

## Problem Solving Styles, Approaches to Learning and Academic Performance of Spanish Accounting Students: An Exploratory Study of Profiles and Relationships.

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### ABSTRACT:

**Background.** Entwistle Students' Approaches to Learning framework and Kolb's Experiential Learning Model has been widely used in higher education. Different inventories have been developed in order to adapt to different contexts and / or to supersede reported weakness.

**Aims.** This paper aims to explore the profiles and approaches showed by a sample of Spanish accounting students as well as the relationship of those profiles with the academic performance.

**Instrument and Sample.** The instrument consists of both the short version of the Study Process Questionnaire (SPQ; Fox et al, 2001) and the Problem Solving Style Questionnaire (PSSQ, Romero et al, 1992). The sample is composed by the students enrolled in advanced financial accounting and financial statement analysis during the 2005-06 academic course at the University of Sevilla.

**Results.** Contrariwise to reported results in our area, but in different countries, Spanish accounting students mainly present diverger learning style, followed by assimilator style. A strong, negative correlation is found between the score on surface approach and the academic performance in the accounting courses. Although there is no difference in grades by style preference, there is a positive correlation in the score CE-AC, which suggest that students scoring high to abstract conceptualization pole tend to obtain higher grades.

**KEYWORDS:** Learning styles, PSSQ, Approaches to learning, SPQ, Kolb.

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### 1. INTRODUCTION

Students' approach to learning (SAL) is a conceptual framework derived from the work of Marton and Säljö (1976). As Biggs et al (2001) indicate, an approach to learning describes the nature of the relationship between student, content and task. The choice an individual could make is usually categorized into two basic strategies (Byrne et al, 2004b): deep level processing and surface level processing. Many instruments are based upon SAL framework. From the initial 64 items Approaches to Studying Inventory, ASI, (Entwistle et al, 1979) to the 44 items version (Entwistle and Tait, 1995), and the further developments of Biggs (1985), all of them maintain those basic approaches. Later developments reduced the number of items in order to obtain instruments easy to use along with other instruments. The two factors Study Process Questionnaire (SPQ)

(Biggs et al 2001), the shortened SPQ (Fox et al, 2001) and the N-SPQ-3f (Fernández-Polvillo & Arquero, 2015) could be included in this last group.

When adopting a deep approach, students try to extract meanings from the contents and tasks, relating the content with other knowledge, real situations, etc. In the other hand, when adopting a surface approach, the aim of the students is merely instrumental (to pass the subject) and, therefore, students try just to reproduce the material (Lucas, 2001).

Our research uses the Problem Solving Style Questionnaire (PSSQ) and the shortened version of SPQ (Fox et al, 2001), exploring profiles and relationships.

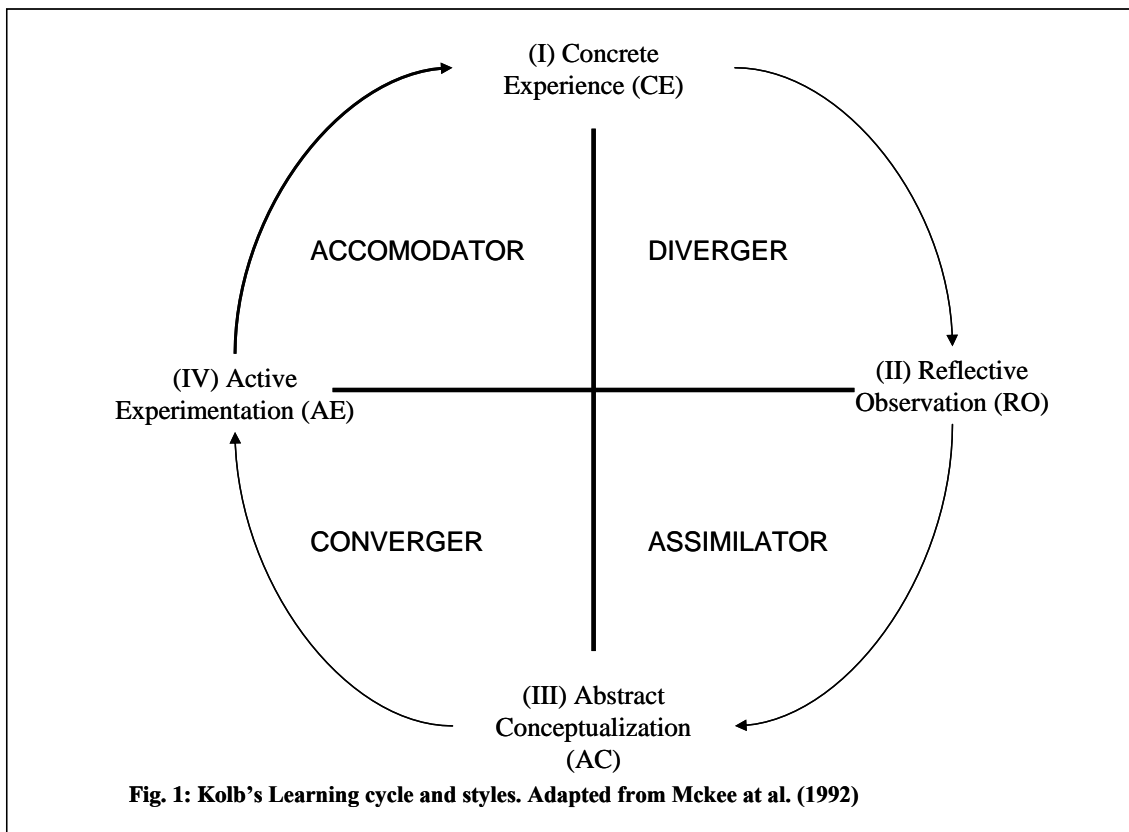
The paper is structured as follows: Learning styles (ELM) and approaches to learning framework are presented, as well as the most used inventories. Sample and results section present the main results obtained; ending with the conclusion, extensions and limitations section.

## **2. LEARNING STYLES AND APPROACHES TO LEARNING**

### **2.1. Learning styles and Kolb's Experiential Learning Model**

Previous research has associated learning styles (in terms of Kolb's Experiential Learning Model –ELM-) to student performance, professional orientation and experience or career choice (Baker et al., 1986; Collins & Milliron, 1987; Brown & Burke, 1987) performance in specific scenarios (Bostrom, Olfman & Sein, 1990) even differences between countries (McKee et al. 1992).

Kolb's learning style inventory (1976, 1984, 1985) was commonly used in higher and further education. The ELM could be classified as focused in information processing (Curry, 1987) and learning centred (Rayner & Riding, 1997). This model proposes (following Cassidy, 2004) a four stage learning cycle, where individuals show a preference in a continuous and interactive process. These four stages are concrete experience (CE, experiencing), abstract conceptualization (AC, thinking), active experimentation (AE, doing) and reflective observation (RO, reflecting). Those four stages form two dimensions: prehension defined by the bipolar dimension CE-AC (experiencing-thinking) and transformation AE-RO (doing-reflecting). The position of an individual along those dimensions allows classifying his/her learning styles as converger, diverger, assimilator or accommodator (see figure 1)



Following Baker et al (1986), the converger's dominant learning abilities are abstract conceptualization (AC) and active experimentation (AE). Convergents prefer the practical application of ideas, perform well in typical intelligence test, are able to apply hypothetico-deductive reasoning, and tend to prefer working with things rather than with people. Divergers are the opposite, learns though concrete experience (CE) and reflective observation (RO). Imaginative, they have broad cultural interests. The assimilator learning preferences are abstract conceptualization (AC) and reflective observation (RO). Strongly theory driven, inductive reasoning is their strong point. On the other side, assimilators like to do things. They solve problems on a trial and error manner.

Alternatives, based on the ELM, were developed to supersede limitations or to adapt to certain contexts. Honey & Mumford's Learning Styles Questionnaire (LSQ, 1992) was clearly focused and developed for managerial context. However, many research studies raised limitations of LSQ and LSI due to weakness in their psychometric properties (Stout & Ruble, 1991a-b, 1994; Swailes & Senior, 1999; Duff & Duffy, 2002; Duff, 2004a).

Romero et al (1992) developed a new instrument, the Problem Solving Style Questionnaire (PSSQ) also grounded in ELM, eliminating the ipsativity problem raised by Stout and Ruble (1994) and showing adequate validity and reliability properties (Tepper et al, 1993). PSSQ consist of 14 items; seven for each dimension (AC-CE abstract conceptualization – concrete experience and AE-RO active experimentation – reflective observation). Each item must be responded in a 6 points scale between two self-descriptive statement anchors. The six points scale was chosen in order to force the election between statements; also, two items per scale are reflected to reduce

acquiescence. The internal consistency reported in Tepper et al (1993) is 0.76 for AE-RO scale and 0.74 for AC-CE dimensions.

## 2.2. Approaches to learning

Approaches to learning were developed from an early qualitative research (Marton & Säljö, 1976) which, from a phenomenological perspective tried to understand learning processes by asses students' experience of learning and the ways in which they make sense of the individual approach to the task prescribed in their courses (Duff, 2004).

Hall et al (2004) highlight the different main sources from which recent research has been developed: the Lancaster group (Entwistle & Wilson, 1970; Entwistle et al, 1974), the Australian group (Biggs, 1978, 1987), the Swedish group (Marton & Säljö, 1976) and the Richmond group (Pask, 1976). Some of those researchers adopted quantitative methods, resulting on inventories and instruments -Entwistle et al. and Biggs- that became widespread used in higher education.

All that body of research identified to main approaches to learning: surface and deep approach.

A student taking a surface approach acquire the knowledge needed to pass the subject or the task, relies on memorisation and do not try to connect concepts "learned" with previous knowledge, or to look for implications. Hall et al. (2004) indicate that surface approach is externally and assessment focused and tends to result in low engagement with the subject.

Contrariwise, deep approach is defined by a personal interest in learning. The student looks for meaning and tries to connect new knowledge with previous concepts. In many aspects, deep and surface approaches are similar to rote and meaningful learning as defined by constructivists (Ausubel, 1968). Characteristics of both approaches could be summarized as follows:

**Table 1: Characteristics associated to approaches.**

<i>Deep approach</i>	<i>Surface approach</i>
o Personal desire to understand the subjects	o Merely reproduction of parts of the subject is satisfactory
o Strong and critical interaction with contents	o Passive acceptance of ideas and information
o Subject is related with prior knowledge and experiences	o Assessment requirements drive the desire for subject knowledge
o Ideas are integrated by using organising principles	o No learning plan or strategy
o Evidence is related to conclusions	o Memorisation of facts and procedures
o The logic of conclusions is examined	o Failure to recognise guiding principles

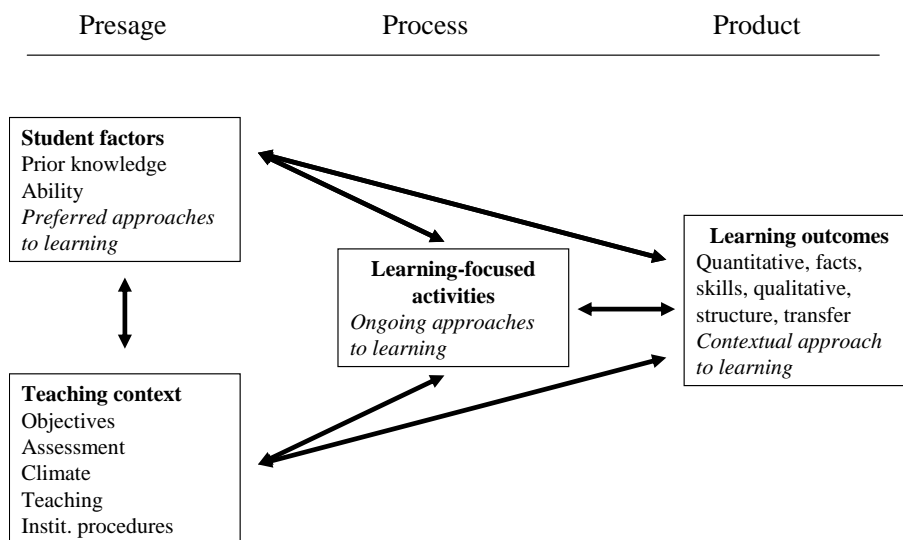
Adapted from Hassall & Joyce (2001)

As Duff (2004c) notes, a key finding is that students' approach to learning is not only due to personal characteristics, but reflects, at least in part, their response to their

perception of the learning environment (actual and past). This continuous influence between contextual factors, personal characteristics and approach could be represented in the 3P model of teaching and learning (figure 2, adapted from Biggs et al. 2001).

- *Approaches to Studying Inventory, ASI.*

Following Duff (2004c), ASI (Entwistle et al., 1979) as been one of the most widely used instruments in higher education (see Duff, 2004b for a review). The original inventory was revised in depth in the early 90's. Revised ASI consisted of 60 items, measuring five dimensions: deep, surface, strategic, apathetic and strategic approaches, plus academic attitude. A reduced 38 items version (Entwistle & Entwistle, 1991) was developed, including five dimensions: deep, surface and strategic approaches, lack of direction and academic self-confidence. The 1995 version (Tait & Entwistle, 1995) consisted of 44 items and added a sixth dimensions over the former version: metacognitive awareness. Finally a 30 items reduced version of 1995 RASI focuses in the three main dimensions: deep, surface and strategic approach (see Duff, 1999).



**Fig. 2. The 3P model of teaching and learning (Source: Biggs et al, 2001)**

The last version of ASI is the Approaches and Study Skills Inventory for Students (ASSIST, 1997; Tait et al, 1998). It measures, from a 52 items instrument, three dimensions or main scales: deep, strategic and instrumental (surface apathetic) approaches.

Strategic approach (Entwistle & Ramsden, 1983) is associated with students primarily concerned with obtaining the highest grades, using deep and / or surface when appropriate and having a competitive and vocational motivation. Therefore, students following strategic approach are able to work effectively and regularly, to organise time and effort to obtain the maximum effects and to check progress to ensure the achievement of aims (Byrne et al, 2002a)

- *Study Processes Questionnaire, SPQ.*

As Cassidy (2004) notes, SPQ is a further development of Entwistle's model, by Biggs (1985). SPQ in the original versions (1985, 1987), consists of 42 items, resulting in 6 subscales: the three approaches (surface, deep, achieving) where each approach is comprised of a motive and strategy component (Gow et al, 1994). Later versions of SPQ are the revised two factors SPQ (Biggs et al, 2001), where two approaches (deep and surface) are presented by motive and strategy components and the shortened 18 items version of SPQ (Fox et al, 2001) that keeps the original three approaches by two components.

**Table 2: SPQ constructs; Summary description**

<i>Approach</i>	<i>Motivation</i>	<i>Process (strategy)</i>
<i>Surface</i>	Fear of failure	Narrow target
	Desire to complete their course of study	Rote learning of facts and ideas
		Focusing on task components in isolation
<i>Deep</i>	Intrinsic interest in the subject	Little real interest in content
	Vocational relevance	Maximise meaning
	Personal understanding	Relate ideas to evidence
		Integration of material across courses
<i>Achieving</i>	Achieving high grades	Identifying general principles
	Competing with others to be successful	Effective use of space & time
		Use any technique that achieves highest grades
		Level of understanding patchy and variable

Adapted from Fox et al (2001) and Biggs et al (2001).

Confirmatory factor and reliability analysis of 18 items version of SPQ reported by Fox et al (2001) indicates adequate properties of the instrument. One of the main rationales for a short version of an instrument is to make it easier to administer along with other scale in a larger questionnaire; however, the long version of SPQ is preferred for individual assessment.

### 3. SAMPLE AND RESULTS

Actual sample consist of 68 students at enrolled in Advanced Financial Accounting / Financial Statement Analysis, compulsory subjects, taught during 1st and 2nd terms of the 4th course in the University of Seville. The instruments consisted of a self administered questionnaire containing the SPQ 18 and the PSSQ. In order to pair data from questionnaires with grades, obtained from university databases, as well as data from

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subsequent surveys, students were asked to indicate the number of their ID card in the questionnaire.

Regarding the distribution of students by learning style, as table 3 indicates, the highest proportion of students could be labelled as diverger (50%) with a 23.5% of students presenting an assimilator style. Converger type is only presented by 10% of the respondents.

**Table 3: Learning style (PSSQ)**

	<i>Percentage</i>
Diverger	50,0
Converger	10,3
Accommodator	16,2
Assimilator	23,5
Total	100,0

This distribution of styles is in contrast with results provided by Duff (2004a), who found accounting students to be predominantly converger, whilst business students presenting diverger style; and Brown & Burke (1987), that found convergent style to be the most usual for accounting students; with an increasing preference for it the exposure to accounting education and related work experience was higher. This conclusion was supported by Collins & Milliron (1987), which reported 50% of accounting staff and 61% of accounting managers to show converger learning style. The contrast of our results with previous research is even higher given that our results indicate no significant variation on styles due to exposure to relevant work experience / placements.

Descriptive statistics for the results of SPQ are provided in table 4.

**Table 4: Descriptives, SPQ constructs**

	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Asymmetry</i>	<i>Kurtosis</i>
SPQ Achiev. Motive	3	15	8,96	2,59	-0,18	0,22
SPQ Achiev. Strat.	4	15	10,46	2,42	-0,20	-0,20
SPQ Achieving	10	29	19,41	4,03	0,02	0,05
SPQ Deep Motive	5	15	10,75	2,23	-0,61	-0,11
SPQ Deep Strat.	7	15	10,51	1,93	0,22	-0,60
SPQ Deep	13	29	21,21	3,48	-0,19	-0,17
SPQ Surface Motive	7	15	11,49	2,33	-0,34	-0,76
SPQ Surface Strat	4	15	8,60	2,14	0,75	0,90
SPQ Surface	11	28	20,01	3,44	-0,11	-0,34

As the research was developed before the 2<sup>nd</sup> term was ended, only one grade was available: Financial Accounting III. In order to test relationships between approaches to learning and learning styles with grades, a cluster analysis (as done by Byrne et al., 2004) was performed, obtaining two groups of students. The number of students in each group as well as the average grade of each cluster is shown in table 5.

**Table 5: Descriptive for clusters**

	Cluster	
	1 Low grades	2 High grades
n	38	35
Av. grade	4,11	7,22

If the predominant learning styles, at higher courses, are, in certain way, associated with academic success; it could be expected to find different distributions of learning styles between the clusters. As table 6 indicates, there are no significant differences (Chi square test) between students with high grades and students with low grades.

**Table 6: Contingency table learning style by grades**

PSSQ	low grades	high grades	total
Diverger	48%	48%	48%
Converger	9%	8%	8%
Accommodator	17%	16%	17%
Assimilator	26%	28%	27%
	100%	100%	100%

The differences with results in table 3 are due to some differences in the sample (some students did not indicate their ID, therefore are not assigned to any cluster)

In the same line, comparisons of approaches to learning by grade cluster are presented in table 7. Successful students present no differences in achieving and deep approaches to low grades students. Only surface approach appears to be related with grades.

**Table 7: Approaches to learning by grade**

		N	Mean	Std. Dev.	T-test sig.
SPQ_AM	low grades	23	8,83	2,59	n.s.
	high grades	25	9,36	2,55	
SPQ_AS	low grades	23	10,61	2,06	n.s.
	high grades	25	10,68	2,72	
SPQ_A	low grades	23	19,43	3,40	n.s.
	high grades	25	20,04	4,69	
SPQ_DM	low grades	23	10,96	2,06	n.s.
	high grades	25	10,48	2,37	
SPQ_DS	low grades	22	10,68	1,62	n.s.
	high grades	25	10,32	2,30	
SPQ_D	low grades	22	21,50	3,23	n.s.
	high grades	25	20,80	3,89	
SPQ_SM	low grades	23	12,17	2,15	0,08
	high grades	24	11,08	2,12	
SPQ_SS	low grades	23	9,35	2,06	n.s.
	high grades	25	8,56	2,29	
SPQ_S	low grades	23	21,52	3,15	0,026
	high grades	24	19,42	3,12	



Students in the low grades cluster score higher in surface approach than their colleagues. Those results are partially consistent with results reported in the literature, given that no relationship appeared between deep approach and academic success.

The results of a correlation analysis (table 8) confirm the results above. Only surface approach scores show significant coefficients. The sign of the correlation is, as expected, negative and quite strong (42%). It is to be noted that the score in the concrete experience (CE) – abstract conceptualization (AC) dimension appears to be related with the grades. Higher scores on the CE-AC dimension, that means more acute abstract conceptualization preference, are strongly related with higher grades.

#### **4. DISCUSSION**

This paper aimed to explore the learning style profiles and approaches to learning showed by a sample of Spanish accounting students as well as the relationship of those profiles with academic performance.

The instruments used were the short version of the Study Process Questionnaire (SPQ; Fox et al, 2001), to explore the approaches to learning and the Problem Solving Style Questionnaire (PSSQ, Romero et al, 1992) for learning styles.

PSSQ was selected instead other more popular ELM based instruments due to the reported weaknesses of most used inventories. Shorter versions of SPQ was preferred to longer versions (such as ASSIST) in order to avoid excessive length for the questionnaire, which included both instruments.

Regarding the distribution of students by learning style, the highest proportion of students could present the diverger style (50%), followed by 23.5% of students presenting an assimilator style. Converger type is presented only by 10% of students. Those results are in contrast with reported results, which indicate converger as the most usual style for accounting students. Association between grades and styles was found, although students scoring high in the concrete experience (CE) – abstract conceptualization (AC) dimension tend to obtain higher grades.

Regarding approaches to learning; students obtaining lower grades scores significantly higher in surface approach. This result is confirmed in the correlation analysis, which shows a strong negative correlation between scores in surface approach and grades and is consistent with theoretical framework and reported results. However, no relationship appeared between any of the other two approaches and academic success.

Table 8. Correlation analysis

	SPQ_AS	SPQ_A	SPQ_DM	SPQ_DS	SPQ_D	SPQ_SM	SPQ_SS	SPQ_S	PSSQ_CVA	PSSQ_RVA	Grade
SPQ_AM	Corr. Coef. 33,1% Sig. (2 tail) 0,006	78,7% 0,000	11,6% n.s.	35,1% 0,004	24,4% 0,046	21,8% 0,077	10,4% n.s.	18,5% n.s.	11,4% n.s.	4,6% n.s.	5,8% n.s.
SPQ_AS		81,3% 0,000	32,5% 0,007	35,9% 0,003	39,9% 0,001	6,0% n.s.	20,0% n.s.	13,7% n.s.	13,5% n.s.	5,4% n.s.	9,2% n.s.
SPQ_A			24,4% 0,045	41,9% 0,000	37,1% 0,002	16,5% n.s.	19,2% n.s.	18,0% n.s.	15,5% n.s.	1,3% n.s.	13,8% n.s.
SPQ_DM				39,3% 0,001	82,8% 0,000	4,4% n.s.	-2,7% n.s.	-0,1% n.s.	-2,6% n.s.	16,9% n.s.	-3,7% n.s.
SPQ_DS					82,0% 0,000	9,6% n.s.	-8,5% n.s.	-1,1% n.s.	-7,8% n.s.	-7,5% n.s.	-13,6% n.s.
SPQ_D						7,7% n.s.	-6,3% n.s.	-1,1% n.s.	-4,5% n.s.	6,0% n.s.	-8,6% n.s.
SPQ_SM							25,3% 0,039	81,3% 0,000	-0,5% n.s.	-8,8% n.s.	-31,7% 0,030
SPQ_SS								73,5% 0,000	-13,5% n.s.	-3,2% n.s.	-32,5% 0,024
SPQ_S									-7,3% n.s.	-2,9% n.s.	-41,7% 0,004
PSSQ_CE-AC										33,9% 0,005	33,2% 0,021
PSSQ_RO-AE											13,6% n.s.

### **Limitations and extensions**

The main limitations of the paper derive from its nature of emerging research. Sample must be broadened, including both, more students at the higher courses as well as students at entry level, in order to investigate (I) potential evolution of learning styles distribution (II) differences in approaches to learning.

Reliability and factorial analyses, that need larger samples in order to show consistent results, should be included.

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