

Relationship between learning style and learning context: an integrative review

Relação entre estilo de aprendizagem e contexto de aprendizagem: uma revisão integrativa

Elzenir Pereira de Oliveira Almeida

Centro Universitário de Patos (UNIFIP). E-mail: elzenirpereira@bol.com.br

Milena Nunes Alves de Sousa

Centro Universitário de Patos (UNIFIP). E-mail: milenanunes@fiponline.edu.br

Abstract: Higher education in recent years has been marked by significant changes and has impacted on the educational process, requiring pedagogical and professional actions capable of translating performances the challenges faced by professional practice in different contexts of the teaching-learning process. In order to investigate the relationship between students' learning style and learning context, an integrative review was performed according to both the available literature and the guiding question: what is the relationship between the student learning style and the learning context? Then, the descriptors were defined: learning style and learning context. The search was processed using the Education Resources Information Center database, which provided eleven articles selected by a defined inclusion and exclusion criteria. All items were organized and analyzed according to whether or not they have influence on the learning style and on the learning context. Thus, it was found that 73% (n = 8) showed a positive relationship between the student learning style and the learning context. This study demonstrated that there is relevance between the student learning style and the learning context, and this relationship helps teachers to provide satisfaction, autonomy and effectiveness regarding the student learning process. Moreover, it is important that teachers recognize this relationship so that they can propose new methods of teaching, learning and assessment that are appropriate to the identified styles.

Keywords: Learning Style; Learning Context; Higher education.

Resumo: O ensino superior nos últimos anos tem sido marcado por mudanças significativas e tem impactado no processo educativo, exigindo ações pedagógicas e profissionais capazes de traduzir performances que atendam aos desafios enfrentados pela prática profissional em diferentes contextos do processo ensino-aprendizagem. Para investigar a relação entre o estilo de aprendizagem e o contexto de aprendizagem dos alunos, foi realizada uma revisão integrativa de acordo com a literatura disponível e a questão norteadora: qual é a relação entre o estilo de aprendizagem do aluno e o contexto de aprendizagem? Em seguida, foram definidos os descritores: estilo de aprendizagem e contexto de aprendizagem. A pesquisa foi processada utilizando-se a base de dados do Centro de Informações sobre Recursos Educacionais, que forneceu onze artigos selecionados por critérios definidos de inclusão e exclusão. Todos os itens foram organizados e analisados de acordo com a influência ou não do estilo de aprendizagem e do contexto de aprendizagem. Assim, verificou-se que 73% (n = 8) apresentaram relação positiva entre o estilo de aprendizagem do aluno e o contexto de aprendizagem. Este estudo demonstrou que há relevância entre o estilo de aprendizagem do aluno e o contexto de aprendizagem, e essa relação ajuda os professores a proporcionar satisfação, autonomia e efetividade no processo de aprendizagem do aluno. Além disso, é importante que os professores reconheçam essa relação para que possam propor novos métodos de ensino, aprendizagem e avaliação adequados aos estilos identificados.

Palavras-chave: Estilo de aprendizagem; Contexto de Aprendizagem; Ensino superior.

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INTRODUCTION

The new educational paradigm supported by the United Nations Educational, Scientific and Cultural Organization (UNESCO) proposal provides the principles that should guide higher education in the twenty-first century, which includes response to challenges in a changing world at international, regional, national and community levels, as well as to ensure the participation of all involved in higher education activities (GACEL-ÁVILA, 2005).

In this sense, higher education in recent years has been marked by significant changes and has impacted on the educational process, requiring pedagogical and professional actions capable of translating performances that efficiently meet the challenges faced by professional practice in different contexts of the teaching-learning process (OECD, 2012).

The current educational paradigm addresses the need to train individuals for life, in their entire scope and, above all, aim to transform society into a more just and solidary one. It is essential that the teaching-learning process be supported by the four pillars of learning: learning to know, learning to be, learning to live together and learning to do (DELORS, 1997).

Such changes that occurred in the education environment, particularly in higher education, require the restructuring of the teaching-learning process and its didactic pedagogical structure, since there is a contemporary dynamic based on new concepts of education, knowledge. In this sense, the construction of this knowledge involves the practice of teaching and learning, object of research and theory for decades, aiming at the search for alternatives that facilitate the improvement of the learning process, Unveil educational practices that lead to school success or failure (OECD, 2012).

Accordingly, teachers need to have intellectual and emotional maturity, be curious, enthusiastic and open to motivate and discuss with students. They should demonstrate what they know and, at the same time, be aware of what they do not know and be open to new things as well as showing students the complexity of learning. Finally, they should teach how to learn and relativize, valuing differences and accepting the provisory (MOHD; BAKAR; MAHBOB, 2012).

Therefore, teaching planning may be more effective should it be possible to know the student learning profile. Teaching should be built as a development promoter and not as an impediment related to its divorce (WILLIAMS; CALVILLO, 2002).

Students do not learn by internalizing some received meaning from outside, that is, from the very teacher, but from the student internal process, an unique and idiosyncratic action that interacts teachers' new ideas with pre-existing ones inside their cognitive structure. Thus, teachers have to take into account what their students already know (GAN; LEE, 2016).

CONCEPTION OF LEARNING STYLE AND LEARNING CONTEXT

In order to understand how students conceive and process knowledge it is necessary to elaborate objective learning strategies to make the process more efficient. The term "learning styles" refers to the concept that individuals differ regarding whether instruction or study is more effective for them (PASHLER et al., 2008).

Learning style may be understood as a stable and lifelong pattern of human individuality that derives from standards consistent with the relationship between the individual and the environment. It considers a cycle of learning that encompasses four necessary processes for learning to take place. Divergent - concrete experience and reflective observation; Assimilating - reflective observation and abstract conceptualization; Convergent - abstract conceptualization and active experimentation; and Accommodating - active experimentation and concrete experience (KOLB, 1984).

Furthermore, the learning style is how students start to concentrate, process, absorb and keep difficult and new information. Individuals learn by a combination of environmental, emotional, sociological, psychological and physiological stimuli (DUNN; PRICE, 1997).

The learning style is the application of a wide variety of student attributes: some students feel comfortable with abstractions and theory; some students prefer active learning, but others are inclined to introspection; some students prefer visual presentation of information, but others choose verbal explanations (FELDER; SILVERMAN, 1988; FELDER; BRENT, 2005).

In relation to the diversity of learning model styles, authors affirm that students have different levels of motivation, distinct attitudes about the learning process and various answers in the classroom environment and to teaching practices. This occurs due to the preference of students to realize (sensing/intuitive), retain (visual/verbal), process (active/reflective) and comprehend information (sequential/global) (FELDER; SILVERMAN, 1988; FELDER; BRENT, 2005).

The conception of learning style takes into account that individuals learn both through concrete experience and abstraction and this knowledge emerges from innate predispositions and inclinations. Learning style categories are: Concrete - Sequential (CS), Concrete - Random (CR), Abstract - Sequential (AS) and Abstract - Random (AR) (GREGORC; BUTLER, 1984).

People are born with predisposition to a certain learning style, each one of them fits in to either one or two categories. In relation to students, especially in higher education, those who fit in the "concrete-sequential" category have the propensity to derive information from concrete experiences, absorb the logical sequence of information and follow a systematic direction, such as textbooks, lectures and programmed instructions. Students with "concrete-

random" characteristics opt to study with an experimental attitude, trial and error and are quite intuitive. They prefer games, simulations, independent study and problem solving activities. Students with "abstract-sequential" characteristics have greater ability to work with written or verbal symbols, are able to abstract thinking, use conceptual figures to understand knowledge and choose to learn only by reading and/or listening to experts. The "abstract-random" type corresponds to those students who associate the medium with the message, linking practice to theory, that is, how the instructor teaches what is being taught. They estimate the content universally and prefer to receive information through a non-structured fashion or through discussion groups, free of rules (GREGORC; BUTLER, 1984).

When it comes to the learning context it can be said that it is relevant and it is connected to the student real world, affording learning (FIGUEIREDO, 2005; WESTERA, 2011). In this sense there are three learning context definitions: (1) Learning event, the situation that the student learns; (2) Content addressed by the teacher and/or by any other means; and (3) Context, which is the combination of all circumstances important to building the knowledge of students (FIGUEIREDO, 2005).

The learning context can be analyzed by the social theory perspective based on four fundamental points: practice (learning by doing; this action can be either individual or collective); meaning (relevance to both the individual and to the collective); community (competence to work in group); and identity (learning arises from the moment that both individual and collective identities are built). Therefore, this theory should incorporate the necessary components to characterize social participation as a process of learning and knowledge. Indeed, engagement of students, imagination and alignment constitute important factors to the learning context (WENGER, 1998).

It is worth noting that all mentioned authors (GREGORC; BUTLER, 1984; FELDER; SILVERMAN, 1988; WENGER, 1998; FELDER; BRENT, 2005; FIGUEIREDO, 2005; WESTERA, 2011) relate student learning styles to the learning context, as well as to other factors that influence the effectiveness of the learning process. Accordingly, when teachers realize the importance of knowing the preferences of their student learning styles, they allow themselves to diversify their methodology rather than merely employ conventional methods and approaches (BOKYUNG; HAEDONG, 2014).

It is important to encouraged teachers and students to identify and understand their preferred learning styles to accommodate some strategies in order to promote learning. A factor that strengthens the learning process is the identification of individual learning styles in order to reach better results in the classroom, balancing teaching styles by adapting activities that meet the student's learning styles. The relevance of using learning styles at the university is to

make the processes of teaching and learning into more effective and meaningful ones (GILAKJANI, 2012).

Observing different styles contributes to understand the specific learning needs of students. A key point is when students have greater satisfaction regarding the method employed in the course, he or she considers the educational process as being very suitable to his or her preferred learning style. When this satisfaction is present, student performance is higher (IUREA et al., 2011).

Therefore, this study intent to investigate the relationship between the student learning style and the learning context.

METHODS

We conducted an integrative review, giving transparency to the process, which in turn allows the reader to see how the conclusions and recommendations were obtained (SOARES et al., 2014). Other factors that led the authors to choose to work with a integrative review were the following: a clear set of goals with a predefined eligibility criteria of studies; a reproducible methodology; a systematic search intended to identify all studies that meet the eligibility criteria; and an assessment of the findings validity in the included studies (HIGGINS; GREEN, 2011).

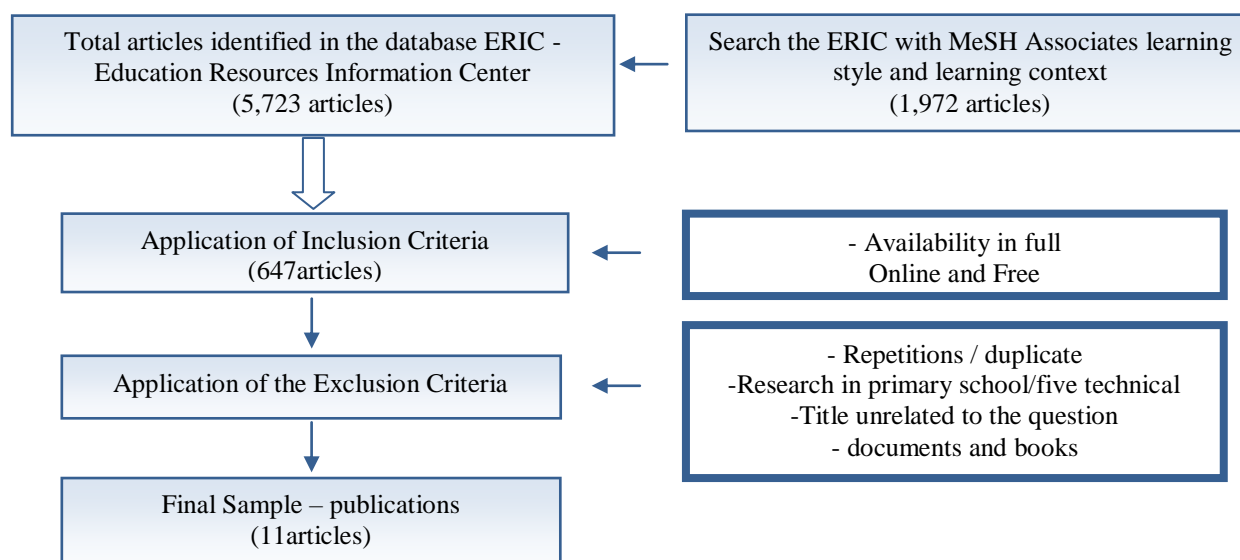
The guiding question employed components based on the PICO strategy (P- higher education students; I - learning style; C- learning context; O- the relationship between the student learning style and the learning context). The stated guiding question was: what is the relationship between student learning style and the learning context? Next, a search in the Education Resources Information Center (ERIC) database was performed using the defined descriptors: learning style and learning context.

The pre-selected and selected articles were identified according to the inclusion and exclusion criteria, which was based on the analysis of article summaries to reach the final sample. The next step was to separate the chosen studies in a table according to their characteristics, analyzing and discussing their results. Finally, a summary was given about the debated issue. All items were organized and analyzed according to whether or not they influence the learning style in the learning context.

In addition, the following figure describes in detail the step-by-step method used for the development of this systematic review, giving a better understanding of the adopted method (Figure 1).

Indeed, after following all phases determined by the method, which raised further analysis and discussion of the results, a synthesis of the desired information was presented. Subsequent preparation of a Microsoft Word table comprised of eleven articles, which was organized according to title, authors, publication year, results and references, provided the relationship between the student learning style and the learning context.

Figure 1 - Selected studies according to the ERIC database



RESULTS

According to the presented table, it was observed that 82% (n = 9) of the selected articles were published between the years of 2016 and 2011, whereas in 2008

it was published 18% (n = 2) of them, the same percentage observed in 2005 (Table 1). Regarding the databases used, 100% (n = 11) of the studies were found in Education Resources Information Center (ERIC) database.

Table 1 - Selected articles according to author, title and year

Author/Year	Title
Breckler; Joun; Ngo (2008)	Learning styles of physiology students interested in the health professions
Chen (2015)	Linking Learning Styles and Learning on Mobile Facebook
Çolak (2015)	The Effect of Cooperative Learning on the Learning Approaches of Students with Different Learning Styles
Dandy Bendersky (2014)	Student and Faculty Beliefs About Learning in Higher Education: Implications for Teaching
Dédic; Markovic (2012)	Influence of learning styles on graphical user interface preferences for e-learners
Khademi; Motallebzadeh; Ashraf (2013)	The relationship between Iranian EFL Instructors' Understanding of Learning Styles and Their Students' Success in Reading Comprehension
Lamm et al. (2011)	An Exploration of Reflection: Expression of Learning Style in an International Experiential Learning Context
Lee; Kim (2014)	What Can We Learn from Our Learners' Learning Styles?
Özdemir (2016)	The analysis of the relationship between primary learning styles and learning objects in an online environment
Wagner et al. (2014)	Learning Style Preferences of Undergraduate Dietetics, Athletic Training, and Exercise Science Students
Walls (2005)	Some strategies for balancing economies of scale and interaction in online/distance education courses

Based upon the guiding question, all articles were grouped into only one category: the relationship between the student learning style and the learning

context. It was observed that 73% (n = 9) of articles displayed a positive relationship between the student learning style and the learning context (Table 2).

Table 2 - Characterization according to the relationship between learning style and learning context

Author/Year	Results
Breckler; Joun; Ngo (2008)	Simply recognizing that there are different styles of learning and evolving one's repertoire of learning strategies may be particularly relevant for pre-health students desiring careers as clinicians and health professionals. Health professions usually require several simultaneous skills involving sensory components such as visual (i.e., deciphering graphic content in research articles), auditory (i.e., listening to patients or clients), reading-writing (i.e., reading journal articles and keeping records), and kinesthetic (i.e., learning or performing physical exams and procedures). Thus, in addition to improving their academic performance, knowledge of learning theory may help pre-health students become aware of and develop ways to master these lifelong professional skills
Chen (2015)	An analysis of variance (ANOVA) was conducted on the pre-test and then an analysis of covariance (ANCOVA) was employed. After analyzing the pre-test scores using ANOVA, the results showed that there was no significant difference among different learning style groups
Çolak (2015)	Posttest student scores for the deep learning approach demonstrated significant differences depending on learning style.
Dandy Bendersky (2014)	There were no significant relationships between learning definitions and beliefs regarding where learning should take place, who poses the biggest hindrance to learning, whether learning styles exist, or whether teaching to a learning style enhances learning.
Dédic; Markovic (2012)	We have found that learner's preference towards a specific GUI is not correlated to any particular learning style.
Khademi; Motallebzadeh; Ashraf (2013)	The results of interviews also indicated that instructors that knew learning styles very well could deal with their students efficiently and handle complexities of the teaching process. When teachers are familiar with a special learning style, they would be able to employ appropriate learning strategies particular to that learning style
Lamm et al. (2011)	Participants of all learning styles reflected on their enjoyment of experiential learning techniques utilized throughout the course
Lee; Kim (2014)	The findings regarding major learning style indicate that 1) Most of the learners (about 74.4%) have a major learning style(s) from one through six of the identified learning styles. More than two-thirds of the major learning style users have one or two learning styles. 2) Among the major learning styles, auditory, individual, and visual learning styles are much more preferred than tactile, kinesthetic, and group learning styles. Context and learning environment appears relevant to their favored major learning styles.
Özdemir (2016)	In this regard, it was concluded that the findings and interpretations in the study would be useful for the educators in the selection of learning objects to be presented to the students with these two styles (visual and sensory) during their university education.
Wagner et al. (2014)	A major focus among university faculty should be on identifying and incorporating experiences and activities aimed at enhancing learning among students. Knowledge of an individual's specific learning style has been shown repeatedly to be useful for formulating discussion, developing curriculum, increasing student control over learning, and promoting self-reflection. These benefits represent numerous possibilities for improving academic performance among college students in all majors.
Walls (2005)	Using a learning styles inventory such as Myers-Briggs, instructors could have students identify the learning strategies that they tend to use. Then, armed with that information, instructors could design various components of the online course to better align with these varying learning strategies

DISCUSSION

It is well known that recognizing different learning styles is important to the processes of both teaching and learning to take place effectively. When teachers are familiar with learning styles, it is possible for them to deal with their students adequately, as they become able to employ appropriate learning strategies specific to each one of them (KHADEMI MOTALLEBZADEH, 2013).

Recognizing and understanding these styles imply the acceptance and use of a wide variety of methods, procedures and teaching materials. They will facilitate that teachers understand better the existing relationship

between students and the act of learning, with all natural peculiarities specific to the process (TOMULETIU et al., 2011).

The adoption of strategies makes learning more effective. Undoubtedly, by using specific learning style tools and by adding to each student his own specific attribute, it is possible to improve teaching (ACHARYA, 2002). Identifying student learning styles helps not only teachers to develop their own strategies, but it also assists in the detection and identification of the best way to teach students (WANG et al., 2013).

In fact, educators should know the characteristics of learning styles in order to comprehend how students perceive and process knowledge. It is also important

for educators to adopt several teaching and evaluation strategies in order to improve student learning and their learning skills (WANG et al., 2013).

On the other hand, when students are aware of their own learning style preferences, teachers are able to design course materials that allow students to better absorb and process information. Moreover, students are capable to benefit themselves and others through the development of study strategies according to their favorite learning method (NEEL; GRINDEM, 2010).

Undeniably, studies have shown that the learning style generates a great impact on student learning and that this style differs among students. Accordingly, it is necessary that teachers redesign their classroom practices taking into account the identification of distinct learning styles (BHAT, 2014)

The learning style should be part of the student life from the beginning of preschool, primarily as a guiding element of intervention in the pedagogical practices of teachers. The evaluation system implemented by institutions should not only assess the course content in general, but also evaluate the methodology employed by teachers in order to establish whether or not such constructs are consistent with the community (NORMAN, 2012).

In the light of this study based on its general objective, it was found that there is a relationship between the learning style and the learning context, which is necessary for the educational process (WALLS, 2005; BRECKLER; JOUN; NGO, 2008; TOMULETIU et al., 2011; KHADEMI; MOTALLEBZADEH, 2013; LEE; KIM, 2014; WAGNER et al., 2014; ÇOLAK, 2015; ÖZDEMİR, 2016).

Although the majority of authors validate the relevance of the relationship between learning style and learning context, some researchers do not recognize that their studies demonstrate a significant correlation between the learning style and learning improvement (DÉDIC; MARKOVIC, 2012; DANDY; BENDERSKY, 2014; CHEN, 2015). In this respect, the authors affirm there is a strong and compelling body of evidence suggesting that learning styles are not a phenomenon that influences educational processes or outcomes (ROGOWSKY; CALHOUN; TALLAL, 2015).

Learning should take place mainly outside the classroom and the focus should be on education, on the very definition of learning rather than style (BUCKLEY et al., 2009). Thus, it is possible to verify that the learning style does not show signs of individual impact on student achievement, but there may be other factors that affect their performance. By recognizing how students learn, teachers will be able to use methodologies that meet all styles, understand and process information, regardless of the learning style (FOX; BARTHOLOMAE, 1999).

Even though there is a significant number of publications on learning style, one notices some limitations: (1) Reduced number of studies portraying in a specific and detailed manner the influence on the learning style and its simplification in student learning; (2) The use of descriptors in the present survey limits

the search in the database; (3) This research was carried out using a single database; and (4) Few scientific studies explore specific indexes on learning style and the relationship between learning style and learning context.

CONCLUSION

According to the data presented, it is possible to observe that investigating the relationship between the student learning style and the learning context is essential for teachers to realize that their own learning styles differ from their students, which consequently facilitates the construction of new knowledge that leads them to improve their pedagogical work.

By improving student learning style knowledge, teachers should develop more effective pedagogical practices, encouraging the learning skills of their students. Learning should not be only collaborative, interactive and participative, but it should also help to diagnose and solve the difficulties that take place in the classroom.

This study was written with the aim of making a contribution in the sense of providing deeper theoretical knowledge about the relationship between the learning style and the learning context, which is relevant to the educational process, especially to higher education.

The authors recommend that new research should be carried out involving, in a more specific manner, the influence of learning styles in the learning process of students.

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