

Learning Styles of Students of Biology and Biomedical at Universities in Colombia (University of La Guajira) and Peru (Lord of Sipan)

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Abstract

Objective: This research was to identify the learning styles (EA) used by students in the program of Biology at the University of La Guajira (Colombia) and of the biomedical area of the University of the Lord of Sipan (Peru), in order to establish a direct relationship between these styles. **Methods/Statistical Analysis:** Subjects were surveyed 36 first half of the program of Biology at the University of La Guajira, and 36 in the second half of the biomedical area of the University of the Lord of Sipan. For the collection of the information was used the questionnaire learning styles Honey-Alonso (CHAEA). **Findings:** Subsequently, a descriptive analysis was performed and standard deviation of the data. The students of the University of La Guajira (Colombia), showed mainly a pragmatic style, in contrast to the students of the University of the Lord of Sipan (Peru), which showed mainly a reflective style. **Application/Improvements:** However, in both groups of students is considered to be a trend toward a mixed learning style. It is recommended to teachers to encourage students to strengthen the learning processes using various tools.

Keywords: Active Learning, Learning Pragmatic, Learning Styles, Reflective Learning, Theoretical Learning

1. Introduction

Among the variables of individual students cannot deny that the Learning Style (EA) is one of the essential because determines how to learn each one, which affects in some way to the other factors. In spite of the ideal, is that the apprentice possesses in the same proportion all EA, it is true that always dominates one or two styles. Therefore, it is necessary to know the EA of students to make recommendations to the teachers and directives of the universities under study, so that you can adjust programs to their preferences and interests, in order to be able to develop their full potential and skills. This requirement is inescapable in the new trend of teaching-learning process in which the student is the center of his or her own learning. Various research has proven that students learn best when they are taught according to their predominant EA. The above, evidence the need to generate pedagogical strategies within the subjects that are consistent with the tendency of the learning of each one of the students.

It is clear that people learn differently, each has individual characteristics, individuals to capture the information processing it and use it, that is to say, we have different learning styles. The Theory of the EA confirms this diversity among individuals and proposes a way to improve learning through personal reflection and different peculiarities in the way of learning. In recent decades, have been carried out interesting research looking for answers to improve the quality of education. The foregoing, responds to the analysis of the various studies that have reported that EA is one of the issues currently being addressed in the next educational research.

The Universidad Complutense de Madrid evaluates each year the EA of their students, revealing data as: When students receive, teaching adapted to your Own EA, this is better received and there has been an increase in academic performance. On the other hand, the knowledge of the EA of students could help a most suitable design of the courses, to improve the development of materials and better adapt resources, to implement the course with indi-

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vidual applications, to propose different evaluation systems, to facilitate the student's knowledge and to increase the effectiveness of the functions tutorials¹. At the same time, various authors have analyzed the model Onion Curry Powder EA, points out that the student can become aware of its vital preferences in the mode of learning in the classroom, and the teacher can plan with more accuracy and adequacy the curriculum, the learning process and the action for teaching in the classroom².

In research on the prevailing EA students in two races of the University of Concepcion (Chile), coming from different areas, Civil Engineering, Biomedical Research and Medical Technology, point to know and to classify students in accordance with the EA that uses, which made it possible to identify clearly what their weaknesses and from this recognition design intervention programs aimed at improving those styles, according to the circumstances, contexts and learning situations that experience students in the university environment³.

On the other hand, in the last decade universities in Latin America reflect on higher education, through the Tuning Project Latin America (Alpha) 2004-2006, a space conducive to the exchange of information and improve collaboration between institutions of higher level, the starting point of the project would be in the search for common reference points, focusing on the competencies and skills. The Tuning Latin America has four lines of work: 1.- The generic and specific competences (of the thematic areas) 2.- approaches to teaching, learning and assessment 3.- Academic Credits and 4.- The quality of programs. With regard to the approaches to teaching, learning and assessment, it is necessary to be able to view which must be appropriate methods for the achievement of better learning. The above, involves carrying out innovations in teaching approaches and how our students learn, to stimulate the development of competencies designed in the professional profile.

In Peru, one of the present concerns of the Ministry of Education (MINEDU) is to improve the level of educational quality; because the level of learning of our students is low, as evidenced by the unfavorable results, obtained in the international assessment of PISA -2012- (Program for International Student Assessment) of the OECD (Organization for Economic Cooperation and Development). In Peru, has also shown interest in improving the quality of student learning, as demonstrated by the study on academic variables that influence the academic performance of university students⁴.

Various authors determine that the predominance of EA in first-year students of general studies of the University of Santo Tomas. In addition, they recommend: Relate the EA with teaching styles and considered that knowledge of the EA, constitutes a teaching tool very useful, the higher the information that the trainer seek of the student, the greater the chances of rapprochement between the three vertexes of the triangle of the learning process: student, teacher and field of study⁴.

At the Universities of La Guajira (Colombia) and Lord of Sipan (Peru), there has been an increase in the low academic performance in students, what has motivated a great concern among the teachers because these students are not achieving the competencies corresponding to an appropriate level. Although the low performance is associated with various factors, the EA that these students have not being exploited adequately by teachers, to enhance their learning and consequently raise their performance, as are unaware of the EA of their students and develop their learning without having them into account. Fact that evidence to verify that the majority of teachers not responsive to the individual differences of their students, not having in his possession of a theoretical framework referential, on EA, therefore, it is important to investigate on the EA two (2) universities in Colombia and Peru.

En el año 1992 se recogió las aportaciones de Honey y Mumford, y adapto el cuestionario de EA (Learning Styles Questionnaire, LSQ) al ámbito académico con el nombre Cuestionario Honey-Alonso de Estilos de Aprendizaje, CHAEA¹. La investigación, en la que se apoya el CHAEA, se inscribe dentro de los enfoques cognitivos del aprendizaje y acepta, propedéuticamente, una división cuatripartita del aprendizaje en línea con Kolb, Juch, Honey y Mumford, ya que estos proponen un esquema del proceso de aprendizaje, en función de la experiencia, y que se divide en cuatro etapas: Vivir la experiencia (estilo activo), reflexión (estilo reflexivo), generalización, elaboración de hipótesis (estilo teórico), y aplicación (estilo pragmático). For all of the above, it was proposed as objective to determine the preference of styles of programming (EA) of students of the program of Biology at the University of La Guajira in Colombia and in the biomedical area in Lord of Sipan University of Peru. The result of the investigation will serve to motivate the teaching staff of these universities to know the EA of their learners, since such information, allow you to adapt their teaching style to the learning style of their students, in order to promote the educational process and consequently raise their aca-

ademic performance, without neglecting other variables that may be associated this performance.

2. Materials and Methods

A descriptive research was conducted and comparative in populations with similar characteristics, which are represented by 36 students, in each of the programs to study, specifically in the area of biology and medical care of the University of La Guajira (Colombia) and the University of the Lord of Sipan (Peru), respectively, for a total of 72 students, who were in the first and second half of their respective careers of study, during the first period of the year 2016 at both universities.

For the collection of information on the EA (variable), surveys were conducted through the questionnaire CHAEA of Honey & Alonso, which consists of 80 questions in 20 sectioned items relating to each of the four EA (active, reflective, theoretical, pragmatic) which must be answered by saying “agree” or “disagree”¹. It was determined the reliability of the instrument, by means of a pilot test, which calculated the Cronbach’s Alpha coefficient, with the aim of measuring the internal consistency of the questionnaire, structured in the sections relating to each style, and whose results were acceptable to all the sections (active style= 0.63; reflective style= 0.73; theoretical style= 0.66; pragmatic style= 0.59) (Hernandez *et al.* 2010). At the same time the questionnaire applies a numerical system (quantitative) that allows you to set and categorize the student preference for one of the EA, by means of the categories Very High, High, Moderate, Low and Very low according to the score obtained for each section (Table 1). The analysis of the results was limited to descriptive statistics, specifically the average as a measure of central tendency and the standard deviation as a

measure of dispersion, as well as relative frequencies of respondents toward the EA and its preference categories; all this made from spreadsheets in the program Excel version 2016.

3. Results and Discussion

The results show the allowed Learning Style (EA) which predominates in the students at the undergraduate programs in biology and biomedical area of the universities of the Guajira and Lord of Sipan respectively, which revealed, mainly a tendency toward the pragmatic (EA) and reflective Colombians and Peruvians, with a moderate preference toward the rest of the styles at both universities, which is not entirely in line with the results obtained, after giving the Questionnaire Honey Alonso of Learning Styles (CHAEA) to a sample of 170 students from different engineering careers of the Technological Institute of Motul, Mexico⁵. This research determined that the predominant learning style was reflective and a positive relationship between the pragmatic learning style and academic performance, both in students of Computer Systems Engineering and Industrial Engineering.

According to the model, related to the EA described in Table 2, students of program of Biology the University of La Guajira (Colombia) have a high preference by the pragmatic style (13.72 ± 1.98), followed by some moderate preferences for the reflexive styles (15.25 ± 2.46), theoretical (13.08 ± 2.54) and active (10.72 ± 1.47). In the case of the students of area Biomedical of the University of the Lord of Sipan (Peru), the results show a high preference for the reflective style (17.59 ± 2.86), followed by a moderate preference in the pragmatic styles (12.61 ± 2.68), theoretical (11.78 ± 1.98) and active (11.25 ± 2.86).

The results obtained fairly consistent with those at the University of Sonora (Mexico), due to the fact that the Mexican students are highlighted by a reflective learning style (31%) with a moderate preference, followed by the pragmatic style (22%), although this presented a very high preference; followed by the styles Active (11%) and Theoretical (11%)⁶. The results obtained in this study are similar to those described allow to obtain a diagnosis on the EA for the student to be aware of their formation process and thereby make independent decisions and enhance their learning with responsibility; this is through the choice of routes, time, themes, that allow the understanding of the new content⁷.

Table 1. Values of the preferences according to the EA in the method established for the CHAEA questionnaire

Preference	Active	Reflective	Theoretical	Pragmatic
Very High	15-20	20	16-20	16-20
High	13-14	18-19	14-15	14-15
Moderate	9-12	14-17	10-13	11-13
Low	7-8	11-13	7-9	9-10
Very Low	0-6	0-10	0-6	0-8

Fuente: (1)

Table 2. Mean values and standard deviation (SD) of the EA in students of the program of Biology and Biomedical at the Universities of La Guajira, Colombia and Lord of Sipan, Peru

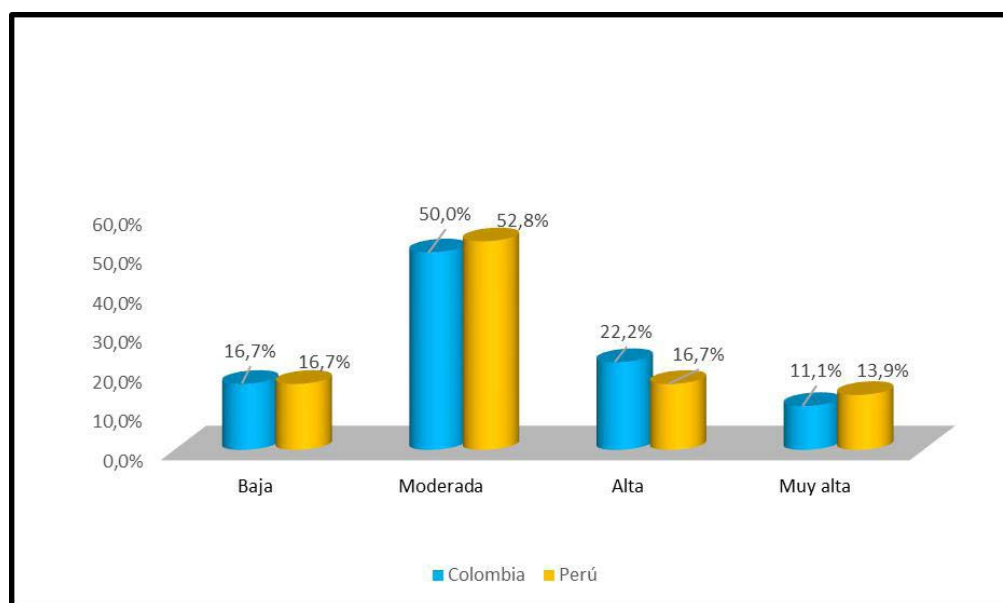
Styles	Colombia (n =36)	category	Perú (n = 36)	category
	mean± SD		mean± SD	
Active	10,72 ± 1,47	Moderate	11,25 ± 2,86	Moderate
Reflexive	15,25 ± 2,46	Moderate	17,59 ± 2,86	High
Theoretical	13,08 ± 2,54	Moderate	11,78 ± 2,69	Moderate
Pragmatic	13,72 ± 1,98	High	12,61 ± 2,68	Moderate

These results contrast with those analyzed in the study of Witham on the learning styles of students the University of Concepcion, Chile), where the average of the EA was of 12.5 for the active style, 14.4 for the reflexive, 12.30 the theoretical and pragmatic 12.6⁸. Similarly, the results are similar to those obtained from the third course of Physiotherapy at the University of Cadiz. The above, should lead to more in-depth studies on the EA that uses the student, enhance the activities with responsibility for better academic performance of the first, and optimize resources by teachers and institution. The results obtained for active learning show that 50% of the students of the Colombian university have a moderate preference, while a 22 % showed a high preference, dividing the remaining percentage among the other EA. In the case of students of the University Peruvian, the results show that 52.8 % of the students have a moderate preference, while a 16.7 %

showed a high preference, with an equal percentage for a preference low (Figure 1).

The reflexive learning showed that students in the program of Biology at the University of La Guajira, according to the preferences of this learning style describes that the 47.2% have a moderate preference, followed by the preference low (27.80%), followed by the high preference (16.7%) and the preference very high (8.3%). In the case of students of Biomedical Sciences of the University of the Lord of Sipan, the results show that 52.80% of the students have a high preference for this style, followed by the preference very high (22.20%), the preference moderate (13.9 %) and the preference low (11.1%) (Figure 2).

The above, determines a difference between Colombian and Peruvian students in regard to this style, since the preference is mainly moderate for some and high for others, respectively. These results are compared

**Figure 1.** Active learning style of the students of the program of Biology and biomedical area of the universities of the Guajira and Lord of Sipan.

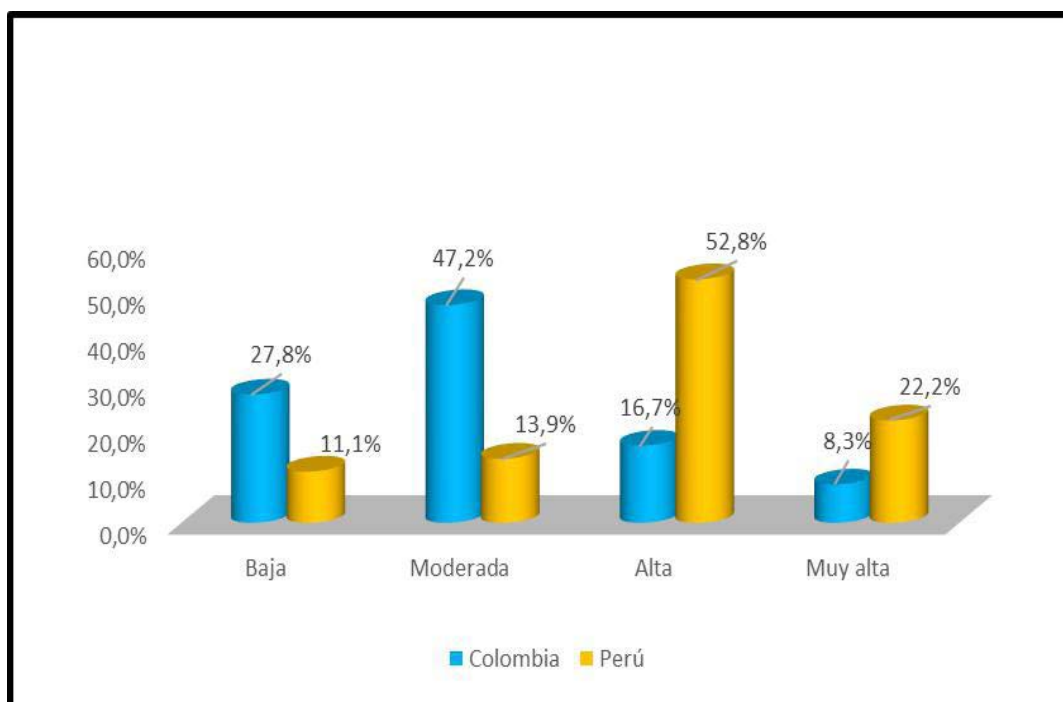


Figure 2. Reflective Learning Style of the students of the program of Biology and biomedical area of the universities of the Guajira and Lord of Sipan.

with those obtained in a study related to the influence of learning styles and metacognition in the academic performance of students in physiology⁹. Where, learning style that first option say they have students in physiology is the 52% of reflective (women versus 36% of men). No correlation was found between the different learning styles. The theoretical style was positively correlated with the strategies of planning ($p < 0.05$) and evaluation ($p < 0.01$), and the reflective learning style, with the evaluation strategy ($p < 0.05$), being more similar to the Colombian students of the present study.

For the theoretical learning, the results show that students in the program of Biology the University of La Guajira describe a moderate preference in a 52.8 %, followed by a high preference with a 27.8 %, then a 16.7 % and 2.8 % for the Low and Very High preferences respectively. In the case of the students in the biomedical area, the University Lord of Sipan, the results show that 47.2 % of the students have a moderate preference, followed the high preference (27.8%), the preference low (22.2%) and the preference very high (2.8%). As well, a tendency observed very similar between these styles in students of both universities studied (Figure 3).

The theoretical style has a greater tendency “moderate” of preference and a “high preference” in second level,

students of the second half of the academic programs of the Instituto Tecnológico de Bolívar in Colombia³. Similarly, the results obtained can be compared with the data obtained from students in the program of law at the University of Sonora (Mexico) who had how prevalent learning style reflexive (52.9 %), followed by the pragmatic style (24 %) and, to a lesser extent, the theoretical style (12.2 %) and active (10.9 %)¹⁰.

According to the results obtained for the pragmatic learning students of Biology at the University of La Guajira, show a very high preference with a 47.5 % of the students surveyed, followed by a high preference with a 25 %. Unlike the Colombian students, students of biomedical area of the Peruvian University Lord of Sipan showed in a 47.2 % a high preference, followed by a moderate preference with a 25 % (Figure 4).

The above, determines a difference between Colombian and Peruvian students, since the preference is mainly very high for some and high for the other respectively. The frequency of each style in the overview of the results, where, from the 100% of the cases, the reflexive and theoretic styles appear alone or in combination, presenting a frequency higher than 60%¹¹. With the above, it has wanted to point out that retains the trend identified in other similar research, respecting differences which may

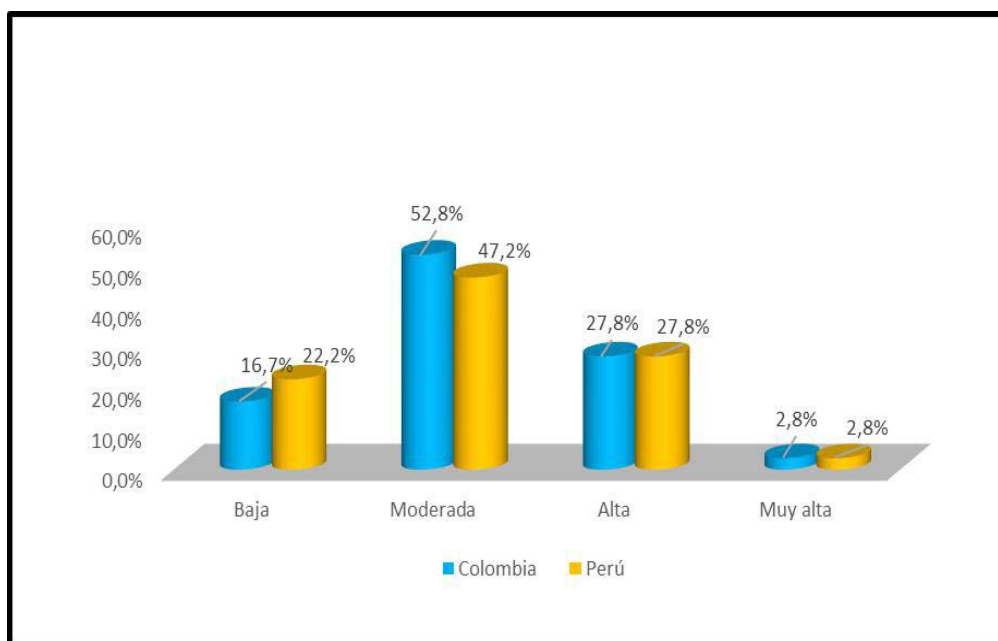


Figure 3. Theoretical learning style of the students of the program of Biology and biomedical area of the universities of the Guajira and Lord of Sipan.

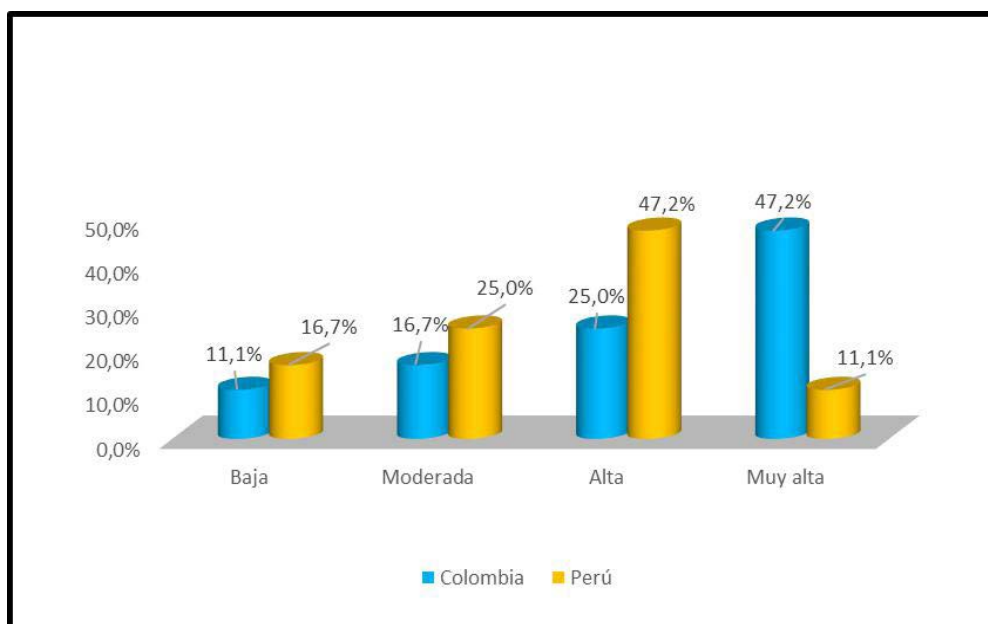


Figure 4. Pragmatic learning style of the students of the program of Biology and Biomedical in the universities of the Guajira and Lord of Sipan.

arise from an analysis, where is also evidenced a tendency toward the reflexive and theoretic styles; a slight difference the investigation of where it concludes in his work that the students of the University School of Teaching Our Lady of Los Tres Hermanos have a preference for the styles (shown as new in the context of student teachers in

terms of preference), followed by the reflexive and theoretic styles¹².

On the other hand, various authors argue that the reflective learning style and active are characteristic in students who are studying careers in health sciences (medicine, nursing, biochemistry and physical education,

among others)¹³⁻¹⁵. It seems that this tendency toward the reflexive learning is determined by the characteristics, perceptual, cognitive, affective, and interactions that present toward learning situations. However, in this study, the largest percentages and preferences were biased toward the styles reflective and pragmatic, for Peruvians show a high preference of 52.8 % and preference Colombians have very high in a 47.2 % respectively.

The student reflective understands the meaning, he likes to observe and describe the processes, their interest is mapped out by the “what is”, rather than “how”, before any content to learn (13). It should be noted that the results of this study coincide in part with those who evaluated the EA in higher education students in the area of health^{9,16,15}. These investigations concluded that the students participating in the studies had a tendency toward the reflective learning style, in addition it was considered that this trend is likely to occur in those people, careful and analytical that consider all possibilities before making a final decision; these people enjoy seeing other risk without directly involved. The data obtained in this research differ from those found in other studies that were carried out a relationship between EA and academic performance in university students, their results showed predominance by theoretical and active EA.

4. Conclusion

The evaluation of the EA is an enriching process that serves as an input to the faculty to develop methodological strategies that facilitate learning for each student, addressing individually the teaching process; it concludes that according to the model of Honey - Alonso (CHAEA), students of the universities of La Guajira in Colombia and Lord of Sipan In Peru, have an affinity toward the four EA (active, reflexive, theoretical and pragmatic), which is considered a style of blended learning, derived from the averages and categories between moderate and high; although independently stands out a high average preference by the pragmatic style in the Colombian students, in comparison with the Peruvians that present A high preference average, toward the reflective style.

Recommendations for the academic authorities and teachers are: strengthening institutional support as a key element for teachers to encourage students and in turn to strengthen the learning processes using different tools

and promote the dissemination of experiences that persist within the academic community; To Promote the conducting ongoing studies in the various programs of the universities of the Guajira and Lord of Sipan to determine EA that allow the student, teacher and university will enhance the activities with responsibility for better academic performance of the first and optimize resources by teachers and institution.

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