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An Explanatory Model of the Relations Between Cognitive and Motivational Variables and Academic Goals

Un modelo explicativo de las relaciones entre variables cognitivas y motivacionales y metas académicas

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Resumen

El objetivo de esta investigación fue diseñar un modelo que explique las relaciones entre algunas variables cognitivas y motivacionales y las metas académicas que se proponen conseguir los estudiantes universitarios. El estudio se llevó a cabo con una muestra formada por 460 sujetos (184 mujeres y 276 hombres) pertenecientes a la Facultad de Ciencias Económicas de la Universidad Nacional del Nordeste, Argentina. Se utilizó un diseño descriptivo, explicativo, transversal y mediacional y se aplicó un Cuestionario de Metas Académicas y varias preguntas de evaluación para recoger información sobre las variables analizadas. Los resultados obtenidos, analizados por medio de la técnica de ecuaciones estructurales, pusieron de manifiesto que tanto las variables independientes (cognitivas) como las intermediarias (motivacionales) que configuran el modelo propuesto son útiles para predecir y mejorar las metas de aprendizaje y las metas de rendimiento de los estudiantes (variables dependientes).

Palabras clave: Cognición, motivación, metas académicas, y ecuaciones estructurales.

Abstract

The purpose of this investigation was to design a model that would explain the relations among certain cognitive and motivational variables as well as the academic goals pursued by university students. The study was performed using a sample of 460 participants (184 women and 276 men) from the Faculty of Economic Sciences of the Universidad Nacional del Nordeste [National Northeastern University], Argentina. A descriptive-explanatory, cross-sectional and meditational design was used, which was accompanied by the administration of an Academic Goals Questionnaire and various assessment questions to collect data about the variables analysed. A structural equation analysis of the results revealed that both the independent variables (cognitive) and the mediating variables (motivational) that comprise the proposed model are useful to predict and improve the students' learning goals, social reinforcement goals, and achievement (dependent variables).

Keywords: Cognition, motivation, academic goals, and structural equations.

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Introduction

This study focuses on an explanatory model of the relations among three kinds of variables: cognitive variables, motivational variables, and academic goals. Among the cognitive variables that seem to affect the mental representations of people's goals is their personal concept of intelligence, which Sternberg (1985) calls implicit theory. The implicit theory of intelligence describes people's beliefs about the nature of intelligence (Cabezas & Carpintero, 2006); however, it does not seek to verify such beliefs because it considers all of them to be true, and it instead assigns more importance to the information that confirms these beliefs than to the information that rejects them.

According to Nicholls (1984) and Dweck (1986), individuals basically conceive of intelligence in two different ways, as either (a) an innate capacity that is fixed and independent of effort (because when one has a high level of intelligence, learning is achieved with little dedication, whereas learning requires higher commitment when one has a low level of intelligence) or (b) a potential that is developed and composed of modifiable cognitive processes that depend on effort (i.e., the more one exercises such processes, the higher the levels of learning achieved and, consequently, the higher the intellectual functioning attained) (Sanz de Acedo, Ugarte, Iriarte, & Sanz de Acedo, 2003). Whereas the first interpretation is thus associated with performance goals and is more closely related to an individual's self-image, the second is related to learning goals and is more adequate for the development of personal competence and task-mastery (Dweck & Molden, 2005; Grant & Dweck, 2003).

Another cognitive variable related to academic goals is perceived capacity, to quote Bandura (1992), self-efficacy. This variable refers to relatively stable feelings of confidence about one's own capacities or the conviction that one can successfully execute the behaviour required to produce a desired outcome (Rosario et al. 2009). The term 'perceived capacity' is normally used in a specific sense; in our case, we use it to refer to the capacity to respond adequately to the situations and demands of the learning process. Some authors emphasise the influence of the perceived capacity on cognitions, self-regulation of behaviours and commitment to academic tasks (González, Valle, Núñez, & González-Pienda, 1996; Sanjuán, Pérez, & Bermúdez, 2000). This perceived capacity, whether high or low, seems to have more impact on students who are oriented towards performance goals rather than learning goals because the former group of students tend to engage in mechanisms to protect their self-worth (Nicholls, Cheung, Lauer, & Patashnick, 1989).

Self-concept and causal attributions are motivational variables that are also related to academic goals. Self-concept can be defined as a person's perception of his or herself, and it develops from one's experiences and relations within an environment that includes significant others. Academic self-concept participates in the construction of personal identity, and it impacts learning because it not only determines the level of academic achievement but is also closely related to the students' expectations and motivations. According to Cabanach et al. (2009) and Valle, González, Núñez, Rodríguez, and Piñeiro (1999), most personal variables that guide motivation are based on the individuals' perceptions and beliefs about diverse aspects of their cognitions.

Bong and Clark (1999) compared academic self-concept and self-efficacy research. From the conceptual perspective, self-concept emerges as a more complex construct incorporating both cognitive and affective response toward the self and is heavily influenced by social comparison. Self-efficacy, in contrast, concerns primarily cognitive judgments of one's capabilities based on mastery criteria. These authors concluded that, on the whole, both processes can predict the academic achievement. Bandura (2005) makes the distinction of two dimensions of self-efficacy: outcome expectancy and personal efficacy. The first, describes the perception that certain actions will contribute to particular outcomes, reflecting a more general belief that inputs into a situation, which can have a functional effect on judgment of the likely consequence of such a performance. In contrast, personal efficacy focuses on perceptions of one's ability to enact the behaviours that will lead to desired results. We have included academic self-concept inside the proposed model.

Some empirical evidences suggest a close relationship between academic self-concept —understood as the self-perceptions formed from the experience with the environment (González, 2008; González-Pineda et al., 2000)— and the attribution of outcomes to diverse causal factors (Keith, Pottebaum, & Eberhart, 1986). This relationship determines the students' motivational orientation and, in this study, is reflected in the adoption of different types of goals.

Causal attributions are the different interpretations and appraisals of one's outcomes, and they represent a relevant motivational aspect when addressing the academic goals pursued by students and luck their results (Weiner, 1986). According to Piñeiro, Valle, Rodríguez, González, and Gómez (1998), internal causal attributions significantly affect learning goals but not performance goals, whereas external causal attributions affect achievement goals but not learning goals. According to Navas & Soriano (2006), the different

perceptions and beliefs in relation with the own capacity and the effort represent different ways of being motivated and of going to the achievement of goals. Subsequent studies have extended these four causal factors to other factors associated with the educational environment, such as the student's and teacher's interest as well as conditions in the classroom. These additional factors imply that the concept of causal attributions is more complex than initially thought (Weiner, 2001).

Lastly, academic goals —what students are trying to achieve in their learning (Wentzel, 1991, 2000)— are the third variable analysed in this investigation. Many authors pay attention to the differences between learning goals and performance goals (Covington, 2000; Dweck, 1986; Dweck & Grant, 2007; Elliott & Dweck, 1988; Elliot & McGregor, 2001; González et al., 1996; Linnenbrink & Pintrich, 2000; Valle et al., 2009). Learning goals, which have a more intrinsic orientation, refer to the students' interest in developing and improving cognitive capacities, even if they make some mistakes. These goals aim to acquire new knowledge or skills and have a positive influence on students' cognition, affect and behaviour (Pintrich, 2003). Performance goals, which have a more extrinsic orientation, refer to the students' interest in asserting competence by means of external positive appraisals. These goals aim to validate one's ability or avoid demonstrating a lack of ability. Students who pursue learning goals consider effort to be the cause of success in school, difficult problems to be a challenge inherent in the learning process, and intelligence to be a modifiable capacity. In contrast, students who pursue performance goals believe that success or failure depends on their cognitive capacity, that difficult problems create the potential for failure, and that intelligence is a stable entity (Dweck & Leggett, 1988; Grant & Dweck, 2003; Midgely, Kaplan, & Middleton, 2001). In short, as stated by Valle et al. (2003), students have learning goals to develop their ability, and performance goals to probe their ability.

Some authors divide performance goals into achievement goals and social reinforcement goals (Ames & Archer, 1988; Elliott & Dweck, 1988; Hayamizu & Weiner, 1991). Achievement goals are primarily associated with the desire to achieve good results in exams and to obtain rewards. In contrast, social reinforcement goals are associated with seeking the acknowledgement of others. Within this framework, Hayamizu and Weiner (1991) and Valle, González, Cuevas, and Núñez (1996) found that, while the two performance goals correlated positively and significantly ($p < .001$), their correlations with learning goals were generally nonexistent or low (indices that ranged between $r = .03$ and $r = .19$). However, Gon-

zález, Torregrosa, and Navas (2002) showed positive and significant correlations among these goals. As such there is still debate about how adaptive performance approach goals are (Roeser, 2004) and further research is needed to establish under what conditions performance approach goals may have positive or negative motivational benefits and show relationships between social and academic achievement goals.

In the opinion of Escurra et al. (2005) and Valle et al. (2009), learning goals and performance goals are not mutually exclusive, they can integrate, but instead they express different dispositions that may lead to having one or both goals (multi-goals) or, as noted by Suárez et al. (2001), the same student may employ these goals variably depending on the type of task, the environment, motivational variables, etc. A large number of studies, using cluster analysis have shown that people may be simultaneously oriented towards learning goals and performance goals. In fact, some authors (Bouffard, Boisvert, Vezeau, & Larouche, 1995; Brophy, 2005; Cano & Berlén, 2009; Linnenbrink, 2005) argue that it is desirable to achieve both kinds of goals as such a combination produces the best academic and cognitive outcomes.

Purpose of the study

Summarising the considerations outlined above, there are certain personal variables of a cognitive and motivational nature that are generally associated with a student's diverse academic goals. These variables are those that best determine the purpose and meaning students may attribute to their learning throughout their stay in the educational system.

Most of the studies that have investigated the interactions among these variables have used exploratory, descriptive, and correlational analysis. In this research, however, we use structural equations analysis, which is an appropriate methodology for assessing the degree of fit of a theoretical model and explaining the role of latent variables in psychological phenomena.

The main purpose of this study was thus to elaborate, using structural equation analysis, a well-fitting and representative model of the relations among the following variables: personal conception of intelligence (PCI), perceived intellectual capacity (PIC), academic self-concept (AS), causal attributions (internal attributions, IA; and external attributions, EA), and academic goals (learning goals, LG; social reinforcement goals, SRG; and achievement goals, AG). In other words, we want to determine whether the theoretical associations among these variables are empirically revealed. The postulated explanatory model is presented in Figure 1 and elaborated using EQS program notation (Bentler, 2006).

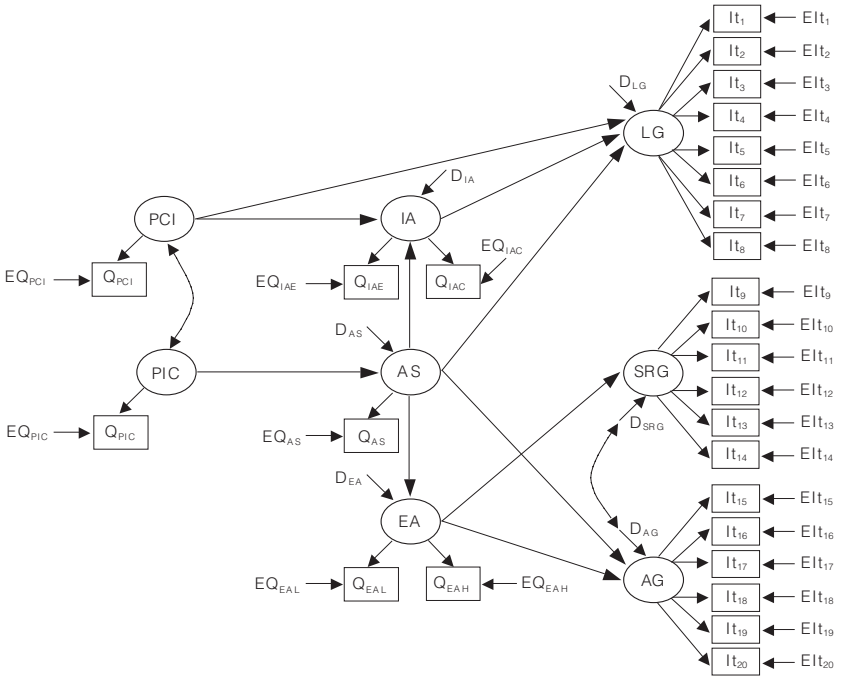

Figure 1. Structural relations proposed among cognitive and motivational variables and academic goals. Observed Variables: Q_{PCI} and Q_{PIC} (cognitive questions); Q_{IAE}, Q_{IAC}, Q_{AS}, Q_{EAL}, Q_{EAH} (motivational questions); and It_1 to It_{20} (items related to academic goals). Latent Variables: PCI = personal concept of intelligence, PIC = perceived intellectual capacity, IA = internal attributions, AS = academic self-concept, EA = external attributions, LG = learning goals, SRG = social reinforcement goals, AG = achievement goals.

Method

Participants

The sample, recruited from a population of 1216 students, was composed of 460 subjects (184 women and 276 men) with a mean age of 20 years (*SD* = 2.17) from the 1st (*n* = 241) and 2nd (*n* = 219) course of the three titles [Public Accountant (*n* = 276), Administration (n = 138), and Economy (*n* = 46)] of the Faculty of Economic Sciences of the Universidad Nacional del Nordeste [National Northeastern University], Argentina. A group-class sampling unit was used based on stratified clusters drawn from three academic shifts

(morning, afternoon, and evening). The group-classes (clusters) that comprised the final sample of the study were randomly and proportionately selected from each shift.

Design and Procedure

The research design was correlational, across-sectional, descriptive, and explanatory. Taking into account the strategy used to collect the data and the relations between the variables, it could also be considered a cross-sectional and mediational design.

Data were collected from each of the group-classes during a single session. The students were informed that the activity was part of a research project to improve their academic achievement. We also commented on the importance of answering the questions sincerely because their responses were strictly confidential and their participation was voluntary. Teachers administered the assessment instruments to the students which lasted for about 30 minutes. First, the students completed the 20 items of the Academic Goals Questionnaire (AGC); then, they answered four questionnaires on the cognitive and motivational variables relevant to the classroom. Of these four questionnaires, three were created ad hoc [Personal Concept of Intelligence (PCI), Perceived Intellectual Capacity (PIC), and Internal Attributions (IA) and External Attributions (EA)] and the fourth questionnaire corresponded to the academic dimension of Test AF5 (Form 5), which was created by García and Musitu (2001).

Instruments

1. *Academic Goals Questionnaire (AGQ)*. This questionnaire, created by Hayamizu and Weiner (1991), has 20 items. Of these 20 items, 8 (items 1-8) represent the Learning Goals Scale (interest in learning), 6 (items 9-14) represent the Social Reinforcement Scale (motivation towards obtaining social reinforcement and acknowledgement), and 6 (items 15-20) represent the Achievement Goals Scale (interest in obtaining a certain goal). The following is a sample item from the questionnaire: *I study because I feel good when I overcome difficulties*. The answers to the questions were rated on a Likert-type scale ranging from 1 (never) to 5 (always). The adaptation to the Spanish language showed high reliability coefficients (global Cronbach's alpha $\alpha = .90$) and excellent structural validity and predictive validity for the use of various types of learning strategies and for academic achievement (García et al., 1998).

2. *Assessment Questions*. Participants expressed their perception of the variables analysed by means of four short questionnaires:

— *Questions Personal Concept of Intelligence (QPCI)*. To measure the personal concept of intelligence we administered a ques-

tionnaire of five items. The following is a sample item from the questionnaire: *Intelligence comprises a series of cognitive skills that can be improved by means of one's own behaviour and learning*. Ratings ranged from 1 (disagree completely) and 5 (completely agree). An analysis based on the item-total corrected coefficient showed that each item in the questionnaire correlated with the total score of the factor that overcomes the criterion of $r > .20$ as proposed by Kline (1995). This analysis showed that each item in the questionnaire was relevant. Furthermore, the Cronbach alpha coefficient for the total items on the questionnaire was .76. Because this coefficient is beyond the recommended criterion of .70 (Nunnaly & Bernstein, 1994), the questionnaire can be considered a reliable instrument. In turn, a principal components analysis with varimax rotation identified a single factor as the cause of 54% of the variance, confirming the construct validity of the questionnaire.

— *Questions Perceived Intellectual Capacity (QPIC)*. To evaluate this variable, we also used an original questionnaire composed of five items. The following is a sample item from this questionnaire: *I consider myself to have the intellectual capacity to carry out the academic tasks required by university studies*. Ratings ranged from 1 (disagree completely) to 5 (completely agree). The degree of relation between every item and the total score was estimated using the corrected item-total ratio. This indicator provided values ranging from .45 to .59, indicating that each item in the questionnaire was relevant. The reliability of the questionnaire items was also proven by the Cronbach's alpha coefficient, which, at .78, was within the acceptable range. The factorial solution (obtained using the method of principal components) showed a one-dimensional structure with saturations moderately high (ranging between .77 and .83), indicating that a single factor represented 62 % of the variance within the sample.

— *Questions Academic Self-concept (QAS)*. To assess this variable, we used the academic dimension of test AF5, a section of the test composed of six items. The following is a sample item from the test: *I am a good student*. The items were evaluated on a scale from 1 to 99. Though the AF5 is a standardised instrument (with confirmed reliability, discrimination validity, and construct validity), we calculated the Cronbach's alpha coefficient of internal consistency for the scale ($\alpha > .81$). In addition, the corrected item-ratios were reasonable and positive (ranging from a minimum of .52 to a maximum of .74).

— *Questions Causal Attributions*. The evaluation of this construct was based on the participants' choice between four alternative responses to the following item: *I consider the academic achievement I attain to be attributed to* (answer all options): a) my capacity (QIAC), b) my effort (QIAE), c) luck (QEAL), d) some special help (QEAH). Each of these possibilities was rated on a scale from 1 (not at all) to 5 (very much). The analysis factorial revealed that there are two essential components in the questionnaire. They explain 58 % of the variance and confirm his conceptual structure. In case of the first component, the saturation level of the items was of .56 (my effort) and of .87 (my capacity); in the second component, the saturation level of the items was of .72 (my luck) and of .76 (some special help). The communalities of the items were acceptable: .44 (my effort), .53 (my luck), .58 (some special help), and .79 (my capacity). In view of these results, the construct validity of the questionnaire can be considered acceptable. The internal consistency was studied for all of the options. The Cronbach's alpha coefficient based on 460 subjects was .71. To classify whether the outcomes were attributed to internal or external causes, we defined the factors 'capacity' and 'effort' as internal attributions, and defined the options 'luck' and 'some special help' as external attributions.

Data Analysis

To explore the answers, both their central tendency and the correlation level of their dispersion, we used a series of descriptive statistical and inferential analyses. Then, to examine whether the relations that compose the hypothesised model (Figure 1) match the empirical data of the investigation, we used structural equations analysis with the EQS program and the maximum likelihood method for estimation. The model was assessed using two analytical procedures: one to determine and contrast the relations among the variables postulated in the model and the other to observe the degree of global fit of the model. The degree of global fit will show how well the theoretical model reproduced the relations observed in the correlation matrix of the empirical data.

Results

Table 1 shows the means, the standard deviations, the skewness, and the kurtosis of the measured variables. These statistics indicate that the sample data followed a normal distribution, as seen in the coefficients of skewness and kurtosis, which are close to zero (values between –.46 and .49).

Table 1

Descriptive statistics of the variables measured in the study (N=460)

Variable	M	SD	Skew	Kurt
PCI	4.01	.83	–.45	.25
PIC	3.61	.81	–.46	.42
AS	6.28	1.68	–.30	–.35
IA	4.13	.61	–.26	.46
EA	2.95	.89	.05	–.05
LG	3.92	.71	–.15	–.35
SRG	2.32	1.04	.46	.01
AG	4.53	.62	.47	.49

Note. PCI = personal conception of intelligence, PIC = perceived intellectual capacity, AS = academic self-concept, IA = internal attributions, EA = external attributions, LG = learning goals, SRG = social reinforcement goals, AG = achievement goals.

To see whether the relations among various variables are associated with in the subjects' backgrounds and to measure presence of the proposed effects, the corresponding coefficients of correlation are presented in Table 2.

Overall, the results shown in Table 2 indicate several positive and significant correlations (between 1% and 5%) among the analysed variables (PCI and PIC, IA, and LG; PIC and AS, IA, and LG; AS and IA, LG, and AG; IA and LG; EA and SRG, AG; SRG and AG). Table 2 also shows two significant negative correlations (5%) between the variables (PIC and SRG; AS and EA). In addition, some variables show weak positive or negative correlations (PCI and AS, EA, SRG, AG; PIC and EA, AG; AS and SRG; IA and EA, SRG, AG; EA and LG; LG and SRG, AG). These correlations correspond either to indirect effects or to relations that were not represented in the proposed model (Figure 1). When working with models of structural covariance, it can be of interest to examine beforehand the linear relations among the variables; nevertheless, the fact that two variables are correlated does not necessarily mean that a cause-and-effect relationship can be established.

Although one may argue that these results are only exploratory, they correlate well with the proposed model and are in accordance with the findings of previous studies (Nicholls et al., 1989; Piñeiro et al., 1998; Valle et al., 1996).

As mentioned, the maximum likelihood method was used to analyse

Table 2

Correlation matrix for variables measured on tests (n=460)

Variable	PIC	AS	IA	EA	LG	SRG	AG
PCI	.13*	.09	.21**	–.01	.23**	–.10	–.07
PIC		.35**	.17**	–.05	.19**	–.13*	–.05
AS			.20**	–.12*	.21**	.09	.12*
IA				.01	.24**	–.07	–.09
EA					–.04	.18**	.13*
LG						.08	.11
SRG							.20**

Note. PCI = personal conception of intelligence, PIC = perceived intellectual capacity, AS = academic self-concept, IA = internal attributions, EA = external attributions, LG = learning goals, SRG = social reinforcement goals, AG = achievement goals.
* $p < .05$; ** $p < .01$

the proposed model. The supposition of that the variables followed a multivariate normal distribution seems reasonable because the normalised estimate of Mardia's coefficient reached a value of 4.24, which is less than the criterion of 5 recommended by Bentler (2006). In the equations used for analysis, certain factor loadings among the observed and latent variables (QPCI and PCI; QPIC and PIC; QIAE and IA; QAS and AS; QEAL and EA; It1-It8 and LG; It9-It14 and SRG; It15-It20 and AG) were arbitrarily fixed at 1, as were the regression coefficients among the mediating variables and the dependent variables associated with error (EQPCI to EIt20; DIA, DAS, DEA and DLG, DSRG, DAG). Moreover, the variance of the independent variables (PCI and PIC) and the variance of certain factors associated with errors (EQIAE, EQIAC, EQEAL, EQEAH, EIt1 to EIt20 and DIA to DAG) were left free; however, the variance of the errors associated with the observed variables was fixed at 0 in instances when the error was caused by a single factor (as it was for PCI, PIC, and AS). We also estimated the covariances among the independent variables and among disturbances (D) that corresponded to two of the dependent variables (SRG and AG). The covariances not specified in Figure 1 are considered null.

The analytical study of the relations between the variables relevant to the model revealed that both the factor loadings and the estimated

structural parameters were statistically significant coefficients. The results of the AGQ followed a similar structure in this study as the one presented in the original test (Hayamizu & Weiner, 1991). The factor loadings of the items that comprise the latent variables (items 1 to 8: learning goals; items 9 to 14: social reinforcement goals, and items 15 to 20: achievement goals) were statistically significant (ranging from .49 to .82, $p < .05$). Likewise, the variables personal concept of intelligence (PCI), perceived intellectual capacity (PIC), academic self-concept (AS), internal attributions (IA), and external attributions (EA) seem to be coherent factors, as factor indicators relevant to the observed variables were significant (ranging from .58 to 1, $p < .05$). Consequently, the diverse factor loadings were accepted as indicators of the construct validity of the AGQ and the remaining latent factors. The estimated variances of the independent factors PCI and PIC as well as the error terms (errors associated with EQIAE, EQIAC, EQEAL; EIt1 to EIt20; and DAS to DAG) were also significant ($\alpha = .05$); however, the variances of the errors EQEAH and DIA were not significant.

Through structural analysis, we were able to estimate the effects of each equation in the assumed model. The covariance postulated between personal concept of intelligence and perceived intellectual capacity (exogenous variables), as well as the covariance postulate between the estimation errors of the social reinforcement goals and achievement goals (endogenous variables) allowed us to measure the correlations between the pairs of variables shown in Figure 1. As expected, the parameters obtained were statistically significant in all cases. Although most of these effects were positive, the parameter that reveals the influence of academic self-concept on external attributions was negative (–.16*) (see Figure 2).

To determine the global fit of the model, we used a strategy based on the following indices: (a) χ^2 and χ^2/df statistics, which should show a significant χ^2 value and a χ^2/df value lower than 2 (Hu & Bentler, 1999); (b) the comparative fit index (CFI) and the nonnormed fit index (NNFI), which should be equal to or higher than .90, and (c) the root mean square error of approximation (RMSEA), which should be lower than .05 (Bentler, 2006).

The chi-square test was statistically significant [$\chi^2(311) = 365.74$, $p = .02$], which, in principle, indicates an inadequate model ($\alpha = .05$); nevertheless, when this value was divided by the degrees of freedom it revealed the model was a good fit (χ^2ldf = 1.17). The CFI and NNFI indices had values of .98 and .97, and the estimation of RMSEA was .02, all of which indicate a good fit between the model and the data.

In addition, we also estimated the practical statistics provided by

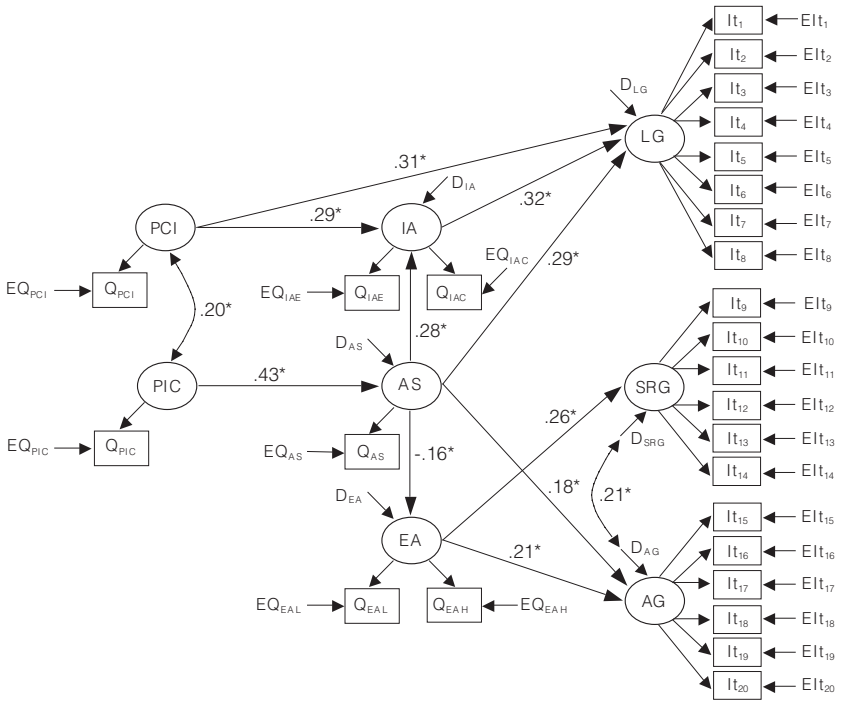

Figure 2. Standardised results of the model of structural relations among cognitive and motivational variables and academic goals. Observed Variables: Q_{PCI} and Q_{PIC} (cognitive questions); Q_{IAE}, Q_{IAC}, Q_{AS}, Q_{EAL}, Q_{EAH} (motivational questions); and It_1 to It_{20} (items related to academic goals). Latent Variables: PCI = personal concept of intelligence, PIC = perceived intellectual capacity, IA = internal attributions, AS = academic self-concept, EA = external attributions, LG = learning goals, SRG = social reinforcement goals, AG = achievement goals. * $p < .05$

the EQS program. Among these statistics were the normed fit index (NFI = .91), the incremental fit index (IFI = .98), and McDonald's fit index (MFI = .94). These indices also showed that the proposed model had achieved goodness of fit, as they all exceed the recommended criterion of .90.

Summing up, the diverse indicators we obtained allowed us to verify that the observed variance-covariance matrix and the matrix predicted by the model are not significantly different; in other words, the selected model fits the empirical model and, consequently, is the best account of the data.

Discussion

The goal of this study was to design a model that accounts for the relations among certain cognitive and motivational variables and the diverse academic goals pursued by university students. After analysing the results, we are confident that we achieved our purpose.

First, the descriptive analysis allowed knows the normal distribution of the sample data. Second, the correlation coefficients between cognitive and motivations variables, as well as between them and the goals evaluated by Academic Goals Questionnaire (AGQ) provided information about the existing associations between them, which agree acceptably with those reported in various studies (Escurra et al. 2005; González et al., 2002; Keith et al., 1986; Piñeiro et al., 1998; Valle et al., 1996; Valle et al., 1999; Valle et al., 2003; Weiner, 1986, 2001). Between the highest correlations are of academic self-perceived competence and self-concept, and internal causal attributions and learning goals. Third, the structural equations technique allowed us to confirm the construct validity of the Academic Goals Questionnaire and the validity of the latent cognitive and motivational variables relevant to the assumed model. This analysis also established that the relations within this model are statistically significant and show, via many of the goodness-fit indicators, that the possible effects represented in Figure 1 correspond to the sample data in Figure 2. Therefore, the results indicate that the proposed model is a suitable way to interpret all the relations, direct and indirect, expressed in the three variables under study.

In general, the model analyzed in this research suggests that: a) the cognitive variables —personal concept of intelligence and perceived intellectual capacity— play a central role in the multiples goals that the students propose to achieve (Dweck, 1986; Navas & Soriano, 2006; Nicholls, 1984; Sanz de Acedo et al., 2003; Valle et al., 1999); b) the motivational variables —causal internal attributions, causal external attributions, and academic self-concept— affect direct and significant form to the different academic goals (Weiner, 2001; Valle et al., 2003; Valle et al., 2009); c) the classification of academic goals in learning goals and performance goals, and the division of the latter into achievement goals and social reinforcement goals respond to the type of goals that students of these research pursue, and it is similar to the one proposed by other authors (Covington, 2000; Dweck & Grant, 2007; Elliott & Dweck, 1988; Hayamizu & Weiner, 1991). The internal attributions best explained the learning goals and the external attributions best explained the social reinforcement goals of the college students.

Then, the results of our study and from previous studies lead us

to conclude that individuals who perceive intelligence as a modifiable capacity dependent on effort, who have a positive image of themselves as students, and who accept responsibility for their actions will be more likely to achieve their learning goals. However, individuals who conceive of intelligence as something fixed, innate, and independent of effort and have attributional patterns characterised by evading responsibility for academic outcomes will be more oriented toward performance goals. Specifically, students who trust their own capacity, consider themselves to be good students, and are concerned about good academic performance tend towards achievement goals, whereas students who do not identify with these values tend towards social reinforcement goals and are not good students (Cabanach et al., 2009; Dweck & Molden, 2005; Grant & Dweck, 2003; Nicholls et al., 1989; Sanz de Acedo et al., 2003; Valle et al., 1999).

Equally, the model supports the theory that effort and behavioural responsibility lead to high levels of meaningful learning and the development of a capacity to learn. This fact, verified by the data from the present study, would change the generalisec belief that high personal competence is sufficient to achieve quality learning —without making any effort or having to work hard. The model also suggests that most of the variables studied have predictive potential for true learning (personal concept of intelligence, perceived intellectual capacity, academic self-concept, internal attributions, and learning goals) rather than the determining power of a good academic performance. In effect, obtaining good academic results does not necessarily indicate that one has developed the skill of «learning to learn»; one can achieve academic success (e.g., through mechanical, mnemonic, or chance learning) but not acquire meaningful and lasting knowledge. It is essential to maintain a favourable attitude or disposition towards learning and study to achieve such knowledge.

In regard to the above, we totally agree with the proposal of Valle et al. (2003) who stated that students, in academic settings, may have more than one goal at the same time, though they may be preferentially oriented toward learning goals or performance goals. These authors found that there were little differences between the profiles of multiple goals and of learning goals. The competence to co-ordinate them in certain situations may be the key to success and an indicator of learning quality.

We could draw some lines of research taking into account the empirically contrasted model and some limitations of this study. First, it would be wise to verify the proposed model introducing new variables that could play a significant role, such as learning strategies, task characteristics, task demands, assessment systems, teachers' attitudes, syllabus

content, and the organisation of the classroom. Second, it would be important to research our model using a longitudinal design with periodical assessments during the years of permanency of the students in the university. This type of study would provide information about the possible changes that may occur in the relations among the cognitive and motivational variables and academic goals. Among other factors, experience in university learning can have an impact on the degree and quality of such relations. Thirdly, it would be very interesting to review role of social reinforcement goals in the learning process, aspects that are still controversial and divergent when contrasting diverse studies.

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