International Journal of Innovative Research and Scientific Studies, 8(1) 2025, pages: 137-146

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Learning styles and regulation of task value in new university students

Juan Pablo Sanchez-Dominguez[1], Angel Esteban Torres-Zapata[2*], Teresa del Jesus Brito-Cruz[3], Manuel Antonio López-Cisneros[4]

[1,2,3,4]*Faculty of Health Sciences, Autonomous University of Carmen, Ciudad del Carmen, Campeche, Mexico*.

Corresponding author: Angel Esteban Torres-Zapata (*Email: etorre@pampano.unacar.mx*)

Abstract

International organizations' analyses of Mexican students have shown that the nation's educational system is currently facing significant challenges in its ability to support the development of academic skills at all educational levels. Evaluations carried out by international organizations on Mexican students have revealed that the educational system in this country currently presents serious difficulties in effectively contributing to the development of academic skills at all educational levels. Models that consider learning styles and other factors that support academic performance such as intrinsic motivation, mastery goals, beliefs, control and Regulation of the Value of Tasks (RVT) have been developed since the last century to improve the skills of both high school and university students. A quantitative, non-experimental, cross-sectional, descriptive and correlational study was conducted to identify the relationship between Regulation of the Value of Tasks (RTV) and learning style (LS). RTV data collection used the motivated strategies for learning questionnaire while EA was assessed using the Honey-Alonso Learning Styles Questionnaire (CHAEA). The study involved 108 university students enrolled in a public institution located in southeastern Mexico. The results indicate a "very weak" relationship between SRL and the active, pragmatic and theoretical learning styles. According to the literature review conducted for this study, there are very few similar investigations making it difficult to compare the results with previous data. Further research is suggested to explore the relationship between these variables in other populations.

Keywords: Academic performance, Learning styles, Teaching, Learning methods, Self-regulated learning, Metacognition, University students.

DOI: 10.53894/ijirss.v8i1.3579
Funding: This study received no specific financial support.
History: Received: 19 April 2024/**Revised:** 23 August 2024/**Accepted:** 11 September 2024/**Published:** 1 January 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Institutional Review Board Statement: The Ethical Committee of the Grupo Mexiquense University, Mexico has granted approval for this study on 1 May 2023 (Ref. No. 0110-UGCM-2023).
Publisher: Innovative Research Publishing

1. Introduction

One of the responsibilities of the Mexican State is to reduce social inequality among its citizens. A set of administrative and management systems is used with the educational system being a key component to achieve this goal

[1]. Formal education must be of the highest calibre, competitive and relevant to have a positive impact on the development of a country. It must also provide students with the skills they need to succeed in the workplace and social situations [2, 3]. According to Almeida and Cunha [4] academic preparation is significant due to its contribution to students' integration into culture through the development of their social, emotional and cognitive skills.

According to evaluations by international organizations, the Mexican educational system currently faces significant challenges in effectively contributing to the development of basic education competencies [5]. Data reported by the OCDE [6] obtained through the Programme for International Student Assessment (PISA) revealed that students under the age of 15 in Mexico ranked among the lowest in reading, mathematics and science. Studies conducted worldwide have demonstrated that the PISA test scores have not increased since the test's introduction at the beginning of this century [7].

On the other hand, regarding upper secondary education, the performance data of students in Mexico is also not encouraging. According to findings revealed by the National Institute for the Evaluation of Education (INEE) [8], a study conducted on third-year high school students found that only 12.2% demonstrated mastery of knowledge and skills in language and communication while in mathematics, only 6.4% proved to have the minimum competency level required for university admission.

It might be stated that Mexican students' low level of competition throughout their pre-university education creates a challenge for higher education institutions (HEIs). Acknowledging these circumstances, universities have constantly sought to respond appropriately to this issue aiming to close educational gaps and break the inertia of low competitive levels among students entering their classrooms [9].

Over the last three decades of the past century, models have been developed to improve student competencies at pre-university levels, considering that each student acquires knowledge, skills and attitudes in the classroom differently [10]. These models assert that the cognitive, affective, social and behavioral capacities historically developed by the student are factors that determine learning [1]. According to Román and Ruiz [11], this historical identity of each student which gives meaning to the received information and significantly enhances knowledge acquisition according to studies is Learning Style (LS).

One of the most widely accepted conceptions of Learning Styles (LS) defines them as the cognitive, emotional and physical characteristics that express how students interact with, interpret and respond to their learning environment [12]. The most frequently used theory for studying LS is the one developed by Alonso and Gallego [13]. This theory includes an instrument capable of effectively measuring the construct along with a categorical classification of styles by type: active, reflective, theoretical and pragmatic. According to Alonso and Gallego [13], the Active Style (AS) is common in students who demonstrate marked abilities for teamwork and tasks that involve immediate results challenges. The Reflective Style (RS) corresponds to students whose predominant approach is the observation and analysis of information based on their experience. The Theoretical Style (TS) is a characteristic of students inclined to rationalize through speculations about observed facts mainly from a theoretical rather than a practical standpoint. Finally, the Pragmatic Style (PS) is preferred by students who favor practical methods when acquiring and applying knowledge [1].

According to Aguilar, et al. [14], the effectiveness of the Learning Style (LS) used to carry out school activities is associated with the intrinsic motivation the student applies to perform these actions as well as the interest and enjoyment of the tasks themselves. Fong-Silva et al. [15] assert that a student with an LS aligned with tasks that have clear objectives and goals will achieve better academic performance. In other words, according to Fong-Silva et al., an appropriate LS combined with the student's ability to internally regulate the value of the task significantly enhances their school performance [15].

2. Literature Review

Studies on self-regulated learning emerged to identify individual factors that affect school performance and are not related to a cognitive variable. In this context, the inclusion of elements other than intellectual capacity such as Learning Styles (LS) and Task Value Regulation (TVR) became evident and necessary [16].

On the other hand, according to a wide range of research on LS among university students, certain approaches considerably enhance academic achievement Alonso and Gallego [13]. Díaz and Diez [17] in research with Cuban undergraduate students identified that students who preferred pragmatic and reflective LS obtained better results in reading competence than those inclined towards theoretical and active LS. Sánchez-Domínguez, et al. [1] carried out research on Mexican psychology students to determine the relationship between LS and academic performance. The study revealed a positive and significant relationship between both variables. Research on Learning Styles (LS) in university students indicates that some styles significantly enhance academic performance [18].

Studies have also indicated that university students who more effectively use their LS tend to have higher indices in factors such as intrinsic motivation, mastery goals, control beliefs and Task Value Regulation (TVR) [19]. According to Garcia-Ros and Perez-Gonzalez [20], TVR as part of self-regulated learning constitutes one of the basic capacities for efficient education. From a metacognitive, motivational and behavioral perspective, TVR can be defined as the selection and use of learning strategies adjusted to the demands of academic tasks.

Studies conducted to determine the relationship between Learning Styles (LS) and Task Value Regulation (TVR) in university students are relatively scarce. A study conducted with a group of Spanish undergraduate students found that academic courses incorporating various types of tasks based on different LS are essential for personalizing learning environments and improving students' valuation of tasks [21]. Another study by Pujol [22] with a sample of university students demonstrated that participants with an active LS tend to be less efficient and show a lower level of TVR than those with a reflective LS. Research by Daura [23] involving 193 medical students from two Mexican universities aimed to

measure the self-regulatory capacity of the participants. The author concluded that students who can establish a positive TVR tend to demonstrate better use of learning strategies.

Finally, according to Barbosa, et al. [24], there is still a lack of scientific evidence explaining the degree of awareness students have in regulating the value of task execution and efficiently adjusting their LS, ultimately improving their academic performance in university despite attempts to explain the relationship between Learning Styles (LS) and Task Value Regulation (TVR). Given this context, the present work presents the results of a study aimed at identifying the relationship between TVR and LS in a group of university students.

3. Materials and Methods

3.1. Design

This is a non-experimental, cross-sectional, descriptive and correlational study [21].

3.2. Participants

The population consisted of all first-year students of the Faculty of Health Sciences enrolled in the undergraduate nutrition program at a public institution located in the State of Campeche, Mexico. A total of 108 students participated, residents of southeastern Mexico which includes the states of Tabasco, Campeche, Quintana Roo and Yucatán. The gender distribution was n=88 women and n=20 men ranging from 18 to 30 years.

3.3. Instruments

3.3.1. Informed Consent

Purpose: a) to inform all participants about the objective and procedure of the study. b) To ensure the privacy and confidentiality of participants' data. c) To inform about the potential risks and benefits associated with their cooperation.

3.3.2. CHAEA Learning Styles Questionnaire [25]*:*

This instrument evaluates 4 Learning Styles (LS) (theoretical, reflective, active and pragmatic) through 80 items (20 for each dimension) with dichotomous responses (+ or -) that the examinee must answer based on their agreement or disagreement with each item. The instrument has an adequate reliability index (α=.80). Studies conducted in Latin America [1, 26, 27] aiming to measure the instrument's reliability have reported adequate Cronbach's alpha coefficients (α ≥ .80). The questionnaire is included in the appendices.

3.3.3. Motivated Strategies for Learning Questionnaire (MSLQ SF)

The MSLQ SF was used in its standardized version by García, et al. [28] in a sample of Argentinean university students to examine the Task Value Regulation (TVR) variable and thus achieve the study's objective. This short validation was derived from the original proposed by Pintrich [29]. This self-report instrument is designed to understand and assess motivational orientations and the use of different learning strategies by university students. It allows for a comprehensive evaluation of cognitive, metacognitive and motivational aspects comprising 40 items with five Likert-type response options (1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always). The questionnaire is included in the appendices.

The test comprises motivation and learning strategies scales. The motivation scale includes subtests such as Task Value Regulation [TVR] (items 20, 26 and 39) and anxiety (items 3, 12, 21 and 29). The learning strategies scale encompasses elaboration strategies (items 4, 5, 22, 24 and 25), organization strategies (13, 14, 23 and 40), critical thinking (items 1, 6, 15), metacognitive self- regulation (items 16, 30, 31, 32, 34, 35 and 36), time and study habits (items 2, 8, 17, 18, 33 and 38), effort self-regulation (items 7, 9, 11, 27 and 28) and intrinsic orientation goals (items 10 and 37).

According to various studies, the MSLQ SF is a widely used instrument and psychometric studies have confirmed its adequate reliability index with Cronbach's alpha levels between 0.75 and 0.86 [28, 30, 31].

3.3.4. Data Collection Procedure

Data collection took place during the first quarter of 2023. Initially, the necessary administrative procedures were carried out with the corresponding institution for the approval of the planned research activities. Information gathering was conducted following standards of voluntariness, anonymity and participant independence. Initially, a consent form was provided to the students for their signature. Subsequently, the administration of the instruments was scheduled and conducted by the researchers in four sessions with groups of 27 students each with the written authorization of all research participants and collaboration from faculty members. For this process, a spacious, well-lit and ventilated classroom was used. Participants were briefed on the purpose of the instruments and given general information about their structure before answering the questionnaires. They were informed that the estimated time for completion would be approximately 15 minutes. Instrument grading was carried out by the researchers. For the CHAEA, responses were classified based on preference level using the following criteria: Very low, low, moderate, high and very high as defined within the questionnaires themselves to facilitate better analysis.

3.3.5. Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 23.0 for Windows. Descriptive statistics (frequencies, proportions, measures of central tendency and variability) were employed with non-

parametric inferential statistics using Spearman's correlation based on the results of the Kolmogorov-Smirnov Normality Test.

3.3.6. Ethical Considerations

The present study received approval from the Ethics Committee of the Universidad Grupo Mexiquense under resolution 0110-UGCM-2023. No conflicts of interest were identified and adherence to the ethical guidelines established in the Code of Ethics of the Mexican Society of Psychology [32] was ensured. No identifying data were requested to preserve the participants' identities. Absence of discrimination based on race, color, sex or ethnicity was guaranteed following the principles of the Helsinki Accords.

4. Results

Upon examining the study population (see Table 1), it can be noted that it comprised a total of 108 university students. According to their gender distribution, 81.50% were female and 18.50% were male with a mean age of 19.94. Participants reported being enrolled in between 1 and 9 subjects with an average of 4.80 subjects.

Table 1.
General data of the study population.

	Population (n=108)				Women (n=88)				Men (n=20)			
Variables	**M**	**DE**	**Max.**	**Min.**	**M**	**DE**	**Max.**	**Min.**	**M**	**DE**	**Max.**	**Min.**
Age	19.94	1.56	30	18	20.05	1.66	30	18	19.5	0.8	21	18
Number of subjects	4.85	1.24	9	1	4.83	1.22	9	1	4.95	1.42	8	1

Note: M = Medium; SD = Standard deviation; Min = Minimum; Max. = Maximum.

Upon conducting the analysis on the overall preference index of Learning Styles (LS) (see Table 2) for the total population, it is noteworthy that the highest prevalence was for the reflective style with 48.15% (n = 52) categorized as "moderate". In the same context, it was found that the style with the lowest preference index was the theoretical style with 1.8% (n = 2).

Analyzing preference by gender, the highest frequency, at 47.73% (n = 42) was for females in the reflective LS at the "moderate" level while the lowest preference at 2.27% (n = 2) was for the theoretical style in the "very low" category. Regarding the male group, the highest preference was likewise for the reflective style at 50% (n = 10) at the "moderate" level. Additionally, none of the males reported preferring the theoretical style at "very low" or "low" levels respectively.

Table 2.
Statistical results of the preference level according to the learning styles.

Population (n = 108)								
Preference	**Active**		**Reflective**		**Theoretical**		**Pragmatic**	
level	*f*	%	*F*	%	*f*	%	*f*	%
Very low	4	3.70	4	3.70	2	1.85	7	6.48
Low	12	11.11	16	14.81	4	3.70	5	4.63
Moderate	36	33.33	52	48.15	23	21.30	30	27.78
High	26	24.07	27	25.00	30	27.78	30	27.78
Very high	30	27.78	9	8.33	49	45.37	36	33.33
Women (n = 88)								
Very low	3	3.41	3	3.41	2	2.27	6	6.82
Low	11	12.50	13	14.77	4	4.55	4	4.55
Moderate	29	32.95	42	47.73	16	18.18	23	26.14
High	22	25.00	22	25.00	26	29.55	25	28.41
Very high	23	26.14	8	9.09	40	45.45	30	34.09
Men (n = 20)								
Very low	1	5.00	1	5.00	0	0.00	1	5.00
Low	1	5.00	3	15.00	0	0.00	1	5.00
Moderate	7	35.00	10	50.00	7	35.00	7	35.00
High	4	20.00	5	25.00	4	20.00	5	25.00
Very high	7	35.00	1	5.00	9	45.00	6	30.00

Note: M = Medium; SD = Standard deviation; Min = Minimum; Max. = Maximum.

Upon analyzing the items of the task value subscale and thereby evaluating Task Value Regulation (TVR), it was observed that when asked about finding time to review previous notes before taking an exam, 35.19% (n = 38) of participants were categorized as " occasionally". In Table 3, it can be observed that when analyzing this same question by gender, the highest preference level " frequently" was observed among females at 29.63% (n = 32) while for males, 6.48% (n = 7) reported experiencing this situation at the "occasionally" preference level.

Regarding the question examining adaptation to a study schedule, overall results showed that 38.89% (n = 42) of participants reported a preference level of " rarely". For the same question by gender, the highest prevalence of " rarely" was for females at 33.33% (n = 36).

When inquiring about giving up an activity of greater difficulty in favor of the task, overall results demonstrated a higher frequency level in the criterion " never" at 37.04% (n = 40). Females had the highest prevalence in the "rarely" preference level at 33.33% (n = 36) while males had the highest prevalence in the "never" preference level at 9.26% (n = 10).

Table 3.
Descriptive data for regulation items in the value of tasks (Motivated strategies for learning questionnaire).

Item 20. I find an hour to review my notes or readings before the exam.						
Population (n=108)			**Women (n=88)**		**Men (n=20)**	
Range	***f***	**%**	***f***	**%**	***f***	**%**
Never	1	0.93	1	0.93	0	0.00
Seldom	19	17.59	16	14.81	3	2.78
Occasionally	38	35.19	31	28.70	7	6.48
Frequently	36	33.33	32	29.63	4	3.70
Always	14	12.96	8	7.41	6	5.56
Item 26. I find it difficult to adapt to a study schedule.						
Never	11	10.19	10	9.26	1	0.93
Seldom	42	38.89	36	33.33	6	5.56
Occasionally	36	33.33	28	25.93	8	7.41
Frequently	14	12.96	12	11.11	2	1.85
Always	5	4.63	2	1.85	3	2.78
Item 39. When the course work is difficult, I give up and only study the easiest.						
Never	40	37.04	30	27.78	10	9.26
Seldom	39	36.11	36	33.33	3	2.78
Occasionally	19	17.59	14	12.96	5	4.63
Frequently	7	6.48	6	5.56	1	0.93
Always	3	2.78	2	1.85	1	0.93

4.1. Spearman Correlation Analysis

Upon analyzing the correlation between the study variables, a "very weak" relationship was found between Task Value Regulation (RVT) and the active, pragmatic and theoretical Learning Styles (LS). The first and second styles exhibited a coefficient of linear correlation of r = 0.06 while the third style had a coefficient of r = 0.03. In the case of the reflective learning style it showed no relationship with RVT (r = 0).

5. Discussion

According to the results derived from the application of the CHAEA instrument [25], it was possible to identify that the Learning Style (LS) that reached a higher preference at a " moderate" level among the participating nutrition university students was the reflective style with 48.15% (n = 52). This indicates that the students show a greater preference for observing and analyzing information in vivid tasks thus demonstrating a clear inclination to draw conclusions based on their experience. The present finding has similarities to the findings of Sánchez-Domínguez et al. [1] who examined university students studying psychology in Mexico and found a prevalence of 57.9% at the "moderate" level for the same style.

The results obtained in the present study differ from those reported by Bobadilla et al. [33] who concluded that the active style was the most preferred at a "moderate" level in a sample of undergraduate students from an institution located in a central Mexican state. Contrary to these results, similar research has questioned the existence of a single predominant LS among university students affirming that most students differ in their choice of a single style [1]. Paradoxically, they tend to be multimodal to use LSs according to the challenges posed by the task [34].

Regarding the results of LSs by gender in the present study, it was identified that there was a greater inclination for both genders towards the reflective style. This result is consistent with what was reported by Torales et al. [35] and with the data found by Alvis-Arrieta et al. [36] in a similar population. However, these findings do not coincide with those obtained by Freiberg et al. [37] who evidenced gender preference differences reporting a higher preference for the pragmatic style in male participants.

On the other hand, according to previous studies in university students aimed at determining the relationship between Learning Styles (LS) and Task Value Regulation (TVR), it has been shown that academic courses where teachers consider students' LSs with the purpose of diversifying school activities tend to improve their TVR [21]. In the present study, upon analyzing the correlations between the variables, a "very weak" linear relationship between TVR and the active, pragmatic and theoretical LSs was identified. This result may support the hypothesis of some scholars in the field who suggest that TVR allows students to reflect and eventually understand the benefits of adopting and diversifying their LSs to improve their learning in terms of academic goals [31]. The findings obtained in this research partially agree with other studies such

as the one conducted by Laffita and Guerrero [38] who were able to verify a statistically significant relationship between the active LS and the ability to regulate task value.

Regarding the results regarding the relationship between TVR and the Reflective Learning Style (RLS), the analysis of the results revealed that there is no relationship between the variables. This lack of relationship may be due to the fact that students with reflective LS often regulate task value based on thorough analysis showing a high level of caution before any action. Therefore, they may encounter difficulties in tasks involving rapid and diverse changes, they may face challenges in switching from one LS to another regarding a task not planned. The findings from this research contradict the evidence reported by Romero [39] who identified the existence of a statistically significant positive relationship between the reflective style and TVR.

Finally, upon analyzing the items of the task value regulation subscale of the MSLQ SF, several characteristics were identified in the studied population. The majority of participants reported no difficulties in finding time to review their notes before evaluations indicated no issues in adapting to study schedules and stated that task difficulty did not affect their motivation to complete it. These findings among university students serve as intrinsic motivation for the task and consequently for their learning which tends to be favorable for achieving their academic goals [40]. According to Stover et al. [41], resource management strategies, including time management and improving the study environment often result in better academic performance for students.

6. Conclusion

There is scientific evidence about the positive and significant relationship between the variables analyzed in the present study. However, in the participating university population of this research, very weak positive relationships were found between the learning style (active, pragmatic and theoretical) and task value regulation. These results are far from establishing a significant relationship. Conversely, a "null" relationship between RVT and the reflective style was found suggesting that the population tends not to link a learning style with the value they can assign to academic tasks.

On the other hand, according to the proposed topics, it is necessary to consider that learning styles may differ for various activities and subjects. These may also be conditioned by physiological and hereditary aspects.

7. Implications

According to the data obtained in the present study, the evidence reveals that for our group of evaluated university students, the statistical relationship between learning style and task value regulation although positive is very weak contrary to what has been reported in other similar studies. These heterogeneous results may be influenced by other factors not considered in the research conducted so far. Therefore, further investigation of these variables in other populations is necessary to allow for comparisons between different groups. Similarly, it is suggested to conduct inquiries considering much more stable non-cognitive factors that may eventually predict students' academic success.

References

[1] J. Sánchez-Domínguez, J. Telumbre, M. Pozo, and S. González, "Reading comprehension, learning styles, and academic performance in university students," *Revista Quaders de Psicología*, vol. 25, no. 3, pp. 1-18, 2023. https://doi.org/10.5565/rev/qpsicologia.1878

[2] C. Porras, M. Quispe, I. Carhuas, and C. Ríos, "Learning styles in university students: A descriptive literature review," *Challenges*, vol. 12, no. 2, pp. 144–151, 2021. https://doi.org/10.37711/desafios.2021.12.2.345

[3] L. Tapia and G. Valenti, "Educational inequality and social inequality in Mexico: New evidence from general primary schools in the states " *Educational Profiles*, vol. 38, no. 151, pp. 32-54, 2016.

[4] L. Almeida and A. Cunha, "An integrative debate on learning styles and the learning process," *Social Sciences & Humanities Open*, vol. 2, no. 1, p. 100017, 2020. http://dx.doi.org/10.1016/j.ssaho.2020.100017

[5] A. Márquez, "Fifteen years of PISA: Results and controversies," *Educational profiles*, vol. 39, no. 156, pp. 3-15, 2017.

[6] OCDE, "PISA publications," Retrieved: https://www.oecd.org/pisa/publications/PISA2018_CN_MEX_Spanish.pdf. [Accessed 2018.

[7] D. Vidal-Moscoso and L. Manriquez-López, "El docente como mediador de la comprensión lectora en universitarios," *Revista De La Educación Superior*, vol. 45, no. 177, pp. 95-118, 2016.

[8] National Institute for the Evaluation of Education (INEE), *Mexico in PISA 2015*, 1st ed. Mexico City: National Institute for Educational Evaluation, 2016.

[9] F. Vallaeys, "University social responsibility: A new university model against commercialization," *Ibero-American Journal of Higher Education*, vol. 5, no. 12, pp. 105-117, 2014. https://doi.org/10.22201/iisue.20072872e.2014.12.112

[10] C. Chacón and M. Rodríguez, "Learning styles and academic performance in university students: The case of the Bachelor's degree in Chemopharmacobiology at the faculty of chemical sciences of UNACH," *Space R&D Innovation plus Development*, vol. 6, no. 15, pp. 125-139, 2017.

[11] E. Román and V. Ruiz, "Learning styles and their relationship with the academic performance of second-year basic general education students," *REA*, vol. 11, no. 22, pp. 1-13, 2018. http://dx.doi.org/10.55777/rea.v11i22.1084

[12] L.-A. Cardozo, D. Rodrigues-Bezerra, E. Molano-Sotelo, J. Moreno-Jiménez, C. Beltrán-Ahumada, and F. Borrero-Ovalle, "Psychometric properties of the «CHAEA-36» learning styles questionnaire in university students," *Studies on Education*, vol. 400, pp. 75-101, 2021. https://doi.org/10.15581/004.40.75-101

[13] C. Alonso and D. Gallego, *Learning styles: Theory and practice*, 7th ed. Madrid: UNED, 2004.

[14] J. Aguilar, D. González, and A. Aguilar, "A structural model of intrinsic motivation," *Acta De Investigación Psicológica*, vol. 6, no. 3, pp. 2552-2557, 2016.

[15] W. Fong-Silva, F. Colpas-Castillo, and E. Causado-Moreno, "Learning style and its association with self-efficacy, prior knowledge and intrinsic motivation in engineering students," *IPSA Scientia, Revista Científica Multidisciplinaria*, vol. 6, no. 4, pp. 81-93, 2021. https://doi.org/10.25214/27114406.1367

[16] P. Rosário, A. Pereira, J. Högemann, A. R. Nunes, M. Figueiredo, and J. C. Núñez, Fuentes, S., Gaeta, M.L., "Self-regulated learning: A systematic review in SciELO journals," *Universitas Psychologica*, vol. 13, no. 2, pp. 781-798, 2014. https://doi.org/10.11144/Javeriana.UPSY13-2.aars

[17] C. M. M. Díaz and E. H. Diez, "Learning styles, reading strategies and their relationship with academic performance in the foreign language," *Educación XX1*, vol. 12, pp. 123-150, 2009.

[18] G. Esguerra Pérez and P. Guerrero Ospina, "Learning methods and academic yields of psychology students," *Diversitas: Perspectivas en Psicología*, vol. 6, no. 1, pp. 97-109, 2010. http://dx.doi.org/10.15332/s1794-9998.2010.0001.07

[19] T. Rojas and M. Valencia, "Self-regulation strategies of motivation in university students and their relationship with the classroom environment in mathematics subjects," *Colombian Journal of Psychology*, vol. 24, no. 1, pp. 47-62, 2021.

[20] R. Garcia-Ros and F. Perez-Gonzalez, "Predictive and incremental validity of self-regulation skills on academic success in university," *Psychodidactics Journal*, vol. 16, no. 2, pp. 231-250, 2011.

[21] S. M. J. Hernandez, G. S. Serate, and O. R. A. Campos, "Influence of the learning styles and task type on online search processes of undergraduate students," *Investigación Bibliotecológica*, vol. 29, no. 65, pp. 115-136, 2015.

[22] L. Pujol, "Information search in hypermedia: Effect of learning style and use of metacognitive strategies," *Research and Postgraduate*, vol. 23, no. 3, pp. 45–67, 2008.

[23] F. T. Daura, "Self-regulated learning and academic performance in students in the clinical cycle of the medicine program," *Revista Electrónica De Investigación Educativa*, vol. 17, no. 3, pp. 28-45, 2015. https://doi.org/10.1016/j.cedpsych.2021.101976

[24] D. S. A. Barbosa, L. Canós-Darós, A. L. D. A. L. Coelho, M. R. Perelló Marín, and C. Santandreu Mascarell, "Student learning styles and strategies: A comparative study between Spain and Brazil," *Journal of Management and Business Education*, vol. 2, no. 3, pp. 192-214, 2019.

[25] C. Alonso, D. Gallego, and P. Honey, *Honey-Alonso learning styles questionnaire*. Madrid: Ediciones Mensajero, 1994.

[26] L. M. E. Mayaute, "Psychometric analysis of the Honey and Alonso Learning Styles Questionnaire (CHAEA) with the Classical Test Theory and Rasch models," *Persona*, vol. 14, no. 14, pp. 71-109, 2011. https://doi.org/10.26439/persona2011.n014.253

[27] C. S. J. Juárez, "Psychometric properties of the honey - alonso learning styles questionnaire (Chaea) in a Mexican sample," *REA* vol. 7, no. 13, pp. 1-19, 2014. https://doi.org/10.55777/rea.v7i13.1011

[28] H. García, R. Sancio, and J. Leporati, "Psychometric analysis of the motivation and strategies learning questionnaire (short form)," *Iztacala Electronic Journal of Psychology*, vol. 25, no. 2, pp. 627-648, 2022.

[29] P. Pintrich, *A process-oriented view of student motivation and cognition. In J. Stark. In J. Stark and L. Mets (Eds.). Improving Teaching and Learning Through Research: New directions for teaching: New directions for institutional research*. San Francisco: Jossey-Bass, 1988.

[30] C. Chen, "Self-regulated learning strategies and regulated learning strategies and achievement in an introduction to information systems course," *Information Technology, Learning, and Performance Journal*, vol. 20, no. 1, pp. 11-25, 2002.

[31] L. Sabogal, E. Barraza, A. Hernández, and l. Zapata, "Validation of the short form motivated strategies for learning questionnaire (MSLQ SF) in university students from a public institution in Santa Marta," *Psicogente*, vol. 14, no. 25, pp. 36-50, 2011.

[32] Mexican Society of Psychology, *Ethical code of the psychologist*. Mexico City: Trillas, 2010.

[33] B. S. Bobadilla, J. D. Cardoso, S. L. Carreño, and G. J. O. Márquez, "Styles of learning in students of the licensee in psychology of the university center UAEM Temascaltepec, 2016," *RIDE. Revista Iberoamericana Para La Investigación y el Desarrollo Educativo*, vol. 7, no. 14, pp. 34-50, 2017. https://doi.org/10.23913/ride.v7i14.271

[34] Á. Torres, J. Sánchez, M. López, and T. Brito, "Learning styles in nursing students from three higher education institutions in Mexico," *Nursing Horizon*, vol. 34, no. 3, pp. 594–609, 2023.

[35] J. Torales *et al.*, "Learning styles of first-year medical students at the National University of Asunción, Paraguay," *Annals of the Faculty of Medical Sciences (Asunción)*, vol. 51, no. 02, pp. 27-36, 2018. https://doi.org/10.18004/anales/2018.051(02)27-036

[36] J. Alvis-Arrieta, W. Arellano-Cartagena, and J. Muñiz-Olite, "Learning styles, gender, and academic performance in students of the fundamentals of economics course," *Revista Electrónica Educare*, vol. 27, no. 1, pp. 92-107, 2023.

[37] H. A. Freiberg, R. Ledesma, and M. Fernández Liporace, "Learning styles and strategies in university students in Buenos Aires," *Psychology Journal*, vol. 35, no. 2, pp. 535-573, 2017. https://doi.org/10.18800/psico.201702.006

[38] P. Laffita and E. Guerrero, "A hypothesis about the relationship between learning styles and academic self-efficacy," *Education Solutions*, vol. 17, no. 58, pp. 1-15, 2017.

[39] R. Romero, "Motivation and the reflective-critical learning style at the National University of engineering," *TECNIA*, vol. 24, no. 1, p. 53, 2014. https://doi.org/10.21754/tecnia.v24i1.33

[40] C. Alfaro, "Academic motivation and learning strategies of students of the professional school of architecture of the Andean University of Cusco, 2019," Doctoral Thesis. Cusco, Andean University of Cusco, 2019.

[41] J. Stover, F. Uriel, A. Freiberg, and M. Fernández, "Learning strategies and academic motivation in university students from Buenos Aires," *Psicodebate*, vol. 15, no. 1, pp. 69-92, 2015.

Annexes

HONEY-ALONSO Learning Styles Questionnaire
[25].

Instructions for answering the questionnaire: This questionnaire has been designed to identify your preferred learning style. It is not an intelligence test or a personality test.

- There is no time limit to answer the questionnaire.
- There are no correct or incorrect answers. It will be useful if you are sincere in your responses.

- If you agree more than disagree with the statement, put a plus sign (+),
- If, on the contrary, you disagree more than agree, put a minus sign (-).
- Please answer all statements.

() 1. I am known for speaking my mind clearly and directly.
() 2. I am sure of what is right and wrong, what is good and bad.
() 3. Many times, I act without considering the consequences.
() 4. I usually try to solve problems methodically and step by step.
() 5. I believe that formalities restrict and limit people's free actions.
() 6. I am interested in knowing the value systems of others and the criteria they act upon.
() 7. I think that acting intuitively can be just as valid as acting reflectively.
() 8. I believe that the most important thing is for things to work.
() 9. I try to stay informed about what is happening here and now.
() 10. I enjoy having time to prepare my work and do it thoroughly.
() 11. I am comfortable following an order in meals, in studying, exercising regularly.
() 12. When I hear a new idea, I immediately start thinking about how to put it into practice.
() 13. I prefer original and novel ideas, even if they are not practical.
() 14. I only accept and adhere to rules if they help me achieve my goals.
() 15. I usually get along well with reflective people and find it difficult to connect with people who are too spontaneous or unpredictable.
() 16. I listen more than I speak most of the time.
() 17. I prefer structured things to messy ones.
() 18. When I have any information, I try to interpret it thoroughly before drawing any conclusions.
() 19. Before doing something, I carefully consider its advantages and disadvantages.
() 20. I get excited about the challenge of doing something new and different.
() 21. I almost always try to be consistent with my criteria and value systems. I have principles, and I follow them.
() 22. I don't like beating around the bush in discussions.
() 23. I dislike getting emotionally involved in the school environment. I prefer to keep distant relationships.
() 24. I prefer realistic and concrete people to theoretical ones.
() 25. I find it difficult to be creative, to break structures.
() 26. I feel comfortable with spontaneous and fun people.
() 27. Most of the time, I openly express how I feel.
() 28. I enjoy analyzing and thinking things through.
() 29. It bothers me when people don't take things seriously.
() 30. I am attracted to experimenting and practicing the latest techniques and innovations.
() 31. I am cautious when drawing conclusions.
() 32. I prefer to have the most sources of information. The more data I gather to reflect, the better.
() 33. I tend to be a perfectionist.
() 34. I prefer to hear others' opinions before expressing my own.
() 35. I like to face life spontaneously and not have to plan everything in advance.
() 36. In discussions, I like to observe how other participants act.
() 37. I feel uncomfortable with quiet and overly analytical people.
() 38. I frequently judge others' ideas based on their practical value.
() 39. I feel overwhelmed if I am forced to rush through work to meet a deadline.
() 40. In meetings, I support practical and realistic ideas.
() 41. It's better to enjoy the present moment than to dwell on the past or future.
() 42. People who always want to rush things annoy me.
() 43. I contribute new and spontaneous ideas in discussion groups.
() 44. I think decisions based on careful analysis are more consistent than those based on intuition.
() 45. I frequently notice inconsistencies and weak points in others' arguments.
() 46. I believe that rules need to be broken much more often than followed.
() 47. I often come up with better and more practical ways of doing things.
() 48. Overall, I talk more than I listen.
() 49. I prefer to distance myself from facts and observe them from other perspectives.
() 50. I am convinced that logic and reasoning should prevail.
() 51. I like to seek new experiences.
() 52. I like to experiment and apply things.
() 53. I think we should get to the heart of the matter, the essence of the issues, quickly.
() 54. I always try to come up with clear conclusions and ideas.
() 55. I prefer to discuss concrete issues and not waste time with superficial conversations.
() 56. I get impatient when given irrelevant and incoherent explanations.
() 57. I always check whether things really work.
() 58. I make several drafts before the final drafting of a paper.

() 59. I am aware that in discussions, I help keep others focused on the topic, avoiding digressions.
() 60. I notice that I am often one of the most objective and dispassionate people in discussions.
() 61. When things go wrong, I play them down and try to do better.
() 62. I reject original and spontaneous ideas if I don't see them as practical.
() 63. I like to weigh various alternatives before making a decision.
() 64.
I often look ahead to anticipate the future.
() 65. In debates and discussions, I prefer to play a secondary role rather than be the leader or the most active participant.
() 66. People who don't act logically annoy me.
() 67. I feel uncomfortable having to plan and foresee things.
() 68. I believe that the end justifies the means in many cases.
() 69. I often reflect on matters and problems.
() 70. Working conscientiously fills me with satisfaction and pride.
() 71. Faced with events, I try to discover the principles and theories on which they are based.
() 72. In order to achieve the goal I aim for, I am capable of hurting others' feelings.
() 73. I don't mind doing whatever it takes to make my work effective.
() 74. I am often one of the people who livens up parties the most.
() 75. I quickly get bored with methodical and meticulous work.
() 76. People often think that I am insensitive to their feelings.
() 77. I often go with my intuition.
() 78. If I work in a group, I try to follow a method and an order.
() 79. I am often interested in finding out what people think.
() 80. I avoid subjective, ambiguous, and unclear topics.

Motivated Strategies for Learning Questionnaire (MSLQ SF)
[28]

Instructions: Carefully read each of the statements and use the scale provided below to respond on the answer sheet. Mark with an "X" the number corresponding to your response, which can range from:

#	Question
1	I try to change the way I study to meet the course requirements and the teaching style of the professor
2	I continue readings and weekly assignments for the course
3	In a test, I think about how poorly I am doing compared to others
4	I relate what I read for class to what I already know
5	When studying readings for this course, I underline material to help organize my thoughts
6	Facing a theory, interpretation, or conclusion, I determine its support in evidence
7	When confused about what I read, I go back and try to resolve it
8	I generally study in a place where I can concentrate
9	I put academic effort even if I don't like what I'm doing
10	I prefer course material that piques my curiosity, even if it's difficult
11	I believe that course material is useful for learning
12	Before an assessment, I think about the consequences of failing
13	When studying, I make summaries of main ideas, readings, and class concepts
14	When studying for courses, I review readings and class notes for main ideas
15	I try to think through a topic and decide what I am supposed to learn
16	I am generally interested in course topics
17	Before studying new course material, I often review it to see how it is organized
18	When studying for classes, I set goals to guide my activities in each study period
19	The most satisfying thing for me in this course is to understand the content as best as possible
20	I rarely find time to review my notes or readings before the exam
21	I feel restless and upset when taking a test
22	I try to understand the material in this class by making connections between readings and concepts given in the class
23	When studying for the course, I review my class notes and outline important concepts
24	I try to relate my ideas to what I am learning in this course
25	When studying for this course, I try to determine which concepts I do not understand well
26	I find it difficult to adapt to a study schedule
27	When course materials are boring and uninteresting, I make an effort to finish them anyway
28	Understanding the subject of this course is very important to me
29	My heart beats rapidly when taking a test
30	I try to apply ideas from course readings to other class activities such as presentations and debates

#	**Question**
31	Whenever I read, hear a statement, or conclusion in this class, I think about possible alternatives
32	I question myself to make sure I understood the material I have been studying in this class
33	I have a regular place to study
34	In a class I like, I prefer course material that really challenges me so I can learn new things
35	I am very interested in the area to which this course belongs
36	I use course material as a starting point and try to develop my own ideas about it
37	If course materials are difficult to understand, I change the way I read them
38	I make good use of my study time for this course
39	When the work for the course is difficult, I give up and only study the easiest parts
40	If I take confusing notes in class, I make sure to organize them later