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Original Research

Predominant learning styles among pharmacy students at the Federal University of Paraná, Brazil

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ABSTRACT*

Background: Learning styles are cognitive, emotional, and physiological traits, as well as indicators of how learners perceive, interact, and respond to their learning environments. According to Honey-Mumford, learning styles are classified as active, reflexive, theoretical, and pragmatic.

Objective: The purpose of this study was to identify the predominant learning styles among pharmacy students at the Federal University of Paraná, Brazil.

Methods: An observational, cross-sectional, and descriptive study was conducted using the Honey-Alonso Learning Style Questionnaire. Students in the Bachelor of Pharmacy program were invited to participate in this study. The questionnaire comprised 80 randomized questions, 20 for each of the four learning styles. The maximum possible score was 20 points for each learning style, and cumulative scores indicated the predominant learning styles among the participants. Honey-Mumford (1986) proposed five preference levels for each style (very low, low, moderate, high, and very high), called a general interpretation scale, to avoid student identification with one learning style and ignoring the characteristics of the other styles. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 20.0.

Results: This study included 297 students (70% of all pharmacy students at the time) with a median age of 21 years old. Women comprised 77.1% of participants. The predominant style among pharmacy students at the Federal University of Paraná was the pragmatist, with a median of 14 (high preference). The pragmatist style prevails in people who are able to discover techniques related to their daily learning because such people are curious to discover new strategies and attempt to verify whether the strategies are efficient and valid. Because these people are direct and objective in their actions,

pragmatists prefer to focus on practical issues that are validated and on problem situations. There was no statistically significant difference between genders with regard to learning styles.

Conclusion: The pragmatist style is the prevailing style among pharmacy students at the Federal University of Paraná. Although students may have a learning preference that preference is not the only manner in which students can learn, neither their preference is the only manner in which students can be taught. Awareness of students' learning styles can be used to adapt the methodology used by teachers to render the teaching-learning process effective and long lasting. The content taught to students should be presented in different manners because varying teaching methods can develop learning skills in students.

Keywords: Students, Pharmacy; Education, Pharmacy; Learning; Brazil

INTRODUCTION

Learning is a process in which knowledge is created by the transformation of experience. This definition highlights several aspects of the learning process from the experiential perspective. The first aspect is the emphasis on the process of adaptation and learning as opposed to content or results. The second aspect is that knowledge is a process of transformation that is continuously being created and recreated; knowledge is not an independent entity to be acquired or transmitted. Third, the learning experience changes in both its objective and subjective forms. To understand learning, we must understand the nature of knowledge and vice versa.¹

The term andragogy refers to the art and science of orienting adults to learn. Students are responsible for their own learning and for establishing and defining their educational route. The need for knowledge makes adults feel more responsible for their learning. Although the andragogical model considers such external motivations as a better job, andragogy particularly values the inner motivations related to the willingness to grow, as well as to build self-esteem, recognition, self-confidence, and the updating of personal potentialities.²

The concept of style in pedagogical language is often used to designate a series of different behaviors gathered under a single label, which is useful for classifying and analyzing comportments.³ Each person is different, not only physically but also with respect to behavior, personality, values, preferences, and experiences. These peculiarities

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contribute to each person's learning in a personal manner.

Some students learn by visual images, others prefer verbal explanations, some tend to try to think things out and see what occurs, others are more inclined to think before doing something, some think sequentially, others have a more holistic orientation, some are comfortable with only information, and others are more attracted to the "real world," etc.⁴

Alonso, Gallego, and Honey (2012) suggested that the only manner in which to learn how to learn is by an awareness of one's own learning style.¹ In this sense, we can consider the following questions: Are there differences in manners of learning among students? How can we interpret, respond, and value these differences?

It is possible to identify students who learn to different degrees and in different manners; most people show diverse and sometimes contrasting reactions in the manner in which individuals prefer to hear the teacher's presentation; other people prefer to discuss each issue in small groups.⁵ There are many definitions of learning styles; currently, one of the most accepted was proposed by Keefe (1988)⁶ and adopted years later by Alonso, Gallego, and Honey (2012)³: "Learning styles are defined as cognitive, emotional and physiological traits that serve as relatively stable indicators of how learners perceive, interact, and respond to their learning environments." Affective traits relate to the needs, expectations, and motivations to learn.

Models of learning styles tend to categorize the different forms of learning, receiving, and processing information in the teaching-learning process. The literature reports a variety of models and instruments to characterize learning styles. A systematic review performed by Coffield *et al.* (2004)⁷ identified 71 instruments described in the literature related to learning styles.

As expected, with the diverse literature on learning styles and instruments for measuring learning preferences, the concept of learning styles is not universally accepted, and there is controversy surrounding its meaning.⁸ Interpretations of learning styles are fraught with difficulties, given the large number of definitions, models, analyses, and tools. The scientific literature is inconclusive regarding which model or style of learning tool is the most appropriate, resulting in difficulty in making choices regarding which method to use.⁷

Honey-Mumford is classified with the flexible, stable learning preference family, which acknowledges that although there is some long-term stability in learning styles, that stability is not a fixed trait, and the style may change slightly from situation to situation. Honey and Mumford's (1986)⁹ Learning Style Questionnaire is an 80-item version tool designed to measure preferences for learning styles. This questionnaire builds on the earlier work of David Kolb (1984).¹

David Kolb (1984) related to styles by proposing a model of cyclic experiential learning: experiencing, reviewing, concluding, and planning. Kolb (1984)

acknowledged that an individual may develop a preference for one stage over another.¹ This author stated that learning styles develop as a result of hereditary factors, previous experiences, and requirements of the environment in which the person lives. Kolb also posited that different factors and situations favor a certain level or degree of development that manifests itself in different styles or manners of learning.

Our theoretical reference on learning styles was based on the work of the Spanish researchers Catalina Alonso and Domingo Gallego in partnership with Honey,³ featured in the work of Coffield *et al.* (2004),⁷ which differentiated learning styles as context and specific areas. This questionnaire identifies existing learning styles in the field of social issues related to education.

According to Alonso and colleagues³, this tool is Honey-Mumford's "Learning Style Questionnaire" (LSQ). The questionnaire was created for commercial use in 1986 for UK business professionals, translated into Spanish and adapted to the academic environment.⁹ Such studies have adopted a reference framework as the model of experiential learning by Kolb (1984)¹ from his Learning Styles Inventory (LSI). Honey-Mumford (1986)⁹ identified four learning styles that may be predominant in an individual—the activist, the reflector, the theorist, and the pragmatist (Table 1). The activist style corresponds to people who like to be kept up to date, are eager for current information, are good speakers and are people who do not tolerate sitting still for a long time or listening to long explanations without interacting. The activist likes group discussions and conducting activities innovatively. Activists can solve problems with ease, know how to work in groups, and can give lectures and communicate easily.

The reflective style predominates in people who prefer to gather detailed data and information. Reflectors often tend to observe and reflect upon their conclusions before taking action because reflectors are prudent. Reflectors have their own rhythms and share opinions with others, and they aspire to investigate information before completing something.

The theorist style prevails in people who are more inquisitive and always curious to know the explanation for everything. Theorists like complex studies and proving things using various methods. Being methodical, theorists like clarity in their goals.

Finally, the pragmatic style prevails in people who can discover techniques in their daily learning

Table 1. Characteristics of Learning Styles (Honey-Mumford, 1986)⁹

Learning Styles	Characteristics
Activist	Enthusiastic, improviser, pathfinder, bold, and spontaneous
Reflector	Prudent, conscientious, receptive, analytical, and exhaustive
Theorist	Methodical, logical, objective, critical, and organized
Pragmatist	Experimenter, practical, direct, effective, and realistic

because pragmatists are curious to discover new strategies and determine whether these strategies are efficient and valid. Pragmatists are direct and objective in their actions, preferring to focus on practical issues that are validated and on problem-solving situations.

The first criterion of interpretation is the relativity of the scores obtained in each learning style. For example, a score of 13 points in the activist learning style is not equivalent to a score of 13 points in the theorist style. To avoid the student's being integrated into only one learning style and ignoring the characteristics of the others, Honey-Mumford (1986)⁹ proposed five preference levels for each style. To build this scale, Alonso used Honey and Mumford's theoretical apparatus, by which styles could be understood by the following preferences: very high preference (10% of the people with the highest scores), high preference (20% of the people with high scores), moderate preference (40% of the people with median scores), low preference (20% of the people with low scores), and finally, very low preference (10% of the people with very low scores). The general interpretation scale (Table 2) was used to categorize the results into very high, high, moderate, low, and very low preferences. The cumulative score for each style indicates the level of the preference in each style. The maximum possible score is 20 points in each style.

The aim of this study was to identify the predominant learning style among pharmacy students of the Federal University of Paraná (UFPR), located in Curitiba, State of Paraná, Brazil (www.ufpr.br).

METHODS

Study Design

The study design was observational, cross-sectional, and descriptive. Students in the Bachelor of Pharmacy program at the Federal University of Paraná from the first to the ninth semester of the course were participants in this study. The inclusion criteria included being a pharmacy student at the Federal University of Paraná and signing the informed consent form. There were no exclusion criteria, except the choice of the student not to participate. The Bachelor of Pharmacy degree takes five years to complete, and the classes average 30 to 35 students.

The research was divided into two sections. The first goal was to identify the students' profiles (socio-demographic variables, age and gender), and the second goal was to identify the distribution of student learning styles in addition to the predominant style.

Questionnaire

To identify the learning styles, the Honey-Alonso Learning Styles Questionnaire (Cuestionario de Honey y Alonso de Estilos de Aprendizaje [CHAEA] <http://www.estilosdeaprendizaje.es/>) was applied.³ The questionnaire comprises 80 brief and dichotomous items structured into four groups of 20 items, each item corresponding to the four learning styles: activist, reflector, theorist, and pragmatist. In this tool, all items are distributed randomly to form a single set.

According to the characteristics of the questionnaire, the same person can have a marked preference for more than one learning style, for example, theorist and pragmatist simultaneously. Exhibiting a high preference for a given style does not prevent students from having the potential for other styles.

As reported by Alonso, Gallego, and Honey³, the ideal would be that the students reached a high level of preference for all learning styles because then students would be able to learn in any situation. Each scale on the questionnaire comprises 20 randomly distributed items, and the score for the scale is the sum of the positive responses. The questionnaire was translated and adapted to Portuguese by the Brazilian researcher Portilho in 2003.¹⁰ Data collection was conducted in classrooms at the Federal University of Paraná—Campus Botânico with the teachers' consent. Data collection always occurred before the beginning of normal course lectures. Students were informed of the study objectives and invited by the researcher to participate voluntarily. Instructions were given on how to complete the questionnaire and the manner in which the answers should be written. Students were instructed to simply write a plus sign (+) if they were more in agreement than in disagreement and a minus sign (-) for the opposite.

The questionnaires were distributed, completed in approximately 20 minutes, and collected before the classes began. Data collection occurred during the second half of 2013.

Ethical Considerations

The study was approved by the Research Ethics Committee of the Federal University of Paraná on 06/26/2013, under the number 317.676/2013. All students agreeing to participate in the study were first informed of the research objectives and signed a Free and Informed Consent Form according to Resolution 196/96. Participants were assured that refusal to participate would not affect assessment in their disciplines. The information collected was used exclusively in research for academic purposes, and the confidentiality of the information was guaranteed.

	10% Very Low Preference	20% Low Preference	40% Moderate Preference	20% High Preference	10% Very High Preference
ACTIVIST	0-6	7-8	9-12 (10.70)	13-14	15-20
REFLECTOR	0-10	11-13	14-17 (15.37)	18-19	20
THEORIST	0-6	7-9	10-13 (11.30)	14-15	16-20
PRAGMATIST	0-8	9-10	11-13 (12.10)	14-15	16-20

Data Analysis

The statistical treatment used in the variables was descriptive and inferential. The nonparametric Kolmogorov-Smirnov test was used to check the normality of the sample in relation to the learning styles. Spearman was used for correlation, and chi-square, Mann-Whitney, and Kruskal-Wallis tests were used for comparison among groups. The significance level for all of the statistical analyses was $p < 0.05$. All results were considered statistically significant for a confidence interval of 95%. Excel spreadsheets and the statistical software SPSS v 20.0 were used to conduct the descriptive and inferential tests.

RESULTS

The questionnaires for the identification of the learning styles were applied to 297 students in the Bachelor of Pharmacy program at the Federal University of Paraná, which corresponded to 70% of all students when the instrument was applied. The median age of the students was 21 years (IQR 19-22); 77.1% were women, and 22.9% were men.

Figure 1 presents the medians of learning styles of students in the Bachelor of Pharmacy program. The results indicate that the pragmatist style attained a median of 14 points (IQR 11-16), followed by the theorist style with a median of 13 points (IQR 11-15), the activist style with a median of 11 points (IQR 9-13), and the reflector style with a median of 16 points (IQR 13-17). According to these medians obtained with the general scale of preference levels are in accordance with Honey-Mumford (1986) (Table 2), it is clear that the pragmatist style is the highest preference, with a median of 14 points. All of the remaining learning styles—theorist (median of 13 points), activist (median of 11 points), and reflector (median of 16 points)—are characterized as moderate preferences.

In Figure 2, the distribution as a percentage of the

general interpretation scale is shown, and we can see the following results for the pragmatist style according to the preferences: 32% (very high), 21.2% (high), 28.6% (moderate), 12.8% (low), and 5.4% (very low). For the theorist learning style, we observed the following results according to the preferences: 21.6% (very high), 25.3% (high), 43.8% (moderate), 8.1% (low), and 1.4% (very low). For the activist learning style, the following results according to preferences were observed: 11.5% (very high), 18.2% (high), 45.5% (moderate), 16.2% (low), and 8.8% (very low). Finally, for the reflector style, we observed the following results according to preferences: 3.0% (very high), 20.9% (high), 49.5% (moderate), 18.9% (low), and 7.7% (very low).

Although the median obtained for the reflector learning style is the highest (16) in relation to other styles within the same preference, the reflector style is considered less prevalent because the sum of the very high and high preferences was the lowest compared with other styles. If we add up the very high and high preferences for all learning styles observed, we achieve the following results: 53.2% for pragmatist, 46.9% for theorist, 29.7% for activist, and 23.9% for reflector.

Based on these results, the pragmatist learning style is the most prevalent among students in the Bachelor of Pharmacy program at the Federal University of Paraná, followed by the theorist, activist, and reflector styles. Differences between genders were not significant in the studied population.

DISCUSSION

All of the learning styles identified by the Honey-Alonso Learning Styles Questionnaire³ are present among pharmacy students at the Federal University of Paraná, with higher preferences observed for the pragmatist and theorist styles. Learning styles are not a complete picture of a student; rather, they something closer to an outline with main points and

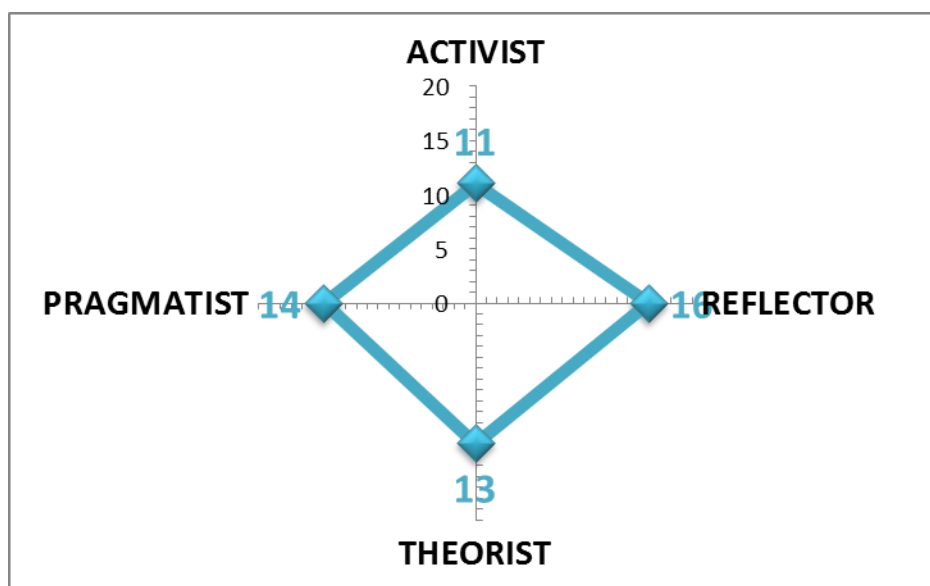


Figure 1. Median of learning styles among pharmacy students at the Federal University of Paraná, Brazil, according to Honey-Alonso¹

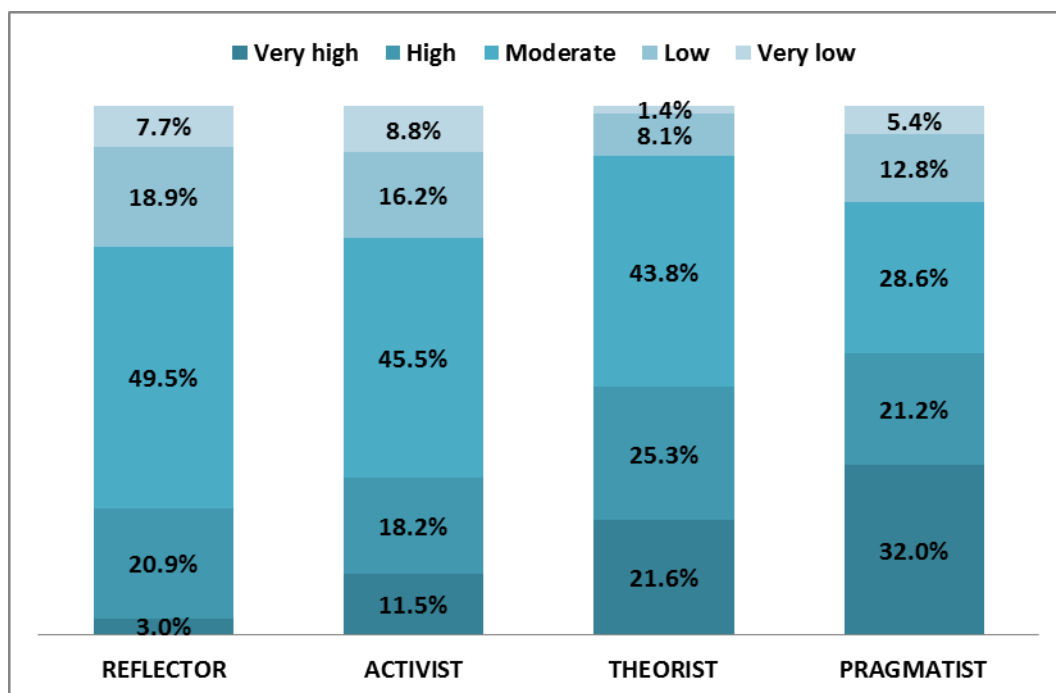


Figure 2. Distribution as a percentage of the general interpretation scale of the activist, reflector, theorist, and pragmatist learning styles among pharmacy students at the Federal University of Paraná, Brazil, according to Honey-Mumford⁹ (n=297)

some supporting details. Learning styles provide useful descriptions of common behavior patterns. Learning styles are not mutually exclusive categories but rather preferences that can be mild, moderate, or strong, which also explains the variations among students with the same learning style. There are numerous individual variations when knowledge, experience, and skill levels are considered in the equation of learning styles.¹¹

The instrument CHAEA (Cuestionario de Honey y Alonso de Estilos de Aprendizaje) for the identification of the students' learning styles used in this study has been utilized as a reference questionnaire³ in several studies performed in Latin America that were intended to improve the quality of the teaching-learning process in classrooms. The CHAEA questionnaire was chosen based on the favorable opinions presented in the scientific literature and in recognition of the high number of investigations that have been supported by this instrument. Many studies that used this questionnaire are referenced on the site of the first International Conference on Learning Styles, organized by the National University of Distance Education of Spain (UNED) and held in Madrid in June 2004. The CHAEA questionnaire of learning styles has been used with excellent results in Spain, Portugal, Argentina, Chile, Brazil, Peru, Mexico, Venezuela, Colombia, Uruguay, Paraguay, and the USA.¹²

Because studies have used different instruments to identify learning styles among pharmacy students, comparison of the results is difficult.¹³ Shuck and Phillips (1999)¹⁴ used the Myers-Briggs instrument to evaluate 1,313 pharmacy students at Drake University from 1987 to 1996. This study observed the personality type ISTJ (introverted, sensitive,

thoughtful, and judging) as the most common among the pharmacy students interviewed, accounting for 16.91% of the students. During the ten-year study, preferences for detection and judgment predominated over preferences for intuition and perception. Parejo (2005)¹⁵ applied the CHAEA questionnaire to 156 students in different fields of study at the Southern University of Chile, proposing to identify learning styles in various fields. Students of biochemistry, chemistry, and pharmacy showed a low preference level for the pragmatist style and a high preference level for the activist and theorist styles. Medical students presented the most balanced preferences in all styles. A low preference level for the reflector style characterized veterinary medical students, and engineering students differed from students in other fields of study by showing a high preference for the activist and pragmatist styles. The learning styles among pharmacy students at the University of Connecticut (USA) were identified by the Felder and Silverman Learning Style Model.¹⁶ These students showed preferences for sensing, visual, and sequential learning styles but not for active or reflective learning.

Educators should be aware that despite some preferences, a mixture of learning styles is present in the classroom. To focus on the identified preferences, teachers should concentrate on presenting lessons in a logical progression and include facts, data and visual features. To meet the needs of the other learning styles identified, teachers can offer other approaches and provide complementary activities to students who would benefit from them¹⁴. Garvey and colleagues (1984)¹⁷ identified learning styles among 501 pharmacy students. Half of the students were

classified as convergent (theorist and pragmatist on Honey-Alonso³), whereas the remaining students were equally divided between adaptable, divergent, and assimilators, a result similar to our findings in which the pragmatist was the predominant style and the theorist was the second most prevalent style in the studied group of students.

The dominant learning styles among pharmacy students and faculty members at the University of Illinois in Chicago were identified using Zubin's Pharmacists' Inventory of Learning Styles (a Kolb Learning Styles Inventory adaptation). In this study, the dominant styles were assimilators (47%) (reflector-theorist according to Honey-Alonso³) and convergent (30%) (theorist-pragmatist for Honey-Alonso³). These results are consistent with the results of our study, which verified a predominance of the pragmatist style followed by the theorist style, according to Honey-Alonso.¹⁸

The data results for the Felder-Silverman Index of Learning Styles (ILS) observed in Becker's study (2013)¹⁹ indicated that there is nearly a balance in the learning style preference profiles of activist and reflector among pharmacy students at the Federal University of Sergipe (Brazil); there is a moderate preference for the visual style over the verbal and for the sensorial style over the intuitive. Despite these considerations, these students can be characterized by the following predominant profile of styles: sensory, visual, activist, and sequential.

A learning style identification study among pharmacy students in Columbia (using the Kolb Learning Styles Inventory) conducted by Pungente *et al.* (2003)²⁰ concluded that the divergent learning style (activist-reflector on Honey-Alonso³) indicated a lower preference for the activities associated with problem-based learning. Generally, the convergent style (theorist-pragmatist on Honey-Alonso³) showed a strong preference for this activity. The assimilators (reflector-theorist on Honey-Alonso³) and adaptables (pragmatist-activist on Honey-Alonso³) also demonstrated positive responses to problem-based learning activities.

Many teachers have made effective use of the identification of learning styles in the planning of teaching methodology, and many studies have been published confirming the usefulness of these models.⁸ The university's faculty may use this information to improve students' learning process. For example, to address the learning styles of lower prevalence (activists and reflectors) among pharmacy students at the Federal University of Paraná, the use of lectures that include reflection, discussions, or problem-solving activities can be highly effective. The idea is that students develop their learning styles to facilitate the learning process to adapt to any methodological strategy that is used by the teacher. It is important that students develop skills in all learning styles.¹⁴

This does not mean that teachers should focus their teaching methods exclusively on the pragmatist and theorist styles, excluding the other less prevalent styles. Teachers should realize that pharmacy

students learn in a variety of manners and attempt to incorporate all learning styles into their teaching.

Pharmacy colleges and schools are encouraged to include discussion regarding learning styles in their teacher-training programs, which promotes self-reflection by students and teachers in the continuous process of professional development. The teachers' development is critical because if teachers begin to use a variety of teaching methods to address different learning styles without proper training, the results can be detrimental to the students' learning experience.²¹ There is at least one good reason to avoid teaching all students in their preferred manners. A classroom of students represents multiple learning styles; thus, when some students are taught in their preferred manner, other students are simultaneously being taught in incompatible manners.⁴

Williams and colleagues (2013)²² recommended that educators consider the learning style preferences of pharmacy students in curriculum development and in the evaluation of teaching approaches, particularly when planning, implementing, and evaluating education initiatives to create an effective, heterogeneous, and contemporary learning environment for their students.

Faculty should concentrate their efforts on teaching in multiple styles to reach the most students in a given class, thus challenging all students to learn from other activities.²³ When this balance is achieved, all students are taught in their preferred mode.⁴ According to Cutts (2003)²⁴, clinical pharmacy teachers must be aware of the importance of identifying the learning styles among their students when planning their classes. An isolated study by Pashler *et al.* (2009)²⁵ identified no valid evidence linking learning styles with teaching methods or better learning outcomes.

The point is not to combine the teacher's teaching style with the student's learning style; rather, it is to achieve a balance by ensuring that each style is approached at a reasonable level as components of the teaching process.^{8,26} Supporters of learning style models argue that teachers should assess the learning styles of their students and adapt their teaching methods to best suit each student's learning style. Critics of the model argue that few studies have reliably tested the validity of the use of learning styles in education.²⁷

Learning styles are the preferences and tendencies of students regarding how they receive and process information in different educational settings. Although the validity of this concept is routinely challenged in psychology literature, considering learning styles has been used frequently and successfully, assisting teachers in designing effective instruction and helping students better understand their own learning processes.⁴ The message of learning styles is that content should be taught in different manners. Furthermore, varying teaching methods develops a wide range of learning abilities. Learning styles provide no indication of what students are and are not capable of, nor are

learning styles legitimate excuses for poor academic performance.¹¹

Students familiar with their own learning styles can enhance awareness of their natural strengths in learning (most prevalent) and can also indicate the need to adapt to less prevalent learning styles.⁴ When the predominant learning style among students in a class is known, we know what methodologies will allow many students to learn more easily and which methodologies will cause more difficulty. Using multiple methods, teachers can include all students and can define by identifying the predominant style what would be the best methodology to use for a specific activity, thus developing a wide range of learning skills among students.

More studies should be performed to identify students' learning styles in the Bachelor of Pharmacy program at the Federal University of Paraná, particularly with a larger sample or even by conducting a longitudinal study to observe changes in learning styles that may occur over time. Students should be encouraged to be flexible in their own learning styles to respond successfully to various teaching methods across the curriculum.

Limitations

This study was limited to a single university and a limited number of students. Furthermore, our study was cross-sectional rather than longitudinal, which precludes conclusions regarding changes in learning styles over time. Another limitation of this study was that students were not informed of the results obtained using the questionnaire. At the end of the process, the researcher made individual results available; however, few students were interested in knowing their results.

CONCLUSIONS

The pragmatic style is the prevailing style among pharmacy students at the Federal University of

Paraná, followed by the theoretical style. The reflector and activist styles were the least represented, indicating the need for adjustments to the teaching-learning process so that students can develop these styles more easily. A variation in teaching methods develops a wide range of learning skills in students. The ideal method is to promote a balanced teaching methodology that fits the learning styles of all students and causes students to "leave the comfort zones" of their predominant learning styles. Such a balance helps students maximize their learning potential during graduate work and ongoing professional development. Although students may have a preferred method of learning that method is neither the only manner in which students can learn nor the only manner in which students can be taught. Variations in teaching methods can promote the development of a range of skills in which students can maximize their learning potential in all styles during their studies and their future professional development. Given the lack of studies that assess learning styles among Brazilian university students, more research in the field of pharmacy is necessary to define in more detail the factors involved in learning styles and their correlations, as well as how these learning styles may be used in students' academic development.

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CONFLICT OF INTEREST

There are no conflicts of interest.

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