Revista de Educação e Pesquisa em Contabilidade
Journal of Education and Research in Accounting
Revista de Educación e Investigatión en Contabilidad

REPeC, Brasília, v. 6, n. 1, art. 4, p. 49-65, jan./mar. 2012
Available online at www.repec.org.br
ISSN 1981-8610

Learning Styles and Performance in Distance Education: an Empirical Study of Accounting Students

Daniel Ramos Nogueira
Ph.D. Student in Controllership, and Accounting (FEA-USP)
Master in Accounting (UFPR)
Professor of the Universidade Norte do Paraná (UNOPAR)
Professor of the Universidade Estadual de Londrina (UEL)
Endereço: Viela Codato, 68 – Centro – Cambé - PR
Address: danielnogueira@usp.br

Márcia Maria dos Santos Bortolocci Espejo
Ph.D. in Controllership, and Accounting (FEA-USP)
Coordinator and Professor in the Master's program in Accounting (UFPR)
Leader of the Research group of CNPQ Laboratório de Controle Gerencial e Teorias Organizacionais Aplicadas
Endereço: Av.Prefeito Lothário Meissner, 3400 - Jardim Botânico CEP: 80210-170 - Curitiba - PR
Address: marciabortolocci@ufpr.br

Luciano Gomes dos Reis
Ph.D. in Controllership, and Accounting (FEA-USP)
Adjunct Professor at Universidade Estadual de Londrina (UEL)
Professor at Universidade Norte do Paraná (UNOPAR)
Endereço: Rodovia Celso Garcia Cid - Pr 445 Km 380 - Campus Universitário - CEP 86051-980 - Londrina – PR
Address: lucianoreis@uel.br

Simone Bernardes Voese
Ph.D. in Production Engineering (UFSC)
Professor in the Master's Program in Accounting (UFPR)
Endereço: Av.Prefeito Lothário Meissner, 3400 - Jardim Botânico CEP: 80210-170 – Curitiba - PR
Address: simone.voese@gmail.com

Abstract

The objective of the present study is to verify whether the performance of distance education students in the disciplines General Accounting and Management Accounting, as well as in the overall Accounting module, differs

Published in Portuguese, English and Spanish. Original Version in Portuguese

Received in 07/21/10. Ask to Revise on 09/15/11. Resubmitted on 10/05/11. Accepted on 11/20/11 by Valcemiro Nossa (Editor). Published on 03/27/12. Organization responsible for the journal: CFC / FBC / ABRACICON.

according to their learning style. The survey was conducted among 109 students in a distance education course and used learning style as the independent variable (verified by Kolb's LSI), and the average grade received in the subjects general accounting and management accounting and the Accounting module as the dependent variable (average between the grades in general and management accounting). Reliability tests were conducted (Cronbach's alpha) on Kolb's LSI instrument, along with tests for data normality. Furthermore, we performed descriptive statistical analysis and tests for differences of means (Kruskal-Wallis and ANOVA) to answer the research question. The results show that most students have an assimilating style (44%) and (34%) are divergent. These indicate that it was not possible to establish that learning styles cause a difference in the performance of students. Therefore, one cannot affirm that any one learning style showed higher performance on average than other styles in the distance course. Considering the small number of observations, the conclusions should not be generalized.

Keywords: Learning Styles; Distance Education; Accounting Courses; General Accounting; Management Accounting.

1. INTRODUCTION

Recent years have seen incredible growth in the pursuit of higher education as a result of an increasingly competitive and selective labor market, requiring a differential from professionals that strive for the best positions (Cerqueira, 2000).

This intense demand for higher education has led both to an increase in the number of places in the federal public education system, with the Plan for Restructuring and Expansion of Federal Universities (*Plano de Reestruturação e Expansão das Universidades Federais* - REUNI), and with the emergence of many new private higher education institutions (HEIs), to meet this demand. Besides an increase of HEIs, in recent decades there has been a proliferation of distance education courses. According to Scremin (2001), the emergence of distance education is a means for the democratization of education and for equal opportunities to gain access to the teaching/learning process.

In recent years, especially after the issuance of the Law of Educational Guidelines and Bases (*Lei de Diretrizes e Bases da Educação*) in 1996, which permitted the practice of distance education for teaching purposes, there has been a marked increase in number of students who have adhered to this style. In 2007 more than 300,000 students were registered in distance undergraduate courses, a significant increase compared to the 40,000 registered in 2002 (MEC/INEP, 2009).

Regardless of the mode of learning, either in person or at a distance, the goal of the student is to acquire new knowledge. However, the construction process of education depends not only on the pro-active activity of the teacher passing on the content, but also on the student seeking the knowledge. Therefore, there must be harmony in this relationship, so that the teacher can transmit knowledge and the student can receive and internalize it.

For the teacher to use methodologies that meet the students' learning styles, it is necessary first to identify what their learning styles are. By identifying these learning styles, the teacher can plan and execute more harmonious lessons, thus contributing so that the goals of both parties are met: the teacher to teach and the student to learn (Silva 2006).

However, distance education has its own peculiarities in the teaching and learning process, due to the gap between teachers and students. Consequently, the learning process will largely depend on the attitude of the student, upon reading, researching and studying in their asynchronous study time, in other words, without the simultaneous participation of the teacher. As such, some students may find it easier to study independently, which could provide a greater learning experience and, consequently, a better development among these students.

Considering the context of distance education, the individual learning styles of students, and aiming to establish whether these cause differences in academic performance, the research question here was as follows: Does the academic performance of students in distance education courses in the disciplines of general and management accounting differ according to their learning style?.

The general aim of the study is to verify whether the performance of students in distance education courses in the disciplines of general and managerial accounting differ according to their learning style.

The need for this study is justified given that each student initially has his or her own learning style. Therefore, from the identification of the students' learning styles, teachers may choose methods that will be more efficient in transmitting accounting knowledge to students. Pungent, Wasan, and Moffett (2002) stress that it is essential to conduct studies that attempt to associate the performance of students and their learning

style, thereby determining if there is any relationship between these variables, to help in verifying the suitability of distance education for all learning styles.

This paper is structured as follows: the next section presents a bibliographic review of learning styles and distance education. The third section addresses the methodological aspects, describing the characteristics of the population and sample, and the methodological classification, as well as other factors. In the fourth section we analyze the data by reporting the statistical tests that were conducted, and present and analyze the results. The fifth section contains our findings and final considerations.

2. BIBLIOGRAPHIC REVIEW

2.1 Learning styles

According to Martins *et al*. (2003), the learning process occurs when a person acquires knowledge that he or she did not have before. This can be defined as the manner by which an individual acquires, stores, and uses knowledge. In Schmeck's view (1982, p. 80, cited in Cerqueira, 2000, p. 36), learning style is:

> The style that an individual exhibits when confronted with a specific learning task, affirming that it is also a student's predisposition to adopt a particular learning strategy, regardless of the specific requirements of the tasks.

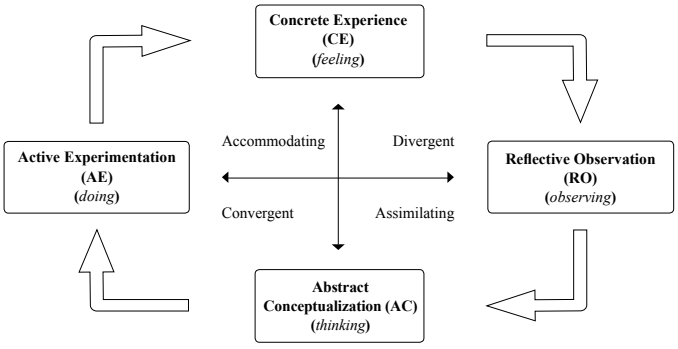
From this perspective, Cerqueira (2000) warns that the style of learning is especially important for teachers because it influences their method of teaching, as teachers tend to teach the way they would like to learn, that is, following their learning style and not the style of their students. This internal and unconscious process of teachers only comes to light when given the opportunity to study and measure their learning style, which reveals the preferences that shape their teaching style.

Coffield *et al*. (2004) conducted a study of learning styles and found the existence of 71 models. After performing analysis, the researchers chose to use only 13 in their study, arguing that the other 58 were small adaptations of these main 13. Among the 13 models, one is that of Kolb, which was used in this study and is described in the next section.

2.1.1 Kolb's learning styles

Through his research, David A. Kolb developed the Experiential Learning Theory (ELT). The theory is so named to emphasize the central role that experience plays in the learning process. The ELT defines learning as "[...] the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38), considering that knowledge is the combination of understanding and the transformation of experience. The former is how individuals perceive (understand) information and the latter is the manner by which they process information (transformation), thereby internalizing it.

Based on the ELT, Kolb developed a learning cycle consisting of the four steps shown below (Table 1).



The cycle begins when the individual is involved in a concrete experience (1), in which observations and reflections are made (2), abstract concepts (3) and/or generalizations will be formulated which will allow for new contact with reality aiming to test (4) this concept created in novel situations through active experimentation.

Chart 1 - Experiential learning cycle written by David Kolb
Source: LIMA (2007, p. 35), Fox, Bartholomae (1999).

According to the ELT, in the process of learning by experience, knowledge arises from the capture and transformation of experience (Kolb and Kolb, 2005). Therefore, the learning cycle is further divided into two structural dimensions (represented by the two axes of the graph), where the first dimension concerns the capture (CE and AC) or perception of the experience and the second the processing (RO and AE) of the experience.

Analyzing the four basic modes (AC, CE, RO, and AE), one may conclude that none of them fully describes the specific learning style of a student, because the style is a combination of these four basic modes of learning (Cerqueira, 2000). In Kolb's classification, individuals show a predominance for two of the four learning preferences. Considering these two, one can identify the student's learning style, which may be: accommodating, assimilating, convergent or divergent. The features of each learning style are explained in Table 2.

Accommodating (CE and AE)
These are people who have the ability to learn especially from practical experience. Their greatest potential lies in doing things, executing plans, and engaging in new experiences. The tendency for people who fit this style is to take actions that are guided more by sense and feeling than by logical analysis. They are intuitive and able to solve a problem by trial and error. The basic question of this style is "What if?".
Assimilating (AC and RO)
These are people who excel at inductive reasoning and by their ability to create abstract or theoretical models. For people of this style, it is more important that a theory make logical sense rather than have practical value. They are competent at uniting observations from experience with prior knowledge to propose theories, the creation of theoretical models being their strong point. These people stand out when it comes to understanding a wide range of information in order to give it a concise and logical form. The typical question for this style is "What?"
Convergent (AC and AE)
These individuals are particularly good at converging theoretical knowledge into practical applications. Problem solving and decision making are their strengths (pragmatic). They prefer to handle situations or technical problems. They like to have the opportunity to work actively on well-defined tasks, and to learn by trial and error in an environment that allows them to make mistakes safely. The typical question for this style is "How?"
Divergent (CE and RO)
These are people who perceive information by the impression that it gives them via their sensory pathway (CE) and they process it in a reflexive manner (RO), without the need for active experimentation. These are people who work best when it comes to observing concrete situations from different points of view, and their way of coping with situations is to observe more than act. They prefer to listen and share ideas, are creative and innovative people, finding it easy to propose alternatives, recognize problems, and understand people. The typical question for this style is, "Why?" as in, "Why is this concept so valuable that I should know it?"

Chart 2 - learning styles according to David Kolb
Source: (Cerqueira, 2000; LIMA, 2007; Pig, 2006; Tanner, Morgan, 2007; Leite *et al*., 2008; VALENTE *et al*., 2006).

Kolb's theoretical framework served to further strengthen research on learning styles. However, to make measuring students learning preferences a possibility and, consequently, to establish their individual learning style, Kolb developed his Learning Style Inventory (LSI), which is the questionnaire used in this study to identify the learning styles of the students surveyed. Kolb's LSI is an inventory composed of 12 sentences with four answers to each question. The answers are given in ordinal form, and the student must assign a 4 of those answers with which he/she most identifies and a 1 for those identified with the least during the learning period. The following shows an example of a response:

I learn:	1	Feeling	4	Doing	2	Observing	3	Thinking

Chart 3 - Model of sentence completion
Source: Authors (2010)

Based on the example in Table 3, we can infer that the respondent learns more easily by doing, secondly, by thinking, followed by observing, and the last way he/she could learn some content would be by feeling.

In previous research of learning styles and academic performance, Manochehr (2006) found evidence that the assimilating style performs better in distance courses. Agreeing with this view, Silva (2006) also showed that the performances were different according to the learning style.

Having presented the basic framework of learning styles, more specifically from Kolb's perspective, we address distance education in the next section.

2.2 Distance Education

Despite having appeared with more emphasis in recent years, distance education is not a new concept. The idea of distance education can be traced back to 1840, in Britain, when Isaac Pitman began teaching shorthand by correspondence (Freitas; Bertram, 2006; Moore and Kearsley, 2008).

Until the mid-1990s, distance education was little used in Brazil, but now one can find a wide variety of distance learning courses; such as undergraduate, graduate and specialization, among others. This growth in distance learning has been driven by the technological evolution in communication systems, especially in the last decade (Ferraz, 2008).

As the teaching method is conducted without physical presence, being mediated by technological tools which provide support for interaction between students and teachers, distance education presents some quirks that are part of its structure. According Pretti (1996), the elements that characterize this type of education are: the physical distance between teacher and student, individualized and independent study, a mediated teaching/learning process, use of technologies, and bidirectional communication.

From the perspective of Pretti (1996), the physical presence between student and teacher is not necessary for learning, as the dialogue between them will occur, albeit not in person, but virtually. However, even with the distance between student and teacher, a bilateral communication can exist, in which the student participates actively in the learning process. There are several tools that allow for such communication, like chat rooms, e-mail, virtual forums, blogs, and even televised classes broadcast at a certain class time, where students can submit questions and the teacher can answer (Moore and Kearsley, 2008).

Some advantages brought by distance courses are the wider and faster dissemination of knowledge, the integration of many people, and the overcoming of social and geographical barriers. However, some disadvantages are the accommodation and lack of discipline which may occur for some students who have not fully prepared for distance courses (Cornachione Jr. and Silva, 2002).

Nevertheless, even with some drawbacks, the "adoption of virtual collaborative models in Brazilian accounting courses, especially if planned properly and in circumstances that can produce better effects as compared to the traditional patterns" is possible (Cornachione Jr, 2004).

According to the Higher Education Census of 2007, prepared by the Brazilian Ministry of Education (MEC) and the National Institute for Educational Studies and Research (INEP), in recent years there has been a remarkable growth of undergraduate courses of the distance genre. In 2007, 97 higher education institutions (HEIs) offered undergraduate courses at a distance, an increase of 20 institutions in relation to 2006 (MEC/INEP, 2009). With the increasing number of HEIs offering long-distance undergraduate courses, it is only natural for there to be an increase in the number of courses, which rose from 349 in 2006 to 408 in 2007 (MEC/INEP, 2009).

With the increase in HEIs, and the courses available for distance education, an increase in the number of students is a natural consequence. In 2007, 369,766 students were enrolled, a 79% increase compared to the previous year (MEC/INEP, 2009).

According to a study by Cornachione Jr., Casa Nova and Trombetta (2007), the attributes that influence the decision of a student to enroll in an online course are mainly institutional (reputation, credibility, etc.), and the course content. This emphasis on the part of students relative to the institution is justified, as a major concern for students is whether it is accredited by the MEC.

Of the available distance courses, the courses offered most are pedagogy (54 courses) and business administration (52 courses). Administration students represent 11% (40,101 students) of the total number of students in the distance education genre (MEC/INEP, 2009). The percentage of students studying accounting is 4% (12,165 students) of the total. Therefore, an appropriate teaching method in a distance accounting course could benefit at least more than 50,000 students who will take classes on accounting, either in accounting or administration courses.

The next section explains the methodological aspects of the work, to clarify how the research was conducted, its methodological classifications, population and research sample, instrument and data collection techniques, and other information.

3. METHODOLOGICAL PROCEDURES

This study is classified according to the framework of Cooper and Schindler (2003) as a formal, ex post facto, descriptive and transverse survey, involving interrogation/communication.

3.1 Operational Definitions and Variables

Based on the research question, it is necessary first to clarify the definition of the terms used, as follows:

a) **Learning Styles,** "are the different ways people learn" (Toms, 2007, p. 10).
b) **Performance:** From the perspective of Petrucci and Batiston (2006, p. 303), classroom assessment for distance education is "[...] the condition of improving the learning process [...] and can identify with greater precision the deficiencies presented by the students." Based on this view of the authors, student performance will be measured by the score given in the face-to-face assessment (test) in the General Accounting and Management Accounting disciplines.
c) **Distance Education:** Is defined as the educational type in which didactic- pedagogical mediation in the educational processes of teaching and learning occurs through the use of information and communication media and technologies, with students and teachers developing educational activities in different places or times (Brasil, 2005).

In this study, learning styles and student performances in distance education courses for the subjects General Accounting and Management Accounting are addressed. As such, the dependent variable (y) is student performance, as measured by the grade received. The independent variable (x) is the learning style, obtained by Kolb's LSI. Figure 1 facilitates comprehension of the study.

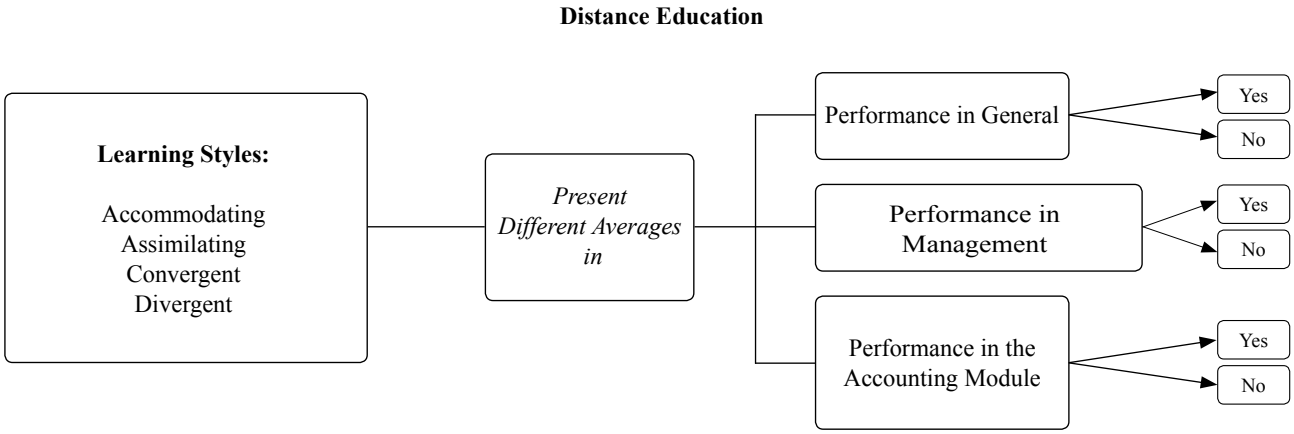


Figure 1 - Diagram of the research
Source: Authors (2010)

The reading of the figure proceeds as follows: within the environment of distance education, the learning styles (Accommodating, Assimilating, Convergent and Divergent) have different performance averages in the General Accounting and Management Accounting disciplines, and lastly in the final performance in the overall Accounting module.

3.2 Population, sample and research instrument

The distance course studied, leading to a bachelor's degree in business administration, is offered by a federal public university. The Accounting module is composed of two classes, General Accounting and Management Accounting.

The population of this study is composed of students actively enrolled at the time of the research, participating in the Accounting module, and who had completed the classroom assessment for General and Management Accounting. Given this limitation of the population, there were a total of 118 students.

However, it is not always possible to conduct a study in which all members of a population are included. Agreeing with this, Hair *et al*. (2005b) clarify that "if a large enough random sample is drawn, then it is possible to make generalizations and statistical inferences about that population." Based on this, starting from the total number of students that comprise the studied population, we proceeded by calculating the sample size for finite populations, using the following formula (Mattos, 2005, p. 322):

$$n = \frac{N \cdot Z^2 \cdot p \cdot q}{e^2 (N-1) + Z^2 \, p \cdot q} \qquad n = \frac{118 \cdot 2^2 \cdot 0{,}5 \cdot 0{,}5}{0{,}05^2 \cdot (118-1) + 2^2 \cdot 0{,}5 \cdot 0{,}5} \qquad n = 91{,}29 \text{ Students}$$

Formula 1 - Calculation of the sample (N= 91.29 students)

Where: N = Population Size. Z = Chosen confidence level, expressed by the number of standard deviations. p = proportion with which the phenomenon occurs. A values p= 0.50 was used. According to Mattar (2005), if there are no previous estimates for *p*, 0.50 is presumed; q = (1-p) is the proportion of non-occurrence of the phenomenon; e = sampling error expressed in the unit variable.

Therefore, it would be necessary to select 92 students (Formula 1) to obtain results representative to the population. We collected 109 valid questionnaires, consistent with the sample size required. The applied questionnaire was divided into three parts (Table 4), the first part included information of a personal nature, the second part questioned the characteristics of distance education and the third applied Kolb's Learning Style Inventory.

Part	Content	References	Scale
Part 1	Personal Information: Name, year of birth, gender, among other aspects.	Cornachione Jr, 2004; Kutay, 2006; Lima, 2007.	Nominal and ordinal
Part 2	How many hours a week do they study and communicate in the distance education course.	Laruccia, 2008; Scremin, 2001.	Nominal and Interval
Part 3	David A. Kolb's LSI	Kolb and Kolb, 2005, LSI 01/03	Ordinal

Chart 4 - Content of the questionnaire

Source: The Authors (2010)

Kolb's LSI is an inventory whose copyright is held by the Hay Group. Therefore, so that it could be applied in this study, we requested authorization from the Hay Group in the United States to apply the LSI in this study. After meeting the requirements of the Hay Group, we obtained permission to administer the questionnaire. Along with this authorization, the Hay Group provided the LSI in the official Portuguese translated version.

Regarding the statistical treatment, the applied variables were analyzed using descriptive and multivariate analysis. The Cronbach's alpha, Kolmogorov-Smirnov and Kruskal-Wallis tests and ANOVA were used. The results are demonstrated in the next section.

4. DATA ANALYSIS

For a better presentation of the data analysis, it is split into four parts. The first is as analysis of the reliability of the instrument used, and the normality tests to determine the use of parametric or nonparametric

statistics. Next, the descriptive analysis is performed to provide information about the sample studied. The third topic covers the analysis of learning styles in the sample and the last topic presents the results of the testing for differences in means in order to detect whether the learning styles show different average performances in the disciplines of General Accounting, Management Accounting, and the Accounting module.

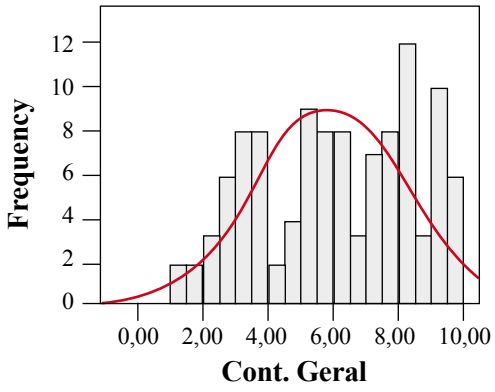
4.1 Reliability test and data normality

Before any analysis, it is necessary to check the internal reliability of the learning style constructs. According to Hair *et al*. (2005b, p. 199), "[...] this kind of reliability is used to evaluate an added range to which several statements (items) are summed to form a total score for a construct." Research aimed toward the testing and confirmation of the reliability and validity of Kolb's instrument has already been conducted and met with success, thus validating the instrument used in this study (Kayes. 2005). However, to increase the reliability of the results within the investigated sample, we applied Cronbach's alpha test.

According to Hair *et al* (2005a), this test should present a result greater than 0.7. The results here show that all the constructs for orienting the learning process had values above the threshold of 0.7 (CE = 0.732, RO = 0.752, AC = 0.759; AE = 0.773), indicating good reliability for internal consistency.

Since the reliability of the instrument that provides the independent variable for this study has been confirmed, we now test the normality of the data for the dependent variable (grade).

Initially, we tested the grades for the General Accounting class, at a significance level (α) of 0.05 (for all tests).



Graph 1 - Histogram on the distribution of grades in general accounting (X = frequency, Y = general accounting)

Source: The Authors (2010)

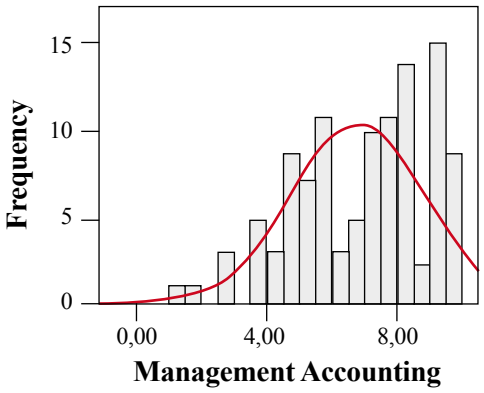
Table 1 - Normality test for general accounting grades

	Kolmogorov-Smirnov (a)			Shapiro-Wilk		
	Statistic	DF	Sig.	Statistic	DF	Sig.
General Accounting Grade	.118	118	**.000**	.952	118	**.000**

Source: The Authors (2010)

Visual inspection of the frequency histogram (Graph 1) and the results of the Kolmogorov-Smirnov test (*sig* <0.05, Table 1) indicated it is not possible to assert that the General Accounting grades are normally distributed.

Extending the normality test to the grades in Management Accounting, we obtained the results shown in Graph 2 and Table 2.



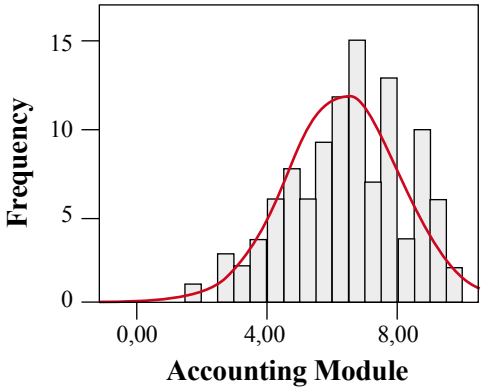
Graph 2 - histogram distribution of notes of management accounting (X = frequency, Y = management accounting)
Source: The Authors (2010)

Table 2 - Normality test of grades in management accounting

	Kolmogorov-Smirnov (a)			Shapiro-Wilk		
	Statistic	DF	Sig.	Statistic	DF	Sig.
Management Accounting Grade	.090	118	**.020**	.963	118	**.002**

Source: The Authors (2010)

Again, the inspection of the graph and the Kolmogorov-Smirnov statistic, at *sig.*<0.05 (Table 2), indicated it is not possible to affirm that the grades show normal distribution. Finally, we tested the normality test of the final grade in the overall Accounting module, which is the arithmetic mean of the results of the general and management accounting exam.



Graph 3 - Histogram of the accounting module grades (X = frequency, Y = accounting module)
Source: The Authors (2010)

Table 3 - Normality test for the grades of the accounting module

	Kolmogorov-Smirnov (a)			Shapiro-Wilk		
	Statistic	DF	Sig.	Statistic	DF	Sig.
Accounting Module	.048	109	**.200**	.983	109	**.193**

Source: The Authors (2010)

In this case, the normality test (Table 3) was *sig* > 0.05, indicating normal distribution of the data.

Therefore, we separately tested the grade from General and Management Accounting using the nonparametric Kruskal Wallis test), while for the overall grade in the Accounting module, it was possible to apply parametric testing (ANOVA).

4.2 Descriptive statistics

As far as age is concerned, Distance Education exhibits a typical feature for this style of education, which is that it presents a higher average age than is found in classroom teaching (Moore and Kearsley, 2008).Further adding to this observation, more than half the students sampled (57%) were between 32 and 46 years of age.

Relative to their having attended another college, 71 said they started another course, but only 21 completed that course. According to Moore and Kearsley (2008), consumers who choose a distance learning program tend to be older and state that lack of time to attend daily classes in a classroom setting, due to family and professional obligations, is the main factor behind this choice.

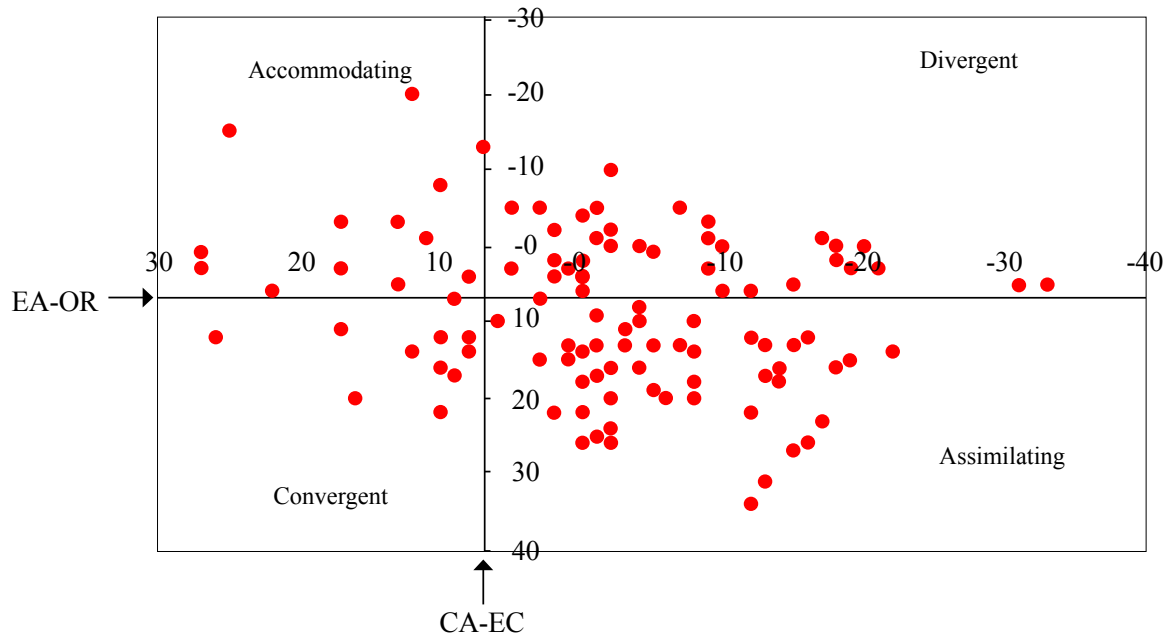
However, this same feature of distance learning concerning the flexible study schedule and the opportunity to study at home is pointed out by Sanchez (2007) as one of the factors of greatest concern, because they facilitate truancy, as this mode of study requires certain skills from students, such as the capacity for organization and concentration. Based on this feature of distance education, we asked the students about the time they devoted to studying the content throughout the week. The responses indicate that students study an average of 10 hours per week, with the lowest reported figure being one hour per week and the highest 30 hours. However, 66% of the surveyed students reported studying up to 10 hours per week.

When asked which principal resource they used to resolve their doubts, consulting the Internet was the alternative that presented the greatest frequency of responses, with 40 replies (36.7%). In this respect, Laruccia and Marcelino (2008, p.12) state that the Internet is an environment "[...] conducive to an exercise in education, the user/student interacts, reinvents a text, reconstructs a thought, develops skills, in short, they can construct new knowledge." However, the authors emphasize the concern with checking the reliability of materials, as some sites can contain information that is not accurate, and conclude by stating that if there is mediation on the part of teachers or tutors, the Internet can contribute to a student's learning.

Relative to the communication with other participants in the distance education learning process, the respondents showed greater communication with tutors and students of the course, being that with students and tutors this communication was indicated as moderate to high, while communication with teachers was indicated as from moderate to very low. These results are consistent with those obtained by Laruccia (2008).

4.3 Analysis of learning styles

Once the reliability of the constructs has been confirmed, one may analyze the data to discover the learning styles. Accordingly, after investigating the results of the LSIs answered by the students, we found that 48 students were of the Assimilating style (44%), 37 in the Divergent category (34%), 14 in the Accommodating category (13%), and 10 in the Convergent (9%).



Graph 4 - Graphic distribution of learning styles

Source: The Authors (2010)

As can be seen (Figure 4), there was a predominance of the Assimilating learning style and, secondly, the Divergent. This finding corresponds with the results obtained by Cerqueira (2000), Loo (2002), Kolb and Kolb (2005), and Tanner and Morgan (2007) for students in the field of business, accounting and administration.

When analyzing both the Assimilating and Divergent styles together, these represented the learning styles of 78% of the students, which can serve as a yardstick to help in preparing teaching materials and lessons.

4.4 Learning style vs. performance

We now consider whether there is a difference in the performance of students according to learning style, so as to answer the research question. Recalling that since there are two different evaluations of content, one being the result for General Accounting and the other for Management Accounting, we performed the tests separately and for these two disciplines and then tested the final average of the Accounting module.

Starting the analysis through descriptive statistics, from Table 4 it can be seen that the results for the Assimilating learning style showed a higher average performance in the General Accounting evaluation, as the average presented for this style was 6.16.

Table 4 - Descriptive statistics of the general accounting performances and learning style.

Learning Styles	N	Mean	Std Deviation	Std error	95% Confidence Interval for Mean		Min	Max
					Upper Bound	Lower Bound		
Accommodating	14	5.7929	2.3715	0.6338	4.4236	7.1621	1.50	9.20
Assimilating	48	6.1563	**2.4290**	0.3506	5.4509	**6.8616**	**2.00**	**10.00**
Convergent	10	5.7400	**2.7011**	0.8542	3.8077	**7.6723**	**1.40**	**9.00**
Divergent	37	6.1081	**2.3736**	0.3902	5.3167	**6.8995**	**1/20**	**10.00**
Total	**109**	**6.0550**	**2.3988**	**0.2298**	**5.5996**	**6.5105**	**1.2**	**10**

Source: The Authors (2010)

As can be seen, there is apparently a difference between the averages of the Assimilating and Divergent styles in relation to the Accommodating and Convergent styles. However, the initial analysis alone is not sufficient to determine whether there is a statistically significant difference between the averages of the learning styles.

Therefore, we used the nonparametric test of Kruskal Wallis, which allows determining the difference between the means of three or more groups. By using this test it is possible to establish whether the learning styles reveal different average performances in the General Accounting evaluation. The results obtained from the test are shown in Tables 5 and 6.

Table 5 - Ranks - Kruskall wallis for general accounting

	Learning Style	N	Mean Rank
General Accounting Grade	Accommodating	(14)	51.71
	Assimilating	48	56.11
	Convergent	10	51.80
	Divergent	37	55.66
	Total	109	

Source: The Authors (2010)

Table 6 - Kruskall wallis for general accounting

	General Accounting Grade
Chi-Square	.330
DF	3
Asymp. Sig.	**.954**

Source: The Authors (2010)

The test result (Table 6) was *sig* > 0.05, indicating a statistically significant difference in students' performance according to learning style in the discipline of General Accounting. This result demonstrates that even when the education of these students occurs at a distance, one cannot confirm that a specific learning style demonstrated any difference in performance as compared to other styles.

For the Management Accounting discipline, the descriptive statistics are shown in Table 7 below.

Table 7 - Statistics of performance in management accounting and learning styles

	N	Mean	Std	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Accommodating	(14)	6.0214	2.2351	0.5974	4.7309	7.3119	2.7	10
Assimilating	48	7.2792	2.2787	0.3289	6.6175	7.9408	1.1	10
Convergent	10	6.5100	2.1356	0.6754	4.9822	8.0378	2.9	9.2
Divergent	37	6.8514	1.6870	0.2773	6.2889	7.4138	3.9	10
Total	**109**	**6.9018**	**2.0901**	**0.2002**	**6.5050**	**7.2987**	**1.1**	**10**

Source: The Authors (2010)

It can be seen in Table 7 that the Assimilating learning style again presented the highest average performance among the four types at 7.279. The Accommodating and Convergent styles again had lower averages than the Divergent and Assimilating styles, as occurred in General Accounting.

Next, to statistically determine if there is a difference between the performances of the learning styles, we applied the nonparametric Kruskal Wallis test.

Table 8 - Ranks - Kruskall wallis for management accounting

	Learning Style	N	Mean Rank
Management Accounting Grade	Accommodating	14	41.39
	Assimilating	48	62.19
	Convergent	10	50.25
	Divergent	37	52.11
	Total	109	

Source: The Authors (2010)

Table 9 - Kruskall wallis for management accounting

	Managerial Accounting Grade
Chi-Square	5.630
DF	3
Asymp. Sig.	**.131**

Source: The Authors (2010)

The test results show that it cannot be said there is a statistically significant difference between the grades obtained due to difference in the students' learning styles, because the results show *sig* > 0.05 (Table 9).

After testing the individual disciplines, the final average of the Accounting module was tested last. Initially, we calculated the descriptive statistics to assess the performance of the four learning styles (Table 10).

Table 10 - Descriptive statistics of the performance in the accounting module

	N	Mean	Std Deviation	Std error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Accommodating	14	5,9071	1,9310	0,5161	4,7922	7,0221	2,7	9,1
Assimilating	48	6,7177	**1,8700**	0,2699	6,1747	**7,2607**	**1,75**	**9,6**
Convergent	10	6,1250	**1,7922**	0,5667	4,8430	**7,4070**	**3,15**	**8,6**
Divergent	37	6,4797	**1,6148**	0,2655	5,9413	**7,0181**	**2,85**	**9,8**
Total	**109**	**6,4784**	**1,7852**	**0,1710**	**6,1395**	**6,8174**	**1,75**	**9,8**

Source: The Authors (2010)

After determining that the data for the average of the Accounting module presented a normal distribution, we applied one-way analysis of variance (ANOVA). These test results are displayed in Tables 11 and 12.

Table 11 - Test for homogeneity of variances - anova for the accounting module grade

Levene Statistic	df1	Df2	Sig.
626	3	105	600

Source: The Authors (2010)

Table 12 - Anova for the accounting module grade

	Sum of Squares	DF	Mean Square	F	Sig.
Between Groups	8.567	3	2.856	.893	**.447**
Within Groups	335.615	105	3.196		
Total	344.182	108			

Source: The Authors (2010)

The analysis of variance (ANOVA) obtained a significance value of *sig* > 0.05 (Table 12), thus we cannot affirm there are significant differences for the performance of learning styles in the Accounting module.

The results obtained in this study allowed us to verify that different learning styles did significantly affect the performance averages in the disciplines of General and Management Accounting for the distance learning mode. Therefore, it can be said that the learning style, analyzed separately as in the study in question, did not present different performance averages.

5. FINAL CONSIDERATIONS

In linear development of the activities seeking to answer the question posed in this study, we began by identifying the learning styles of students using the Learning Style Inventory develop by Kolb. With the results obtained, we can confirm the predominance of the Assimilating style, characteristic of students who appreciate ideas and theories, and do not require experimentation in order to internalize knowledge. They can do so only by reflective observation. This larger frequency of the Assimilating style finds support in the literature on learning styles, in which the predominance of the style found in the researched area was reported (Kolb and Kolb, 2005; Loo, 2002).

However, it was the objective of this study to verify whether the learning styles of the students provided different performance results (final class grades) for General Accounting, Management Accounting, and the overall Accounting module.

The results demonstrate that the performance of students in the discipline of General Accounting are not different according to learning style, since we could not find statistical evidence to suggest there are significant differences between the learning styles in the General Accounting evaluation. Although the Assimilating and Divergent styles showed higher average performances than the other styles, we cannot affirm they are statistically different.

When analyzing the performance of students in the discipline of Management Accounting, we also noted there was no difference in performance averages according to learning styles, because it was not possible to determine better performance for any one style, as demonstrated the lack of statistical significance. The absence of differing averages between the styles was also found by Fox and Bartholomae (1999), who obtained the same result in research conducted with students in a finance course given through a distance module.

By analyzing the average of the overall Accounting module, comprised of the average of the General and Management accounting evaluations, we found no statistical evidence that demonstrates different performance averages for the learning styles. The results follow those found by Leite *et al*. (2008), who could not confirm that any one learning style performed significantly different from the others in accounting disciplines.

One limitation of this study is that the results obtained are related to business students who took the two accounting classes studied. The results may differ significantly for students with other majors or among business students in other subjects. We also recommend further research be conducted involving the influence of learning styles on performance, but including new variables in the study, such as the influence of the technological tools used in the process of distance education, motivational aspects of the students (Wooten, 1998), professional activities, prior knowledge (Byrne and Flood, 2008; Turner, Holmes and Wiggins, 1997), performance in objective and essay questions, as well as other items.

REFERÊNCIAS

BRASIL. Decreto n. 5.622. Regulamenta o art. 80 da Lei nº 9.394, que estabelece as diretrizes e bases da educação nacional. **Diário Oficial da República**, Brasília, DF, Dec 20, 2005.

BYRNE, Marann; FLOOD, Barbara. Examining the relationships among background variables and academic performance of first year accounting students at an Irish University. **Journal of Accounting Education**, United States, v. 26, n. 4, p. 202-212, 2008.

CERQUEIRA, Teresa Cristina Siqueira. **Estilos de aprendizagem em universitários**. Tese (Doutorado em Educação) – Faculdade de Educação, Universidade Estadual de Campinas. Campinas, 2000.

COFFIELD, F. et al. Learning styles and pedagogy in post-16 learning: a systematic and critical review. London: LSRC, 2004. Available at: <https://crm.lsnlearning.org.uk/user/order.aspx?code=041543>. Consulted on: 01/7/2008.

COOPER, D.R.; SCHINDLER, P.S. **Métodos de pesquisa em Administração**. 7. ed. Porto Alegre: Bookman, 2003.

CORNACHIONE JR, E. B. **Tecnologia da educação e cursos de ciências contábeis:** modelos colaborativos virtuais. Tese (Livre Docência) – Faculdade de Economia, Administração e Contabilidade, Universidade de São Paulo. São Paulo, 2004.

CORNACHIONE JR, E. B. **Physiological interface in online learning enviroments:** vocal expresssion as na anxiety indicator. Tese (PhD) – University of Illinois. Urbana-Champaign, 2008.

CORNACHIONE JR, E. B,; CASA NOVA, Silvia Pereira de Castro; TROMBETTA, Maria Rosa. Educação on-line em contabilidade: propensão e aspectos curriculares. **Revista Contabilidade & Finanças** (Impresso), v. 18, p. 9-21, 2007.

CORNACHIONE JR, E.B.; SILVA, Matheus da. Tecnologia da Educação: análises envolvendo experimentos a distância e presenciais em disciplinas de cursos de contabilidade. **Contabilidade Vista & Revista**, Belo Horizonte, v. 13, n.1, p. 57-92, 2002.

FERRAZ, Ana Paula do C. M. **Instrumento para facilitar o processo de planejamento e desenvolvimento de materiais instrucionais para a modalidade a distância**. Tese (Doutorado em Engenharia de Produção) - Escola de Engenharia de São Carlos, Universidade de São Paulo. São Carlos, 2008.

FOX, Jonathan; BARTHOLOMAE, Suzanne. Student learning style and educational outcomes: evidence from a family financial management course. **Financial Services Review**, DeLand, n. 8, p. 235 – 251, 1999.

FREITAS, A. S. de; BERTRAND, H. Ensino à Distância no Brasil: avaliação de uma parceria universidade-empresa. In: ENANPAD, 30, 2006, Salvador. **Anais..**. Salvador: ANPAD, 2006. CD-ROM.

HAIR JR, Joseph F. et al. **Análise multivariada de dados**. 5. ed. Porto Alegre: Bookman, 2005a.

HAIR JR, Joseph F. et al. **Métodos de pesquisa em Administração**. Porto Alegre: Bookman, 2005b.

KAYES, D. C. Internal validity and reliability of Kolb's learning style inventory version 3 (1999). **Journal of Business and Psychology**, v. 20, n. 2, p. 249-257, dec. 2005.

KOLB, Alice Y.; KOLB, David A.; The Kolb learning style inventory version 3.1 2005: Technical Specifications. London: Hay Group, 2005. Available at: <http://www.learningfromexperience.com>. Consulted on: 08/24/2008.

KOLB, David A. **Experiential learning:** experience as the source of learning and development. New Jersey: Prentice Hall, 1984.

KUTAY, Huban. **A comparative study about learning styles preferences of two cultures**. Tese (PhD em Educação)–College of Education, The Ohio State University, Columbus, 2006.

LARUCCIA, Mauro Maia. A Educação a distância e as tecnologias de informação e comunicação (TIC). In: SEMEAD, XI, 2008, São Paulo. **Anais**... São Paulo: USP, 2008.

LARUCCIA, Mauro Maia; MARCELINO, Silvia de Castro. Ensaio sobre a informação e conhecimento na internet. In: SEMEAD, XI, 2008, São Paulo. **Anais**... São Paulo: USP, 2008.

LEITÃO, Monique Bezerra Paz. **Estilos de aprendizagem sob a ótica da psicologia evolucionista**. Dissertação (Mestrado em Psicobiologia) – Departamento de Fisiologia, Universidade Federal do Rio Grande do Norte. Natal, 2006.

LEITE FILHO, Geraldo A. et al. Estilos de aprendizagem x desempenho acadêmico – uma aplicação do teste de Kolb em acadêmicos no curso de ciências contábeis. In: CONGRESSO USP DE CONTROLADORIA E CONTABILIDADE, 8, 2008, São Paulo. **Anais**... USP, 2008.

LIMA, Angelita I. A. de O. **Estilos de aprendizagem segundo os postulados de David Kolb:** uma experiência no curso de odontologia da UNOESTE. Dissertação (Mestrado em Educação) – Departamento de Educação, Universidade do Oeste Paulista, Presidente Prudente, 2007.

LOO, Robert. A meta-analytic examination of Kolb's learning style preferences among business majors. **Journal of Education for Business**, v. 77, n. 5, p. 252-256, 2002.

MANOCHEHR, Naser-Nick. The influence of learning styles on learners in E-learning environments: an empirical study. **Journal Computers in Higher Education Economics Review**. Bristol, 18, 1, p. 10-14, 2006.

MARTINS, W. et al. Estilos de aprendizagem em educação a distância. In: CONGRESSO INTERNACIONAL ABED DE EDUCAÇÃO A DISTÂNCIA, 10º, 2003, Porto Alegre. **Anais**... Porto Alegre: ABED, 2003.

MATTAR, F. N. **Pesquisa de marketing**. 6. ed. São Paulo: Atlas, 2005.

MEC/INEP. **Resumo técnico censo da educação superior 2007**. Brasília: MEC/INEP, 2009.

MOORE, Michael; KEARSLEY, Greg. **Educação a distância:** uma visão integrada. São Paulo: Cengage Learning, 2008.

PETRUCCI, Valéria B. C.; BATISTON, Renato R. Estratégias de ensino e avaliação de aprendizagem em contabilidade. In: PELEIAS, I. R. (org.). **Didática do Ensino da Contabilidade:** aplicável a outros cursos superiores. São Paulo: Saraiva, 2006.

PRETI, Oreste. Educação a distância: uma prática educativa mediadora e mediatizada. In: PRETI, Oreste (org.) **Educação a distância:** inícios e indícios de um percurso. Cuiabá: EDUFMT/NEAD, 1996.

PUNGENTE, M.D.; WASAN, K. M.; MOFFETT, C. Using learning style to evaluate first-year pharmacy students' preferences toward different activities associated with the problem-based learning approach. **American Journal of Pharmaceutical Education**, Alexandria (Virginia – EUA), v. 66, n. 2, p. 119-124, summer 2002.

SANCHEZ, Fábio (Coord). **Anuário brasileiro estatístico de educação aberta e a distância**, 2007. 3. ed. São Paulo: Instituto Monitor, 2007.

SCREMIN, Sandra Margarete Bastianello. **Educação a distância: uma possibilidade na educação profissional básica**. Dissertação (Mestrado em Engenharia de Produção) – Departamento de Engenharia de Produção, Universidade Federal de Santa Catarina, Florianópolis, 2001.

SILVA, Denise Mendes da. **O impacto dos estilos de aprendizagem no ensino de Contabilidade na FEA-RP/USP**. Dissertação (Mestrado em Controladoria e Contabilidade) – Departamento de Contabilidade e Atuária, Universidade de São Paulo, São Paulo, 2006.

TANNER, Raquel Cristina Silva; MORGAN, Beatriz Fátima. Estilos de aprendizagem em universitários: uma análise sobre os alunos das disciplinas de contabilidade geral I e introdução à contabilidade na universidade de Brasília. In: CONGRESSO USP DE CONTROLADORIA E CONTABILIDADE, 7º, 2007, São Paulo. **Anais**... São Paulo: USP, 2007.

TOMS, William M. **Exploring the relationship between Kolb´s learning styles and TLP leadership styles in the New Jersey State Police:** a correlation study. Tese (Doutorado em Educação) – The Graduate School of Education and Human Development, George Washington University, Washington (D.C.), 2007.

TURNER, J. L.; HOLMES, S. A.; WIGGINS, C. E. Factors associated with grades in intermediate accounting. **Journal of Accounting Education**, v. 15, n. 2, p. 269-288, 1997.

VALENTE, Nelma Terezinha Z. et al. Análise dos estilos de aprendizagem dos alunos e professores do curso de graduação em ciências contábeis de uma universidade pública do estado do Paraná com a aplicação do inventário de David Kolb. In: ENANPAD, 30, 2006, Salvador. **Anais..**. Salvador: ANPAD, 2006. CD-ROM.

WOOTEN, Thomas C. Factors influencing student learning in introductory accounting classes: a comparison of traditional and nontraditional students. **Issues in Accounting Education**, v.13, n. 2, p. 357-373, May. 1998.