Volume 6, Issue 11, November 2016 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Analysis of Learning Styles of University Students in a Multidisciplinary Unit

Marbella Kuyoc Balam, Cinhtia M. González Segura, Michel García García
Autonomous University of Yucatan,
Mexico

Abstract— The use of technology in education has changed greatly the process of teaching and learning for teachers, students and administrators. This article presents the development of a tool created to analyze and classify learning styles for each student enrolled in a university program in the Multidisciplinary Unit of Tizimin, in the east of the State of Yucatan, Mexico. To achieve this, it was implemented an approach based on a learning styles questionnaire, the VARK model, to record the learning style of each student enrolled in college. This new tool will help teachers to know the learning profile of each student and thus incorporate elements that contribute to a better learning of their subjects.

Keywords— learning styles 1; VAK model 2.

I. INTRODUCTION

In formal education, teachers make plans and lead the students learning by applying methodologies which are commonly derived from their own experience on learning, and it is very common to put into practice the same methods used by their own teachers, years ago. However, currently there is a great diversity of applications and tools that could be used to facilitate the students learning, regardless the learning style that each one has.

Learning styles are defined in [1] as the cognitive, affective and psychological traits used as indicators to define how students react in their learning environment. The proposal of evaluating learning styles offers to teachers and students meaningful data about the predominant style of learning both individually and as a group.

With the arise of new teaching-learning technological alternatives, it is possible to incorporate new forms of teaching regardless the learning styles of students.

However, not all students agree with the learning resources that their teachers propose in platforms to reinforce the knowledge seen in class, since each students perceives and interprets the acquired information in a different way. Thus, knowing the learning style of students could make a meaningful difference when the time to learn comes.

II. THEORETICAL FRAMEWORK

Some works that have addressed learning styles are described in this section. In [2] is stated that the term "learning style" refers to the way in which a person applies his or her own method or strategy when learning; each individual tends to develop a certain preference, which defines his or her learning style. These styles vary according to the topic under study. Each person learns differently, uses different strategies, takes different time to learn with more or less efficiency, even if two or more persons have the same motivation, the same age, and if they are taking the same course or studying the same subject.

On the other hand, [1] states that evaluating the learning styles of students could improve their academic performance, since if students know their styles and also the available strategies, they will be able to adopt techniques to make a better use of their courses. These authors conclude that students learn with greater effectiveness when are taught based on their dominant learning style.

In the same way, [2] states that knowing the learning style of each student impacts positively in their learning, avoiding distractions and thus optimizing their academic performance.

Similarly, [3] claims that the use of tools that help to assess their learning styles provide different benefits both for teachers and students. These benefits constitute a great advantage in the teaching-learning process, some of these benefits are: knowing the individual learning style helps to understand those moments in which a person is not able to success in the proposed objectives relative to the learning of some course or theme, helping thus to avoid the anxiety of not knowing why other students were able to pass the course; other benefits are those relative in a positive sense with the diagnosis of the dominant style of each person, because once the learning style is detected, the student can choose the appropriate techniques, strategies and resources that have been seen work better for that learning style, and therefore facilitates more his or her learning process.

On the other hand, even when each teacher has a particular teaching style and employs resources selected according to said style, diagnosing the learning style of his or her students can be relevant, because in this way teachers

may select the most suitable and effective mode to fulfill their role as guide in the learning process of students. In [4] is stated that if students can detect their own learning style, then they will be able to adapt their behavior in accordance.

There are different models and/or tools which aids in the diagnosis of learning styles, to name a few, [5][1] make mention of the learning theory of Kolb, named Learning Style Inventory (LSI), which is based on the learning process that considers as its main axis the direct experience of the student; its questionnaire is composed of twelve series of words, each one related with one of the learning styles, which Kolb classified in four types: Diverging (Concrete Experience and Reflective Observation); Assimilating (Abstract Conceptualization and Reflective Observation); Converging (Abstract Conceptualization and Active Experimentation); and Accommodating (Concrete Experience and Active Experimentation).

Another tool for the assessment of learning styles is the questionnaire created in [1] named CHAEA, which establishes four learning styles: Active, Reflective, Theoretical and Pragmatic, these are characterized by a series of principal features that help to outline the different trends on students about the learning process, as stated in [6].

In [7] is listed the CHAEA questionnaire as one of the most used tools for learning styles assessment, the questionnaire has 80 items, of which each one is answered with a plus sign (+) if the student agrees with what the item states, or with a minus sign (-) if the student disagrees.

However, the model for the assessment of learning styles that guided this research was the VARK model, because it was determined that the two measurement instruments of the other mentioned models were too extensive. The VARK model includes a questionnaire, which besides representing a diagnosis tool for learning styles, serves as a catalyst for intellectual reflection. This questionnaire was created in [8] and consists of a test that helps to detect the students preferences for processing information from a sensorial point of view. In 2001, Lozano, cited by [4] mentioned that "the VARK model assumes that, if students can identify their own learning style, then they can adapt to the teaching styles of their teachers and act on their own modality in an attempt to increase the achievement in their learning", which is beneficial for them. Similarly, [4] mention that the acronym VARK stands for:

- Visual: The learner prefers images, charts, graphs or symbolic representations of information.
- Aural (Auditory): Refers to the preference for oral presentations, discussions, debates, and everything related with listening the information.
- Read/Write: Is related with everything that involves reading and writing.
- Kinesthetic: Perceptual preference related with the physical experience and the practice real or simulated.

In the same way, [9] states that this model allows to represent the predictions of students with regard to their learning. Through this model, students will be able to define and know their learning style based on their preference, so they can apply educational strategies and thus improve their academic performance.

III. METHODOLOGY

Objectives

This work aims to analyze the learning styles of university students enrolled in the Multidisciplinary Unit of Tizimin.

The research methodology developed has procedures that allow to achieve efficiently the objectives proposed. With the intention of formulating a valid and reliable proposal of solution, it was proceeded with the search of bibliographic references related with the interest topic "learning styles".

The type of research performed was a descriptive study, in which the VARK model was used to determine the predominant learning style of students according to the bachelor's degree that they are studying. The instrument used to collect information was the VARK questionnaire (part of the model).

Population and Sample

This research was performed in the Multidisciplinary Unit Tizimin (UMT), located in the city of Tizimin, in the east of the State of Yucatan. Here are offered bachelor's degrees in Education, Nursing, Computer Science, and Accounting. This unit is incorporated to the Autonomous University of Yucatan (UADY). The Multidisciplinary Unit Tizimin (UMT) was founded on November 27 of the year 2000. And this being one of the best schools offering quality higher education in the State of Yucatan, it was decided to use it as headquarters to apply the questionnaire.

The population taken into account for this research were 402 students from the Multidisciplinary Unit Tizimin distributed in the following way: Computer Science with 60 students, Education 91 students, Accounting 115 students, and Nursing with 136 students.

For the selection of the sample the following formula was used:

$$n = \frac{N \;\; Z_a^2 \; p \; q}{d^2 \, (N-1) + Z_a^2 \;\; p \; q}$$

It is noteworthy that the formula for selecting the sample was applied to each one of the bachelor's degrees, in which were used parameters such as: the population's size, a margin of error of 10%, and a confidence level of 90%.

Table 1 Data of the sample by bachelor's degree and knowledge area

Bachelor's degree	Population	Sample
Nursing	136	45

Education	91	39
Computer's science	60	32
Accountancy	115	43

The questionnaire was applied to enrolled students of both sexes who were present at the university. The duration of the questionnaire was found between 10 and 15 minutes and it was answered online.

Instrument

The instrument for collecting data consisted of 16 multiple choice questions with four possible answers each one, which correspond to the four profiles of the learning styles (Visual, Auditory, Read/Write and Kinesthetic). When answering, the student can choose more than one answer for each question. Figure 1 shows some questions of the questionnaire.

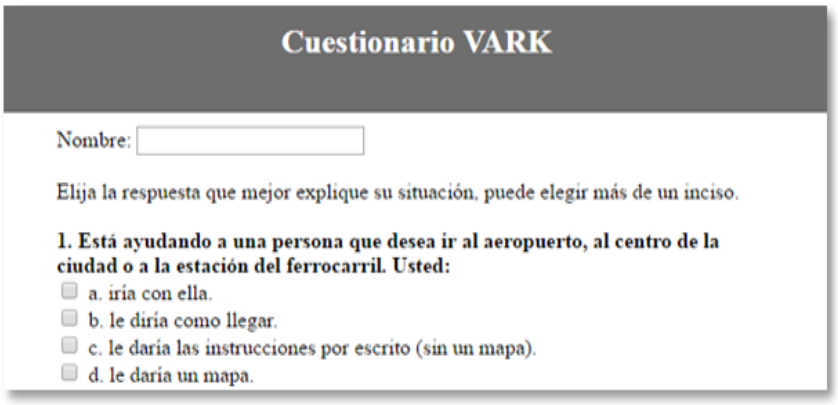

Fig. 1. Questions of the VARK questionnaire.

Procedure for data collecting and analysis

The following table (see Table 2) served as support for assessing and obtaining the learning style of students.

Table 2 Type of learning style for each question.

Question	Item A	Item B	Item C	Item D
1	K	A	R	V
2	V	A	R	K
3	K	V	R	A
4	K	A	V	R
5	A	V	K	R
6	K	R	V	A
7	K	A	V	R
8	R	K	A	V
9	R	A	K	V
10	K	V	R	A
11	V	R	A	K
12	A	R	V	K
13	K	A	R	V
14	K	R	A	V
15	K	A	R	V
16	V	A	R	K

IV. RESULTS

In order to estimate the predominant learning style of students, it was analyzed the more outstanding learning style for each bachelor's degree, for it, it was calculated the average of each one of the four learning styles (Visual, Auditory, Read/Write and Kinesthetic), and the biggest average was taken as the predominant. Following are described the results for each degree.

For Nursing students, the data showed that their predominant learning style was Read/Write with 29.88%. Besides, of the surveyed Nursing students, 80% presented a balance with the four learning styles (V, A, R and K), while 13.35% presented a balance with only three styles, either Visual, Auditory and Read/Write (VAR) or Auditory, Read/Write and Kinesthetic (ARK) (Fig. 2).

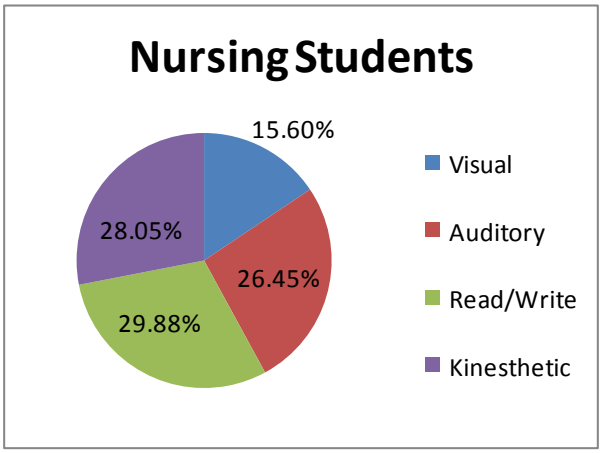

Fig. 2. Learning styles of Nursing students.

As for the students of Computer Science, the collected data indicated that the predominant learning style was Auditory with a 28.82%. In this bachelor's degree, 70.83% of the surveyed students presented a balance with the four learning styles, while 8.33% presented a balance only with three styles, as shown in Fig. 3.

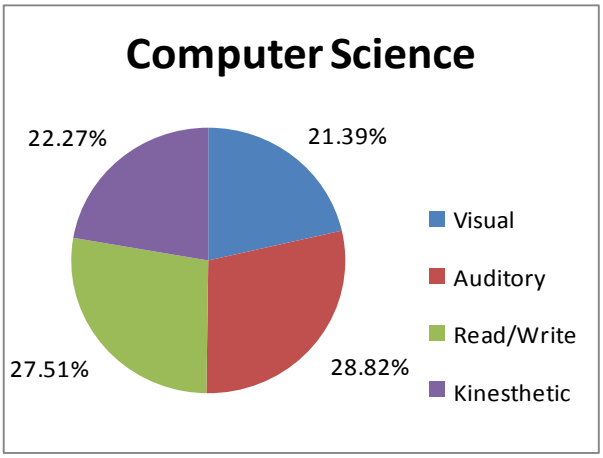

Figure 3. Learning Styles of Computer Science students.

Similarly, Education students presented a learning style predominantly Auditory with a 32.91%. Of the surveyed students in this bachelor's degree, 66.66% presented a balance with the four styles, while 33.33% presented a balance with only three styles (Fig. 4).

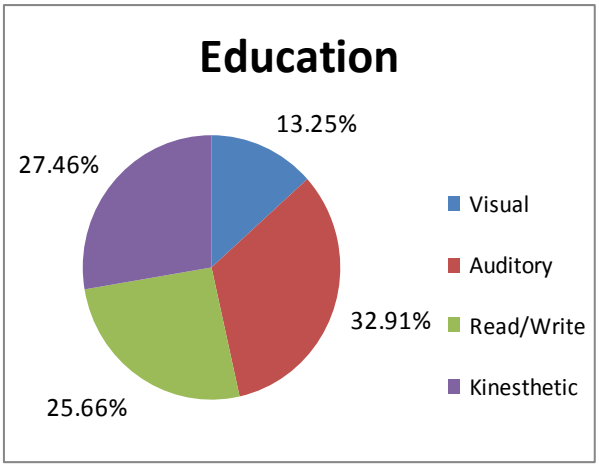

Fig. 4. Learning Styles of Education students.

Finally, Accounting students manifested the Read/Write learning style as their predominant style with a 35.42%. Besides, 60% of those students presented a balance with the four learning styles and 40% exhibited a balance with three styles (Fig. 5).

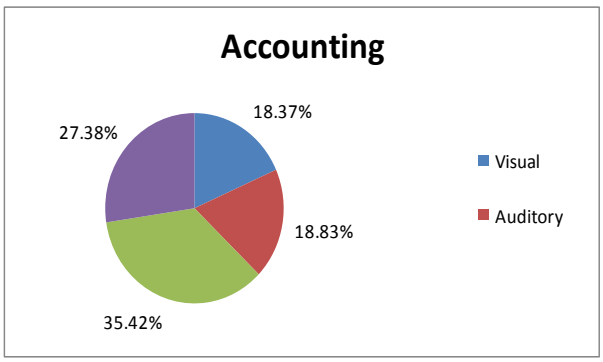

Fig. 5. Learning Styles of Accounting students.

V. CONCLUSIONS

These preliminary results showed that the students of each bachelor's degree possess a different predominant learning style, which relates with the skills required in that degree. And this, certainly is expected, since each degree has different skills and/or strategies of learning that students require to pursue that degree.

Knowing the learning style that has each student is an advantage for both students and teachers, since as students knowing their own learning styles makes easier to choose the learning techniques more adequate according to that style, as well as to adapt to the teacher techniques; and as teachers, knowing the learning style of their students, gives the teachers a repertory of new teaching ways that can be implemented according to the learning styles of their groups, which helps to capture the attention of the students, and to make the classes more dynamic.

As recommendation, some of the activities proposed by [4] for the teachers to implement in their sessions according to the students learning styles are: for the Visual style, they recommend to perform activities that contains pictures, diagrams, graphics, or texts with several character styles, sizes and bright colors in order to attract the attention of students; for the Auditory style to have debates, arguments, conversations or discussions in the sessions, as well as audios and music, would attract the attention of these students; As for the Read/Write style, to implement readings, note takings, essays, would be interesting for students with this learning style; and finally, for the Kinesthetic style, to conduct representations or examples of the daily life that illustrate the exercises explained in the sessions would help to capture the attention of these students.

ACKNOWLEDGMENT

We thank the Autonomous University of Yucatán and the Faculty of Mathematics from all facilities in the accomplishment of this work.

REFERENCES

[1] C. M. Alonso, D. J. Gallego, y P. Honey, *Los estilos de aprendizaje: procedimientos de diagnósticos y mejora*. Mensajero, 1997.

[2] M. G. del Valle, "Identificación de los estilos de aprendizaje predominantes en estudiantes de magisterio de la Facultad de Ciencias de la Educación de la Universidad de Cádiz", *Rev. Electrónica Interuniv. Form. Profr.*, vol. 6, núm. 2, p. 1, 2003.

[3] C. A. Barahona y I. C. Benito, "El diagnóstico de los estilos de aprendizaje: Un instrumento valioso para apoyar la formación en los estudiantes de enfermería", *Enferm. Glob. Rev. Electrónica Semest. Enferm.*, núm. 3, pp. 11–9, 2003.

[4] B. González, "El modelo VARK y el diseño de cursos en línea", *Rev. Mex. Bachill. Distancia*, vol. 4, núm. 8, 2012.

[5] L. N. R. Agudelo, V. S. Urbina, y F. J. M. Gutiérrez, "Estilos de aprendizaje basados en el modelo de Kolb en la educación virtual", *Apert. Rev. Innov. Educ.*, vol. 2, núm. 1, 2010.

[6] M. García, N. Castillo, y M. Zuleta, "Estilos de aprendizaje en la formación inicial docente", *Rev. Estilos Aprendiz.*, vol. 7, núm. 7, pp. 4–24, 2011.

[7] J. L. G. Cué, J. A. S. Rincón, y C. M. A. García, "Instrumentos de medición de estilos de aprendizaje", *J. Learn. Styles*, vol. 2, núm. 4, 2009.

[8] N. D. Fleming y C. Mills, "Not another inventory, rather a catalyst for reflection", 1992.

[9] A. Lozano Rodríguez y A. L. Rodríguez, "Estilos de aprendizaje y enseñanza: un panorama de la estilística educativa", 2008.

