New university students' instructional preferences and how these relate to learning styles and motivational strategies

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Abstract

Introduction. The main objective of this study is to analyze the dimensions which underlie new university students' preferences for instructional methods, and how these preferences relate to their learning styles and motivational strategies.

Method. The sample consisted of 158 students in their first year of teacher training at the University of Valencia (Spain). Learning style was evaluated using the Inventory of Learning Processes, motivational orientation through the Motivated Strategies for Learning Questionnaire, and preferences for instructional methods using a scale specifically designed for this study.

Results. Results reveal three types of preferred methods – multidirectional, unidirectional and autonomous. Preferences for multidirectional and unidirectional methods were significantly greater than preferences for autonomous learning. Furthermore, the results show a significant relationship, though small in magnitude, between preference for instructional methods, learning style and motivational orientation toward learning. Likewise, we observed a significant relationship between preferences for multidirectional or unidirectional methods and elaborative processing, as well as an inverse relationship between a preference for the multidirectional method and fact retention.

Conclusions. Intrinsic and extrinsic orientations toward learning are related to different preferences in instructional methods: preferences for unidirectional and autonomous methods are related to an internal attribution for academic success, while preferences for multidirectional methods are related to high expectations of self-efficacy for learning.

Keywords: teaching methods, instructional preferences, learning styles, motivational orientation, adaptive instruction.

Resumen

Introducción. El objetivo principal de este estudio es analizar las dimensiones que subyacen a las preferencias respecto a distintos métodos instruccionales de los estudiantes universitarios de nuevo acceso y su relación con sus estilos de aprendizaje y estrategias motivacionales.

Método. La muestra está compuesta por 158 estudiantes de primer año de Magisterio de la Universidad de Valencia (España). El estilo de aprendizaje fue evaluado a través del *Inventory of Learning Processes*, la orientación motivacional a través del *Motivated Strategies for Learning Questionnaire* y las preferencias respecto a métodos instruccionales a través de una escala específicamente diseñada para este trabajo.

Resultados. Los resultados destacan la existencia de tres tipos de preferencias: Métodos multidireccionales, unidireccionales y autónomos. Las preferencias por los métodos multidireccionales y unidireccionales resultan significativamente superiores a las preferencias por métodos de aprendizaje autónomo. Los resultados también destacan una asociación significativa, aunque de escasa magnitud, entre preferencias por métodos instruccionales, estilos de aprendizaje y orientación motivacional hacia el aprendizaje. Así, se observa una relación significativa entre preferencias por métodos multidireccionales y unidireccionales y el procesamiento elaborativo, así como una relación inversa entre preferencias por métodos multidireccionales y retención de hechos.

Conclusiones. Las orientaciones intrínseca y extrínseca hacia el aprendizaje están relacionadas con preferencias por métodos instruccionales distintos, las preferencias por métodos unidireccionales y autónomos se relacionan con una atribución interna de los resultados académicos, mientras que las preferencias por métodos multidireccionales se relacionan con altas expectativas de autoeficacia hacia el aprendizaje.

Palabras Clave: *métodos de enseñanza, preferencias instruccionales, estilos de aprendizaje, orientación motivacional, instrucción adaptativa.*

Introduction

Instructional methodology has traditionally been a point of special interest to researchers in education. Models of educational situations, that is, attempts at describing and functionally organizing the variables that intervene in teaching/learning processes, include teaching methods as one of their fundamental elements (Anderson & Burns, 1989; Entwistle, 1988; Fraser, 1987; Rivas, 1997). Instructional theories, eminently prescriptive and oriented toward educational practice, identify useful methods for encouraging learning processes and the situations where such methods are appropriate (Reigeluth, 1999). Instructional design models take on an eminently technological perspective and are understood as systematic procedures for guiding the planning, implementation and control/evaluation of teaching/learning processes (Gufstafson & Branch, 2002). A critical element in such models is the choice of instructional strategies or methods to facilitate learning processes (e.g., Newby, Stepich, Lehman & Russell, 2000; Podolskij, 1997; Terlouw, 1997).

Research on individual differences also boasts a long tradition in the field of instruction, focusing a large part of its efforts on analyzing relationships between the individual characteristics of learners and teachers, as agents in the educational process (e.g., their prior knowledge, learning styles and strategies, personality characteristics, etc.) and variables in the educational context (e.g., characteristics and complexity of the content, available time and resources, types of grouping). In this framework, the concept of "adaptive instruction" appears (Corno & Snow, 1986), understood as the need to respond to individual differences in the agents of educational processes, encouraging the teacher to adjust his or her action to the students' characteristics, or helping students adjust their expectations and behaviors to the teachers' peculiarities. There are numerous studies which seek to evaluate the interaction between instructional methods and instructional context variables (especially type of content); however, there is much less research that analyzes relationships between learner and/or teacher characteristics and their preferences for different methodologies (Clariana, 2001).

The present study falls within the latter; it seeks to analyze the preferences of new teacher training students for instructional methods. "Instructional preference" is understood as an "individual's tendency to choose or express preference for a specific teaching technique or

combination of techniques" (Sadler-Smith, 1996, p. 31) and "instructional methods" as "the different channels or procedures for helping students reach learning objectives or acquire the content being taught" (Newby, Stepich, Lehman & Russell, 2000, p. 91). Thus, our objective is not to determine whether one method is better or not – this would depend on the interaction between the variables mentioned above (teacher, learners and context) – but rather to understand learners' preferences for one or several instructional methods.

There are many different classifications of instructional methods in the scientific literature, based on diverse criteria (Reigeluth & Moore, 1999): domain (cognitive, psychomotor, attitudinal), type of learning (recall, comprehension and/or application), control of learning (teacher- or student-focused), direction of learning (a specific area vs. multidisciplinary, content vs. problem orientation), type of grouping, interactions for learning and/or support for learning (cognitive and emotional). There is also the traditional distinction between expository methods – which emphasize an orderly, exhaustive presentation of learning content – and learning by discovery – involving personal exploration, elaboration and checking of information (Romiszowski, 1981). Other authors (e.g., Rivas 1997) suggest classifications as a function of the type of knowledge to be acquired: declarative (lecture, explanation, demonstration and interrogation), procedural (tutoring and sharing among the group) and conditional (debates, case studies, workshops, laboratory, seminars). This may be considered singly or in conjunction with the directionality of communication: uni-directional (lecture, presentation, demonstration, interrogation and tutoring), multi-directional (focused on leading and controling the class dynamic – sharing among the group, debate, round table and panel – or focused on interaction and control of work – workshops, case studies, lab work, field work and research seminar). Finally, Hernández (1998) classifies methods as a function of the following dimensions: (a) logocentric-psychocentric perspective (depending on whether teaching practice revolves around the teaching objectives-content or around the learners' prior knowledge, personal experiences, schemas and motivations), (b) verbal vs. natural/simulation, (c) teacher-learner roles (expository-receptive methods, interactive methods and active training methods, i.e. practice and discovery).

Despite the fact that students' instructional preferences are a traditional topic in Educational Psychology research (Ausburn & Brown, 2006; Check, 1984; Entwistle & Peterson, 2005; Ford & Chen, 2001; James, 1962; Lowyck, Elen & Clarebout, 2005; Phillips, 1999; Tait, Entwistle & McCune, 1998), and that in recent years there are many studies on learners'

preferences with regard to using information technologies in teaching/learning processes (e.g., Shuell & Farber, 2001; Smith, 2001; van den Bosch, 2006), there are much fewer studies on university students' preferences for instructional methods, or for how these may relate to learning styles and motivational orientation.

Within the latter, we can point to the study carried out by Hocevar, Zimmer and Strom (1987), who obtain two dimensions relative to preferences, as a function of the (1) degree of structuring, and (2) degree of difficulty in the proposed activities. In secondary education, Clariana (2001) analized the relationship between preferences for methods based on learning by reception vs. by discovery, and different variables of a sociopersonal nature (age, sex, cognitive and personality variables) or of a scholastic nature (performance). The results revealed (a) a lack of significant differences in preferences for one type of method or another, (b) a relationship between performance in the humanities and a preference for receptive methods, and (c) a relationship between extraversion and preferences for discovery methods.

Studies by Sadler-Smith (1997) and Sadler-Smith and Riding (1999) are noteworthy studies that analyze the relationship between university students' learning styles and preferences for instructional methods. In the former, Sadler (1997) analyzes the preferences of 245 business students for nine different instructional methods, using the *Inventory of Learning Preferences*, as well as how these preferences relate to learning styles as assessed by the Learning Styles Questionnaire (Honey & Mumford, 1986; 1992), i.e. active, reflective, theoretical or pragmatic styles. Three main factors seem to underlie preferences for instructional methods: (a) autonomous methods (computer-assisted learning, distance/flexible learning), (b) collaborative methods (role-playing, group discussion and instructional games), and (c) dependent methods (lecture, tutoring/consultation). Although the study does not indicate whether differences found are significant or not, the value given to dependent methods (mean = 3.92, sd = 0.9) is greater than that given to collaborative methods (mean = 3.22, sd = 0.9) or to autonomous methods (mean = 3.07, sd = 1.0). As for relationships between preferences and learning styles, significant relationships of a low magnitude are found between some subscales of the two instruments: the relationship between preferences for collaborative methods and an active style (r = .24, p< .001), preferences for collaborative methods and a reflective style (r = -.15, p< .05), preference for autonomous methods and a reflective style (r = .17, p< .05). These results support the lack of any substantial relationship between learning styles and instructional preferences as assessed by these two instruments.

In the second study with 240 business students, Sadler-Smith and Riding (1999) broaden the scope of the Inventory of Learning Preferences by incorporating more items related to preferences for instructional methods and to evaluation techniques. Once again three underlying dimensions appear in preferences for instructional methods (collaborative, dependent and autonomous methods) and they additionally identify a relationship between an analytical vs. global cognitive style and preferences for collaborative methods, where subjects characterized by a global style (mean = 3.34, sd = 0.9) as compared to an analytical style (mean = 3.09, sd = 0.9) show the greater preference for collaborative methods.

Garner and Korth (1998) analyze the relationship between learning styles drawn from Kolb's experimental model (1984, 1985) and attitudes toward different learning methods – traditional classes, report preparation, readings, working in pairs and group work – and they establish a relationship between the two constructs. In particular, the assimilating subjects – characterized by abstract conceptualization, logical analysis of information and its concise presentation – prefer traditional classes and report preparation, while the accommodating subjects, characterized by learning from concrete experiences and active experimentation, and from intuition as compared to logical analysis, prefer to work in groups. More recently, Loo (2004) analized the relationship between the four learning styles defined in Kolb's model – diverging, converging, assimilating and accommodating – and university students' preferences regarding 12 instructional elements. Results indicate a significant relationship, though small in magnitude, between learning styles and instructional preferences. Regardless of learning style, all subjects showed preferences for doing practical exercises, solving problems and participating in groups, while giving much lower ratings to writing reports, making presentations to their classmates and/or reviewing documents.

Continuing in this line, our fundamental objectives in this study are to (a) evaluate the preferences for instructional methods of new teacher training students, (b) analyze the dimensions which underlie how learners rate their preferences, and (c) analyze the relationships that may exist between instructional preferences, learning styles and motivational strategies.

Method

Participants

158 newly enrolled students in the University of Valencia undergraduate program for Teacher Training participated in this study. Student age ranged from 18 to 40 years, with a mean of 19.5 years and a standard deviation of 0.42. 79% of the subjects were women and 21% men, presenting a middle to lower middle socio-economic level. There were a variety of teaching specializations within the group (early childhood, primary, music, physical education, foreign language, and speech and hearing).

Instruments and procedure

Scale of Preferences for Instructional Methods

The Scale of Preferences for Instructional Methods used in this study was drawn from a review of preceding studies on this topic (Marqués, 2000; Sadler-Smith & Riding, 1999) and from manuals about theories (e.g., Reigeluth, 1999) and instructional technologies (Newby et al., 2000). A preliminary draft was produced and submitted to a discussion group made up of members from the research group, school psychologists and secondary school teachers, for the purpose of determining the specific items to incorporate in the scale. After discussing the relevance of each item, unanimous agreement was reached on a 13-item scale (see Table 1). This version was the one used for assessment, requiring items to be rated from 1 to 10, where 1 means "Not at all preferred" and 10 means "Totally preferred", the scale from 1 to 10 being commonly used across the Spanish educational system. In order to avoid ambiguity and/or misconceptions, subjects were provided with a description of each instructional method included in the scale.

Inventory of Learning Processes (ILP)

For assessment of learning styles, we used a Spanish adaptation of the Inventory of Learning Processes (Schmeck, 1983; Schmeck, Ribich & Ramanaiah, 1977, 1978), whose psychometric goodness and factorial validity have been verified in several studies with Spanish populations (Cano & Justicia, 1993; García-Ros, Pérez-González, Martínez & Alfonso, 1999). Schmeck conceptualizes learning styles as "a predisposition to adopt a particular learning strategy regardless of specific task demands" (Schmeck, 1983, p. 233); they lie "between personality and learning strategy on the causal continuum that leads to a learning outcome" (Schmeck, 1988, p. 174). The test consists of 36 items on a Likert scale from 1 to 5

(where 1 means never and 5 means always); it assesses the four complementary dimensions which are summarized below:

- Deep Processing (DEEP). This comprises 9 items and is associated with conceptualization strategies and search for meanings, comparison and contrast of abstractions, and critical evaluation of information.

- Elaborative Processing (ELA). This comprises 12 items which evaluate preferences for elaboration and personalization of information and class material.

- Fact Retention (F_RET). This incorporates 4 items and relates to the preference for information in the form of facts, and to recall of details.

- Methodical Study (MET). This comprises 11 items and it assesses the systematic use of traditional study techniques.

Motivated Strategies for Learning Questionnaire (MSLQ)

The MSLQ constitutes one of the most highly regarded tests for assessing self-regulated learning. Its objective is to "evaluate the motivational orientation of university students and their use of different learning strategies in a course" (Pintrich, Smith, Garcia & McKeachie, 1991, p. 3). Many recent studies in our country have highlighted the importance of self-regulated learning as a basic competency to be developed within the educational system, focusing on both the strategic and motivational dimensions (e.g., De la Fuente & Justicia, 2007; Monereo, 2007). In this study we use the motivational category of the Spanish adaptation of the MSLQ (Reynaldo & Galán, 2000; Roces, Tourón, González, Núñez, González & García, 1993), which assesses the dimensions of instrinsic goal orientation (IO), extrinsic goal orientation (EO) and task value (TV), control of learning beliefs (BELIEF), self-efficacy for learning and performance (SELF-EF), and test anxiety (ANX). The test is made up of 31 items with a seven-point Likert response scale (from 1, not at all, to 7, completely). The instruments were completed during school hours. Any questions were addressed on an individual basis.

Analysis

First, an Exploratory Factorial Analysis with Varimax rotation was performed, using SPSS 10.0.6 for Windows, in order to evaluate the dimensionality of responses given on the Scale of Preferences for Instructional Methods. Second, we evaluated the descriptive statistics and internal consistency (alpha coefficient) of the instructional preference subscales resulting

from the preceding analysis. Finally, we performed a correlational analysis (Pearson bilateral), in order to analyze the relationship between students' preferences for instructional methods, their learning styles and motivational orientation.

Results

Scale of Preferences for Instructional Methods

Analysis of items

Table 1 presents the basic descriptives for each of the items which make up the scale, as well as the commonality among them. The basic descriptives of the items show that the most-highly valued methods are "Practice and Exercises", "Cooperative Learning", "Demonstrations", "Simulations" and "Instructional Games". By contrast, "Distance Learning" presents the lowest value (2.56), far below the theoretical reference mean (5.0); "Learning through use of Internet", "Lecture or Master Class" and "Computer-assisted Learning" present values which are slightly below the theoretical mean (their means falling between 4.4 and 4.7). As for commonality, they all surpassed the traditionally considered critical value (0.30).

**Table 1. Basic descriptives and commonality indices of items on the
Scale of Preferences for Instructional Methods**

Items	Mean	s.d.	Commonality
1.- Lecture or Master Class	4.70	2.59	.48
2.- Discussion Groups	6.98	2.09	.45
3.- Computer-assisted Learning	4.70	2.50	.77
4.- Simulations	7.59	2.18	.44
5.- Role-playing	6.40	2.57	.47
6.- Distance Learning	2.56	1.82	.48
7.- Face-to-face Individual Tutoring	5.59	2.66	.32
8.- Cooperative Learning	7.91	1.81	.56
9.- Instructional Games	7.20	2.19	.46
10.- Problem Solving	6.61	2.16	.57
11.- Demonstrations	7.64	1.89	.58
12.- Practice and Exercises	8.09	2.06	.33
13.- Learning through use of Internet	4.49	2.82	.77

Exploratory Factorial Analysis

Initial results from the factorial analysis of main components reveals the data's suitability for applying this statistical test, since the Kaiser-Meyer-Olkin measure of sample ade-

quacy gives a value of 0.67, and Bartlett's sphericity test also gives appropriate results ($\chi^2(78)$ = 518.05, p<.0001). The Kaiser method suggested the existence of three underlying factors which jointly explain 50.62% of the variance among scores. Table 2 presents the saturation of each item in its corresponding factor, the factor's overall value and the percentage of variance explained.

Using a 0.40 saturation as the cut-off for including items in a factor, the factorial solution is defined as follows:

- *Multi-directional Methods (MULT-DIR).* Made up of items 1 (with negative saturation), 2, 4, 5, 8 and 9. Its overall value is 2.38 and it explains 17.9% of the variance among responses. The average value for items in the subscale is 7.07.

- *Uni-directional Methods (UNI-DIR).* Made up of items 7, 10, 11 and 12. Its overall value is 2.13 and it explains 16.4% of the variance. The average value for items in the subscale is 6.97.

- *Autonomous Methods (AUTON).* Made up of items 3, 6 and 13. Its overall value is 2.12 and it explains 16.3% of the variance. The average value for items in the subscale is 3.94.

**Table 2. Factorial saturations of items in the
Scale of Preferences for Instructional Methods**

Items	Factors		
	1	**2**	**3**
1.- Lecture or Master Class	*-.614*	.322	.019
2.- Discussion Groups	*.660*	.003	.009
3.- Computer-assisted Learning	.128	-.119	*.862*
4.- Simulations	*.569*	.109	.325
5.- Role-playing	*.585*	.335	.113
6.- Distance Learning	-.231	.007	*.653*
7.- Face-to-face Individual Tutoring	.022	*.438*	-.152
8.- Cooperative Learning	*.681*	.306	.069
9.- Instructional Games	*.474*	.322	.230
10.- Problem Solving	.066	*.744*	.112
11.- Demonstrations	.086	*.759*	.023
12.- Practice and Exercises	.188	*.537*	.042
13.- Learning through use of Internet	.205	.050	*.854*
Overall Value	2.38	2.13	2.12

| % Variance explained | 17.9 | 16.4 | 16.3 |

Correlation between factors and internal consistency

Table 3 presents Pearson correlations between scores from the different factors in the Scale of Preferences for Instructional Methods, as well as levels of internal consistency for each of the subscales.

We can see that there is a significant positive correlation between the preference for uni-directional and multi-directional methods (r = .29, p<.001), while there is practically a null correlation between these two and the preference for autonomous methods. For preference factors "multi-directional methods" and "uni-directional methods", internal consistency (Cronbach's alpha) in both cases is 0.69, while it is 0.55 for the factor "autonomous methods" preference.

Table 3. Level of association between factors of preference for instructional methods

Factors	Multi-directional	Uni-directional	Autonomous
Multi-directional	.69		
Uni-directional	.29***	.69	
Autonomous	.07	.03	.55

Level of significance (bilateral): ***.001, **.01, *.05. Alpha Coefficients on the diagonal.

Repeated Measures ANOVA

In order to verify greater preferences for one instructional method or another, a repeated measures ANOVA was carried out, comparing values which each each subject assigned to multi-directional, uni-directional and autonomous methods. After Mauchly's test revealed that the sphericity assumption was not fulfilled ($W_{Mauchly}$=.85, ji-cuadrado (2)= 25.2, p<.001), and taking into consideration use of the Greenhouse-Geisser Epsilon corrector (ε_{GG}= .87), results reveal significant differences between preferences for different instructional methods as expressed by the subjects ($F_{1.74,273.3}$ = 241, p<.001). More specifically, *a posteriori* comparisons using the Bonferroni test indicate that preferences for multi-directional and uni-directional methods are significantly higher than for autonomous methods (difference in means for multi-directional / autonomous = 3.14, p<.001; difference in means for uni-directional / autonomous = 3.03, p<.001), while the former present homogeneous levels between themselves (difference of means = 0.1, p<.98).

Preferences for instructional methods and learning styles

Table 4 presents Pearson correlations, and their corresponding significance, between factor scores for the scale developed for this study and for the Spanish adaptation of the Inventory of Learning Processes (ILP).

Table 4. Correlations between Preferences for Instructional Methods and Learning Styles

	Inventory of Learning Processes (ILP)			
	DEEP	**MET**	**F_RET**	**ELA**
MULT-DIR MET.	.01	-.06	-.22**	.21**
UNI-DIR MET.	.04	.02	-.00	.24**
AUTON MET.	-.02	-.02	-.07	.02

Level of significance (bilateral): ***.001, **.01, *.05.

The factor of preference for multi-directional methods presents significant correlations with fact retention in the opposite direction (r = -.22, p<.01) and with elaborative processing in a direct relation (r = .21, p<.01). The factor of preference for uni-directional methods correlates positively with elaborative processing (r = .24, p<.01). Finally, the factor of preference for autonomous methods does not correlate significantly with any dimension relative to learning styles.

Preferences for instructional methods and motivational orientation

Table 5 presents Pearson correlations, and their corresponding significance, between factor scores for the Scale of Preferences for Instructional Methods and for Motivational Orientation as assessed using the Spanish adaptation of the MSLQ.

The factor of preference for multi-directional methods presents significant correlations with dimensions of intrinsic orientation (r = .23, p<.01) and self-efficacy for learning and performance (r =.17, p<.05). The factor of preference for uni-directional methods correlates significantly with intrinsic orientation (r =.22, p<.01), extrinsic orientation (r=.15, p<.05) and with beliefs about control of learning (r =.16, p<.05). The factor of preference for autonomous methods correlates only with beliefs about control of learning (r =.17, p<.05). No significant level of association is obtained between any of the preferences for instructional methods and motivational dimensions related to test anxiety or task value.

Table 5. Correlations between Preferences for Instructional Methods and Motivational Orientation toward Learning

	Motivational Orientation toward Learning (MSLQ)					
	IO	EO	TV	BELIEF	SELF-EF	ANX
Multi-directional	.23**	-.04	.11	.13	.17*	-.01
Uni-directional	.22**	.15*	.08	.16*	.00	-.002
Autonomous	-.05	.02	-.02	.17*	-.01	.08

Level of significance (bilateral): ***.001, **.01, *.05.

Conclusions and discussion

Results indicate that new students in pre-service teacher training are inclined toward methods such as "Practice and exercises", "Cooperative Learning", "Demonstrations", "Simulations" and "Instructional Games". By contrast, the least-valued method is "Distance learning" with a value far below the theoretical mean. Additionally, the factorial analysis of students' preferences for different instructional methods reveals three large underlying dimensions:

a) *Multi-directional methods*. Characterized as student-focused and requiring a great deal of interaction between learners as they carry on academic activities. Included here are methods such as "lecture or master class" (negative saturation), "discussion groups", "simulations", "role-playing", "cooperative learning" and "instructional games".

b) *Uni-directional methods*. Comprising the more traditional, teacher-focused instructional methods, characterized by interaction and information transmission in the direction of teacher to student. Included are methods such as "individual tutoring", "problem solving", "demonstrations" and "practice and exercises".

c) *Autonomous methods*. Characterized by a high degree of autonomy and a lower amount of social interaction. Included are methods such as "computer assisted learning", "distance learning" and "learning through use of Internet".

Based on these results we can assert that the underlying structure of preferences for instructional methodologies is articulated around three of the dimensions identified by Reigeluth and Moore (1999): (1) the placement of learning control (teacher vs. learner), (2) extent and type of interaction involved, and (3) the typical type of grouping that is involved. Thus, multi-directional and uni-directional methods are characterized by a high level of interactivity, although differing in the axis of interaction (student-student or teacher-student), and these methodswould be adequate for small to medium sized work groups, while autonomous methods are characterized fundamentally by a high level of learner autonomy and by individual activity.

As do previous studies (Sadler-Smith, 1997), we confirm a greater preference for multi-directional and uni-directional methods – with quite similar levels in our case – in contrast to autonomous methods. These results are congruent with the characteristics of students who participated in this study: they have enrolled in a university offering face-to-face learning, as compared to other alternatives based on distance learning, and in addition, since they are new to university studies, their prior experience with information technology in education is limited to what they have experienced in secondary education. Along these lines, it may be of interest in future studies to analyze whether preferences for instructional methods vary as a function of the choice of modality of university studies (face-to-face vs. distance), and more specifically, to evaluate the relationship of preference for autonomous methods with the learners' use/mastery of information technology, and with their experience and familiarization with these during earlier stages of the educational system.

Despite using noticeably different scales, results presented so far basically concur with those of Sadler-Smith (1997) and Sadler-Smith and Riding (1999) in regards to the underlying dimensions of preferences for instructional methods (multi-directional, uni-directional and autonomous), and to their defining characteristics (level of interaction and extent of autonomy) and the greater preference for multi-directional and uni-directional methods as compared to autonomous. The main discrepancies lie in that preference for autonomous methods was noticeably lower in our case (in the study by Sadler-Smith and Riding it was above the theoretical mean of the response scale) and that the "lecture or master class" method in our study falls in the scale of preference for multi-directional methods with a negative saturation, while in the two studies above it is placed in uni-directional methods.

Although these two discrepancies could be analyzed in more detail, the differences in values assigned for autonomous methods could be prompted by differential contextual factors (experience and familiarization with the use of information technologies in compulsory education in the two countries) and/or they may be related to participant characteristics – in our case we are dealing with newly enrolled students in pre-service teacher training, while the studies mentioned deal with participants in higher level courses in business administration programs. On the other hand, despite the fact that our results suggest placing the method "lecture or master class" in the preference for multi-directional methods – given the magnitude of its negative saturation in that factor – and not in the preference for uni-directional methods, this placement must be confirmed by later studies, from both a conceptual and empirical point of view (this item also saturates in the uni-directional methods factor with a value higher than the standard .30).

As for the relationship between preferences for instructional methods and learning styles, significant relationships of low magnitude were found only in the cases of preference for multi-directional methods and elaborative processing ($r = .21$, $p<.01$), uni-directional methods and elaborative processing ($r = .24$, $p<.01$) and, finally, preferences for multi-directional methods and fact retention ($r = -.22$, $p<.01$). No significant relationship was obtained between preferences and the learning styles dimension with regard to deep processing or methodical study. These results concur basically with those of prior studies; although they are based on different theoretical models of learning styles, they point to a lack of any substantial relationship between the two constructs (Loo, 2004; Sadler-Smith, 1997).

More specifically, the learning styles dimension Deep Processing (named after levels of processing established by Craik and Lockhart, 1972) involves a learning approach based on conceptualization and the search for meanings, on comparing and contrasting information sources, on information categorization and critical evaluation, and it shows no significant relationship with preferences for instructional methods. These results imply that subjects characterized by deep processing behave in this fashion regardless of the instructional format used by the teacher, and they do so without significant preference for one instructional methodology or another. Likewise, we found no significant relationship between preference for instructional methods and the Methodical Study dimension. Thus, subjects characterized by systematic use of traditional study techniques seem to behave in this fashion consistently, regardless of the instructional method used in class or their preferences for any particular instructional

method. These results also basically concur with other research studies on this dimension as referenced above, since subjects with high scores in this area usually prove to be students who are reliable, hard-working, moderate and calm (Schmeck & Ribich, 1978).

The learning styles dimension Fact Retention, which contains items that indicate preference for content in the form of facts and for recalling details, does show a significant, inverse correlation with preferences for multi-directional methods (learner focused and with high levels of peer interaction) as compared to uni-directional or autonomous methods. This result is also congruent, since multi-directional methods have little to do with instructional perspectives that emphasize recalling literal information as a result of the teaching-learning process, or with using evaluation techniques that evaluate recognition, recall and/or memorization of definitions. Finally, the Elaborative Processing dimension – characterized by the use of visual images, by synthesizing information presented in class, by the search for relationships and practical applications – is related to preferences for uni-directional and multi-directional methods, but not with autonomous. Thus, individuals who score high on this dimension show preferences for both types of instructional methods, which may be due to greater familiarity with these methods as compared to autonomous methods. In this case they would find it easier to elaborate class material in a personal fashion, translating the information into their own terminology and/or generating specific examples from their own experience.

As for the relationship between learners' motivational dimensions toward learning and their preferences for instructional methods, results also show significant levels of association between the two constructs, though low in magnitude (in no case greater than 0.23).

More specifically, intrinsic orientation toward learning goals is related to uni-directional and multi-directional preferences, but not to autonomous. Since an intrinsic orientation indicates that subjects perceive the completion of academic tasks as an end in itself, for reasons of curiosity, competency or change (Pintrich et al., 1991), it seems logical that they would simultaneously show preferences for different instructional methodology formats, with the exception of autonomous methods that require familiarity with and prior mastery of information technologies in order to be able to focus on acquiring the knowledge involved in the academic tasks. However, an extrinsic orientation is significantly related to preferences for uni-directional methods, also a logical result since subjects characterized by this orientation do not consider academic tasks as an end in themselves, but their main purpose is to ob-

tain good marks, to successfully compete with classmates and/or to obtain high levels of performance. Attaining these objectives seems to be easier in those areas which use traditional uni-directional methods than in areas which emphasize methods based on interaction between pairs and/or prior use and mastery of different technological resources.

Additionally, two motivational dimensions toward learning (test anxiety and task value) do not present any significant relationship with preferences for instructional methods. Thus, the level of anxiety (negative thoughts and affective and psychophysiological action) and academic stress when facing evaluation, as well as the degree of importance and usefulness which subjects assign to academic tasks, appear to be individual characteristics which are independent of their tendency to choose or express preferences for any given instructional technique or combination thereof.

With regard to beliefs about learning control (internal vs external), preferences for uni-directional and autonomous methods show a significant relationship with an internal attribution for academic success, a situation which is nearly reproduced with multi-directional methods also. Thus, although levels of association are low (the greatest correlation is .17), results indicate that preferences for different instructional methods are related to a perception of internal control of learning and to beliefs that one's efforts will result in positive academic scores. Finally, the perception of self-efficacy for learning only shows a significant relationship with preferences for uni-directional methods. These results may also be considered congruent, since subjects are more familiar with this instructional methodology, they have developed and refined performance strategies which are better adjusted to this modality, and it is more directly linked to personal individual performance and effort – the level of peer interaction is lower – and the use of technology resources and devices is not involved, as is normally the case in autonomous methods. Consequently, it is congruent that their expectations for success and their reliance on their own skills for completing academic tasks are greater with uni-directional methods than with multi-directional or autonomous.

In summary, results point to a significant level of association – though low in magnitue – between learners' preferences for instructional methods and their motivational strategies toward learning. This situation underscores the need to consider not only traditional contextual variables (e.g. content type, timing and/or teacher preferences) when planning teaching-learning processes and choosing the instructional methodology to use in university teaching,

but also student preferences, taking into account their characteristics when planning and implementing educational processes (Ford & Chen, 2001). On the other hand, we should also be aware of the importance of diversifying the instructional methodology used in our classes, given their diverse positive effects for learners: first, their effects on motivation and the level of learning when methods are used that suit learners' preferences for teaching metholodogy; second, learners can become more experienced and effective students when interacting with diverse methods, whether or not they suit their preferences (Check, 1984; Entwistle & Peterson, 2005; Loo, 2004; Sadler-Smith & Smith, 2004).

Finally, diversifying instructional methods in university education is especially important in the case of pre-service teacher training. Facilitating direct experimentation with different teaching methodologies, along with solid corresponding theoretical and applied training, encourages the development of teaching skills for the choice and adaptation of teaching methodologies which are best suited to the characteristics of the instructional context and the individual characteristics of their future students.

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