

Exploring relationships between learning styles and academic performance in Nursing: a case in tertiary and technological education

Explorando relaciones entre estilos de aprendizaje y el rendimiento académico en Enfermería: un caso en educación terciaria y tecnológica

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ABSTRACT

The relationship between learning styles and academic performance (AP) was investigated in first semester students of the Nursing career of a tertiary and technological education institute of the Metropolitan District of Pichincha, Ecuador. The work corresponds to a quantitative research, based on a non-experimental design, under the modality of a case study, which had a relational scope. A probabilistic sample of 107 subjects from the first semester (N: 147; n: 107) was selected. The questionnaire used was the CHAEA ($\alpha > 0.8$) (Alonso et al., 1999), which explores 4 learning styles through 80 items [Active (Act-S), Theoretical (Theo-S), Pragmatic (Prag-S) and Reflective (Ref-S)], assigning 20 items per dimension. The responses are dichotomous [1(+) / 0 (-)], assessing the presence or absence of the attribute. The ratings summarizing academic performance (AP) were explored through 4 levels (Insufficient to Very good). Scores were identified for each style and a calculation of frequencies and percentages by levels was made from the ratings. The association contrast required the design of contingency tables and subsequently the application of Pearson's Chi2 test (H1: presence of significant association between learning style and AP; p.value: <0.05). The presence of the four learning styles was observed, having higher prevalence Ref-S and Theo-S; both with 103 cases, followed by the Prag-S style. This indicates that students perceive that they learn in a reflective manner, privileging logical thinking, and practical applications and problem solving. No association was found with AP (χ^2 : p.value >0.05). This differs from what has been reported in the literature, which calls for a review of the contextual elements.

Keywords: Nursing learning; Quality of teaching and learning; Technology education; Learning styles; Academic performance..

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RESUMEN

Se indagó la relación entre los estilos de aprendizaje y el rendimiento académico (AP) en estudiantes de primer semestre de la carrera de Enfermería de un instituto de educación terciaria y tecnológica del distrito Metropolitano de Pichincha, Ecuador. Corresponde el trabajo a una pesquisa cuantitativa, basada en un diseño no experimental, bajo la modalidad de un estudio de caso, que tuvo un alcance relacional. Se seleccionó una muestra probabilística de 107 sujetos del primer semestre (N: 147; n: 107). El cuestionario empleado fue el CHAEA ($\alpha > 0.8$) (Alonso et al., 1999), que explora 4 estilos de aprendizaje a través de 80 ítems [Activo (Act-S), Teórico (Theo-S), Pragmático (Prag-S) y reflexivo (Ref-S)], asignando 20 reactivos por dimensión. Las respuestas son dicotómicas [1(+) / 0 (-)], valorando la presencia o ausencia del atributo. Las calificaciones que resumen el rendimiento académico (AP) fueron exploradas mediante 4 niveles (Insuficiente hasta Muy bueno). Se identificaron puntajes por cada estilo y se realizó un cálculo de frecuencias y de porcentajes por niveles a partir de las calificaciones. El contraste de asociación requirió el diseño de tablas de contingencia y posteriormente la aplicación del test Chi² de Pearson (H1: presencia de asociación significativa entre el estilo de aprendizaje y el AP; p.valor: <0.05). Se observó la presencia de los cuatro estilos de aprendizaje, teniendo mayor prevalencia Ref-S y Theo-S; ambos con 103 casos, seguido del estilo Prag-S. Esto indica que los estudiantes perciben que aprenden de manera reflexiva, privilegiando el pensamiento lógico, y las aplicaciones prácticas y en la resolución de problemas. No fue encontrada una asociación con el AP (χ^2 : p.valor>0.05). Esto difiere de lo reportado en la literatura, lo que obliga a una revisión de los elementos contextuales.

Palabras claves: Aprendizaje en Enfermería; Calidad de la enseñanza y el aprendizaje; Educación tecnológica; Estilos de aprendizaje; Rendimiento académico.

INTRODUCTION

The concept of learning styles has been a topic of interest in educational research for decades (Rodríguez Cepeda, 2018; Montaluisa-Vivas et al., 2019; Chila Reina et al., 2024). In the context of nursing education, understanding how students prefer to learn and how these preferences relate to academic achievement can be crucial to developing effective teaching strategies and improving educational outcomes. This paper focuses on the relationship between learning styles, as conceptualized by the Honey-Alonso Learning Styles Questionnaire (CHAEA), and the academic performance of nursing students. The CHAEA model, developed by Alonso et al. (1999), is an adaptation of the Learning Styles Questionnaire by Honey & Mumford (1986) for Spanish-speaking contexts. It identifies four distinct dimensions of the learning style: 1. Active: students who prefer hands-on experiences and enjoy new challenges; 2. Reflective: those that favor careful observation and analysis before taking action; 3. Theoretical: individuals who enjoy logical thinking and the construction of conceptual models; 4.

Pragmatic: Students who focus on practical applications and real-world problem solving.

Alarcón (2019) raised the need to recognize the predominant learning style in learners, as this allows teachers to improve the application of teaching strategies and techniques. It is assumed that teaching practice should, in part, understand the learning styles of students and learn how to adapt them flexibly to teaching methods, as well as promote the teaching of self-regulation, based on self-perception and self-knowledge (Chila-Reina et al., 2024; Chambi-Choque et al., 2020; Vera, 2019; Ortiz-Ojeda & Canto Herrera, 2013). This also implies that students not only assimilate knowledge, but also improve skills that can be expressed in the formation and development of the personality; learning to adapt their preferred learning style to the teacher's teaching methods (Rodríguez Cepeda, 2018; Montaluisa-Vivas et al., 2019; Chila Reina et al., 2024).

On the other hand, the background on the relationship between learning styles and student performance has highlighted a favorable impact. A study by Estrada (2018) established that, in a sample of 46 students, the most prevalent learning style was reflective, representing 42.30% of the population studied. It was concluded that learning styles do indeed impact academic performance, although there are also a variety of factors that contribute to poor student performance.

Matagira et al. (2019), indicate that nursing students have different learning styles, although there is a tendency towards the reflective and theoretical style, related to being auditory and visual, students had problems with subjects in which teachers were more masterful with scarce use of resources for learning, having a little outstanding academic performance in relation to teachers who are more dynamic and practical in their subjects, so learning styles influence their performance.

In this order of ideas, the study by Caballero et al. (2020) carried out with the aim of identifying the relationship between learning styles and academic performance of first-year nursing students, established as results that 80.88% of students are women, with an average age of 19.5 years, and 17.65% are working. The average grade point average of the Cardiopulmonary Resuscitation workshop was 6.29 (on a scale of 1 to 7), while the integrated clinical simulation workshop had an average of 6.27 and the theoretical test reached a 5.6. It was found that pragmatic (52.80% at high and very high levels) and theoretical (66.10% at high and very high levels) styles predominate in students. In addition, a correlation was observed between learning styles and academic performance, highlighting that the active experience with simulation contributed to improving students' grades.

In the selected institute of tertiary and technological education, this type of study has not been carried out, and it is assumed that a study with such guidelines can be crucial to improve the quality of teaching and learning in students of the first semester of the Nursing career.

For the reasons stated above, the purpose of this research is associated with determining the relationship between learning styles and academic performance in first-semester students of the Nursing career. This work responds

to the need to improve teaching and learning processes; and generate an impact in terms of institutional quality.

METHODOLOGY

The work corresponds to a quantitative research, based on a non-experimental design, under the modality of a case study, which had a relational scope. The unit of analysis was nursing students from an institute of tertiary and technological education in the Metropolitan District of Pichincha, Ecuador. A probabilistic sample of 107 subjects from the first semester was selected (N: 147; n: 107).

The questionnaire used is derived from the CHAEA model (Alonso et al., 1999), which is a Spanish adaptation of the Learning Styles Questionnaire by Honey & Mumford (1986). It investigates 4 learning styles through 80 items [Active (Act-S), Theoretical (Theo-S), Pragmatic (Prag-S) and Reflective (Ref-S)], assigning 20 items per dimension. The answers are dichotomous [1(+) / 0 (-)], assessing the presence or absence of the attribute. The instrument has been sufficiently validated, and is considered reliable, as it exhibits a $\alpha > 0.8$ (Alonso et al., 1999; Chambi-Choque et al., 2020; Caballero et al., 2020).

The grades that summarize academic performance (AP) were explored by 4 levels (Insufficient to Very Good). Data analytics included identifying scores for each learning style, subsequent classification. A calculation of frequencies and percentages by levels was made based on the grades. The association contrast required the design of contingency tables and subsequently the application of Pearson's Chi² test (H1: presence of significant association between learning style and AP; p.value: <0.05).

RESULTS

Table 1 shows the presence of the Act-S. It can be seen that it is present in 79 subjects, having greater contingency with the APs of the very good (n: 35) and good (n: 23) levels, which together group 58 cases. Insufficient (n: 12) and sufficient (n: 9) yields were in the minority. It was observed that 28 subjects do not reflect this type of learning. It can be seen that this style translates into superior academic performance for 54.2% of the sample. The Chi² test did not reflect that there was an association between the variables (χ^2 : 4.80; p.value 0.187 > 0.05).

Table 1

Contingency table: Active Style vs AP.

Act-S	AP				Total
	Insufficient	Enough	Well	Very good	
1= Yes	12	9	23	35	79
2= No	3	7	4	14	28
Total	15	16	27	49	107

Note. χ^2 : 4.80; p.value 0.187.

Table 2 shows the presence of the Ref-S and its contingency with the AP. It can be seen that it is present in 103 students (96.3%), with a higher prevalence of very good (n: 46) and good (n: 26) levels, which together group 72 cases. Insufficient (n: 15) and sufficient (n: 6) returns were again in the minority. Of the 107 students, only 4 subjects do not reflect this type of learning. It can be seen that this style translates into superior academic performance for 69.9% of the sample. Despite this, the Chi² test did not reflect an association between the variables (χ^2 : 1.98; p.value 0.577 > 0.05).

Table 2

Contingency table: Reflective style vs AP.

Ref-S	AP				Total
	Insufficient	Enough	Well	Very good	
1= Yes	15	16	26	46	103
2= No	0	0	1	3	4
Total	15	16	27	49	107

Note. χ^2 : 1.98; p.value 0.577.

Table 3 shows that Theo-S was also present and that its contingency with PC translates into it being exhibited in 103 students (96.3%), with a higher prevalence of very good (n: 45) and good (n: 27) levels, which together group 72 cases. Insufficient (n: 13) and sufficient (n: 18) returns were again in the minority. These percentages are very close to those observed in the Ref-S.

It is repetitive that of the 107 students, only 4 subjects did not reflect the same. It can be seen that this style translates into superior academic performance for 69.9% of the sample, as well as in the Ref-S. Despite this, the Chi² test did not reflect an association between the variables (χ^2 : 4.92; p.value 0.178 > 0.05).

Table 3

Contingency table: Theoretical style vs AP.

Theo-S	AP				Total
	Insufficient	Enough	Well	Very good	
1= Yes	13	18	27	45	103
2= No	0	0	0	4	4
Total	15	16	27	49	107

Note. χ^2 : 4.92; p.value 0.178.

Table 3 shows that Theo-S was also present and that its contingency with PC translates into it being exhibited in 103 students (96.3%), with a higher prevalence of very good (n: 45) and good (n: 27) levels, which together group 72 cases. Insufficient (n: 13) and sufficient (n: 18) returns were again in the minority. These percentages are very close to those observed in the Ref-S. It is repetitive that of the 107 students, only 4 subjects did not reflect the same. It can be seen that this style translates into superior academic performance for 69.9% of the sample, as well as in the Ref-S. Despite this, the χ^2 test did not reflect an association between the variables (χ^2 : 4.92; p.value 0.178 > 0.05).

Table 4

Contingency table: Pragmatic Style vs AP.

Prague-S	AP				Total
	Insufficient	Enough	Well	Very good	
1= Yes	15	14	24	45	98
2= No	0	2	3	4	9
Total	15	16	27	49	107

Note. χ^2 : 1.96; p.value 0.576.

The Prag-S was present and contingent with the AP, manifesting itself in crosses relative to 98 students (91.6%), having a greater presence in the very good (n: 45) and good (n: 24) levels, which together group 69 subjects. Insufficient (n: 15) and sufficient (n: 14) yields had low prevalences. Of the 107 cases, only 9 subjects did not reflect the same, but it is notorious that, despite the absence of the style investigated, they had a superior performance in 7 of these subjects [sufficient (n: 2); very good (n: 4); good (n: 3)]. It can be seen that this style has an impact on superior academic performance for 64.5% of the sample. The χ^2 test did not reflect an association between the variables (χ^2 : 1.96; p.value 0.576 > 0.05). The styles with the highest prevalence were: Ref-S and Theo-S; both with 103 cases (Table 5). Prag-S had the third highest prevalence (n: 98), with the active style being in last place (n: 79). The presence of all styles was contingent with superior performance, with the active style being the one that was least reflected in the good and very good performance, which positions it as a not very effective style.

Table 5

Summary of contingencies: learning styles vs AP.

Learning - Style	AP				Total
	Insufficient	Enough	Well	Very good	

Learning - Style	AP				Total
	Insufficient	Enough	Well	Very good	
Act-S	12	9	23	35	79
Ref-S	15	16	26	46	103
Theo-S	13	18	27	45	103
Prague-S	15	14	24	45	98

DISCUSSION

The presence of the four learning styles that emerge from the CHAEA model, developed by Alonso et al. (1999), was observed. The styles with the highest prevalence were: Ref-S and Theo-S; both with 103 cases, followed by the Prag-S style. This indicates that students perceive themselves as subjects who learn in a reflective way, favoring observation and analysis before taking action related to their learning processes. It is also clear from the data that it is necessary to take measures linked to the theoretical style, privileging logical thinking, requiring the construction of conceptual models. The attributes of the Pragmatic style also emerge, that is, Nursing students need to focus on practical applications and on solving problems in the everyday world, something very typical of the theoretical-practical training of the health field where they are. Although not absent, learning based on the active style, oriented to practical experience only and related challenges, was not a style that stood out from the others. This reveals the need to link praxis and application for future professional practice. The diagnosis made allows us to have a line of evidence about the way in which the students consulted learn. This is aligned with what Alarcón (2019) pointed out in terms of the relevance of knowing the prevailing learning style(s). Based on this, it will be up to teachers and coordinators to take actions that are based on the metrics reported here.

This partially coincides with what was reported by Estrada (2018), who highlighted in his study the prevalence of Ref-S in 42.30% of cases, contrasting with the 96.3% found here. The differences may be due to contextual factors and the field of study or module taught at that time. Although Estrada (2018) found that learning styles did indeed have a positive effect on academic performance, this was not found in this work, which could be a consequence of the analysis methodologies used. Other research (Chila-Reina et al., 2024; Alvis-Arrieta et al., 2023; Chambi-Choque et al., 2020; Vera, 2019; Ortiz-Ojeda & Canto Herrera, 2013) have agreed with what was reported by Estrada (2018), so in the future it will be necessary to incorporate more details in the exploration of the relationship already reported in the literature. However, we do agree with Matagira et al. (2019), when they point out that nursing students have a tendency towards the reflective and theoretical style, although they mention that this will depend on the teaching style of the teachers, thus incorporating a variable not considered in this study. Caballero et al. (2020) had reported that, in a practical subject, it was found that students who reflected the prevalence of a theoretical (66.10%) and pragmatic

(52.8%) style predominated, pointing out the correlation between learning styles and academic performance, highlighting the positive role of simulation.

The results of the study also reflect both styles, which helps to make visible the importance of working on the classes by highlighting the pragmatic aspect of them. In other training fields, Ortiz-Ojeda & Canto Herrera (2013), reported that students had a significant positive relationship between pragmatic and theoretical learning styles with respect to academic performance, although significant differences were found by sex. This contrast was not made, which leaves another window to continue advancing.

CONCLUSION

The data of this work show the presence of the four learning styles that emerge from the CHAEA model (Alonso et al., 1999), with Ref-S and Theo-S emerging as the most prevalent styles; followed by learning based on the attributes of pragmatism (Prag-S), with learning based on active style being relegated to last place. No association of any style with academic performance was found (χ^2 : p.value > 0.05). This differs from what has been reported in the literature, which requires a review of the contextual elements and the nature of the modules where the diagnosis was made, as well as the temporality of the academic terms.

However, the findings highlight the importance of taking into account the nature of specific courses when examining the effects of learning styles. It may be the case that in nursing education, theoretical courses can favor reflective and theoretical learners, while clinical practices can benefit students with pragmatic and active styles, for which attention should be paid to the aspect of the significant link of the contents with professional practice. The results open the need to explore the various teaching methods and strategies (Guerrón Andrade et al., 2024; Reyes et al., 2020, 2023, 2024), academic coaching, the use of technology (Navarrete-Enríquez et al., 2024) aspects of the microcurriculum and metacognitive skills, which are associated with students' self-reflection on their own learning processes.

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