Learning Styles in Business Management students: An empirical study in Portuguese Higher Education

Estilos de aprendizagem dos alunos de administração: Um estudo empírico aplicado em Instituições de Ensino Superior Portuguesas

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ABSTRACT

This research aims to identify the learning styles of Portuguese higher education students in business management, and in turn to enable the identification of effective ways to foster the teaching-learning process. The research is divided into two parts: a theoretical approach and the analysis and discussion of the results obtained in light of the learning style of these students as characterized by the Felder-Silverman model. The data were collected from 3 Portuguese higher education institutions with the goal to contribute to the improvement of the learning process in business management courses and to provide for adequate planning of learning strategies aimed at educational success. The statistical analysis of the data was performed with SPSS version 25.0 for Windows and included both descriptive and inferential statistics. The results of the study are consistent with the findings in the literature in similar contexts, suggesting that learning styles vary according to the individual. Regarding gender, a variable that has been studied relatively little to date, there is also evidence in the study that female students seem to use cognitive strategies significantly more than their male counterparts.

Keywords: Management Business Course; Learning Style; Higher Education.

RESUMO

Esta investigação pretende identificar os estilos de aprendizagem dos estudantes portugueses de cursos de administração, possibilitando assim identificar formas efetivas de promover o ensino-aprendizagem. O desenvolvimento da pesquisa divide-se em duas partes: abordagem teórica e análise e discussão dos resultados obtidos atendendo à estruturação dos principais estilos de aprendizagem dos estudantes de administração

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caracterizados a partir do modelo de Felder e Silverman. Os dados foram recolhidos em três instituições de ensino superior portuguesas e procuram contribuir para a implementação de melhorias no processo de aprendizagem destes estudantes, contribuindo para o planejamento adequado de estratégias de aprendizagem que visem o sucesso educativo. A análise estatística dos dados foi realizada através do software SPSS, versão 25.0 para Windows, envolvendo medidas de estatística descritiva e estatística inferencial. Os resultados do estudo são consistentes com os achados na literatura em contextos similares, sugerindo que os estilos de aprendizagem variam em função do indivíduo, e no que concerne ao Gender, variável ainda relativamente pouco estudada, supostamente as alunas utilizam significativamente mais as estratégias cognitivas do que os alunos.

Palavras-chave: Cursos de Administração; Estilos de Aprendizagem; Ensino Superior.

Introduction

Education plays a fundamental role in human development and societies in general. It has become an essential factor in understanding the complex world around us, enabling us to interpret this continually changing reality better. In higher education, rapid changes and challenges impose new approaches that suit the networked world strongly impacted by technology. Given this rapid technological evolution (or revolution), it is crucial to take a different look at the learning processes in higher education, the teacher's role, and the classroom itself. For obvious reasons, higher education's central objective tends to be based more and more on the understanding of the studied phenomena or realities and less on the memorization of the processes that underlie them. In this sense, more important than a mind full of concepts and theories, is a well-structured mind showing a high capacity for analysis and critical reflection. Complex societies lack answers that only a mind with these characteristics and knowledge intentionally pragmatic and action-oriented can provide.

During the 20th century, several models were developed to study learning styles. With due reservations inherent in the fact that these models are based on students' self-perceptions and that these learning styles have changed over time, the model of Felder and Silverman (1988) was applied and followed empirically. This model was explicitly designed to be used in a classroom context to categorize stu-

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dents' preferences regarding learning. Starting from aspects such as the typology and the way of perceiving information (sensory or intuitive, visual or verbal), the different approaches in the organization and processing of information (inductive or deductive, active or reflective) and, finally, the pace of progression of students in the context of understanding (sequential or global), the Felder and Silverman model (FSM) later provides the Solomen and Felder Learning Styles Index (ILS) as a characterization tool. As an instrument formulated from the model, the ILS consists of a questionnaire with 44 questions, through which it is possible to assess students' preferences from four dimensions (active/reflective, sensory/intuitive, visual/verbal and sequential/global), with a corresponding set of differentiating characteristics attached to each dimension.

Therefore, this research aims to identify learning styles among Portuguese higher education students taking business courses, in order to develop appropriate teaching strategies and to understand better the profiles of these students, especially those under the category of "millennia." A questionnaire was applied online based on the model mentioned previously, and a total of 99 valid responses were obtained from a convenience sampling. The knowledge and understanding of the different learning styles within the mentioned context prove to be relevant study areas of practical utility. This knowledge allows teachers to improve the design and customization of teaching activities regarding the different learning styles and, consequently, to support their students more effectively and in accordance with the challenges that education is currently facing (BALAKRISHNAN; LAY, 2016; SADOVNIK, 2019).

Teaching-Learning in Higher Education

In the context of the teaching-learning process in higher education, the complexity of the environment influences classical concepts. According to Rifkin (2014, pp.193), the concept of a classroom in this context has been changing. While the conventional classroom treated knowledge as a set of objective and isolated facts, in the new collaborative classroom collaboration "the knowledge is seen as the meanings we attribute to experience". Consequently, "educational models are now conceived to free students from the enclosed private space of the traditional classroom,

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allowing them instead to learn in open common spaces, in the virtual space, public square, and the biosphere" (RIFKIN, 2014, pp.194-195).

It is also essential to highlight within this complex higher education environment the area of management studies. This specific area of study might be one of the areas most subject to pressure in the current context, either due to the profound changes in the market or the technology itself. Phenomena such as globalization, hyper-competitiveness in markets, infusion of technology in organizational structures and management processes, the virtualization of markets, and new consumer buying behaviors are some of the main challenges that invite us to reflect on teaching in this particular area of study.

According to Moratis, Hol, and Reul (2006), management education has evolved at a slower pace than in the business world. This gap between the different dynamics of the evolution of these two realities may be a problem, especially if the adequacy and applicability of the contents learned in the programs of management courses, from a practical viewpoint, are at stake. The legacy of the educational theory, based on the industrial revolution, must give way to a new theory based on a real and pragmatic vision of the business world. A theory that should, in turn, also be based on new pedagogical models centered on the dynamics of the current context and the student's in-depth knowledge.

In addition to the importance of adapting the teaching of business management to social, economic, and political dynamics and business practices, it is also essential to consider the different approaches to learning. These perceived differences in terms of the individual's intentions and motivation in light of a given learning situation and their use of specific strategies (DENZINE; BROWN, 2015; MURRAY, 2019; ZAREI; AHOUR; SEIFOORI, 2020) need to be continuously understood and deeply studied by those tasked to teach. The knowledge of the student´s different characteristics must be considered a relevant aspect in the development of appropriate teaching methods and the design of curricular plans; hence, the need to know the different cognitive, thinking, and learning styles of students. This knowledge and understanding in terms of the importance of individual differences and how the different ways of teaching can impact students with specific styles in distinct ways are seen as central in curriculum design and the optimization of the learning process (BISHOUTY, et al., 2018; EVANS; COOLS, 2009; DA SILVA, et

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al., 2013). Finally, a note to highlight that learning styles as a theory have provided valuable knowledge on learning, not only in the academic field but also in other contexts as well (JENA, 2018).

Cognitive and Learning Styles

Learning styles allow a view of the different ways in which individuals learn by grouping them according to a set of characteristics and preferences more or less common among themselves. Although each individual may present a mixture of styles or resort to different styles depending on certain circumstances (QUINN et al., 2018), students often have a specific dominant style, and they use that style to learn whenever information is presented according to that style (KNOLL et al., 2017). Learning styles and the knowledge of these styles prove to be useful because they allow educators to get to know their students better and allow them to develop equally useful teaching approaches and techniques (QUINN et al., 2018; HALL; MOSELEY, 2005).

Considering that the terms cognitive and learning styles tend to be used indiscriminately in the literature (EVANS; COOLS, 2009), it is important for a better understanding of these terms to establish a distinction between them from a conceptual point of view. These main styles that have been identified in the literature are listed below:

1. *Cognitive styles:* Constructive/heuristic cognitive styles of higher order are understood as consistent differences in the way individuals process information, that is, in the way they understand, organize, and analyze it. They are thought to be affected by past experiences, habits, and socialization and impact learning behaviors by interacting with personality, intelligence, gender, and other external variables. In summary, the different definitions found in the literature allow us to conclude that individuals have differences in terms of the cognitive style they adopt to solve a particular problem or make decisions, demonstrating that there are different individual characteristics.

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2. *Learning styles:* Learning styles have been viewed as constructs much broader than cognitive styles, and even more responsive to tasks and situational requirements (EVANS; COOLS, 2009). These styles are considered context-specific, socialized, and taught. According to Dunn and Dunn (1992), the learning style is how each student begins to concentrate, process, absorb, and retain new and difficult information. Each of these elements occurs differently in all individuals. In fact, each student will have his or her preferred way of processing new information to develop their school activities, which is supposed to, in turn, interfere in some way with their learning (FAN, 2016). Because the perspective behind the term learning styles is that people learn differently, so it is implied that learning styles vary depending on the individual (HOFFLER; SCHWARTZ, 2011). In effect, there will be students who prefer to learn through verbal information (oral or written), some through visual information, such as pictures and diagrams, while others will prefer to learn interactively. Thus, it becomes necessary to determine what is most likely to trigger each student's concentration, maintain it, and respond to its natural processing style so that he can memorize and retain, in the long run, what he has learned. The learning styles in this study's scope are understood conceptually according to these previous interpretations identified in the literature.

3. *Thinking styles:* Conceptually, thinking styles are considered preferential ways for individuals to apply their intellectual skills and knowledge to solve a specific problem. In this sense, a style of thinking reflects the individual's preference for the use of skills in a certain way. The central issue, according to this proposal, is not the ability itself, but rather the way the individual prefers to use it (ZANG; STERNBERG, 2005). This research focuses on identifying the learning styles of business students in higher education.

Learning Style Research Models and Instruments

Learning in a school context is a complex process involving several social, cognitive, and affective models and factors, leading one to believe that the individual

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is not perhaps the only active agent in group teaching. In fact, there are several socio-cultural, physical, psychological, economic and environmental factors that can contribute to an individual´s success and influence his preference for a particular learning style (AKANDE et al., 2017).

The literature on learning styles shows that it is a promising and highly relevant area of study. However, studies in this area also reveal a lack of consensus concerning the results and the different approaches applied, proving that this is a complex area of study. The lack of consensus and complexity is perhaps due to a myriad of theories and instruments in this area of study. Indeed, Coffield, Mosely, Hall, and Ecclestone (2004) identified 71 models of learning styles, of which 13 were categorized as main models. The above authors reveal the idea that although it is possible to explain the main dimensions that support the different approaches to learning styles, it is still very difficult to choose simply the appropriate approaches. The reason is that the competing theories and techniques to measure them, as well as the effectiveness of these measurements, are so diverse and contested (COFFIELD et al., 2004). Supposedly, the various tools available have theoretical diversity in how the construct is understood (STERNBERG; ZHANG, 2005).

Learning styles have been studied using instruments such as surveys and questionnaires, which aim to self-assess students' behaviors. For some authors, this procedure proves to be more appropriate in the case of the traditional classroom, where it is difficult to observe and analyze student preferences throughout the learning process. Nevertheless, in this case, it has still some drawbacks, caused by factors such as the risk of bias given that the results depend on an assessment that the student makes of himself, the dimension of the questionnaire and the fact that the learning styles can change over time (TRUONG, 2016).

As mentioned earlier, several models and measurement instruments applied in the study of different learning styles are identified in the literature. For the sake of synthesis and simplification, only a few are referenced within this study's scope.

One of the models referred to in the literature is Kolb´s (1984), also known as the Learning Style Inventory (LSI). This model is based on a self-assessment questionnaire consisting of 9 to 12 items. Each item is composed of four different words/options, whose ordering assigned by the individual determines his learning style.

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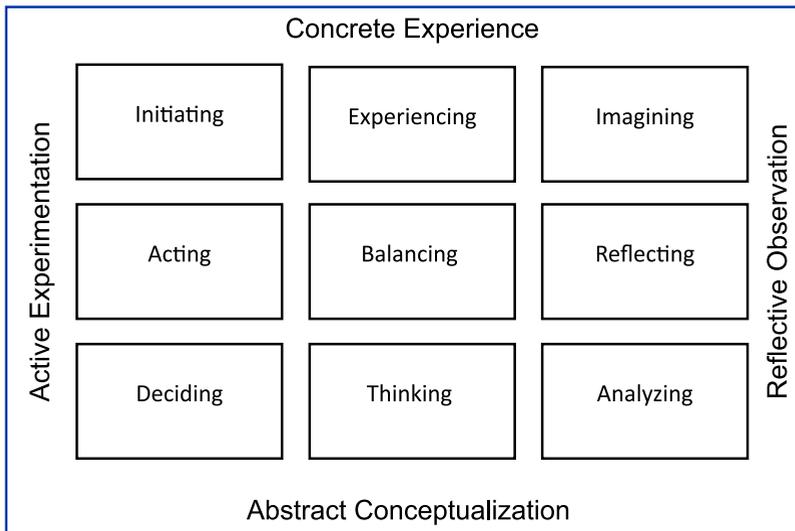
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The model proposes a hypothetical learning cycle composed of four stages based on an individual's preference for one of these stages more than the others. These stages are the concrete experience (doing/having an experience), abstract conceptualization (concluding/learning from the experience), active experimentation (planning/trying out what has been learned), and reflective observation (reviewing/reflecting on the observation). A two-dimensional measurement model is translated in a matrix form by two axes representing the dimensions used to classify the individuals' styles, corresponding each stage to the opposite end of each of these axes. While one axis measures how the individual perceives or apprehends the information he receives, represented at each opposite end by concrete experience and abstract conceptualization, the other measures how individuals process or internalize the information, having, in this case, at opposite ends, active experimentation and reflective observation.

Based on this model, it is possible to identify four learning styles: divergent, assimilating, converging, and adapted. From a learning viewpoint, the Divergent (learners) present the concrete experience (doing/having an experience) and the reflective observation (reviewing/reflecting on the observation) as dominant skills and tend to see a given situation from different angles. They are usually individuals who have broad cultural interests, perform better in situations that require the creation of ideas through brainstorming, and who like to collect information. They are equally imaginative, emotional, and have an appreciation for people. Concerning the assimilators, they have the Abstract Conceptualization (concluding/learning from the experience) and Reflective Observation (reviewing/reflecting on the observation) skills. These individuals are less centered on people and more on ideas and abstract concepts. They understand that the logical robustness of a given theory is even more important than its practical value, and their preferences are, above all, reading, classes, the use of analytical models. They also need time to think. With regard to convergent people, their dominant skills are mainly of the Abstract Conceptualization and Active Experience type. They seek to find practical utility in ideas and theories and are oriented towards solving problems. They are usually more connected to problems and technical tasks than to social or interpersonal aspects. Finally, the adapted ones are characterized by having concrete experimentation and active experimentation as dominant skills. These individuals´ learning is done by experimenting, acting more

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by intuition than by analyzing. They also tend to depend more on the information they receive from others than on their technical analysis (KOLB; KOLB, 2005).

The model in question has been reconfigured in response to some criticism, and its most recent version is the 4.0. This version was introduced in 2011, and, unlike the original one, it seeks to extend the learning cycle proposed in the initial model. Instead of the four styles recommended in the initial model, it started by incorporating a total of nine styles organized systematically in a two-dimensional space defined by the combination of abstract conceptualization / concrete experience and active experimentation / reflective observation (KOLB; KOLB, 2013). In Figure 1, the nine styles are identified as defined by the author.

Figure 1 Kolb learning style inventory 4.0.

Source: Adapted from (KOLB; KOLB, 2013).

According to the authors mentioned above, the reconfigured model started to bring the following characteristics to the different learning styles:

Initiating style: The individual acts with experiences and situations that surround him, involving active experimentation and concrete experience. In this case, the individual's preference is for an active learning context (Adapted).

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Experiencing style: The individual seeks to find meaning by immersing himself deeply in the experience, based on concrete experience, while maintaining a balance between active experimentation and reflective observation.

Imagining style: This style is characterized by the ability to imagine different possibilities by observing and reflecting on experiences and combining concrete experience with reflective observation. In this style, the individual expresses a strong preference for creating opportunities and perspectives based on experience (Divergent).

Reflective style: The individual seeks to link experience and ideas through sustained reflection, based on reflective observation and the balance between concrete experience and abstract conceptualization.

Analyzing style: The main characteristic lies in the ability to integrate and systematize ideas through reflection, thus combining reflective observation and abstract conceptualization. The individual has a strong preference for reflective and conceptual learning (Assimilator).

Thinking style: This style presents disciplined involvement in abstract and logical reasoning, based on abstract conceptualization and the balance between active experimentation and reflective observation.

Deciding style: The individual decides to solve problems and lines of action using theories and models, thus combining abstract conceptualization and active experimentation.

Acting style: This style has a strong motivation for actions directed towards objectives that integrate people and tasks.

Balancing style: Characterized by the ability to adapt, to weigh the pros and cons of acting versus reflecting, and experiencing versus thinking, this style seeks a balance between concrete experience, abstract conceptualization, active experimentation, and reflective observation.

One of the important pieces of evidence to be taken from studies carried out through the Kolb Learning Styles Inventory (LSI) is that there are significant differences in the distribution of students' styles according to the areas of study. This observation has generated some consensus among some researchers about the possibility of having preferred learning styles in certain disciplines, especially con-

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cerning those inserted in the social sciences or humanities (KOLB; KOLB, 2013). However, considering the limited number of existing studies, there still seems to be insufficient reasoning to validate a possible association between students' styles and their choices in relation to subjects or areas of study (NIELSON, 2013).

Another model to highlight in the context of the study of learning styles is that of Honey and Mumford (2000), who use the Learning Style Questionnaire (LSQ) as an alternative measurement tool. Using a questionnaire consisting of 80 items, the instrument in question allows us to identify four different styles: activists, whose learning takes place mainly through experience; reflectives, whose learning results from reflective observation; theorists, centered on learning through the exploration of associations and interrelationships; and pragmatists, in which their learning is developed by performing or experiencing "things" aimed at a certain practical result.
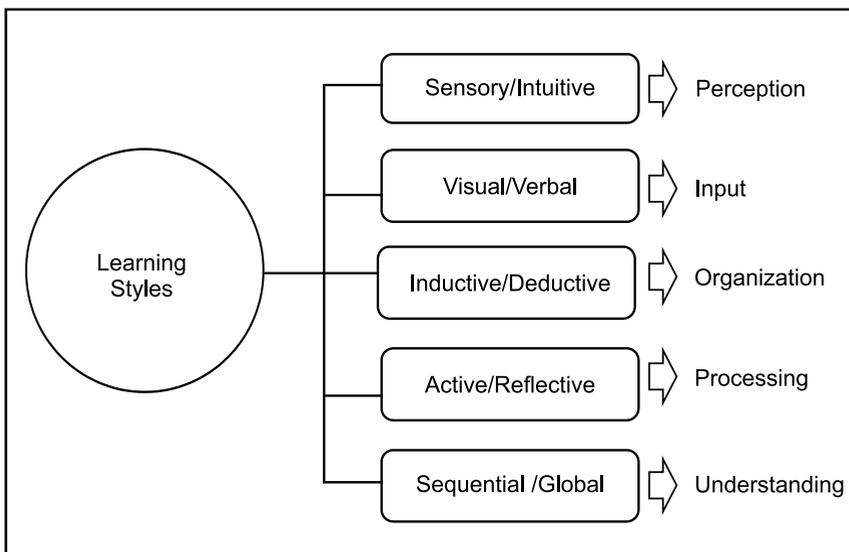
As noted, the model in question, and like Kolb's, proposes learning as a circular four-step process. Nevertheless, there are still some differences between the two models, presenting Honey and Mumford as an improved model, not only in the number of questions in the questionnaire but also in the process, dimensions, and learning styles (RODRIGUEZ, 2018). Thus, while in Kolb's model, what defines the learning style is how the individual perceives information through the senses and processes it. In the Honey and Mumford model the focus is on the individual's attitude and behavior. Despite being seen as a more improved instrument than Kolb's LSI, specifically concerning the differences indicated in the context of validation and predictive precision (ROMANELLI, et al., 2009), there is still evidence in the literature of some skepticism about its validity for students, particularly concerning those studying management. The model´s value in the context of learning tends to be recognized mainly as a tool for self-development and the design of learning experiences.

The Felder and Silverman model is yet another example of the vast diversity of models and instruments used in learning styles. Specifically designed to be used in the classroom (ROMANELLI, et al., 2009), and having been initially introduced in the context of engineering education (FELDER; SILVERMAN, 1988), the model seeks to categorize student preferences taking into account aspects such as typology and the way of perceiving information (sensory/intuitive or intuitive, visual or verbal), the different approaches to the organization and processing of information (inductive or

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deductive, active or reflective) and, finally, the pace of progress of students regarding understanding (sequential or global).

For the authors of the model, the dimensions underlying the proposed learning styles proposed (Figure 2.) are not exactly original since the first dimension (sensory/intuitive) constitutes one of the four dimensions recommended in Jung's theory of psychological types, and the fourth (active or reflective) is one of the components belonging to Kolb´s model.

Figure 2 Felder and Silverman´s learning dimensions

Source: Authors´adaptation of (FELDER; SILVERMAN, 1988).

The instrument formulated from this model is known as the Learning Styles Index (ILS). It consists of a questionnaire with 44 questions that aim to assess learning preferences from four dimensions (active/reflective, sensory/intuitive, visual/verbal and sequential/global), attaching to each of these dimensions or styles the following main characteristics (BRENT; FELDER, nd):

Active and reflective: They are individuals who tend to retain and better understand information when doing something practical, that is, discussing,

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applying, or explaining information to other individuals. Reflective individuals prefer to think first before they manifest themselves. While the active have difficulty staying in a class without developing any activity and prefer group work, the reflective are mainly dedicated to taking notes and prefer to work alone. Considering that each individual can sometimes combine one of these characteristics alternately, the evaluation allows us to determine within each of these preferences whether it manifests itself in an intense, moderate, or weak way; the balance between the two styles is ideal.

Sensory and intuitive: The sensory individuals prefer to learn primarily from facts, while the intuitive ones from the discovery of possibilities and relationships. The sensory individual is equally good at memorizing facts, preferring subjects more connected to the real world and finding solutions through duly proven models. On the contrary, the intuitive individual prefers to work on new concepts, feeling more comfortable with abstractions and mathematical formulations. He tends to dislike subjects that involve considerable memorization and routine calculations. As a rule, he also tends to be more innovative than the sensory individual, who will also be more pragmatic and less quick to work than the first.

Visuals and Verbs: In the case of individuals who fall within the "visual" typology, their learning is more visual, so they prefer images, diagrams, films, and demonstrations. Individuals in the verbal category give more importance to words and written and oral explanations.

Sequential and global: Individuals identified with the sequential style, tend to learn in linear and sequentially logical steps. Therefore, when looking for solutions, they tend to follow a path based on a logical set of steps. With regard to individuals inserted in the global style, their learning is done in great "leaps," absorbing the materials almost at random and without establishing connections. That is, they manage to arrive unexpectedly at the answer without knowing how they got there. They can also quickly solve complex problems or innovatively gather facts from the moment they understand the big picture.

The Dunn and Dunn model (1978) is a research model supported by a questionnaire developed to provide researchers with a valid and reliable measuring ins-

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trument for identifying higher education students´ learning style preferences. Also known as the VAKT model, it includes 20 variables organized around five strands or types of stimuli. These stimuli are physical (sound, light, temperature, and design (formal/informal), emotional (motivation, responsibility/conformity, persistence in tasks and structure), sociological (self, peer, peers, team, adult, and diversity), physiological (element of preceptive preference such as auditory, visual, tactile and kinesthetic, time of day, intake and mobility) and, finally, psychological (holistic/analytical and reflective/impulsive) (KITMOLER, 2015). The model demonstrates that students are affected by environmental, emotional, sociological, physiological, and psychological elements. Despite recognizing the influence of external factors on learning styles, the truth is that the preferences identified in the model are grounded on the idea that they can only be worked on and not changed (COFFIELD et al., 2004).

At last, a reference to another model, the VARK by Fleming and Mills (1992). This model is based on a questionnaire with 13 questions from which it is possible to identify four styles or modes of learning: visual (V), suggesting that the individual learns best through figures, graphics, diagrams, and other available visual resources; the read / write style (R), with the individual's preference for text; the aural/auditory style (A), whose preference of the individual is the information transmitted by speech or sounds and, finally, the kinesthetic style (K), in turn, characterized by the preference related to the use of experience and practice (simulated or real) (FLEMING; MILLS, 1992).

All of these different models present advantages and disadvantages in terms of their application. For the purpose of this empirical study, the Felder and Silverman (1988) model was chosen for its characteristics and applicability to the target audience.

Learning Styles in the Context of Business Management Teaching

One of the underlying assumptions found in the literature is that knowledge of students' learning styles will allow the teacher to be more effective in transmitting

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knowledge, giving him, through this knowledge, the possibility of developing peda-gogical strategies and techniques to reinforce this transmission (NIELSEN, 2015). This assumption could not be so different in the case of business management teaching, and it should be stressed in this context that future managers must be prepared for the future labor world (DA SILVA et al., 2012).

Despite the idea that the knowledge of learning styles can be beneficial for students and their performance, some educators still refuse it, arguing that this knowledge contributes little to the effectiveness of learning (NANCEKIVELL; SHAH; GELMAN, 2020; HUSMANN ; O'LOUGHLIN, 2018), and perhaps instead the fo-cus should be more on the effectiveness of presentation modes (visual or verbal) and other learning techniques such as mass practice versus distributed practice (KNOLL et al., 2017). For clarity, in the case of mass practice, the individual learns by practicing a certain number of attempts in a fixed period, that is, without resting or with very short intervals between sessions. Conversely, in distributed practice, the individual practices the same number of attempts in several sessions, with sufficient intervals between each session (KAIPA; HOWARD; KAIPA; TURCAT; PREMA, 2020; MAGILL, 2004).

One of the issues also addressed in the literature is whether the different styles identified are intrinsic or extrinsic to the individual. Therefore, it is interesting to see whether the learning styles of business students are innate, independent of the course and its contents, or whether there are perhaps preferred styles that are common among these students depending on the course. The results observed in the literature regarding this issue tend to be contradictory. According to some of these studies, the styles are not innate, with the students' preference resulting from the need to adapt to the information presented within the course (SANDMAN, 2014). Therefore, according to this evidence, the preference for a particular learning style may vary according to the student's perception of the differences in the information found in each course. In a study conducted by Loo (2002) based on the Kolb model, there was a great diversity of styles among business students. The author recom-mended that teachers encourage students to use all identified learning styles in the indicated model, thus avoiding dependence on a certain style. Another study applied to Brazilian business students shows that the use of a teaching case can contribute to the development of skills, but also that the nature of the skill to be developed may

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be influenced by learning styles (SONAGLIO et al., 2013). Thus, efforts to combine the teaching styles and the mix of pedagogical techniques used in each discipline, with the preferred learning styles, can be a way of mitigating negative results and contributing to positive ones. In another study conducted by Rupasinghe (2008), in students studying management (i.e., courses in entrepreneurship and marketing), significant differences were observed in terms of learning styles.

The results observed in other studies using the Felder and Silverman (ILS) model have shown that there is a preferred learning style among management students. In this case, the predominant styles identified are the Visual (MAZUMDER, 2013) and Sensory (MAZUMDER, 2013). Of equal interest, based on the results presented, the study by Poves, Vílchez, and Céspedes (2019), grounded on Fleming's VARK model, revealed that business school students have predominant styles. For example, while students at the professional business school had two or more styles, those at the professional school in international business management had the predominant reader/writer style.

Ding and Lin (2012) found differences in learning styles between Asian and Western (European) students, and by doing so, asked to what extent does culture, together with other factors such as the value systems and educational objectives of each educational institution, influence learning styles.

Methodology

The data were collected in business management courses offered in Portuguese Higher Education Institutions in the Metropolitan Area of Lisbon (AML), namely: School of Business Sciences (Setúbal Polytechnic Institute Instituto), Lisbon Accounting and Business School (Lisbon Polytechnic Institute). This particular area was considered for this study's purpose as it represents the region with the highest offer of business courses in the country.

Two scales were used to analyze the students' learning styles and learning strategies. In the case of the learning styles, the ILS scale adopted by Felder and Soloman was used. As for the learning strategies, the option was for the Martins and Zerbini scale (2014).

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The statistical analysis involved measures of descriptive statistics (absolute and relative frequencies, means, and standard deviations) and inferential statistics. The level of significance for rejecting the null hypothesis was fixed at $\alpha \leq .05$. The Cronbach's alpha consistency coefficient, Pearson's correlation coefficient, the Chi-square test of independence, the Student's t-test for one sample, the Anova of Repeated Measures and the Manova were used. The Chi-square assumption that there should be no more than 20% of cells with expected frequencies below 5 was analyzed. In situations where this assumption was not met, the Chi-square test by Monte Carlo simulation was used. The differences were analyzed with the support of standardized adjusted waste. According to the Central limit theorem, distribution normality was accepted in samples with a size greater than 30. The assumption of homogeneity of the matrix of variances and sphericity were analyzed.

Statistical analysis was performed using SPSS (Statistical Package for the Social Sciences) software version 25.0 for Windows.

SAMPLE CHARACTERIZATION

A convenience sampling method was applied, and a total of 99 valid responses were obtained. Data were collected between November and December 2019 through an online survey. Most of the respondents were female (69.4%), holding an undergraduate degree (73.7%) and who attended a course in management (76.8%). The respondents' average age was 26.2 years, ranging from a minimum of 17 to a maximum of 59 years.

Table 1 Sociodemographic characteristics of respondents (N = 99).

	Number	%
Gender		
Male	30	30.6
Female	68	69.4
Level of educational qualifications		
Undergraduate degree	73	73,7
Master's degree	24	24.2

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Other	2	2.0
Specialization		
Administration	16	16,2
Economics	7	7,1
Management	76	76,8
Age (Av; Sd)	26.2	10.5

Source: Own Elaboration.

Analysis and Discussion of Results

LEARNING STYLES - ILS (*Index of Learning Styles*)

For each dimension, scores from 1 to 3 were classified as mild, from 4 to 7 as moderate preference and from 8 to 11 as strong preference. Thus, in the "processing" dimension, 71.7% of the subjects were categorized in the active style. The predominant dimension is a slight preference for Active (40.4%). In this dimension, the results appear to be very similar to those observed in the study conducted by Holt et al. (2018), in which 72% of the population were found to be in the Active style.

Table 2 Processing (Active/Reflective).

	N	%
Strong preference for active	3	3
Moderate preference for active	28	28,3
Mild preference for active	40	40,4
Mild preference for reflective	19	19,2
Moderate preference for reflective	9	9,1
Total	99	100

Source: Own Elaboration.

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In the "perception" dimension, 84.9% of the subjects were categorized in the Sensory style. The predominant dimension is a slight preference for sensory (48.5%). The results obtained for this dimension again reveal that they are very similar to those found in the same study by Holt et al (2018), in which case 83% of the population was categorized in the Sensory style.

Table 3 Perception (Sensory/Intuitive).

	N	%
Strong preference for sensory	5	5,1
Moderate preference for sensory	31	31,3
Mild preference for sensory	48	48,5
Mild preference for intuitive	12	12,1
Moderate preference for intuitive	3	3
Total	99	100

Source: Own Elaboration.

In the "input" dimension, 86.9% of the subjects were categorized in the Visual style.

Table 4 Input (Visual/Verbal).

	N	%
Strong preference for visual	19	19,2
Moderate preference for visual	45	45,5
Mild preference for visual	22	22,2
Mild preference for verbal	9	9,1
Moderate preference for verbal	4	4
Total	99	100

Source: Own Elaboration.

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In the "organization" dimension, 58.6% of the subjects were categorized in the Sequential style. The predominant dimension observed was the moderate preference for sequential (39.4%). Similar to what was observed in other dimensions, the results related to this dimension are also very close to those of other studies regarding the distribution of the predominant style (HOLT et al., 2020; FILLIPIDIS; TSOUKALAS, 2009).

Table 5 Organization (Sequential/Global).

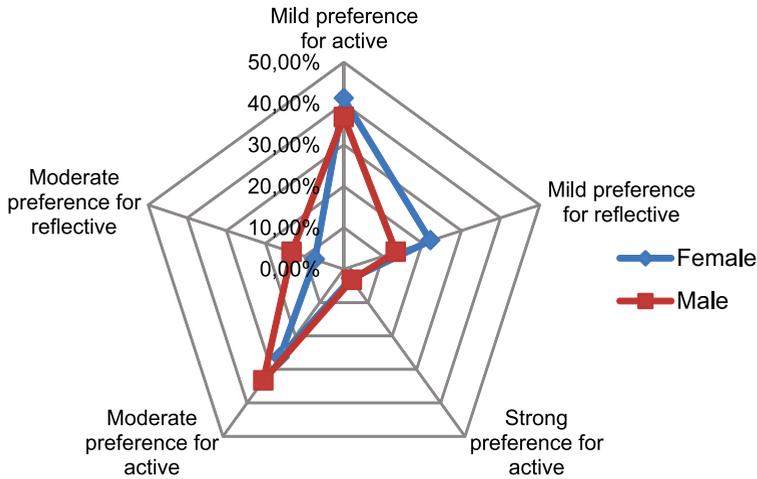|	N	%
Strong preference for sequential	1	1
Moderate preference for sequential	18	18,2
Mild preference for sequential	39	39,4
Mild preference for global	32	32,3
Moderate preference for global	9	9,1
Total	99	100

Source: Own Elaboration

Gender comparison

The gender distribution of students by learning styles in the processing dimension was relatively similar, $\chi^2 (4) = 2.088$, p = .720.

Table 6 Processing and gender.

	Gender		Total
	Female	Male	
Strong preference for active	2,9%	3,3%	3,1%
Moderate preference for active	26,5%	33,3%	28,6%
Mild preference for active	41,2%	36,7%	39,8%
Mild preference for reflective	22,1%	13,3%	19,4%
Moderate preference for reflective	7,4%	13,3%	9,2%
Total	100%	100%	100%

Source: Own Elaboration.

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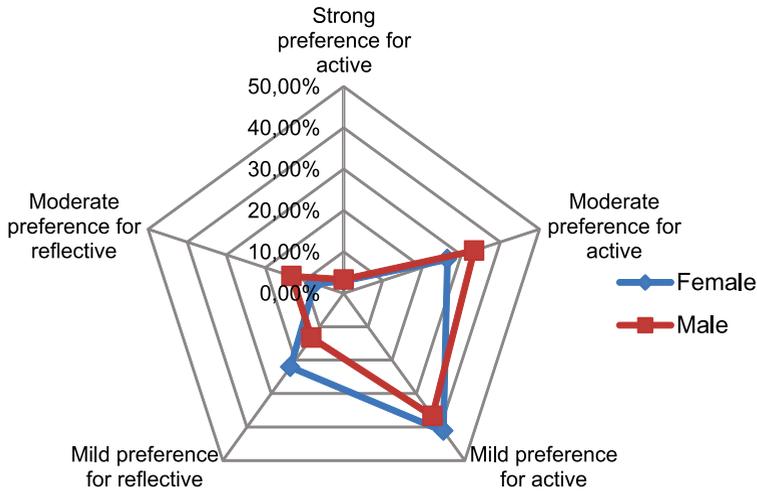**Figure 3** Processing dimension

Source: Own Elaboration.

The gender distribution of students by learning styles in the Perception dimension is relatively similar, $\chi^2 (4) = 8.300$, p = .081.

Table 7 Perception and gender.

	Gender		Total
	Female	Male	
Strong preference for sensory	5,9%	3,3%	5,1%
Moderate preference for sensory	30,9%	33,3%	31,6%
Mild preference for sensory	54,4%	36,7%	49%
Mild preference for intuitive	8,8%	20%	12,2%
Moderate preference for intuitive	0%	6,7%	2%
Total	100%	100%	100%

Source: Own Elaboration.

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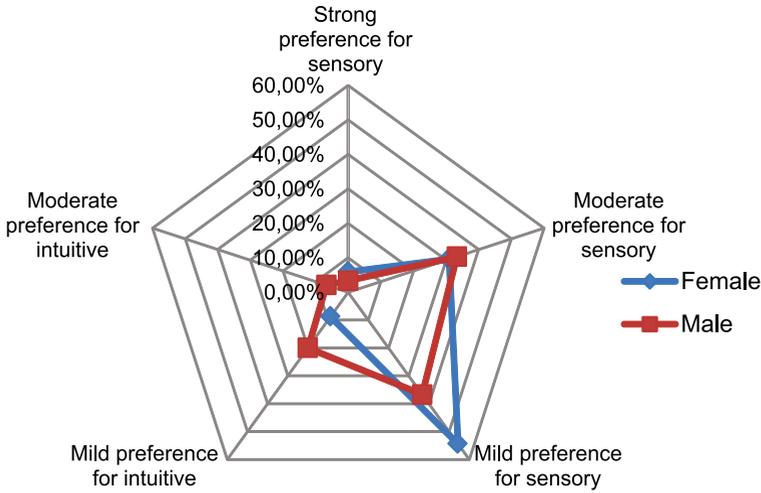
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Figure 4 Perception dimension.

The gender distribution of students by learning styles in the "perception" dimension is relatively similar, χ^2 (4) = 3.739, p = .442.

Table 8 Input and Gender.

	Gender		Total
	Female	**Male**	
Strong preference for visual	17,6%	23,3%	19,4%
Moderate preference for visual	47,1%	40%	44,9%
Mild preference for visual	19,1%	30%	22,4%
Mild preference for verbal	10,3%	6,7%	9,2%
Moderate preference for verbal	5,9%	0%	4,1%
Total	100%	100%	100%

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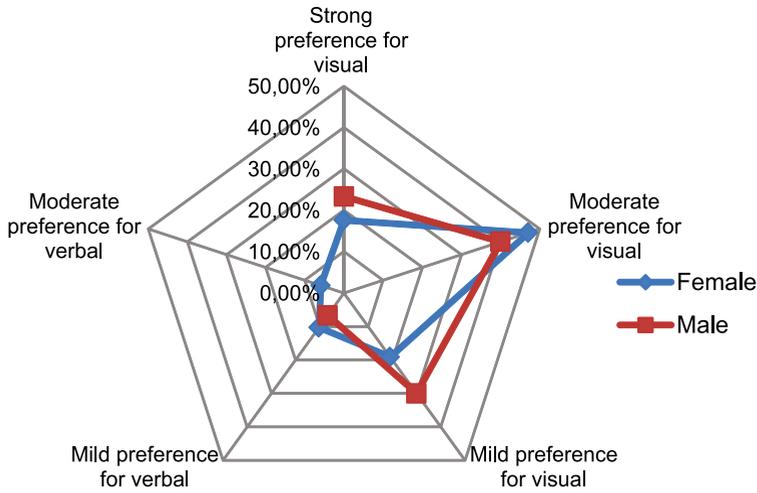**Figure 5** Input Dimension.

Source: Own Elaboration.

The distribution of students' gender by learning styles in the "perception" dimension is relatively similar, χ^2 (4) = 7.032, p = .134.

Table 9 Input and gender.

	Gender		Total
	Female	**Male**	
Strong preference for sequential	1,5%	0%	1%
Moderate preference for sequential	22,1%	10%	18,4%
Mild preference for sequential	44,1%	30%	39,8%
Mild preference for global	25%	46,7%	31,6%
Moderate preference for global	7,4%	13,3%	9,2%
Total	100%	100%	100%

Source: Own Elaboration.

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Figure 6 Dimension organization.

Source: Own Elaboration.

According to the results, no relationship was found between learning styles and gender. Other works in the literature corroborate this result, namely the work of Silva et al. (2016).

LEARNING STRATEGIES SCALE

The internal consistency, determined with the Cronbach's alpha internal consistency coefficient, ranged from a minimum of .762 (reasonable) to a maximum of .864 (good).

Table 10 Internal consistency.

	Cronbach´s Alpha	Nr items
Emotional Control	.807	4
Self-regulatory strategies	.864	5
Search for Interpersonal Help	.762	3
Cognitive Strategies	.839	15

Source: Own Elaboration.

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The descriptive statistics of the learning strategies are depicted in Table 11. The average obtained for each of the strategies is significantly higher than the midpoint of the scale (5) (*p <.001*). The most used strategy is the search for interpersonal help (7.10), and the least used is emotional control (6.05). This last strategy is significantly less used than the others (*p <.001*), while the differences in means between the other learning strategies are not statistically significant (*p > .05*).

Table 11 Descriptive statistics.

	Minimum	Maximum	Average	Standard. Deviation
Emotional Control	,50	9,75	65	27
Self-regulatory strategies	,40	100	6,86	1,95
Search for Interpersonal Help	10	100	7,10	24
Cognitive Strategies	,93	9,67	6,87	1,32

Source: Own Elaboration.

The correlation coefficients between the learning strategies are all statistically significant and positive. The highest correlation occurs between self-regulatory strategies and cognitive strategies.

Table 12 Correlations.

	Emotional Control	Self-regulatory	Interpersonal Help
Self-Regulatory	,291**		
Interpersonal Help	,306**	,285**	
Cognitives	,220*	,636***	,407**

Source: Own Elaboration.
Note: * *p < .05* ** *p < .01* *** *p < .00*.

Gender Comparison

Manova's Multivariate test indicates the existence of significant differences between genders in at least one of the learning strategies, Pillaí´s Trace, = .965, F, (4, 93)

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= 635.086, p = .001. Univariate tests indicate that female students use cognitive strategies significantly more than male students (7.08 vs 6.45), F (1, 96) = 4,869, p = .030.

Tabela 13 Strategies and Gender.

	Female		Male		F
	Av	Sd	Av	Sd	
Emotional Control	5,78	2,14	6,63	1,83	3,543
Self-regulatory strategies	6,98	2,05	6,66	1,78	,547
Search for Interpersonal Help	7,41	1,94	6,62	1,93	3,476
Cognitive Strategies	7,08	1,39	6,45	1,08	4,869*

Source: Own Elaboration.

Note: * p < .05 ** p < .01 *** p < .001. Av – Average. Sd – Standard deviation.

LEARNING STYLES AND COGNITIVE STRATEGIES

Processing

Manova's Multivariate test indicates the existence of significant differences between learning styles in at least one of the learning strategies, Pillai´s Trace, = .104, F, (4, 94) = 2,715, p = .034 . Univariate tests indicate that students with an active style use significantly more Interpersonal Search strategies than students with a reflective style (7.37 vs 6.44), F (1, 97) = 4,305, p = .041.
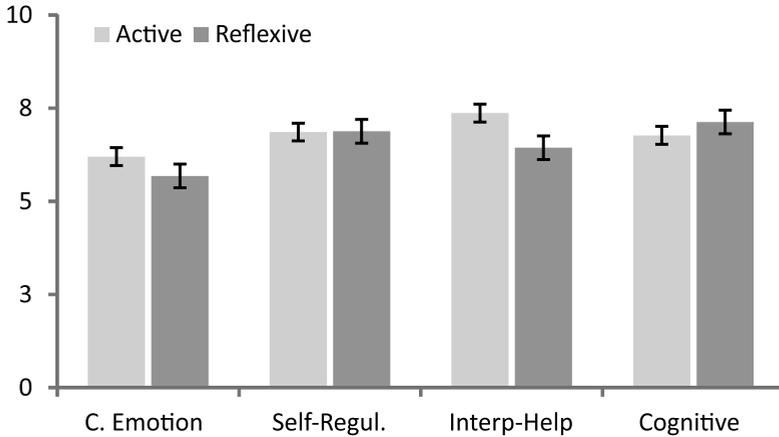
Table 14 Processing and strategies.

	Active		Reflective		F
	Av	Sd	Av	Sd	
Emotional Control	6,20	1,93	5,68	2,40	1,280
Self-regulatory strategies	6,86	1,93	6,88	2,07	,001
Search for Interpersonal Help	7,37	1,82	6,44	2,43	4,305*
Cognitive Strategies	6,77	1,41	7,13	1,10	1,425

Source: Own Elaboration.

Note: * p < .05 ** p < .01 *** p < .001. Av – Average. Sd – Standard deviation.

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Figure 7 Processing Dimension and learning strategies.

Source: Own Elaboration.

Input

Manova's Multivariate test indicates that differences in the use of learning strategies according to the learning styles are not statistically significant, Pillai's Trace, = .022, F, (4, 94) = 0.519, p = .722.
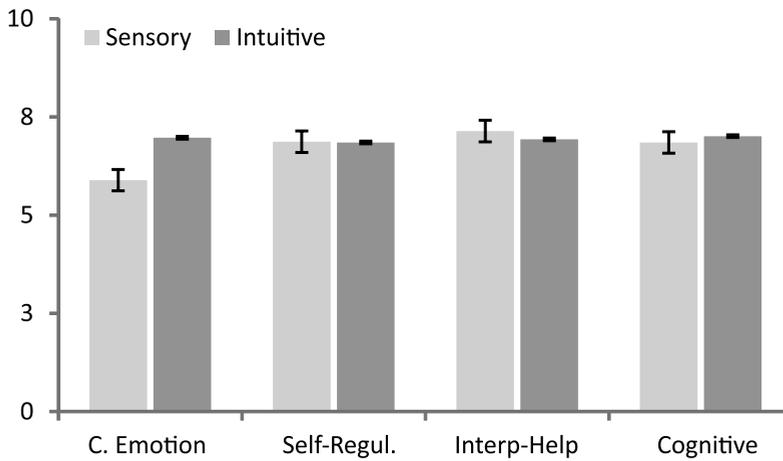
Table 15 Input and strategies.

	Visual		Verbal		F
	Av	**Sd**	**Av**	**Sd**	
Emotional Control	6,12	2,10	5,60	1,91	,726
Self-regulatory strategies	6,85	2,01	6,97	1,65	,039
Search for Interpersonal Help	7,05	2,02	7,51	2,26	,586
Cognitive Strategies	6,87	1,36	6,88	1,13	,001

Source: Own Elaboration.
Note: * p < .05 ** p < .01 *** p < .001. Av – Average. Sd – Standard deviation.

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Figure 8 Input Dimension and learning strategies.

Perception

Manova's Multivariate test indicates that differences in the use of learning strategies according to learning styles are not statistically significant, Pillai's Trace, = .053, F, (4, 94) = 1.317, p = .269.

Table 16 Perception and strategies.

	Sensory		Intuitive		F
	Av	Sd	Av	Sd	
Emotional Control	5,89	1,99	6,97	2,35	3,530
Self-regulatory strategies	6,87	1,94	6,85	2,13	,001
Search for Interpersonal Help	7,14	1,94	6,93	2,63	,128
Cognitive Strategies	6,85	1,36	7,01	1,20	,196

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Figure 9 Perception dimension and learning strategies.

Organization

Manova's Multivariate test indicates the existence of significant differences between learning styles in at least one of the learning strategies, Pillai´s Trace, = .109, F, (4, 94) = 2,879, p = .027 . Univariate tests indicate that students with a sequential style use significantly more self-regulatory strategies than students with a global style (7.24 vs 6.34), F (1, 97) = 5,392, *p* = .022.

Table 17 Organization and strategies.

	Sequencial		Global		F
	Av	Sd	Av	Sd	
Emotional Control	5,78	2,07	6,44	2,04	2,468
Self-regulatory strategies	7,24	1,95	6,34	1,86	5,392*
Search for Interpersonal Help	7,18	2,07	7,00	2,02	,193
Cognitive Strategies	7,02	1,45	6,66	1,12	1,803

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Figure 10 Organization dimension and learning strategies.

Source: Own Elaboration.

As observed in the studied sample, there are few relationships between learning styles and learning strategies. An overview of the results is depicted in Chart 1 presented below.

Chart 1 General view of the results.

	Emotional Control	Self-Regulatory	Search for Interpers. Helpl	Cognitive Strategies
Processing (Active / Reflective)			Active> Reflective	
Input (Visual / Verbal)				
Perception (Sensory / Intuitive)				
Organization (Sequential / Global)		Sequential > Global		

Source: Own Elaboration.

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Two results are of particular importance and, therefore, worthwhile mentioning here. The first is that more active students tend to seek more interpersonal help than reflective ones, which does not necessarily imply that students with a reflective profile need less interpersonal help. However, it could mean that these students with a reflective profile may not seek help even when needed. Therefore, when analyzing students' styles in the classroom, it is important to verify in the presence of students with a more reflective profile whether they require interpersonal help or not. Future research in this context could also be conducted.

Another equally relevant aspect is whether students with a more sequential profile tend to use more self-regulatory strategies than those with a more global style. Self-regulatory strategies consist of the student's ability to make an effort, even when he is losing concentration or interest, or even reviewing learning, to seek and select his doubts and better understand what is being studied. In the case of individuals identified with the sequential style, their learning tends to be done in linear and sequential logical steps. On the other hand, as for individuals in the global style, their learning is done in great "leaps," absorbing the materials almost at random and without establishing connections. Thus, this result shows a possible relationship between the dimensions studied (organization and self-regulatory strategy). Therefore, in classes that have students with a more global profile, the teacher must pay attention to the development of self-regulatory strategies within this group.

Conclusions

The context and profile of students have been changing in recent years. Access to digital resources and the social, economic, political, and technological context brings new challenges to the teacher, leading to the importance of understanding and accompanying the students' learning styles. One of the challenges is the increasing adoption of distance learning. It is also in this context that it is essential to understand how the student learns since the different learning styles are known to influence his success in online courses (CHANG ; HUNG; LIN, 2015). The literature mentions several learning style models, and in the case of the Felder and Silverman (ILS) model, it is evidenced that there is a preferred learning style among manage-

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ment students, the predominant styles identified in this case as Visual (MAZUMDER, 2013) and Sensory (MAZUMDER, 2013).

Our study, applied to a sample consisting of higher education students in Portugal, reveals some interesting results. These results were found to be partially consistent with the literature, particularly in the case of the Visual and Sensory styles that were also predominant and preferred among management students. Nevertheless, some of the results we obtained are somewhat in line with those of other studies carried out with students who attended other courses, which leads us to reflect on the possibility of styles and student preferences being independent of the course. We find this possibility to be an issue that should be further studied by contrasting the results of a larger sample with those found in the literature. Concerning gender, a variable that is still relatively poorly studied, it seems that female students use cognitive strategies significantly more than their male counterparts, evidence that tends to be in line with other studies corroborating differences in learning between genders (GARBER; HYATT; BOYA, 2017).Regarding the distribution of learning styles by gender, we found no significant differences.

In the dimensions "perception", "entry", and "organization", the prevailing styles that were found were the sensorial, visual, and sequential. The results also suggest that students with an active style use significantly more interpersonal search strategies than students with a reflective style. In contrast, students with a sequential style use significantly more self-regulatory strategies than those who have a global style. This result shows the need for teachers to be attentive to students' learning styles, as they can often fail to use certain learning strategies, making the teaching-learning process more difficult. Few studies relate learning styles and strategies, and this work presents a possible path for further studies in this area. Despite some of the limitations found in this study, namely the sample size, reduced execution time and the fact it primarily uses a quantitative descriptive approach, the results still prove to be consistent with other research done in this area and reinforce the importance to think about different educational practices for different classes/ profiles, as also shown in a similar study applied in Portugal to business management courses in a distance learning context (CARVALHO et al., 2019).

It is suggested that new studies be developed using larger and comparative samples between countries. This could be a way to improve the understanding of the dimensions that impact learning and the appropriate approaches to each style and to develop more efficient and personalized learning paths.

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