CLASSIFICATION OF LEARNING STYLES OF UNIVERSITY STUDENTS

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Abstract

An important challenge for Higher Education, particularly Education 4.0, is to improve the student's online learning experience, for which models of learning styles have been proposed for virtual teaching. For this effect, this research classified the learning styles (learning preferences/dimensions) of students studying at a higher education institution. Consequently, 96 students who are studying the Industrial Administration degree from a public university during the 2017-2018 school period have been surveyed. The learning preferences of the students were identified using the ULSM (The Unified Learning Style Model) instrument; The results of the learning styles, analyzed in their dimensions and preferences, indicate that the students are kinesthetic, preferably of concrete learning, which tend to be global. They tend to be both active and reflective, show field independence, and are inductively reasoning. These students are deeply motivated, highly persistent, tend to do one thing at a time and prefer to work individually. Learning style is a temporary state and not a stable characteristic, therefore, raising awareness and motivating students to develop preferences that add to online learning can make a difference in student success.

Keywords:

learning styles, ULSM, e-learning, LMS, higher education.

1. Introduction

Higher education faces great challenges, and one of them is related to school dropout, whose causes have its origin in various factors, among them, the high failure rate, which is mainly observed in subjects considered “difficult”, that demand a high level of knowledge and a lot of dedication to study on the part of the student.

One of the strategies to solve this challenge has been the proposal of various models of learning styles, which classify the way in which a student learns and, consequently, develop educational materials that serve to facilitate the learning process. The Unified Learning Style Model (ULSM) (Popescu, 2009) serves to unify the most relevant learning style models and, as a result, facilitate student learning in the web 4.0 era.

The identification of the way in which students learn may influence their school performance, however, this has been a matter of controversy since there have been various studies in favor of the hypothesis that the academic performance of students is favored through the use of educational materials designed to satisfy learning styles, and additionally other studies that contradict this idea. Due to this, the present research aimed to classify the learning style of students through the ULSM instrument and thus quantify its influence on academic performance.

Popescu (2010) studied the platforms that use learning styles as personalization criteria, also known as adaptive educational systems based on learning styles (WELSA, Web-based Educational system with Learning Style Adaptation). This study involved 64 graduate students who were surveyed with the ULSM instrument. Each student was sized and adaptation rules were created according to the preferences detected by the ULSM. The results showed that students whose learning preferences were considered to recommend courses had a favorable outcome on their learning, while students who did not use the recommended course had an adverse effect on their learning.

There are studies whose objective has been to identify the dominant learning style of students, for example, the study directed by Karakiş (2012) who conducted an experiment in a high school applying a survey to 584 students in order to determine the dominant learning style based on the inventory of learning styles by Kolb (1984). The results showed that 50.5% of the students were classified as assimilators, that is, they are between reflective observation and abstract conceptualization. Additionally, the study concludes that there is no significant difference in terms of learning style and gender, which supports the idea that the learning styles of both men and women have similar preferences.

The study by Ramírez-Arellano, Bory-Reyes and Hernández-Simón (2016) developed a management system to merge LOs, and adapt them to the student's learning preference. 56 university students participated in the study and were divided into two groups, control and experimental. The ULSM instrument was used to classify students according to their learning style. The proposed system searched for the didactic contents in a LO repository to later be able to merge LOs according to the learning preferences detected. Subsequently, the OA fused and adapted to the students of the experimental group were shown. The authors showed that there are favorable results for the experimental group, when presenting the merged LOs to the students, the students were able to focus on the subject of study and avoid the distractions underlying the location of other materials that may or may not be related to their learning preference or to their subject of study.

2. Theoretical framework

A learning style is defined as "cognitive behavior, affective, and psychosocial behaviors that serve as relatively stable indicators of how students perceive, interact with, and respond to the learning environment" (Romanelli, Bird & Ryan, 2009).

According to the literature, 71 different models of learning styles are identified, however, thirteen models have been recognized as the models with the best results (Coffield et al., 2004). The large number of models indicates that identifying student learning styles is a complex task.

Unified Learning Styles Model (ULSM)

The Unified Model of Learning Styles synthesizes the main characteristics of the models cited in the literature, being known as integrative taxonomy (Popescu, 2010). The ULSM model includes the following dimensions and preferences: perception modality and its visual vs. verbal preferences; information processing and its preferences abstract vs. concrete, serial vs. holistic; experimentation and its preferences, active vs. reflective observation, careful vs. not careful with details; field and its dependency/independence preferences; reasoning and its deductive vs. inductive preferences; organization of information and its preferences synthesis vs analysis; motivation and its preferences intrinsic vs extrinsic, deep vs superficial vs strategic vs resistant approach; persistence and its high vs. low preferences; rhythm and its preferences focus on one task at a time vs alternating tasks and topics; social aspects and its preferences individual work vs team work, introversion vs extroversion, competitive vs collaborative; coordination state and its affectivity vs. thought preferences.

The preferences of the dimension of perception modality are part of several models of traditional learning styles such as the Felder-Silverman model FSLSM (visual/verbal dimension) (Felder and Silverman, 1988), VARK (visual, aural, read/writing, kinesthetic) (Fleming, 1995), VAK (visual, auditory, kinesthetic), of the Dunn and Dunn model (Dunn and Griggs, 2007) (visual, auditory, kinesthetic, tactile) and Riding model (verbalizer/generator of images) (Riding and Rayner, 2007). However, only visual vs. verbal preference was considered, since kinesthetic or tactile preference is difficult to perceive in an online environment (Popescu, 2010).

Based on Kolb's learning cycle (abstract conceptualization/concrete experimentation) (Kolb and Kolb, 2015) and Gregorc's model (abstract/concrete) (Gregorc, 1985), the information processing dimension includes preferences: concepts and abstract vs. concrete generalizations, practical examples.

Based on the results of the FSLSM model (sequential/global) (Felder and Silverman, 1988) and Pask's model (serial/holistic) (Pask, 1988), the serial vs. holistic preference was proposed.

From Kolb's learning cycle, the preference of active experimentation vs. reflective observation was taken, which is also described in the FSLSM model (active/reflective) (Felder and Silverman, 1988) and in the Honey and Mumford model (activist/reflector) (Honey and Mumford, 2000).

According to Popescu (2010), students with the abstract preference tend to trust contextual interpretation, while students with the concrete preference rely on immediate experience in order to capture learning. In the same way, students with the sequential preference tend to understand knowledge linearly, while students who have the global learning preference tend to learn in a disorderly manner, some consider that they achieve their learning in large leaps and that they possess the ability to make quick connections between different topics.

Based on the model of Witkin et al. (1962), the field-dependent vs field-independent dimension was proposed. Field-dependent students have difficulty locating accurate information. Independent students from the field find it easier to recognize and select what is important in their environment, additionally, with an abstraction manner, they have an impersonal orientation (Popescu, 2010).

From the first version of the FSLSM, the reasoning dimension and its inductive vs. deductive preferences were taken. Inductive students prefer to reason from particular facts or situations and thus reach a general conclusion. Deductive students prefer to reason from the general to the specific, which is why they prefer the course to start with the theoretical foundations and then continue with the applications (Popescu, 2010).

In the dimension organization of the information and its preferences, synthesis vs analysis. A student with a synthesis preference is one who has a general image of the topic and tends to combine different elements to understand something in its entirety. On the other hand, a student with a preference for analysis focuses on each of the parts of a whole, as well as on basic principles to be able to understand everything that remains (Popescu, 2010).

The motivation dimension and its preferences, deep vs. strategic vs. superficial vs. reticent, was based on the Entwistle (1998) model. According to Popescu (2010), students with the preference of profound are oriented towards meaning, they tend to try to understand ideas on their own. Students with a preference for strategic focus, are usually achievement-oriented, generally within a group of students, they are who want to obtain the highest grades, they are constantly attentive to the requirements and evaluation criteria. Students with a superficial preference are oriented to reproduction, that is, their intention is to pass the different evaluations, by memorizing facts and data. Students with the reticent preference have a total disinterest in the course, generally refusing to participate in learning activities.

Based on the Dunn and Dunn model (Dunn and Griggs, 2007) (persistent / non-persistent), the persistence dimension and its preferences were proposed. In this dimension, the students who have a high persistence preference are those who are inclined to complete all the tasks assigned to them. On the other hand, students who have the low persistence preference tend to take consecutive breaks and rarely return to study material to use it (Popescu, 2010).

The rhythm dimension includes two preferences, concentrating on one task at a time / alternating between multiple tasks and topics. If the student has the preference to concentrate on one task at a time, it means that they will not continue with the learning if they cannot complete the current task, while the students who have the preference to alternate subjects or themes are considered as inconsistent because they usually jump from topic to topic and from subject to subject (Popescu, 2010).

The dimension social aspects and its preference, learning alone vs learning among similar students, was based on the Dunn and Dunn model, and was also related to other learning styles such as the active / reflective of the FSLSM model. Introversion vs. extroversion preference was based on the Myers-Briggs classification (MBTI). From the Grasha and Riechman-Hruska (1996) model, competitive vs. collaborative preferences were taken. Introverted students are those who tend to avoid social contact and are constantly preoccupied with their inner thoughts and feelings. Extroverted students constantly engage with social and practical realities of the same nature, instead of worrying about their thoughts and feelings (Popescu, 2010). Students who have the competitive preference tend to participate in everything as long as they have competition with someone. While students with the preference for collaboration, they feel better helping a common goal for all, constantly considering the “win-win” (Popescu, 2010).

The coordination dimension of the learning process and its affectivity vs. thought preferences are related to the feeling vs. thought preferences of the Myers-Briggs model (MBTI). Students who have a preference for affectivity tend to complete tasks based on intuition and their feelings, while those with a preference for learning-thinking make decisions based on analysis, logic, and reasoning (Popescu, 2010).

As mentioned above, the ULSM model has only integrated learning style preferences related to the web-based educational context, rather than the context for face-to-face learning.

3. Method and materials

The study was carried out in a higher education school during the January-June 2019 semester. 96 students participated in the experiment. The ULSM instrument was used, which has been validated through the electronic learning platform, WELSA (Popescu, 2010) and served to determine the learning preferences of the students. This instrument was also installed on the Moodle platform.

4. Results

With the ULSM instrument the dominant learning style of each student was determined, the results showed that:

Participating students showed that 65% are kinesthetic, 21% aural, 6% visual and only 8% prefer to read/write. All these preferences are from the perception dimension. In the sample obtained, it was determined that for the information processing dimension, 86% of the students have the concrete preference and only 14% abstract. For this same dimension in the sequential vs global learning preference, 64% turned out to be global and 36% sequential. For the active vs. reflective preferences, 50% of the students are active and 50% reflective.

In the field dimension, 33% of the participants turned out to have field dependence, while 67% turned out to have field independence. Regarding the reasoning dimension, 26% turned out to have deductive reasoning, while 74% turned out to have inductive reasoning. Regarding the

information organization dimension, 66% of the students turned out to have the synthesis preference, while the remaining 32% turned out to have the analysis preference.

Regarding the motivation dimension, 44% of the students reflected deep motivation, 31% superficial, 21% strategic and 4% reluctant. For the persistence dimension, 51% of the students turned out to have high persistence, while 49% turned out to have low persistence.

For the rhythm dimension, 70% of the students turned out to have the reference to do one thing at a time and the remaining 30% can be alternative, which means they have a preference for constantly changing activities.

The results of the social dimension showed that 25% of the participants prefer team work and 75% prefer to do it individually. In the introvert vs. extrovert preference, the results showed that 48% of students have a preference towards extraversion while 52% turned out to have a preference towards introversion. For the collaborative vs. competitive preference, the results were that 84% of the participants turned out to have a collaborative preference while 16% turned out to have a preference to be competitive.

5. Discussion and Conclusions

The results showed that more than a half of the sample were kinesthetic students, preferably with concrete learning, who tend to be global. They tend to be both active and reflective, show field independence, and are inductively reasoning. They are deeply motivated students with high persistence, who tend to do one thing at a time, and who prefer to work individually. The sample pointed out that they are both introverts and extroverts, alike.

The research of Karakiş (2012), aimed to identify the dominant learning style of the students, in this study it was observed that most of the students are kinesthetic (65%), with inductive reasoning (74%), with preference of synthesis (66%), deeply motivated (44%), highly persistent (51%), and who prefer to work individually (75%). The students of this research showed a learning preference very similar to those reported in the research by Karakiş (2012). Due to these data, it can be concluded that a student in the online environment perceives and interacts in the same way with the virtual platform.

According to Giuliano et al. (2014), learning preferences are a state and not a trait in students, that is, a trait is associated with stable characteristics, while states are temporary feelings or behaviors.

In conclusion, for education 4.0, online learning is necessary to decrease the educational needs requested by a demanding generation of young students. A student's learning style is a temporary state and not a stable characteristic. Raising awareness and motivating students to develop preferences that contribute to online learning can make a difference in student success in 4.0 education.

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