

ANALISE ENTRE A ASSOCIAÇÃO DOS ESTILOS DE APRENDIZAGEM COM O GÊNERO, FAIXA ETÁRIA E INTELIGÊNCIA DE CRIANÇAS BRASILEIRAS DO ENSINO FUNDAMENTAL I

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Resumo: A associação de estilos de aprendizagem com o gênero, faixa etária e inteligência de crianças entre 6 e 12 anos demonstram que considerando a idade o estímulo predominante foi o reflexivo, seguido pelo pragmático, ativo e teórico. A média dos estilos em relação à idade variou bastante conforme a faixa etária das crianças. Foi possível perceber que o estilo ativo predomina para os meninos e o teórico e pragmático para meninas, o reflexivo apresenta uma diferença pequena entre ambos. Na correlação entre inteligência e estilos, foi observada uma correlação negativa entre o estilo pragmático com o QI verbal. Os resultados revelam a importância de se avaliar o estilo de aprendizagem das crianças, num modelo que permita o conhecimento mais ampliado sobre as características de preferência de aprendizagem da criança, possibilitando o desenvolvimento de estratégias para intervenções mais significativas no ensino e na aprendizagem das crianças.

Palavra Chave: Estilos de aprendizagem, diferenças etárias, gênero, inteligência.

ANALYSIS BETWEEN THE ASSOCIATION OF LEARNING STYLES WITH, THE GENDER, AGE AND INTELLIGENCE OF BRAZILIAN CHILDREN OF ELEMENTARY EDUCATION I

The association of learning styles with the gender, age and intelligence of Brazilian children between six and 12 years of age demonstrates that with respect to age, the predominant style was reflective, followed by pragmatic, active, and theoretical. The average of the styles in relation to age determines an oscillation between ages. For boys, the active style was predominant, whereas for girls, the theoretical and pragmatic styles were predominant. The reflective style differed slightly between the sexes. The correlation between intelligence and the learning styles was negative for the pragmatic style and verbal IQ. The results are considered to be tools to understand children's learning styles using a model that facilitates a broader understanding of the styles and their characteristics and that can suggest more appropriate strategies to improve the learning process.

Keywords: Learning styles, behavior differences in age, gender, intelligence.

INTRODUCTION

Technological advances, globalization, the increasing need for knowledge, and models proposed by educators that require an understanding beyond the maturity and cognitive capabilities of children have changed the nature of education and made it more demanding in recent years. Therefore, we must create means to strengthen the conditions of the learning process unique to each

student to support these changes in the school environment. It is the responsibility of the country, teachers, and all school professionals to understand the individual learning styles of students in order to improve the teaching and learning process for children and adolescents.

Keefe (1987) claims that knowledge of each student's learning characteristics serves as a basis for lesson planning. Herein, Keefe substitutes for the traditional educational model of mass production a more personalized model that enables the incorporation of strategies appropriate for a variety of styles. This researcher's studies are based on the development of the cognitive abilities of the individual in relation to learning with regard to the behavioral characteristics that comprise an individual learning profile.

Hargreaves (2004, p. 32) stresses that "in this society in constant transformation and self-creation, knowledge is a flexible, fluid process in an incessant process of expansion and change," which results from the speed at which information circulates and expands. "Poza (2002, p. 33) treats society as a learner, in which the need to learn to learn (or to teach how to learn) is one of the characteristics that defines the learning culture."

In the international literature on the learning process in the school environment, the child's individual learning profile is considered to be important. These studies focus on the child's learning style as a means to strengthen the styles of others, which significantly contributes to the academic life of students and teachers (Beltrami, 2008).

Studies based on this idea have been reviewed by Kolb (1984), who asserts that learning by experience is not a molecular educational process but a concept that describes the central adaptation process of human beings in the physical and social environment.

Learning involves the full functioning of the organism: thinking, feeling, perceiving, and behaving. Learning is a process in which knowledge is created through the transformation of experience (Kolb, 1984 pg 41). Therefore, the learning process is not identical for all persons and social groups. Each person possesses an inherent learning style.

Researchers who have studied learning have concluded that the manner in which individuals interact with knowledge and learning is evidence of the learning style. After analyzing several distinct individual reactions to the same learning situation, the researchers constructed a learning scheme. As in Kolb, the scheme is comprised of four stages: experience, reflection, the development of hypotheses, and application.

For Kolb (1984), experiential learning as a process transitions between two axes: capturing and transforming. Capturing refers to grasping a matter intellectually. Transforming is internalizing what has been captured, i.e., understanding. The process is a cycle of interaction in which the individual through capturing and transforming experiences, observes, reflects on, and

conceptualizes each new piece of information. During this cycle, four stages can be observed in the construction of knowledge: concrete experience (CE) – being involved in new experiences completely, openly, and without harm; reflective observation (RO) – reflecting on the experiences and observing them from several perspectives; abstract conceptualization (AC) – creating new concepts and integrating the observations into logically sound theories; and active experimentation (AE) – employing theories to make decisions and solve problems.

Keefe and Alonso (1994) define learning styles as possessing cognitive, affective, and physiological traits that serve as relatively stable indicators of how students perceive, interact with, and respond to their learning environments.

A learning style is acquired based on experience and is modifiable. Thus, each style constitutes a possible developmental pathway (Kolb, 1974, 1984; Honey and Mumford, 1992). Thomaz and Harry-Augstein (1990) treat as a myth the idea of learning style as a characteristic of the individual. According to these researchers, we must free ourselves from biases that prevent us from exploring different modes.

The learning model of Honey and Mumford (1986) was developed from an academic reflection on and analysis of the theory and questionnaire of Kolb (1984). This model posits a circular learning process with four phases: having an experience (active), reviewing the experience (reflective), concluding the experience (theoretical), and planning the next step (pragmatic). Thus, the authors developed a learning cycle (doing, observing, reflecting, developing abilities, doing, and developing new abilities). This model does not present a classification. Instead, the model creates a tool that “diagnoses” the learning style and strengthens underappreciated styles to increase learning effectiveness. Learning effectiveness depends on the route that students follow in the experience phase and continue on to reflection, critical analysis, and finally the general use of new abilities.

For Honey and Mumford (1992, p.1), the learning style describes the attitudes and behaviors that determine the individual’s preferred form of learning.

Honey (1986, apud Alonso, 1984, pg. 69) suggests that the ideal for learning would be the effective use of the four stages: active, reflective, theoretical, and pragmatic, described and considered according to their most marked characteristics. Thus, the authors designed an instrument termed the Learning Styles Questionnaire (LSQ), which consists of 80 items

with the goal of finding behavioral trends. These researchers focus on the topic of individuals' learning and conclude that the mode in which individuals interact with knowledge and learning is demonstrated by the learning style. Regarding the several distinct individual reactions to same learning situation, the authors noted the existence of a learning scheme.

Building on studies by the English researchers Honey and Mumford, Alonso, Gallego, Honey, and Portilho (2003) examined the learning styles of Spanish university students. Based on Keefe (1994, p. 48), these researchers maintain the following:

Learning styles are cognitive, affective, physiological traits that serve as relatively stable indicators of how students perceive, interact, and respond to their learning environments.

With regard to cognitive ability (analytical ability, spatial discrimination, categorization, sequencing, and memorization), perceptive responses (visual, auditory, and emotive), study preference, and teaching perseverance, students seek to express opinions, verbal-spatial preferences, and their opinions on manipulation due to morning or afternoon work.

Alonso (1994) adapted and translated the LSQ from English to Spanish with a focus on socio-academic questions, which resulted in the Honey-Alonso Questionnaire of Learning Styles (HAQLS). The HAQLS comprises 80 items with four learning styles: active, reflective, theoretical, and pragmatic.

Studies by Beltrami (2008) and Santos, Amadi and Oliveira (2005) indicate the relevance of individual differences in learning situations and emphasize the need to expand considerations of the manner in which individuals learn.

Learning styles consist of cognitive, affective, and physiological aspects that show in a relatively stable manner how individuals perceive, interact with, and respond to learning environments (Beltrami 2008; Cerqueira, 2000; Santos, 2007).

According to Beltrami (2008), Cerqueira (2000), and Santos (2007), an idea closely related to the learning process is that of learning styles. The concept of learning styles improves understanding of the interactions of the individual with the learning environment, which evens the path to a more effective acquisition and mastery of knowledge. Learning styles are comprised of cognitive, affective, and physiological aspects that show in a relatively stable manner how individuals perceive, interact with, and respond to the learning environment.

For studies on university students, Portilho (2003) adapted and translated HAQLS into Portuguese. Portilho and Beltrami (2008) performed the validation process, which was based on HAQLS, an instrument used for adults and adapted for children.

The instrument consists of 12 questions with four response options. According to Beltrami (2008), the instrument enables teachers to understand the essential and predominant aspects of their students' learning styles. After understanding and identifying the learning styles of their students, teachers can make classes flexible and use different teaching styles, seek to accommodate

the different styles, and improve their teaching. Additionally, the instrument enables the students to identify their preferred manner of learning, which helps the students perceive their limitations and strengths in the search for autonomy in the learning process.

Therefore, in addition to identifying the child's preferred learning style, the perspective of the professionals and the parents is broadened with respect to each child's individuality. After studying the theory of learning styles and relating the content of the classroom experience to Brazilian children, the following styles were identified: active, reflective, theoretical, and pragmatic.

Most research finds a preference for the reflective style, which results in the belief (Martinez, 2004) that the educational system encourages this style. This style's predominance among students and teachers appears to indicate that the society in which we live and the teaching system value reflective individuals more than individuals who learn in other styles (Labatut and Lupion, 2004; Portilho, 2004).

Furthermore, in agreement with others involved in the teaching and learning process for children, we cannot express the importance of the individual and group behavioral aspects with respect to the possibilities for learning in the school environment. Santos and Graminha (2006) indicate that behavioral problems represent a strong risk condition for learning problems and that work with children with learning difficulties should consider the aspects linked to behavior.

In research on the classroom and teacher evaluations, Machado et al. (1994) conclude that a group of children with learning difficulties displayed more behavioral problems. The problems were primarily linked to externalization, which reinforces the idea that children who display learning difficulties are also evaluated as having more behavioral problems.

Furthermore, in a survey of prospective and longitudinal studies that investigate the association between externalizing behavioral problems and poor school performance in elementary education, D'Abreu and Marturano (2010) suggest the influence of several background factors, such as adverse family conditions and a low socioeconomic level. These scholars indicate that the association implies a poor prognosis for the children, such as comorbidity with psychiatric disorders, subsequent academic problems, and anti-social behavior, which reflects the circumstance of psychosocial risk in which such children are found.

Peixoto (2005) demonstrates that cognitive variables (IQ and the "g factor" for intelligence) influence learning and behavioral problems. The perception of teachers is consistent with the results obtained for the cognitive variables, as the students referred to by the teachers as not experiencing problems tend to obtain better results for the cognitive variables. Another interesting finding is that the difference in means is larger in the categories related to cognition-learning, with a larger difference in the set of indicators related to cognition (reasoning, attention, and memory) than in the indicators for learning (reading and writing, computation, and motivation).

Gallego and Alonso (2008) correlate intelligence with learning style and find a weak relationship with a predominance of individuals with high intelligence for any of the styles. In studies on fluid (process speed and brain capacity) and crystalized intelligence (influenced by learning and experience), Kline (1991) proposes the following simple algorithm: fluid intelligence + learning experiences and strategies = crystalized intelligence.

Learning styles are independent of intelligence and, particularly, of fluid intelligence. However, studies show that the learning style is a critical element for individuals with low intelligence, given that these individuals are more dependent on the materials and the adapted presentations that refer to their own style. The designing of learning by keeping in mind the style thus becomes an important element for students with less ability, while the more intelligent students have repertoires and strategies that allow them to overcome the lack of fit between the learning style and the presentation of learning contents.

Cattell and Horn (2006), fluid intelligence is associated with non-verbal behavior, which depends little on previously acquired knowledge and cultural influence. Fluid intelligence is determined by biological aspects (genetics) of crystalized intelligence and “social intelligence”, which is developed from cultural and educational experiences.

According to Kloomok and Cosden (1994), children with a negative self-image display a lower perception of their intellectual abilities compared with children with a positive self-image.

Research performed by Santos and Graminha (2006) in a public state school in São Paulo's interior indicates that behavioral problems represent a strong risk condition for learning problems and that work with children with learning difficulties should consider aspects linked to behavior. In addition, these researchers note that compared with parents, teachers discriminate better and perceive a strong association between learning difficulties and behavior. These researchers further suggest that children who display low academic performance are at a developmental disadvantage in relation to children with high performance, given that among the low academic performance group the following were increased: the incidence of children with school performance that is lower than expected, the number of children with below-average intelligence or who are intellectually deficient, and the number of children with visual-motor results that are lower than expected for their age.

In an analysis of the opinion of teachers regarding academic performance, the behavior of students, and the need for specialized services when schools cannot meet demands, Barra et al. (2002) conclude that teachers evaluate behavioral problems more accurately than low academic performance problems in students, with high sensitivity in the detection of children with emotional or behavioral problems.

These studies raise many questions and indicate a need for other instruments to identify the conditions and characteristics of the individual learning processes.

METHODOLOGY

The evaluation of the children under study occurred weekly in the school environment as part of broader research project in which 49 children aged 6 to 12 years and enrolled at a public school in the South Zone of São Paulo were individually subjected to tests and scales.

To analyze the intelligence coefficient of the children, the children were given the Weschler Intelligence Scale (WISC-III) test, using only the subtest of vocabulary and cubes, which determines estimated IQ.

The Learning Style Inventory was applied to the children using the Portilho-Beltrami Learning Style Scale. The instrument was completed in an individual session at the school.

This study is cross-sectional and evaluates the learning style of children using a standardized scale, a comparison among ages, and an analysis of the association between learning style and the variables of gender and intelligence.

A total of 49 children participated in the study. The children were regularly enrolled in the first (second year) through sixth (seventh year) grades of elementary education at a public municipal school in the South Zone of São Paulo/Brazil and aged between six and 12 years with a mean of 9.02 years (SD = 1.95). The descriptive data for the participants are presented in Table 1.

Table 1: Description of the participants by age, sex, and school type.

	N	Age		Sex (%)		IQ	
		Mean	SD	Female	Male	Mean	SD
Participants	49	9.02	1.95	24 (48.5)	25 (51.5)	113.7	16.33

All of the children were regularly enrolled at a municipal school in the South Zone of São Paulo.

OBJECTIVE

The objective of this study is to analyze the association between learning styles and the gender, age and intelligence of 49 children studying at a school in the South Zone of São Paulo/Brazil .

INSTRUMENTS

The IQ evaluation was performed using WISC III, which is an internationally known clinical instrument for individual application to evaluate the intellectual capacity of children and adolescents (from six to 16 years of age). The scale is composed of several subtests, each measuring a different aspect of

intelligence. The performance on these subtests is summarized in three composite measures: verbal IQ, executive IQ, and total IQ, which estimate the intellectual capacities of the individuals. In this case, the subtest of vocabulary and cubes was considered, which determines an estimated IQ. This test is the only test exclusively for children.

The instrument used to evaluate the learning style was the Portilho-Beltrami Learning Style Inventory, the objective of which was to identify the predominant learning style among the children.

The model consists of 12 learning situations distributed among 24 slides with colored figures, an explanatory phrase that determines the situational context, and the responses, which correspond to four learning styles: active, reflective, theoretical, and pragmatic. The styles are characterized as follows:

ACTIVE: The child has a happy demeanor, is communicative, quick to perform tasks or assignments, and curious, that is, likes discovering new things. Additionally, the child prefers to diversify the environment in which he or she studies or plays. In the classroom, this child is a student who even while working is also conversing and who does not perform the same activity for long. The child's creativity enables him or her to perform actions that surpass what was solicited. The teacher identifies this student as the student who is always prepared to help classmates and the teacher. The child demonstrates fascination with new content, which reveals the child's desire to learn. In playing with classmates, this child is the leader, invents games and activities, and may be considered the protagonist in the presented situations. The child is an extrovert who enjoys being noticed by others. Additionally, the child is responsible for reconciling conflicts among classmates and displays a willingness to help.

REFLECTIVE: This child predominantly exhibits the following characteristics. The child first observes and analyzes the environment before participating in it. In the school environment, specifically, in the classroom, the teacher identifies this child as a student who first waits for classmates to speak and then offers, or weaves in, his or her own comment or conclusion. This prudence compels the child to consider the alternatives before exposing him- or herself. Therefore, the child seeks to analyze the lessons before performing them, and the same attitude is adopted when playing. In recreational activities, games, and play, the child first observes classmates playing and then joins them. For example, given several color options, the student first observes and thinks and then selects the color he or she prefers. Another characteristic of this style is that the child is detail-oriented. Whether painting or performing other activities, he or she seeks to do his or her best and endeavors to achieve the best and most perfect result possible.

THEORETICAL: In general, the child organizes and plans his or her tasks. When using a computer or playing video games or with classmates, the child starts the activity already knowing what he or she wants and what he or she will do first. This planning extends to completing assignments: the theoretical child waits for the instructions from the teacher before starting the assignments. The manner of organization may be identified in the assembling of a puzzle because the pieces

are first separated by the child before starting to play. The child always wants to know the “whys” of the facts, seeking an explanation for everything.

PRAGMATIC: This attitude is based on self-confidence and decision-making in the face of what must be achieved. The approach implies not listening to or considering what classmates say regarding their tasks. Pragmatic students are decisive and practical, which may be observed when such students play, in the color they use to paint a design, and in the clothes they choose. Choices are made in a quick, objective, and practical manner. These children display autonomy in performing tasks. If a problem emerges, the pragmatic child wants to resolve the problem quickly, and the child is pleased by the practicality of the objects and novelties that appear during tasks.

DATA ANALYSIS

To analyze the data, the statistical package SPSS, version 15.0 (Statistical Package for the Social Sciences), was used. To analyze the categorical data, the chi-square method and the Cramer's V coefficient were applied. For the numerical data, ANOVA (analysis of variance) was used determine whether any factors of the Learning Styles Scale are sensitive to the child's age, in addition to the Spearman correlation between the estimated IQ and the Learning Styles Scale.

RESULTS

The results of the evaluation of the children regarding the predominant learning style are provided in Table 2 in the form of descriptive data by age. The results for the frequency of occurrence of each learning style among the children reveal that 20.4% (10) of the children display the active style, 34.7% (17) the reflective style, 20.4% (10) the theoretical style, and 24.5% (12) the pragmatic style. The analysis of the variation of the style according to the age and gender of the children is provided in Tables 2, 3, and 4.

Table 2: Descriptive data for the children regarding Learning Style Scale scores according to age.

Style	Age	N	Mean	SD	95% CI for			
					Mean	Minimum	Maximum	
Active	6	5	2.80	1.09	1.44	4.16	1	4
	7	7	3.14	0.90	2.31	3.97	2	4
	8	7	3.71	1.79	2.05	5.38	2	7
	9	9	2.00	1.41	.91	3.09	0	4
	10	8	2.25	0.88	1.51	2.99	1	3
	11	8	3.13	1.72	1.68	4.57	1	6
	12	5	1.60	0.89	.49	2.71	0	2
	Total	49	2.67	1.42	2.27	3.08	0	7
Reflective	6	5	4.80	1.30	3.18	6.42	3	6
	7	7	3.71	1.11	2.69	4.74	2	5
	8	7	2.43	1.27	1.25	3.61	1	5
	9	9	4.22	1.39	3.15	5.29	2	6
	10	8	3.25	1.28	2.18	4.32	2	6
	11	8	3.88	0.83	3.18	4.57	3	5
	12	5	3.60	0.89	2.49	4.71	2	4

Theoretical	Total	49	3.67	1.29	3.30	4.05	1	6
	6	5	2.20	0.44	1.64	2.76	2	3
	7	7	3.14	0.90	2.31	3.97	2	5
	8	7	3.00	0.81	2.24	3.76	2	4
	9	9	3.56	1.23	2.61	4.51	1	5
	10	8	3.38	1.68	1.97	4.78	1	6
	11	8	2.50	1.30	1.41	3.59	1	5
Pragmatic	12	5	3.80	1.09	2.44	5.16	3	5
	Total	49	3.10	1.21	2.75	3.45	1	6
	6	5	2.20	1.64	0.16	4.24	0	4
	7	7	2.00	1.00	1.08	2.92	1	4
	8	7	2.86	1.57	1.40	4.31	1	5
	9	9	2.22	1.56	1.02	3.42	0	5
	10	8	3.13	1.88	1.55	4.70	1	6
	11	8	2.50	1.19	1.50	3.50	1	5
Total	49	2.55	1.45	2.13	2.97	0	6	

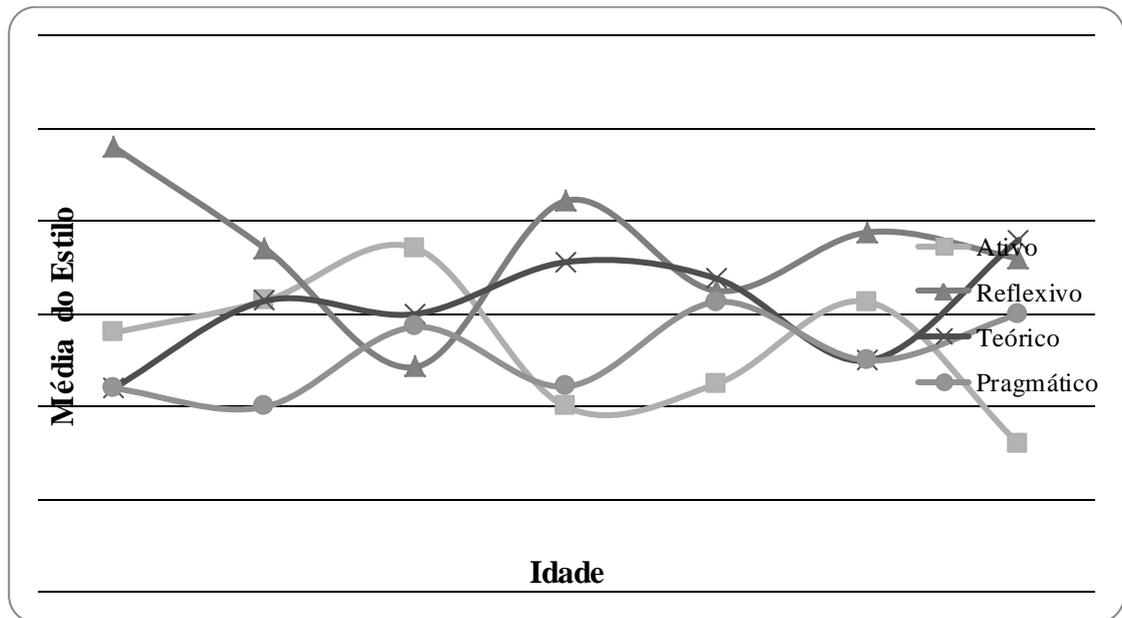
The influence of the age variable on the score for each learning style was investigated using ANOVA (Table 3). The results reveal significant differences only for the reflective style.

Table 3: ANOVA analysis of the age of children between six and 12 years of age on the Portilho/Beltrami Children's Learning Styles Inventory.

Styles	N	Mean	SD	F	<i>p-value</i>
Active	49	2.67	1.42	2.07	0.07
Reflective	49	3.67	1.29	2.57	0.03*
Theoretical	49	3.10	1.21	1.42	0.22
Pragmatic	49	2.55	1.45	0.59	0.73

Legend: Significant at $p < 0.05$.

Graph 1: Learning style means in relation to the age of the children.



Graph 1 depicts the performance of the children in relation to learning style. The reflective and actives style vary the most among the ages. For example, the reflective style oscillates significantly between six and nine years of age and tends to stabilize at 10 years of age, when a balance is achieved among the styles (between means 3 and 4).

Another question explored in the study relates to the influence of gender on a child's learning style. The results indicate a significant association between these variables with 20.25% of the variation in the learning style among the evaluated children explained by gender difference. The results of the chi-square test that associated the predominant learning style with gender reveal that the active style predominates among the boys, whereas the theoretical style predominates among the girls.

Table 4: Relationship between the predominant learning style and gender using the chi-square method and Cramer's V coefficient.

Style		Male	Female	Total	Statistic	<i>p-value</i>	Cramer's V
		N (%)	N (%)	Nº			
Style	Active	8 (80)	2 (20)	10	$\chi^2_{(3)} = 9.98$	0.019*	0.45 (20.25%)
	Reflective	8 (47.1)	9 (52.9)	17			
	Theoretical	1 (10)	9 (90)	10			
	Pragmatic	5 (41.7)	7 (58.3)	12			
Total		22 (44.9)	27 (55.1)	49			

The correlation between IQ and the learning style of the children was analyzed. Only one significant correlation was observed, which was a moderate and negative correlation between the pragmatic style and verbal IQ.

Table 5: Correlation between IQ and learning style.

	Verbal IQ	Executive IQ	Total IQ
Active	0.02	0.20	-0.02
Reflective	0.23	0.09	0.25
Theoretical	0.11	-0.10	-0.05

Pragmatic	-0.31*	-0.19	-0.16
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*significance $p < 0.05$

DISCUSSION

With the analysis of the numerical data, it was possible to create standards for the learning styles instrument for a sample of children between the ages of six and 12 at a public school in the municipality of São Paulo by defining the mean, standard deviation, and the minimum and maximum values according to age and gender.

The results of the evaluation regarding the frequency of the predominant learning styles, described according to age, reveal that the reflective style was predominant, followed by the pragmatic style, and, finally, the active and theoretical learning styles in the same proportion. According to studies by Beltrami (2008), who evaluated children with basic education in public and private schools, the predominant style was the active style, followed by the theoretical, pragmatic, and reflective style with an order of predominance different from that observed in the present study. Notably, the age group studied by Beltrami (2008) was lower: ages 5 to 7. Based on Table 1, we can hypothesize that certain variables, such as age, cognitive development stage, and education, may interfere in the results. Gallego and Alonso (2008) indicate that the styles are relatively stable due to the physiological basis and the different strategies used and identify three primary psychological elements that according to the learning style reflect the way a person learns: “*an affective component – feelings; a cognitive component – knowing; and a behavioral component – doing.*” The conclusions of Martinez (2004) reinforce these results, indicating that in most research, the reflective style appears to be the style of preference, which suggests that the educational system encourages this style.

In analysis of the age of children between six and 12 years of age on the Portilho/Beltrami Children’s Learning Styles Inventory. In, a significant correlation was found between performance and the reflective style. This result is compatible with the characteristics of the reflective style. In daily school life, children who learn using this style are generally described by the teacher as children who first wait for other classmates to speak before offering comments or conclusions. In other words, these students first analyze the context and then express their ideas, which may represent a more effective strategy that is less subject to errors due to impulse or under-elaboration of the answer. Thus, children with a predominantly reflective style respond in an appropriate manner to the demands of learning. Few studies have been found in the literature on learning styles with children, as adults are the focus of the majority of such studies. In studies on children, the active and reflective styles have been shown to be the most common (Silva, 2001; Beltrami, 2008). The research on the relationship between childhood During ages and learning style may support individualized pedagogical practices, Given That each child displays one or more learning styles reflect That the best way for the child to learn and Incorporate knowledge. To study the learning styles of a child is to recognize the importance of meta-cognition and the child’s executive style, i.e., the child’s particular manner of approaching tasks,

content, and the exploration of the physical and social environment to understand that environment. Although most studies conclude that the reflective style is the best predictor of good academic results, a balance among the styles and the recognition of the different ways of learning may lead to more effective learning strategies (Leme, 2010).

According to Honey (1986), ideally, all individuals possess the same capacity to experience, reflect, and form and apply hypotheses, and there is an equitable and balanced division among these domains. However, in fact, individuals exhibit different capacities, which can change over the course of their lives. Graph 1 presents the means of the learning styles in relation to the age of the children. We can conclude that based on the age ranges there is variation in the means, which indicates a distribution of the style that is differentiated and dependent on the development phases. Therefore, the active learning style displays an index that is above average at eight years, is average at six, seven, and 11 years, declines at nine, 10, and 12 years, and in the sequence remains below average. For the reflective style, at six, nine, 11, and 12 years, the index is above average. At seven and 10 years, the index is average, whereas at eight years, the index is below average. For the theoretical style, at nine, 10, and 12 years, the index remains above average. At seven and eight years, the index is average, and at six and 11 years, the index is below average. For the pragmatic style, at eight, 10, and 12 years, the index is average, whereas at six, seven, 9, and 11 years, the index is below average.

Regarding gender, the active style is significantly predominant for boys, whereas the theoretical style is predominant for girls. The pragmatic style is predominant for girls, whereas the reflective style displays a small difference with respect to gender. The results corroborate the findings of Beltrami (2008) with respect to the predominance of the active style for girls and regarding the reflective and pragmatic styles for girls. However, it was not confirmed that the theoretical style is predominant among boys, whereas in this study, the predominance of the theoretical style occurred among the girls (Table 4).

Regarding the correlation between the intelligence coefficient and the learning style, a negative significance was observed for the pragmatic style with verbal IQ. This result indicates that children using the pragmatic style display attitudes that are based to a relatively large degree on self-confidence and determination in the face of a task.

This attitude implies not listening and not considering the comments of classmates with respect to tasks. The children are decisive and practical, which may be perceived when they play, color or draw a design, and in the clothes that the children choose to wear. Choices are made in a rapid, objective, and practical manner.

These children display autonomy in performing tasks. If a problem emerges, the pragmatic children want to resolve the problem rapidly. These characteristics describe action-oriented individuals with little patience to explore through communication and a tendency to explore execution. Such children display less mastery of the verbal components, which may be understood as in Cattell and Horn (1998), for whom fluid intelligence is associated with non-verbal

components (little influenced by culture and educational processes and more determined by biological aspects), whereas crystalized intelligence is represented by the capacities required to solve problems. This capacity is known as “social intelligence” and is developed from cultural and educational experience (Table 5).

In the following table A , we summarize the main results of the present study, in which the relationship between learning styles and gender, age and intelligence were analyzed.

Table A

Variable	Main Results
Intelligence	Demonstrates that verbal IQ has a negative correlation with a pragmatic style, which indicates a tendency for the exploration of execution and less mastery of verbal components.
Gender	Boys had a predominantly active style, whereas girls had a predominantly theoretical style followed by a pragmatic style. There were few differences between boys and girls in the reflective style.
Age	Learning styles varied according to the child's development with younger children displaying a more active style and older children exhibiting a higher index for the theoretical and reflective styles.

Considering the results of the present study regarding gender, Table B shows a comparison between the present results and those of a study involving a sample of Brazilian elementary school children.

Table B – Gender comparisons of the frequency of learning styles in a Brazilian sample of elementary school children.

Style	Fonseca, 2011		Beltrami, 2008	
	Female	Male	Female	Male
Active	20.0%	80.0%	18.75%	31.82%
Reflective	52.9%	47.1%	59.38%	36.36%
Theoretical	90.0%	10.0%	37.50%	15.91%

Pragmatic	58.3%	41.7%	10.0%	0.5%
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CONCLUSION

Considering the standards and amount of information that children and adolescents are subjected to in their social, school and family environments, it is necessary to have a better understanding of the learning process in children. Further studies on learning styles related to age, intelligence and gender are necessary to fulfill this objective. Furthermore, because learning styles can determine how children learn, it was also possible to perceive the necessity for other studies focusing on the relationship between learning styles, behavior and academic performance.

The results of the present study regarding the learning styles of children and adolescents also indicate the value of a more individualized perspective on the issue, as understanding how the individual learns and teacher teaches could be fundamental for academic performance. The similarities, differences and averages observed throughout the present study help identify and expand the knowledge on individual learning styles. The possibility of constructing averages for the learning styles of children in elementary school between second and sixth grade (ages six to 12) was highly significant given the importance of understanding how children learn as individuals. Therefore, new studies are necessary to develop this knowledge. Studies and experiments should be performed more frequently in the school environment on the various aspects of the learning styles, behavior, ages, and the intelligence coefficient of children so that this knowledge can encourage school practices that are more appropriate to children's learning in basic education.

Regarding the predominant learning styles, the existing literature has been expanded and a tendency revealed that facilitates the examination of the teaching and learning processes for children according to the profiles that are most recognized and individualized by school professionals.

The analysis shows that it is possible to increase understanding of how the child learns and the predominance of certain styles and indicates the methods that are used to examine the learning process and seek additional knowledge on academic performance and the with relation learning style.

An important finding is the relationship of the predominance of the styles and their oscillations as a result of the child's development according to age. This topic has been rarely examined until now with children.

Considering previous studies, in the relationship between learning styles and gender, it was possible to find similarities and differences of styles, which encourages us to examine this subject further, including different school environments and a larger number of children to improve the significance of the results.

The negative correlation of the intelligence coefficient with verbal IQ and the pragmatic style encourages the further examination of the cognitive development of the child in language in the school environment. Persistently using tasks that examine this communication is a noble aspect of human life.

We must consider the results obtained in this study as a tool to understand the individual learning styles of children and children's behavior, perception, thinking, development, emotional states, strategies, facilities, and difficulties.

Ultimately, we suggest that school professionals adopt a more individualized view of children's learning styles. To assist the child in the challenge of exploring and assimilating knowledge, appropriate motivation, meaningful teaching, affection, organization, and planning are required.

REFERENCES

Alonso, C. y Gallego, D. (2003). *Cómo diagnosticar y mejorar los estilos de aprendizaje*. Madrid: UNED, Formación Permanente.

Alonso, C. y Gallego, D. (2004). *Los estilos de aprendizaje: una propuesta pedagógica*. Actas del I Congreso Internacional de Estilos de Aprendizaje. Madrid: UNED.

Alonso, C.; Gallego, D. y Honey, P. (2004). *Los estilos de aprendizaje. Procedimientos de diagnóstico y mejora*. Bilbao: Mensajero.

Alonso, C. G; Gallego D J. (2008). *Estilos de aprender en el siglo XXI*, Revue de Les Styles d'apprentissage n 2 vol. 2, outubro.

Amadi, R G & Santos A. A. A. (2003). *Estímulos Musicais e solução de problemas com crianças na educação infantil*. Manuscrito não publicado. Universidade São Francisco.

Bariani, I.C.D. (1998). *Estilos Cognitivos de Universitários e Iniciação Científica*. Faculdade de Educação, UNICAMP, Campinas: [Tese de Doutorado].

Beltrami, K. (2008). *Tese de Mestrado em Educação. Inventário de Estilo de Aprendizagem para Crianças Portilho/Beltrami: O Estilo de Aprendizagem das Crianças e da Professora de Educação Infantil*. Pontifícia Universidade Católica do Paraná. Centro de Teologia e Ciências Humanas .

Cerqueira, T. C. S. (2000). *Estilos de Aprendizagem em universitários*. Tese de Doutorado em Educação, Universidade Estadual de Campinas, Campinas.

Dunn, R. y Dunn, K. (1984). *La enseñanza y el estilo de aprendizaje*. Madrid: Anaya

Gallego, A. y Martínez, E. (2003). *Estilos de aprendizaje y e-learning. Hacia um mayor rendimiento académico*. RED, Revista de Educación a Distancia, 7.

Disponibile en: <http://www.um.es/ead/red/7/estilos.pdf>

Gallego, D.J. (2004). *Diagnosticar los estilos de aprendizaje*. Actas del I Congreso Internacional de Estilos de Aprendizaje. Madrid: UNED.

Goulão, M.F. *Estilos de aprendizagem e gênero*. Revista de Aprendizaje n9, v9,

abril,2012.

Honey, P. y Mumford, A. (1992). The manual of learning styles. Maidenhead:
Peter
Honey Publications

Martínez, P. (2004). Investigación y análisis de los estilos de aprendizaje Del
profesorado y de sus alumnos del primer ciclo de Educación Secundaria
Obligatoria
(ESO) en el ámbito del CPR de Laredo. Cantabria. España. Actas del I Congreso
Internacional de Estilos de Aprendizaje. Madrid: UNED.

Keefe, J.W. (1987). Learning style theory and practice. Reston, Virginia: NASSP.

Keefe, J.W. (1979). Learning styles: An overview. En J. Keefe (ed.). Student
Learning Styles: Diagnosing and prescribing programs (pp. 1-17). Reston, VA.:
National Association of Secondary School Principals.

Kolb, D. A. (1974). Learning and problem solving. En Kolb, D. A; Rubin, I. M. &
Mc
Intyre, J. M. (Eds.),Organizational Psychology. (pp. 21-40). 2ª Edición, New
Jersey:
Prentice-Hall, Inc, Englewood Cliffs.

Kolb, D.A. (1984). Experiential learning: Experience as the source of Learning
and
Development. Englewood Cliffs, New Jersey: Prentice-Hall.

Kline, P. (1991) Intelligence: The Psychometria View:London Routledge

Kline, P (2000). Handbook of Psychological Testing London:Routledge.

Leme, E.M.(2010). Estilos e Estratégias de Aprendizagem: estudo das relações
entre os construtos. Dissertação de mestrado, Programa de Pós Graduação
Stricto
Sensu em Psicologia. Universidade São Francisco, Itatiba. SP.

Machado, VLS, Marturano EM, Loureiro SR, Linhares MBM, Bessa LCD. (1994).
Crianças com dificuldades na aprendizagem escolar: características de
comportamento conforme avaliação de pais e professores. Arq Bras Psicol.
46(3/4):184-98.

Mumford, A. y Honey, P. (1992). Questions and answers on Learning Style
Questionnaire. Industrial And Commercial Training, 24, 7, 10-13.

Piaget, J. (1967). The origins of intelligence in children. New York: International
University Press.Piaget, Jean. A equilibração das estruturas cognitivas. Rio de
Janeiro : Zahar, 1975.

Piaget, Jean. *Biologia e Conhecimento*. 2ª Ed. Vozes : Petrópolis, 1996.

Peixoto, LM. (2005). Estudo das variáveis da inteligência (Q.I. e Factor 'g') e sua relação com problemas de aprendizagem-comportamento: Estudo tomando a percepção dos professores. In: Silva BD, Almeida LS, orgs. *Actas do VIII Congresso Galaico-Português de Psicopedagogia*. Braga: Universidade do Minho.

Portilho, E.M.L. *educacion Infantil: uma mirada p estilos de aprendizaje y La metacognição* . *Revista Estilos de Aprendizaje* . n10, v10, october, 2012.

Pozo, J.I. (2002). *Aprendizes e Mestres a nova cultura de aprendizagem*. P.Alegre. Artmed.

Santos, A. A. A. Amadi R. G. & Oliveira, K. L. (2005). *Estilos de Aprendizagem e solução de problemas: um estudo com pré- escolares*. *Interação em Psicologia*. 9(1), 1-9.

Santos, PL, Graminha SSV.(2006). *Problemas emocionais e comportamentais associados ao baixo rendimento acadêmico*. *Estudos Psicológicos*; 11(1): 101-9.

Schellini, P. W. (2006). *Teoria das inteligências fluida e cristalizada: inicio e evolução*. *Estudos de Psicologia Universidade Federal de Santa Catarina*, 2006.

Wechsler, D. (2002). *WISC-III: Escala de Inteligência Wechsler para Crianças: Manual*. 3ª ed.; São

Paulo: Casa do Psicólogo. 309 p. Avaliação Psicológica <http://pepsic.bvsalud.org/scielo.php?script=sci_serial&pid=16770471&lng=pt&nr m=iso>/versão On-line/ ISSN 2175-3431 Aval. psicol. v.2 n.1 Porto Alegre jun. 2003

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