constructivism/cognitivism would suggest (Arghode et al., 2017). Table 1 summarizes the three discussed learning theories and their implications for online instruction.

Table 1 - Learning Theories

Learning Theories	*Behaviorism*	*Cognitivism*	*Constructivism*
Core Beliefs	Knowledge is handed down by the instructor	All learners can be engaged regardless of their motivation	Learners create their own meaning
Learning perspective	Learning involves stimulus and response	Learning involves processing of information	Learning involves knowledge construction
Aim of learning	Ensure learned behavior is remembered	Make learning engaging, motivating	Facilitate and agree upon meanings with learners
Role of teachers	Repository of knowledge	Engage students	Facilitate and guide students
Implications for online instruction	The content can be designed to promote learning through improved practice	Online activities should be structured logically and systematically to grab learners' attention	Online activities can be designed to promote creative thinking encouraging learners to create meaning.

(Adapted from Arghode et al. 2017)

2.1.2. Instructional Design

According to Arghode et al. (2017), learning theories and their roles in shaping online learning and instruction deserve more attention. Frequently, despite the enthusiasm that goes into the development and utilization of Information and Communication Technology (ICT) within the learning process, key opportunities are missed (Oliver & Herrington, 2003).

Ertmer & Newby (1993) long proclaimed the need for a bridge between basic learning theories and academic practice, which would convert relevant aspects of pedagogical approaches into optimal instructional actions. Moreover, Lynch (1945) and Tyler (1978) also called for the development of a "linking science". In line with Reigeluth (1983), the sphere of Instructional Design performs this role. The designer must at the same time analyze practical learning problems and understand the potential sources of solutions from the theories of human learning (Ertmer & Newby, 1993). While learning theories focus on the learners and how they learn, instructional design theories assist educators by providing explanations for interpreting data on learning and help make predictions

associated to learner performance (Branch & Stefaniak, 2019). Hence, the function of instructional design is the application of these learning theories and not the creation of them.

Instructional design, which gained more and more importance during the last half of the 20th. century, has led to the development of many models to improve teaching as a result of technological advancements (Göksu et al., 2017). The main goal of instructional design is to ensure quality in education and teaching that is more effective. Reeves et al. (2005) acknowledge that all instructional design research focus on questions of how people learn and perform, especially with respect to technology.

2.2. Technology-Mediated Learning

Although the digital revolution has the potential to completely digitize services previously provided face-to-face, there is a tendency for hybrid solutions to prevail, such that the real and digital worlds coexist peacefully. This occurred, for example, with e-commerce. From the initial concept that the Internet would eliminate traditional commerce completely, a situation was established in which both physical and online stores co-existed peacefully, by means of a hybrid commerce model (Yen, Chen, & Hu, 2018).

The same phenomenon occurred in education. From totally face-to-face education, it was considered, that through ICT – and especially the Internet – a fully online teaching-learning relationship would arise (O'Donoghue et al., 2001), in what was traditionally referred to as e-learning (Moore et al., 2011). The term e-learning emerged in the mid-1990s to describe learning delivered fully online via technology with students and instructors not present at the same time or place (Gros & García-Peñalvo, 2016). Furthermore, e-learning might be synchronous (e.g., online classes by video conference), or asynchronous (e.g., self-paced training with pre-recorded videos) (Gustafson, 2002). Despite being used interchangeably in the literature, e-learning and distance education are not synonymous. Distance learning takes place when the instructor and the student are separated by physical distance (Smith, 1998). Originally, distance education was associated with learning materials sent by correspondence (Filipczak, 1995).

The origins of e-learning lies in distance education as well as the development of the Internet in the 1990s (Gros & García-Peñalvo, 2016). E-learning provides people with a

flexible way to learn, reducing the cost of learning (Cidral et al., 2018) while democratizing it. One of the goals of e-learning is to remove barriers of education and the new Massive Open Online Courses (MOOC) take that intention to another level (Hone and Said, 2016). However, a high dropout rate (of over 90%) is still very common and cast doubt on the usefulness and viability of these courses (Aparicio et al., 2019). For students in developing countries, the potential benefits of e-learning seem even higher than for students in developed countries (Hone and Said, 2016; Liyanagunawardena, Adams, & Williams, 2013).

In recent years, hybrid teaching-learning models – generically referred to as TML – have begun to emerge where characteristics of face-to-face and online approaches are complemented in the classroom (Graham, 2006; Saadé et al., 2011). Thus, TML offers the opportunity to integrate the strengths of synchronous (face-to-face) and asynchronous (IT-based) learning activities (Garrison & Kanuka, 2004). Therefore, the importance of TML is on track to increase even further, since it empowers the design of innovative, more individual, and resource-preserving ways of learning, for example, micro-learning at the workplace or location-independent, cloud-based learning (Söllner et al., 2018).

Alavi and Leidner (2001) define TML as an environment in which students' interactions with learning material, teachers and/or their classmates are mediated through advanced ICT. In addition, Saadé et al., (2010) state that TML courses can fully support the two educational paradigms described above (instructivism/behaviorism and constructivism/cognitivism), leaving the teacher to create an instructional design suitable for the course to be taught.

As seen above, the field of online education has many distinct and overlapping terms such as e-learning, distance education, technology-mediated learning, etc. Online learning, for instance is often used as an umbrella term and often misused when scholars mean online education (Singh & Thurman, 2019). Nonetheless, theory can only be built if a common set of terms is used and if their meaning is popularly adhered to (Nichols, 2003). This is the reason why is important to address the differences between these terms. Table 2 consolidates the aforementioned definitions.

Table 2 - Online Education Definitions

Construct	*Definition*
Online Education	Education that occurs only through the Web, that is, it does not consist of any physical learning materials issued to students or actual face to face contact. Purely online learning is essentially the use of eLearning tools in a distance education mode using the Web as the sole medium for all student learning and contact (Nichols, 2003).
E-learning	The use of various technological tools that are either Web-based, Web-distributed or Web-capable for the purposes of education (Nichols, 2003).
Distance Education	Distance teaching may be defined as the family of instructional methods in which the teaching behaviors are executed apart from the learning behaviors, including those that in a contiguous situation would be performed in the learner's presence, so that communication between the teacher and the learner must be facilitated by print, electronic, mechanical or other devices (Moore, 1973).
Technology-Mediated Learning (TML)	An environment in which the learners´ interactions with learning materials, peers, and/or instructor are mediated through advanced information technology (Alavi & Leidner, 2001).
Massive Open Online Courses (MOOC)	Online courses designed for large numbers of participants, that can be accessed by anyone anywhere as long as they have an internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for free (Jansen & Schuwer, 2014).

2.3. Evaluation of ICT-Mediated Courses

Studies referring to the use of e-learning or TML in Brazil are scarce (Cidral et al., 2018) and do not entirely capture its success drivers (Cidral et al., 2020). In fact, most of the studies on e-learning in Brazil focus on learners' satisfaction and not in measuring the individual performance (Dias, 2008; George et al., 2014; Machado-Da-Silva et al., 2014).

One of the first studies on the theme, from Machado-Da-Silva et al. (2014) found that information quality, service quality, and system quality had direct impact on e-learning systems use and satisfaction. Furthermore, according to Cidral et al. (2017), collaboration quality, information quality, and user perceived satisfaction seem to explain e-learning use, while system quality and user perceived satisfaction explain individual impact on e-learning use.

There is no pivotal theoretical foundation for the evaluation of ICT-mediated courses, as the most common way of developing a measurement model has been conducting a literature review that analyzed a similar problem and the derivation of a modified model (Bitzer et al., 2012). Furthermore, the evaluation of higher education courses has heavily relied for a long time on students' evaluations (Kember et al., 2002; Rovai et al., 2006). Currently there is a broad diversity of approaches and models for assessing the outcome of ICT-mediated courses (Bitzer et al., 2012). As argued by Al-Fraihat et al. (2019), there are four ways of evaluating e-learning success in the scientific literature, namely: DeLone and McLean Information Systems Success Model; Technology Acceptance Model (TAM); User Satisfaction Models, and E-learning Quality Models.

However, according to Bitzer et al. (2012), there is a tendency for research in this area to follow basically one of two different research paths. The first track is based on models that analyze the factors of acceptance of TML courses by students, which are supported mainly by frameworks of Information Systems acceptance and adoption, such as TAM, TAM2, UTAUT, e-TAM, WEBQUAL, the DeLone and McLean Model of Information Systems Success, etc. (Dorobat, 2014; Kattoua et al., 2016; Al-Fraihat et al., 2020; Tawafak et al., 2020). The second track, on the other hand, evaluates TML courses from the standpoint of their pedagogical approach and instructional design (Reeves & Reeves, 1977; Reeves & Hedberg, 2003; Siragusa et al., 2007), in other words, in relation to their pedagogical option, namely instructivism/behaviorism or constructivism/cognitivism.

In this work, in line with Attwell (2006) and Bitzer at al. (2012), one opted to follow the second track, using an adaptation of Reeves' model for the identification and evaluation of the different pedagogical dimensions involved in the teaching-learning process (Reeves & Reeves, 1977), since it has been applied consistently and successfully to assess courses mediated by ICT (see, e.g., Joia & Costa, 2008; Joia & De Lima, 2012).

The adaptation of Reeves' model was made on the basis of the evaluation framework proposed by Siragusa et al. (2007), seeking to include dimensions associated with student and teacher dexterity in relation to the use of the TML platform adopted, as these dimensions are lacking in the original model. In the end, a model with twelve dimensions was decided upon, which relates the pedagogical characteristics of the TML course taught with the students' perception regarding the attainment of the objective proposed in their syllabus, as detailed below.

Each of the twelve dimensions of the final model is represented by a continuum, which ranges from 0 to 10, having, at each end, opposite philosophical orientations for each dimension – ranging from "fully aligned with the instructivist/behaviorist paradigm" – rank 0 to "fully aligned with the constructivist/cognitivist paradigm" – rank 10. The dimensions are: (1) Pedagogical Philosophy; (2) Learning Theory; (3) Goal Orientation; (4) Task Orientation; (5) Source of Motivation; (6) Teacher's Role; (7) Teacher's Digital Competence; (8) Student's Digital Competence; (9) Metacognitive Support; (10) Collaborative Learning; (11) Cultural Sensitivity; and (12) Structural Flexibility.

Table 3 below represents the twelve dimensions used to evaluate TML courses. For each dimension, the opposite poles of the continuum are described, and their significance explained.

Table 3 – Dimensions for TML Courses Assessment

0 ←	**Dimension**	**→10**
Instructivist Knowledge is handed down by the instructor	**Pedagogical Philosophy (PP)** 0 – 10	**Constructivist** Knowledge is constructed in the mind of the student
Behaviorist Emphasis on discernible behavior	**Learning Theory (LT)** 0 - 10	**Cognitivist** Emphasis on individual mental perception
Specific Direct instruction focusing on expected behavior	**Goal Orientation (GO)** 0 -10	**Generic** Simulations with various solutions for a given problem
Academic Emphasis on standard academic exercises	**Task Orientation (TO)** 0 -10	**Authentic** Emphasis on exercises that go beyond the parameters of the student in authentic environments

Extrinsic Motivation extrinsic to the student and the learning environment	**Source of Motivation (SM)** 0 -10	**Intrinsic** Motivation centered on the student and the learning environment
Didactic The teacher is considered to be the repository of knowledge	**Teacher's Role (TR)** 0 -10	**Facilitative** The teacher is a study facilitator and guide for the students
None The teacher does not have the ability to work in a TML environment	**Teacher's Digital Competence (TC)** 0 – 10	**Expert** The Teacher is an expert in working in a TML environment
None The student does not have the ability to work in a TML environment	**Student's Digital Competence (SC)** 0 – 10	**Expert** The student is an expert in working in a TML environment
Unsupported No student progress tracking mechanisms or adjustments to individual needs are made	**Metacognitive Support (MS)** 0 -10	**Integrated** Student progress tracking mechanisms, as well as adjustments to individual needs, are implemented.
Unsupported Students work independently	**Collaborative Learning (CL)** 0 -10	**Integrated** Students work in pairs or in small groups
Unsupported Training is prepared without heeding the culture and diversity of the students it sets out to address	**Cultural Sensitivity (CS)** 0 -10	**Integrated** The program is adapted to the cultural differences among the students
Fixed Program restricted to specific places and specific times	**Structural Flexibility (SF)** 0 -10	**Open** Program independent of constraints of time and/or location

(Adapted from Martin, 1998; Joia, 2001; Joia & Costa, 2008; Joia & De Lima, 2012)

2.4. The Role of Content in TML Courses

Surprisingly, research on the role of content in online learning is almost nonexistent. Although Arbaugh (2005) mentions that the subject´s content is relevant for the outcomes of TML courses, the type of course to be taught – namely soft skill courses and hard skill courses – hasn't been taken into consideration when evaluating a TML course by the class (Kebritchi et al., 2017; Baldwin et al., 2018). Hence, this is a research gap that this study intends to address.

Piccoli and Ahmad (2001) claim that TML is generally thought to be an effective mean for transferring factual and procedural knowledge when the instructivist/behaviorist paradigm is employed. On the other hand, technologies that promote participant communication and interaction can be effectively used in TML courses following a constructivist/cognitivist approach to emphasize discussion, brainstorming, problem-solving, collaboration and reflection (Wells, 1990), aiming to develop higher-order thinking skills and build conceptual knowledge. Furthermore, Moore and Pearson (2017) argue that the development of hard skills courses content for an online environment is relatively simple and straightforward. While improving students' soft skills in an online classroom is considerably more complex and demanding. In addition, Fan et al. (2017) suggest that, since hard skills are mainly related to technical knowledge, they can be more easily developed and measured. Soft skills, however, have a slower development, as they require first a change of attitude and then the mastery of methods for their development (Balcar et al., 2011).

According to Laker (1996) and Mahmoud (2013), hard skills are linked to technical competence associated with working with equipment, data, software, numbers, equations, graphs, etc. On the other hand, soft skills deal with intrapersonal skills such as one's ability to manage oneself as well as interpersonal skills such as how one handles one's interactions with others. While hard skill disciplines are more focused on technical knowledge and theory, soft skill disciplines try to improve student's communication, problem solving, critical observation, and professionalism.

Soft skills are now one of the most important assets for enhancing employability (Ali et al., 2017; Makhathini, 2016; Rao, 2010). Nevertheless, it is so far a multifaceted concept, (Gutman & Schoon, 2013; Rao, 2010), very difficult to define and whose economic returns are not easily measured (Borghans et al., 2014; Fan et al., 2017). According to Moss and Tilly (1996, p.5), an individual's soft skill can be defined as "skills, abilities, and traits that pertain to personality, attitudes, and behavior rather than to formal and technical knowledge". These skills, abilities and traits are still not uniform in the literature (Aworanti et al., 2015; Alston, 2019).

As maintained by Fan et al. (2017), soft skills constitute acquired skills and learned behaviors based on individual's predispositions, like psychological traits, preferences, motivation and other predispositions usually called non-cognitive abilities (Heckman et

al., 2006). For instance, the ability to communicate effectively in a work environment is a soft skill. However, even a person with a low predisposition to communicate (low communicativeness) can be a good communicator giving the opportunity to learn with appropriate methods and tools. Finally, there are important economic consequences associated with soft skills. In particular, extant literature shows that discrimination varies across occupations and that the black/white wage gap is smaller for hard-skills jobs than for soft-skill jobs (Fan et al., 2017; Moss and Tilly, 1996).

In line with Laker and Powell (2011), one considers that making the distinction between hard- and soft-skill TML courses can have a significant impact on training transfer and will add significantly to the understanding of a TML course's success. Thus, the type of course delivered by TML is expected to be taken into consideration in the evaluation of same, as also pointed out by Aurbaugh (2005) and Burke & Hutchins (2008).

3. METHODOLOGICAL PROCEDURES

In this research, an undergraduate class in Administration was investigated, which, due to the COVID-19 pandemic, studied the subjects of the first academic semester of 2020 via TML supported by the Zoom tool. Two subjects studied by this class were analyzed in this work: Differential Calculus (a hard skill discipline) and Rhetoric and Argumentation (a soft skill discipline), such that the impact of the TML environment in subjects that develop opposite skills could be identified.

3.1. Sample

A group of forty-six freshman year students enrolled in the Business Administration course served as the sample for this work. The investigated group is from a world-renowned private graduate school[1] located in Rio de Janeiro, which is considered one of the best business school´s in Brazil. The faculty is among the most productive in the country, with the largest number of papers published in top-tier journals, namely rated as A1 by the University Level Staff Higher Education Coordination Unit (CAPES). Most of the students in the sample are in the 18 to 21 age group, and 41% of the sample consists of women. The online classes mediated by the Zoom platform were established due to the COVID-19 pandemic, which led to the implementation of social distancing, making it impossible for the classes to be taught in a lecture hall environment. In total, 65% of students stated that they had never used the Zoom platform before.

3.2. Data Collection

The data collection questionnaire was made available to forty-six students in the same class of the first undergraduate year of Business Administration, in June 2020 at the end of the last day of class of the first semester. As stated, two subjects were considered in this research: “Differential Calculus” and “Rhetoric and Argumentation,” such that it was possible to evaluate potential differences in the introduction and use of technology between subjects that develop hard skills (Differential Calculus) and soft skills (Rhetoric and Argumentation). Appendix A contains a reproduction of the questionnaire applied to the students translated to English, as the original questionnaire was applied in Portuguese.

[1] Public Universities in Brazil are free and financed by the government treasury, while Private Schools, whether for-profit or philanthropic, are financed by registration and tuition fees (Litto, 2002).

In the questionnaire, the students evaluated the twelve dimensions of the model presented and outlined their perception in relation to the degree of attainment of the objectives foreseen for the subject. First, the data related to the Differential Calculus subject were collected and then those linked to the Rhetoric and Argumentation subject. At the end, the questionnaire presented open-ended questions regarding the students' perception of the course and the teacher in general, the TML platform, and the impact of the COVID19 pandemic on their learnings.

In addition to the questionnaire, online interviews were conducted with teachers from both subjects (Ti, i = 1,2) and five students[2] chosen at random (Si, i = 1,5), seeking to ensure an enhanced understanding of the results obtained.

3.3. Data Analysis

For analysis of the data collected, multiple linear regression was conducted using the Ordinary Least Squares (OLS) method. The dependent variable is the Attainment of Objectives (AO) foreseen for the subject. In turn, the independent variables are the twelve dimensions of the adopted model, which range from 0 to 10, and where each end of the scale is fully associated with an educational paradigm (0 to the instructivist/behaviorist paradigm and 10 to the constructivist/cognitivist paradigm). The dimensions considered were: Pedagogical Philosophy (PP), Learning Theory (LT), Goal Orientation (GO), Task Orientation (TO), Source of Motivation (SM), Teacher's Role (TR), Teacher´s Digital Competence (TC), Student´s Digital Competence (SC), Metacognitive Support (MS), Collaborative Learning (CL), Cultural Sensitivity (CS), and Structural Flexibility (SF).

Statistical average comparison tests (t-tests) between the respective dimensions were also processed for each of the two subjects analyzed (hard skills and soft skills), to better understand the results of the multiple regression.

Lastly, content analysis of the interviews with teachers and students was conducted, in order to triangulate the data obtained in search of a better interpretation and discussion of the results (Heale & Forber, 2013).

[2] All five students were approved in the subjects investigated (Differential Calculus, and Rhetoric and Argumentation).

4. RESULTS

As stated earlier, this research seeks to investigate the significant dimensions of attaining the objectives of two subjects of undergraduate courses in Business Administration, which, due to the COVID-19 pandemic, were mediated by technology via the Zoom platform.

Regarding the attainment of objectives, the general average (AVG) of the subjects was 6.73, on a scale of 0 to 10, with a standard deviation (SD) of 2.66. This average was significantly higher for the Rhetoric and Argumentation subject (AVG = 8.13; SD = 1.59) than for Differential Calculus (AVG = 5.33; SD = 2.79). Thus, through the t-test, it emerges that the subject associated with the development of soft skills – Rhetoric and Argumentation – was evaluated as having an enhanced attainment of objectives than that which develops hard skills – Differential Calculus (p-value = 0.000).

Table 4 presents the descriptive statistics and correlations between the variables of the evaluation model adopted. The last variable Dummy Hard Skill (DM) is a dummy variable associated with the type of subject (hard skill or soft skill), which assumes a value equal to 1 when the subject is Differential Calculus (hard skill) and zero when it is Rhetoric and Argumentation (soft skill). One can observe that the dimensions of the model do not have a strong correlation ($|r| < 0.5$) between them and the Attainment of Objectives, in isolation (see Cohen, 1988).

Table 5 presents the results of multiple regressions. The only difference between Model 1 and Model 2 is that in Model 2 the dummy variable DM was added. The R^2 of Model 2 is equal to 0.54 (as opposed to 0.48 of Model 1), which means that approximately 54% of the variance of the Attainment of the Objectives variable can be explained by the dimensions included in the regression.

Furthermore, observing the results of Model 2 (Table 5), one realizes that the dimensions Teacher's Digital Competence, Metacognitive Support and the dummy variable associated with the type of subject are significant antecedents to the attainment of the objectives of the two subjects. Teacher's Digital Competence has a positive ($\beta = 0.23$) and significant effect ($p < 0.05$) in attaining the objectives of the subject; Metacognitive support also has a positive ($\beta = 0.29$) and significant effect ($p < 0.01$). In addition, the fact

that the subject is associated with the development of hard skills has a significant negative effect (β = -2.51) and a statistically significant effect (p <0.01).

Lastly, Table 6 shows the variance inflation factor (VIF) for each dimension. A maximum VIF above 10 indicates that multicollinearity may be influencing the minimum squares estimates. As the maximum VIF of the regression is 3.78 in relation to the dummy variable and the average VIF is 2.01, one can claim that the regression has no multicollinearity problems.

Consolidating the results obtained, the following relationship was found:

$$AO = \beta 0 + \beta 1 * TC + \beta 2 * MS + \beta 3 * DM$$

where AO = Attainment of Objectives; TC = Teacher's Digital Competence; MS = Metacognitive Support and DM = dummy variable. The variables AO, TC and MS vary from 0 to 10, while DM has a value of 1 when the subject is Differential Calculus (associated with hard skills) and zero when the subject is Rhetoric and Argumentation (associated with soft skills).

Thus, the following equation was obtained:

$$AO = 2.618 + 0.226 * TC + 0.291 * MS - 2.514 * DM$$

Table 4 - Means and Correlations between Variables

Variables	Mean	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Pedagogical Philosophy (PP)	6.185	1.000													
	(2.777)														
(2) Learning Theory (LT)	5.402	-0.275**	1.000												
	(2.746)	(0.008)													
(3) Goal Orientation (GO)	5.454	0.536**	-0.394**	1.000											
	(3.255)	(0.000)	(0.000)												
(4) Task Orientation (TO)	5.815	0.595**	-0.307**	0.682**	1.000										
	(3.610)	(0.000)	(0.003)	(0.000)											
(5) Source of Motivation (SM)	5.685	0.047	0.074	0.232*	0.126	1.000									
	(2.669)	(0.660)	(0.480)	(0.026)	(0.231)										
(6) Teacher's Role (TR)	4.815	0.490**	-0.100	0.408**	0.630**	0.110	1.000								
	(3.200)	(0.000)	(0.342)	(0.000)	(0.000)	(0.296)									
(7) Teacher's Digital Competence (TC)	6.989	-0.182	0.117	-0.249*	-0.316**	-0.108	-0.174	1.000							
	(2.452)	(0.082)	(0.269)	(0.017)	(0.002)	(0.305)	(0.097)								
(8) Student's Digital Competence (SC)	7.348	-0.140	0.207*	-0.036	-0.069	-0.098	0.195	0.364**	1.000						
	(2.308)	(0.182)	(0.048)	(0.734)	(0.515)	(0.353)	(0.063)	(0.000)							
(9) Metacognitive Support (MS)	5.369	0.270**	-0.145	0.227*	0.253*	0.108	0.298**	0.011	0.130	1.000					
	(2.167)	(0.009)	(0.167)	(0.030)	(0.015)	(0.306)	(0.004)	(0.916)	(0.217)						
(10) Collaborative Learning (CL)	6.967	0.411**	-0.004	0.230*	0.446**	0.151	0.462**	0.032	0.151	0.281**	1.000				
	(2.925)	(0.000)	(0.971)	(0.027)	(0.000)	(0.152)	(0.000)	(0.761)	(0.150)	(0.007)					
(11) Cultural Sensitivity (CS)	4.826	0.406**	-0.018	0.376**	0.426**	0.071	0.444**	-0.104	0.149	0.296**	0.417**	1.000			
	(2.839)	(0.000)	(0.867)	(0.000)	(0.000)	(0.501)	(0.000)	(0.322)	(0.158)	(0.004)	(0.000)				
(12) Structural Flexibility (SF)	4.783	0.156	-0.089	0.225*	0.181	0.082	0.298**	-0.153	-0.033	0.092	0.280**	0.394**	1.000		
	(2.736)	(0.138)	(0.398)	(0.031)	(0.085)	(0.435)	(0.004)	(0.146)	(0.754)	(0.386)	(0.007)	(0.000)			
(13) Attainment of the Objectives (AO)	6.728	0.379**	-0.126	0.364**	0.319**	0.054	0.383**	0.180	0.320**	0.414**	0.431**	0.488**	0.202	1.000	
	(2.661)	(0.000)	(0.230)	(0.000)	(0.002)	(0.607)	(0.000)	(0.086)	(0.002)	(0.000)	(0.000)	(0.000)	(0.054)		
(14) Dummy Hard Skill (DM)	0.5	-0.657**	0.203	-0.628**	-0.760**	-0.086	-0.625**	0.236*	-0.028	-0.212*	-0.527**	-0.562**	-0.216*	-0.530**	1.000
	(0.503)	(0.000)	(0.052)	(0.000)	(0.000)	(0.415)	(0.000)	(0.023)	(0.788)	(0.043)	(0.000)	(0.000)	(0.039)	(0.000)	

P-values in brackets, standard deviation in brackets for the first column
*** p<0.01, * p<0.05*

Table 5 - Regression Results

	Attainment of the Objectives (AO)	
Variables	Model 1	Model 2
Pedagogical Philosophy (PP)	0.129 (0.110)	0.0421 (0.108)
Learning Theory (LT)	-0.0620 (0.0920)	-0.0721 (0.0872)
Goal Orientation (GO)	0.157 (0.105)	0.0801 (0.102)
Task Orientation (TO)	-0.0678 (0.108)	-0.171 (0.107)
Source of Motivation (SM)	-0.00892 (0.0880)	0.0152 (0.0836)
Teacher's Role (TR)	0.0361 (0.1000)	-0.0198 (0.0963)
Teacher's Digital Competence (TC)	0.204** (0.103)	0.226** (0.0974)
Student's Digital Competence (SC)	0.219* (0.115)	0.211* (0.109)
Metacognitive Support (MS)	0.234** (0.110)	0.291*** (0.106)
Collaborative Learning (CL)	0.145 (0.0960)	0.0691 (0.0940)
Cultural Sensitivity (CS)	0.229** (0.0983)	0.138 (0.0973)
Structural Flexibility (SF)	0.0123 (0.0916)	0.0468 (0.0874)
Dummy Hard Skill (DM)		-2.514*** (0.790)
Constant	-0.786 (1.402)	2.618 (1.705)
Observations	92	92
R-squared	0.480	0.540

Standard errors in brackets
**** p<0.01, ** p<0.05, * p<0.1*

Table 6 - Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
Dummy Hard Skill (DM)	3.780	0.265
Task Orientation (TO)	3.580	0.280
Goal Orientation (GO)	2.640	0.378
Teacher's Role (TR)	2.270	0.440
Pedagogical Philosophy (PP)	2.150	0.465
Cultural Sensitivity (CS)	1.830	0.547
Collaborative Learning (CL)	1.810	0.552
Student's Digital Competence (SC)	1.520	0.657
Learning Theory (LT)	1.370	0.729
Structural Flexibility (SF)	1.370	0.730
Teacher's Digital Competence (TC)	1.370	0.732
Metacognitive Support (MS)	1.250	0.799
Source of Motivation (SM)	1.190	0.839
Mean VIF	**2.010**	**-**

Next, the results obtained are discussed.

5. DISCUSSION

The purpose of this study is to (i) ascertain the antecedents that are important for the TML courses to attain their objectives, and to (ii) investigate potential differences between hard skill and soft skill disciplines in this context.

Based on the results, it appears that teacher's digital competence ($p < 0.05$), metacognitive support ($p < 0.01$) and the dummy variable ($p < 0.01$) associated with the content of the discipline are significant antecedents for the courses to reach their objectives. Thus, despite of the content of the course, the digital competence of the teacher on the TML platform and the metacognitive support provided are paramount for the TML courses to attain the desired objectives.

This finding can be supported by the following statements from the students (Si) and teachers interviewed (Ti):

- Teacher's digital competence[3]

> S1: *It is essential that teachers have full mastery of the tool. I have the impression that hard skill teachers have an easier time with the tool[4]. The greatest difficulty for teachers was to divide the class into groups, which is essential to take full advantage of the TML tool.*

The teacher´s expertise on the TML platform was cited by the five students as a key factor for a good evaluation of the course. Students mentioned that the T1 (Hard Skill Teacher) saved his notes and recorded the classes. On the other hand, they acknowledged the effort that T2 (Soft Skill Teacher) had to adapt the classes to the online environment.

- Metacognitive support

> S1: *In general, I would say that all things considered and in the final analysis it was positive. We had access to all notes and recordings of the classes, and from that point of view it even added value to the course.*

[3] The t-test showed that the hard skill teacher really had greater competence on the platform than the soft skill teacher - p-value = 0.0234 (AVG Soft Skill = 6.413; SD = 2.400 and AVG Hard Skill = 7.565; SD = 2.391).

> S2: *To my mind, having the recording of the classes on file was especially useful for me to be able to track my progress in the subject. In addition, the use of an auxiliary system to TML, to provide other tools to enhance the course, helped us greatly to understand where we were in the subject, enabling us to adapt the course to our individual needs.*
>
> T1 (Hard Skill Teacher): *I used One Note a great deal, where I saved the notes and posted them on the e-class system. In addition, I recorded the lessons on Zoom and made them available to students. In this way, they could review the classes and track their progress on the course.*
>
> T2 (Soft Skill Teacher): *I sought to adapt my course to the online reality, so that students could monitor their progress in the area of rhetoric and argumentation.*

Thus, it appears that the metacognitive support (the student's ability to track his/her progress and potential progress on the course) is fundamental to the success of TML courses. Metacognition is based on the literature of cognitive psychology (Hart, 1965), cognitive development psychology (Piaget, 1950), and social development psychology (Vygotsky, 1962). John Flavell (1976) defines metacognition as follows: “metacognition refers to one’s knowledge concerning one’s cognitive processes and products or anything related to them”. In short, metacognition is the ability to monitor and control our thought processes (Lai, 2011) or “thinking about thinking”. Metacognition is proven to affect performance in the learning context (Veenman et al., 2006). With greater awareness of how they acquire knowledge individually, students learn to regulate their behavior to optimize performance. They begin to see how their strengths and weaknesses affect how they perform (Vrugt & Oort, 2008). With the rapid growth of online education students must become experts in mastering their own learning processes due to the high degree of learning autonomy and sometimes physical absence of the teacher (Schunk & Zimmerman, 1998). Thus, metacognition is long regarded as a critical component of a successful online education (Tsai et al., 2018) and this work attest it.

In addition, there is statistical significance in the dummy variable associated with the type of subject taught. This is made visible by the difference in assessment of 2,514 points

(coefficient β3 in the final equation found), on a scale of 0 to 10, when the subject is hard skill, compared to the soft skill subject.

The phrases below support this result:

> S2*: There were losses in the learning process, especially in Differential Calculus, which requires a great deal of concentration. It's much worse!*
>
> S4: *Learning was jeopardized in general, but Differential Calculus was the one that suffered the most – you need to be fully concentrated. By the end of class, you are exhausted. During the last 20 minutes of class, I cannot even absorb any further information.*
>
> S5: *Differential Calculus is far more tiring than Rhetoric and Argumentation in online teaching. After class I have zero desire and willingness to exercise. I get far more tired than in the classroom because of the effort to remain focused, and I end up not studying as much as before.*

The need for concentration was mentioned by the five students as quite critical and challenging in a Differential Calculus course taught online.

To better understand the reasons for the difference between the hard skill and soft skill courses, a t-test of comparison of averages between all dimensions of the model was conducted, with the dimensions in Table 7 found to be significant.

Thus, it appears that Structural Flexibility (SF) and Cultural Sensitivity (CS) were especially important for the soft skill subject to obtain a better evaluation than the hard skill subject, given the possibility of the subject content and pedagogical practice to be flexible and customized to the reality of each student, unlike the hard skill subject – a fact attested by the statements below by students and teachers.

Table 7 - T-test of Comparison of Averages between Subjects

Dimensions	Average Soft Skill	Hard Skill	p-value
Structural Flexibility (SF)	5.370	4.196	0.039 (**)
	(0.396)	(0.396)	
Cultural Sensitivity (CS)	6.413	3.239	0.000 (***)
	(0.340)	(0.356)	
Attainment of the Objectives (AO)	8.130	5.326	0.000 (***)
	(0.234)	(0.411)	

Standard errors in brackets
(**) p<0.05;
(***) p<0.01.

T1 (Hard Skill Teacher): *It is very difficult to adapt a subject like Calculus to a participatory online environment. The course is extremely high in content. If the intention is to continue with online classes, it would be necessary to think about a hybrid model in the future, with part of the course being face-to-face. For the computing part, it is necessary to have different tools. Merely sharing a screen does not work.*

T2 (Soft Skill Teacher): *I was surprised at how soft skill activities are appropriate in online communication and what can be achieved in the digital environment. The students showed me that there is a demand for this type of content taught online.*

S4: *In Calculus the subject lacked flexibility. There were people in the class with coronavirus; people lost family members; we are not at home because we want to be. The teacher has to understand that our stress level is greater, as we have no environment in which to study and in this respect, we expected him to adapt the subject and conduct the assessments differently.*

S1: *The Rhetoric teacher is sensational. He persuaded everyone and enthralled the whole group. Everyone was delighted. He managed to adapt and understand the group and was highly supportive. On the other hand,*

> *the Calculus teacher took an uncompromising stance. For example, in the exam, a student from a favela explained that the Internet was crashing all the time and that she could not be in Zoom with the camera connected. His answer was "find a way around it."*
>
> S3*: The Differential Calculus teacher was highly intransigent and did not take into consideration the nuances of the moment we were going through, unlike the rhetoric teacher, who managed to put himself clearly in our place.*

Thus, it is clear that the lack of structural flexibility and cultural sensitivity associated with the type of content were decisive factors for the evaluation of the hard skill subject to be far lower than the evaluation of the soft skill subject, as seen in Table 7. Brazil is a vast country comprising several cultures, and universities face many challenges when providing access to instruction for their students (Cidral et al., 2020). Additionally, social isolation and lockdown policies implemented by government in Brazil to contain the COVID-19 pandemic inevitably caused a sharp reduction of activity and consequently a rise in poverty and inequality for a country that is already extremely unequal. Within this context, cultural sensibility and structural flexibility had an additional importance. Thus, TML courses should be open to the cultural differences among the students and flexible to students'constraints of infrastructure, location and time.

To conclude, it appears that both the digital competence of the teacher on the TML platform and the existence of adequate metacognitive support are significant antecedents for the TML courses to attain their objectives. In the case in question, it is mandatory for the teachers to master the features available on the Zoom platform, especially the creation of workgroups for the dynamics of the subject. Furthermore, the recording of the classes by Zoom for later consultation and viewing at any time and in any place, the appropriate use of other systems to provide didactic material to promote the course, as well as the availability of activities, tasks and templates for the proposed exercises allow the student to track their own development and growth throughout the TML course. Lastly, it emerges that soft skill subjects are more likely to achieve their goals in TML environments than hard skill subjects. This fact is mainly due to the capacity that the soft skill subjects have to allow greater structural flexibility and cultural sensitivity, when compared to the hard skill subjects.

6. CONCLUSIONS

This thesis provided insights into the impact of the COVID-19 pandemic in the classroom, investigating the introduction of ICT tools in the teaching-learning process in the Brazilian higher education context. Thus, the digital competence of the teacher, the metacognitive support and the type of content (discipline of hard skills or soft skills) were considered significant factors for the courses in Business Administration to reach their pedagogical objectives successfully. In addition, the hard skills disciplines after migration to a technology-mediated environment were rated worse than the soft skills disciplines, in relation to the achievement of their educational objectives from the students' perspective.

6.1. Contributions and Implications

According to Alavi & Leidner (2001), there is a need for greater depth of research into the question of how technology enhances learning. In essence, this thesis intends to fill this gap by making contributions to the computer-based higher education scientific literature, especially in the management field, as explained below.

First, the work, by exploring the relationship between pedagogical approaches, instructional strategy and contextual factors involved in learning, revealed crucial factors for the success of TML courses. Second, the study examined the differences between hard skills and soft skills disciplines in online instructional environments. Thus, an original contribution of this study is the analysis of the impact of content on the success of TML courses. Third, this thesis puts forth important contributions to help practitioners in management education to effectively and efficiently create and maintain environments within their institutions that might promote, support, and sustain effective teaching and learning on the online environment – in special, in face of the sudden shift to the online environment because of the COVID-19 pandemic.

In view of the above, the actions listed below are important to help the achievement of objectives proposed in the TML courses in Administration:

- Train teachers adequately in all features of the TML platform adopted. In the case of Zoom, the proper use of workgroup rooms, the sharing of files in real time, the staging of

quizzes, among other aspects, were features cited by the students as decidedly important for TML courses to attain their goals.

- Make auxiliary systems available that enable the supply of support material for the course, broadsheets to students, exercises, recordings of previous classes, etc., such that the students can have an understanding of the degree of cognitive transformation that the course is providing them – in other words, offer adequate metacognitive support to the student by means of the TML platform and the instructional design of the course.

- Make the structure of the TML course highly flexible, avoiding merely transforming it from an instructional design based on the face-to-face approach to an instructional design supported by an ICT-mediated approach – which involves the development of actions that lead to greater student participation – and use auxiliary systems to support the teaching-learning process.

- In addition, it is necessary to observe the context and climate of the class, seeking to obtain adequate cultural sensitivity to the reality faced by the students, in order to be able to customize the course adequately to that context.

6.2. Research Limitations and Further Steps

This research, as with all research, has its limitations as set forth below.

First, the teacher's rapport with the students was not taken into consideration on the assessment model. However, the level of empathy and sympathy of the teacher with the class may have influenced the outcomes of the TML courses, as suggested by Marks, Sibley and Arbaugh (2005). Further studies could address this issue and investigate if it is the content of the course itself or the soft skills of the teacher that most influence how much the objectives can be achieved in the TML courses.

Another limitation is related to the acuity of perception of the students who took part in this research. Scandura and Williams (2000) and Bertucci (2005) contend that this issue is related to a restriction of the information available when the respondents filled out the survey, to the epistemological profile of the students, and to the plethora of possible interpretations of the questionnaire they filled out in their attempt – not necessarily conscious – to present a good/bad impression of the TML courses under analysis.

In addition to this, as the number of respondents in the sample used in this study is limited, some care is needed when generalizing the results obtained – in other words, the external validity of the study cannot be fully guaranteed (Yin, 2017). Likewise, a specific TML platform was investigated, namely Zoom. Thus, it is necessary that other TML platforms available on the market (MS Teams, Google Meet, etc.), applied to both hard and soft skill subjects, be investigated as well (Pal et al., 2020). In this way, it could be assured, with greater security, that the results presented here remain valid in other computational environments.

Finally, due to the COVID-19 pandemic and the need for social distance, all classes, activities and assignments were carried out remotely. Thus, the findings of this thesis refer to a TML course given 100% online and at a distance. The results for hybrid TML courses - with online and face-to-face activities - may differ. In addition, there may also be differences between online courses that are synchronous or asynchronous.

By way of conclusion, it is hoped that this work – the interest in which arose due to the sudden growth of technology-mediated courses, due to the COVID-19 pandemic – can contribute to a better understanding of the key success factors in TML courses, as well as their suitability to subjects that predominantly develop both hard and soft skills.

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APPENDIX A

Survey to assess the key factors in the TML courses´ attainment of objectives:

Each one of the twelve dimensions in the questionnaire must be evaluated with values from 0 to 10 – extremes of the different dimensions detailed below.

The questionnaire should be fulfilled twice. For the first time, you will evaluate the subject Differential Calculus. For the second time, you will evaluate the subject Rhetoric and Argumentation.

Please, answer the questions bellow that refers to the subject ***Differential Calculus***.

Dimensions for Evaluation (in bold).

1. **Pedagogical Philosophy** varies between *Instructivist*, knowledge is handed down by the instructor, and *Constructivist*, knowledge is constructed in the mind of the Student.

2. **Learning Theory** varies between *Behaviorist*, emphasis on discernible behavior, and *Cognitivist*, emphasis on individual mental perception.

3. **Goal Orientation** varies between *Specific*, direct instruction focusing on expected behavior, and *Generic*, simulations with various solutions for a given problem.

4. **Task Orientation** varies between *Academic*, emphasis on standard academic exercise, and *Authentic*, emphasis on exercises that go beyond the parameters of the student in authentic environments.

5. **Source of Motivation** varies between *Extrinsic*, motivation extrinsic to the student and the learning environment, and *Intrinsic*, motivation centered on the student and the learning environment.

6. **Teacher´s Role** varies between *Didactic*, the teacher is considered to be the repository of knowledge, and *Facilitative*, the teacher is a study facilitator and guide for the students.

7. **Teacher´s Digital Competence** varies between *None*, the teacher does not have the ability to work in a TML environment, and *Expert*, the Teacher is an expert in working in a TML environment.

8. **Student's Digital Competence** varies between *None*, the student does not have the ability to work in a TML environment, and *Expert*, the student is an expert in working in a TML environment.

9. **Metacognitive Support** varies between *Unsupported*, no student progress tracking mechanisms or adjustments to individual needs are made, and *Integrate*, student progress tracking mechanisms, as well as adjustments to individual /needs, are implemented.

10. **Collaborative Learning** varies between *Unsupported*, students work independently, and *Integrated*, students work in pairs or in small groups.

11. **Cultural Sensitivity** varies between *Unsupported*, training is prepared without heeding the culture and diversity of the students it sets out to address, and *Integrated*, the program is adapted to the cultural differences among the students.

12. **Structural Flexibility** varies between *Fixed*, program restricted to specific places and specific times, and *Open*, program independent of constraints of time and/or location.

13. As for the **Attainment of the Objectives** foreseen for the discipline, it could vary between not achieved (0) and totally achieved (10).

Now, please answer regarding the subject ***Rhetoric and Argumentation***.

(The same twelve dimensions were asked again, as well as a question about the attainment of the discipline´s objectives).

Finally, the gender, age and previous experience with the TML platform (Zoom) were also requested.