Psicothema
ISSN: 0214-9915
psicothema@cop.es
Universidad de Oviedo
España

Tapia, Jesús Alonso; Fernández Heredia, Blanca
Development and initial validation of the Classroom Motivational Climate Questionnaire (CMCQ)
Psicothema, vol. 20, núm. 4, 2008, pp. 883-889
Universidad de Oviedo
Oviedo, España

Psicothema 2008. Vol. 20, nº 4, pp. 883-889
www.psicothema.com

ISSN 0214 - 9915 CODEN PSOTEG

Development and initial validation of the Classroom Motivational Climate Questionnaire (CMCQ)

Jesús Alonso Tapia and Blanca Fernández Heredia*
Universidad Autónoma de Madrid and * Universidad Michoacana de San Nicolás de Hidalgo (México)

Research on classroom goal-structures (CGS) has shown the usefulness of assessing the classroom motivational climate to evaluate educational interventions and to promote changes in teachers' activity. So, the Classroom Motivational Climate Questionnaire for Secondary and High-School students was developed. To validate it, confirmatory factor analysis and correlation and regression analyses were performed. Results showed that the CMCQ is a highly reliable instrument that covers many of the types of teaching patterns that favour motivation to learn, correlates as expected with other measures of CGS, predicts satisfaction with teacher's work well, and allows detecting teachers who should revise their teaching.

Desarrollo y validación inicial del Cuestionario de Clima Motivacional de Clase (CMC-Q). La investigación sobre estructura de metas de clase ha mostrado la necesidad de evaluar el clima motivacional para facilitar la valoración de las actividades educativas y promover su cambio. Con este fin se ha desarrollado el Cuestionario de Clima Motivacional de Clase, para Secundaria y Bachillerato. Para validarlo se han realizado análisis factoriales confirmatorios, de correlaciones y de regresión. Los resultados han mostrado un instrumento fiable, que cubre los principales patrones de actuación que estimulan la motivación por aprender, que correlaciona en forma esperada con medidas similares, que predice excelentemente la satisfacción con el profesor y que permite detectar qué profesores necesitan cambiar.

Several recent books and reviews have summarised the implications for classroom practice derived from research on motivation in education carried out within the framework of different theoretical orientations (Alonso-Tapia, 2005; Urdan & Turner, 2005). However, according to Urdan and Turner, the beneficial effects of many of the suggested applications have not been tested in actual classrooms, a fact that may be due to different factors. One of them might be the difficulty of application of the suggested teaching practices. For instance, it has been recommended that teachers should develop and assign academic tasks that are personally meaningful and relevant for students, but it is very difficult to individualize instruction like this.

Another factor contributing to the above mentioned fact might have been that modifications of classroom practices take place in the context of a set of teaching patterns with which they interact. Due to this fact, It is very difficult to test the effect of an isolated modification in real classrooms unless the set of teaching patterns is taken into account. So, in order to overcome this obstacle it is necessary to identify teaching patterns that configure different learning environments, and to develop instruments for assessing them, a task that constitutes the objective of this study.

Fecha recepción: 23-11-07 • Fecha aceptación: 26-5-08
Correspondencia: Jesús Alonso Tapia
Facultad de Psicología
Universidad Autónoma de Madrid
28049 Madrid (Madrid)
E-mail: jesus.alonso@uam.es

Theoretical framework

The classification and assessment of learning environments defined by typical teaching patterns is not a new task. Ames (1992) described what is known as «classroom motivational climate». This concept was coined when trying to relate achievement goals to classroom factors. According to achievement goal theory (Dweck, 1986; Elliot, 2005; Harackiewicz et al., 2002), positive and negative patterns of cognition and affect defining mastery/learning, performance-approach or performance-avoidance goal orientations can be elicited by different reasons for task engagement. Moreover, different authors have pointed that experimental and field studies suggest that situational factors and instructional demands can influence the salience of a particular goal and, hence, its adoption (Ames & Archer, 1988), and so, that it is necessary to examine how the classroom can be structured to optimize student motivation (Good & Brophy, 2000).

Ames (1992) considered that classroom motivational climate could be considered as favouring mastery or performance goal orientation depending on patterns of teacher's activity in six areas of teaching represented by the acronym TARGET: task, authority, recognition, grouping, evaluation and time. It was supposed that specific teaching patterns related to each of these areas could favour the mastery orientation, whereas the lack of these patterns, or patterns opposite to them would obstruct this orientation. Thus, Ames' conception of classroom climate was at that time bipolar.

However, instruments for assessing the classroom motivational climate have not taken into account most of teaching patterns related to the different areas suggested by Ames and recently

summarised by Urdan and Turner (2005), Alonso-Tapia and Pardo (2006) and Alonso-Tapia and Ruiz (2007). Most research on classroom effects on motivation has made use of scales developed by Midgley et al. (2000). These scales, aimed at assessing classroom goal structures –one of the characteristics of classroom motivational climate-, are based on students' perception of the degree of importance given by their teachers, mainly to explicit messages, to: a) effort and understanding (mastery goal structure), b) getting right answers, high scores on tests and good grades (performance-approach structure), and c) avoiding mistakes in front of other and not to do worse than others (performance-avoidance structure). Thus, instead of considering classroom motivational climate as bipolar, theory underlying these scales suggest that there can be three different kinds of motivational climate depending on the goal stressed by teachers. In any case, teachers' messages related to effort and understanding, to scores and grades, and to the importance of avoiding looking dumb in front of others are only a part of teaching patterns affecting motivation, though recent studies and reviews of research have shown that such messages are related to some of the patterns identified by Ames and Archer (Meece, Anderman, & Anderman, 2006; Kaplan et al., 2002; Midgley, 2002). Scales relying on these messages can be useful for some purposes, as research on relations between classroom goal structures, cheating and disruptive behaviour has shown: these behaviours are more frequent in case of performance or avoidance GS (Anderman & Midgley, 2004; Kaplan, Gheen & Midgley, 2002). However, they do not allow the identification of other specific teaching patterns contributing to classroom motivational climate that should be modified, and might not be sensitive enough to changes in classroom practices after educational interventions.

Recently, Alonso-Tapia & Pardo (2006), in line with ideas of Ames (1992) and of Urdan and Turner (2005), have summarized a set of teaching strategies that can be organised around different points along the learning sequence, and whose effectiveness for enhancing learning motivation has been shown by research. These strategies, described next, will be used for developing the Classroom Motivational Climate Questionnaire (CMCQ).

1) *At the beginning of learning activities, when teachers need to activate the learning intention*. At this point it seems important *to arouse curiosity, to show task relevance in relation to students' interests, values and objectives* and to design learning tasks with *a reasonable degree of challenge* (Ames, 1992). *Strategies such as the* presentation of new or surprising information and the setting of problems and questions are useful for the first purpose, whereas the use of authentic tasks that show the usefulness of knowing what the student have to learn or the explicit indication of task functionality can be useful for the second purpose (Alonso-Tapia, 2002)**.**

2) *During the development of learning activities, when teachers need to keep students' attention focused on the learning process rather than on outcomes*. Depending on the academic subject to teach, teachers explain concepts, principles, theories, procedures and strategies; design activities that students have to carry out in classrooms or as homework, working alone or in group; induce —or force— students in lesser or greater degree to publicly participate in classroom discussions and activities; and give different amount of feedback and help. Teachers act in different ways when carrying out these activities, but the literature revised suggests the convenience to adopt the following teaching patterns:

In the first place, when *introducing subjects or activities*, after arousing curiosity and showing task relevance, teachers' messages and instructions should focus students' attention on learning processes and intrinsic goals instead of focusing on outcomes, social comparison and assessment (Urdan & Turner, 2005). Teachers should also help students to visualise and develop a precise planning of activities to be carried out. This help can prevent students to become lost while trying to follow an explanation or to develop a project, and helps them to self-regulate their work (Alonso-Tapia & Pardo, 2006).

In the second place, when *giving information and explanations*, teachers should make sure that students' experience understanding and competence (Assor & Kaplan, 2001). This can be achieved:

If teachers make use of hierarchical and coherent discourse, properties that are not warranted *a priori* by its formal characteristics. It is necessary to build a bridge between «the given» —what the student already knows— and «the new» —the ideas that the teacher is trying to convey and explain—. This objective is better achieved if teachers induce the students to participate, thus showing weather they understand or need clarification.

If teachers make use of illustrations and examples that help to build more concrete mental representations of abstract ideas (Alonso-Tapia & López, 1999).

In the third place, when teachers *interact* with their pupils, research on autonomy-supportive teaching behaviours reviewed by Assor & Kaplan (2001) as well as on classroom motivational climate (Alonso-Tapia, 1992) has shown that it is beneficial for students' motivation to allow pupils to intervene spontaneously, to listen them attentively and to request more explanation of their answers if necessary, to reinforce these «echoing» them or nodding while pupil is speaking, to highlight the positive elements of responses even if they are incomplete, to praise «quality» of performance, to ask for reasons behind incorrect answers, to devote time to any pupil who asks for help and to avoid comparison between students, favouring perception of equity.

Finally, when teachers have to propose learning activities in which their pupils should involve independently, motivation can supposedly be favoured —once curiosity has been activated and relevance has been shown— if teachers: a) suggest the establishment of personal goals; b) gave opportunity for options; c) teach their pupils to ask themselves «How can I do it?» and to look for the necessary means and strategies; d) suggest to their pupils to divide tasks into small steps, challenging but attainable; e) underscore the importance of asking for help; f) give careful feedback and help as often as needed and demanded; g) highlight progress and pupils' active role in it, and if the working rhythm is neither slow nor stressful (Alonso-Tapia, 1992).

3) *At the points —during or at the end of learning activities— at which assessment takes place*

Research on assessment implications for motivation and learning have underlined —and often shown— that assessment process can positively influence motivation to learn and conceptual understanding depending on certain conditions: a) If they provide information —to the teacher or the student him/herself, as is the case with portfolio-assessment— that may help students to overcome their difficulties and to self-regulate their understanding and learning processes (Underwood, 1998); b) if tasks demanding the *application and use* of knowledge for solving problems implying some degree of novelty (*analogous* and *transfer tasks*) are used (Schnotz & PreuB, 1997), especially if teachers make explicit

for what goals understanding of a particular content is relevant, if tasks are designed to allow teachers to identify specific factors in students that hinder conceptual change and procedural learning, and if teachers give specific help based on assessment, whether this takes place before, during or after instruction; c) if teachers avoid messages and classroom practices stressing the relevance of assessment for goals extrinsic to understanding, and give messages that focus student's attention on progress as an intrinsic goal (Self-Brown & Mathews-II, 2003).

The set of strategies just described define a classroom climate that, according to Ames and Archer (1988), can favour the activation of motivation to learn even if this goal it not explicitly stressed by teachers' messages, whereas not using such strategies or using of strategies opposite to them can favour the activation of performance or avoidance goal orientations. So, in order to detect whether teachers create or not a classroom climate oriented to learning with their messages, but also the strong and weak elements of the classroom motivational climate that they create, it is necessary to dispose of a questionnaire encompassing the teaching patterns affecting motivation throughout the different periods of the teaching process. The development and initial validation of it is the objective of the present study.

Method

Participants

A total of 827 students from two public schools of suburban areas of Madrid participated in the study. From them, 615 were Secondary School (SS) students —353 males and 261 females—, distributed by course as follows: 1st: 147, 2nd: 138; 3rd: 160; 4th: 170. There were also 212 High School (HS) students —101 males and 111 females—, 165 from 1st course and 47 from 2nd course. The SS sample was divided randomly in three samples with almost equal number of subjects. The first sample was used for carrying out the initial analysis and the remaining samples, for cross-validating the results.

Instruments

The Classroom Motivation Climate Questionnaire (CMCQ) was developed for this study. It was designed to cover sixteen kinds of teaching strategies or patterns that, according to the theoretical review, could affect positively student motivation to learn. Two items were written to assess each kind of pattern. To avoid acquiescence effects, one was positive and the other negative. Each item had to be answered in a Likert five-point scale, so the score of each pattern ranged from one to ten. Table 1 shows the sixteen variables and examples of the items

In order to obtain additional information on the validity of the questionnaire, two strategies were used. First, eight more items were added. Four of them allowed assessing student's interest, self-efficacy expectancies, outcome expectancies and disposition to effort. These variables were expected to correlate positively and in a significant degree with the score in the CMCQ because they can act as antecedents or consequents of perceived CMC. On one side, according to motivational research above revised, differences in interest, self-efficacy, self-confidence in achieving good outcomes and in disposition to effort when trying to learn could make students more or less sensitive to teaching patterns favouring learning and, as a consequence, affect the perception of classroom motivational climate (Kaplan, Middleton, Urdan y Midgley, 2002). On the other side teaching patterns assessed by the CMCQ could enhance the rise of these motivational variables —interest, self-efficacy, self-confidence in achieving success, and disposition to effort. Preliminary analyses showed high correlations between these four variables. So, in this first study a combined variable called «student's motivation» (SM) was derived to simplify the presentation of results. The remaining items formed a scale designed to assess the «degree of satisfaction with teacher work» (SWT) because it favours learning. It is then a «criterion variable» whose value is expected to depend on classroom motivational climate and student motivation.

Second, the Classroom Goal Structure Scales (CGS-S) designed by Midgley et al. (2000) were also given to the students. The reason for this decision was that they constitute the instrument most used in research related to classroom motivational climate. Moreover, the content assessed by the first of its scales —teachers' messages stressing Mastery Goals (MGS)— is very similar to a component of the CMCQ. The other two scales —Performance-approach (PAPS) and Performance-Avoid Structure (PAVS)—

Table 1
Teaching patterns assessed by the CMCQ, and criterion scale with item-examples

CMCQ Variables
Teacher makes use of novelty. This teacher (T) often presents new information that increases our interest.
Teacher assesses previous knowledge. This T explores what we know on a subject before explaining it.
Teacher relates different topics. This T tries to help us to relate new ideas with what we already know.
Teacher induces public participation. This T likes us to participate, listens to us and answers to our questions
Teacher' messages orient to learning. This T likes us to enjoy learning new things.
Learning objectives are clearly stated (-).This T changes from one moment to the next, and this is confusing
Classroom activity is well organized. In this class, task instructions are clear, so that we know what to do.
Teacher supports autonomy. (-) This T does not allow the freedom of choosing how to work or with whom.
Teacher teaches to work step by step. This T explains step by step, and so it is easier to understand.
Teacher uses many examples. (-) This teacher gives almost no examples: so it is difficult to understand.
Classroom rhythm is adequate. This T adapts to our learning rhythm: he/she gives us time to think.
Teacher use feedback that help to learn from errors. This T makes you feel that you can learn from errors.
Teacher assesses «for» learning. (-) This T gives exams that have little to do with classroom work.
Teacher praises student's progress. This T praises our effort to learn at every occasion.
Teacher treats pupils with equity. (-) This T pays more attention to most intelligent pupils.
Teacher cares from each pupil. (-) Few pupils ask questions because this T is aloof and does not help.
Criterion scale
Satisfaction with teacher work: If one could choose his/her teacher, I would advise to choose my own T

include messages stressing respectively competition and the importance of avoiding appear non-intelligent. As in the CMCQ, students had to show their agreement with item content in a five-point Likert scale.

Procedure

Each group of students was instructed to fill in the questionnaires in relation to the teacher of one of the following subjects: Language Arts, Maths, Social Sciences, Natural or Experimental Sciences, and Foreign Language. The questionnaires were applied in group sessions during a class period (50 minutes).

Data analysis

Several confirmatory factor analyses and reliability and regression analyses were carried out.

First, the structure derived from the theoretical considerations was used as baseline model to be estimated with confirmatory techniques (CFA-1). Estimates were obtained using the maximum likelihood method. Absolute fit indexes (χ^2, χ^2/df, GFI), relative fit indexes (IFI) and non-centrality fit indexes (CFI, RMSEA) were use to assess model-fit, as well as criteria for acceptance or rejection of degree of adjustment described by Hair et al. (2006).

Second, in order to cross-validate the results of the above analysis, two confirmatory multiple group analyses were carried out, the first using the three SS samples, and the second using the first SS sample and the HS sample. The theoretical model proposed was used as the base for comparison without any restriction for parameter equality between samples. Against this model, two models were compared, in which equality between the groups was imposed for different sets of parameters: a) The model with equality of factor loadings imposed, and b) the model with additional restriction for error variances equality. The relative decline in goodness-of-fit was assessed by means of the difference in the chi-square statistic between the model with restrictions imposed and the model without restrictions.

Third, with the aim of testing whether gender had a significant effect on the structure of classroom motivational climate perceived by students, both samples —SS and HS— were divided by gender in two sub-samples, and a re-estimation by groups was carried out.

Fourth, reliability of the CMCQ and of the remaining scales used in the study was calculated.

Fifth, in order to get initial information on the external validity of the CMCQ, correlation analyses between scores on all the scales used in the study were carried out using the whole SS sample and the HS sample. Moreover, regression analyses were executed using as criterion the variable «satisfaction with teacher's work», and two combination of scales as predictors: a) the CMCQ, the Student's motivation scale, the Avoidance Goal Structure and the Performance Goal Structure scales from the CGS of Midgley et al. (2003), and b) these last three scales and the Mastery Goal Structure scale of the same questionnaire instead of the CMCQ.

Sixth, in order to see whether the CMC created by different teachers was significantly different, every teacher received the mean of his/her pupils' score in each variable and in the whole CMC, and several one-factor ANOVAs were carried out. However, only results corresponding to the CMC after transforming scores in a ten point scale with Mean= 5 and SD= 2 will be described.

Results

Confirmatory factor analyses

Figure 1 shows the standardized estimates of the confirmatory model. All the estimated loadings (λ) are significant (p<0,001). Table 2 shows the fit statistics of the proposed model (CFA-1). *Chi-square* statistic is significant, probably due to sample size, but the quotient χ^2/df as well as the remaining fit indexes are well inside the limits that allow the model to be accepted (χ^2/df= 1.35<5; *GFI (goodness of fit index)*= .92>.90; *IFI (incremental fit index)*= .95>.90; *CFI (comparative fit index)*= .95>.90; and *RMSEA (root mean square error of approximation)*= .04<.08).

Multigroup cross-validation analysis

In order to test the validity of the model, two multi-group analyses were carried-out. The first tests the validity for other groups of SS students. In relation to this study, the model comparison statistics presented in table 3 (CFA2) show that fit is not reduced significantly even if restrictions on measurement weights and measurement residuals are imposed. Moreover, the adjustment indexes are well inside acceptable limits (table 2, CFA2). Therefore, the model cannot be rejected.

The second multi-group analysis tests the validity for HS students. As it can be seen again, the adjustment indexes are well

Table 2
Goodness of fit statistics for CFA of base model, multi-group cross-validation analyses, and multi-group analyses by gender[1]

	χ^2	Df	P	χ^2/df.	GFI	IFI	CFI	RMSEA
CFA1 SS	176.04	105	.000	1.67	.904	.952	.952	.057
CFA2 CVA1-SS/SS	635.05	346	.000	1.73	.893	.942	.942	.035
CFA3 CVA2-SS/HS	408.23	210	.000	1.94	.892	.936	.936	.048
CFA4 MG-SS-Gender	455.89	210	.000	2.17	.916	.944	.944	.044
CFA5 MG-HG-Gender	397.83	210	.000	1,77	.827	.902	.900.	.061

[1] CVA= Cross-validation analysis; MG: Multigroup analysis by gender; SS: Secondary School Sample, HG: High School Sample

Table 3
CFA 2 cross validation of the model using multi-group analyses with different samples. Chi-square differences for model comparison against the unconstrained multi-sample model

Analysis	Model	DF	Chi-square	P
CFA2: Spain-SS-SS	Measurement weights	15	21.17	.131
	Measurement residuals	31	35.55	.267
CFA3: Spain-SS-HS	Measurement weights	15	18.22	.251
	Measurement residuals	31	79.81	.000
CFA4: Spain-SS-Gender	Measurement weights	15	11.87	.689
	Measurement residuals	31	37.39	.199
CFA5: Spain-HS-Gender	Measurement weights	15	20.96	.138
	Measurement residuals	31	40.10	.127

inside acceptable limits (table 2, CFA3). Nevertheless, the model comparison statistics shown in table 3 (CFA3) indicate that fit is reduced significantly when restrictions on measurement residuals are imposed. This fact implies that the structure of relations between variables is not exactly the same for SS students than for HS students. So, in order to determine which relations in the model differed in a significant way, the z test proposed by Clogg, Petkova and Haritou (1995) was used. Only a difference between regression coefficients was significant: «Teacher supports autonomy»-«Classroom learning climate» (Difference: -0.37; z= -2.71). This difference implies that for HS students the degree of autonomy is more indicative of a classroom climate oriented to learning than for SS students.

Testing gender effects on the perception of classroom motivational climate. Multigroup analyses

In order to find whether gender was influencing the adjustment level, two validation analyses were carried out, one for SS students (CFA4) and the other for HS students (CFA5), using two subgroups, males and females. In both cases, the model comparison statistics presented in table 3 (CFA4) show that fit is not reduced significantly even if restrictions on measurement weights and measurement residuals are imposed. Moreover, the adjustment indexes are well inside acceptable limits (table 2, CFA4 & CFA5).

CMCQ reliability

Before studying the external validity of the CMCQ Cronbach-α coefficient was calculated for the CMCQ and the remaining scales used in the study. Results are shown in Table 4. The reliability indexes of CMC in both samples are excellent; those of the scales «satisfaction with teacher's work» and «Mastery goal structure» are quite good, whereas the remaining indexes are in the limit to be accepted.

Correlation analysis

Table 4 shows also the correlations between CMCQ, the scales assessing CGS, and the «motivation» and «satisfaction with

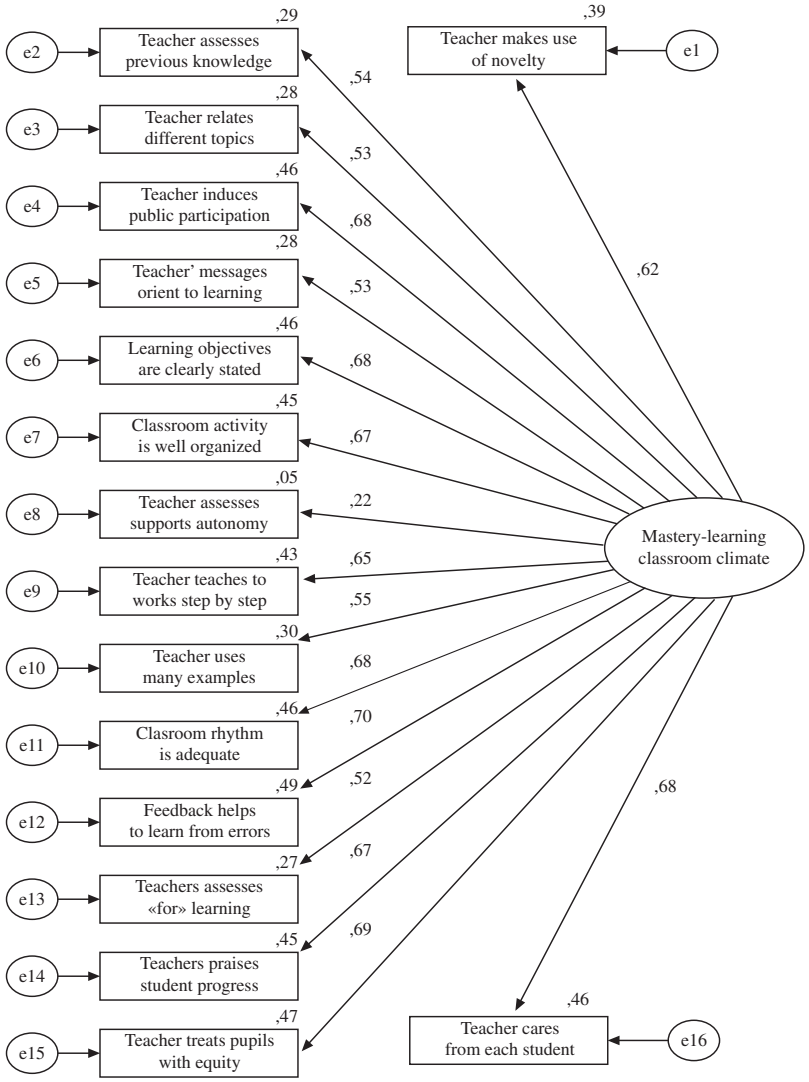

Figure 1. *CMCQ: Initial confirmatory standardized solution*

teacher work» scales. Several results deserve to be pointed out. First, CMCQ and MGS are positively and highly correlated in SS and HS, a result expected, as teacher's messages suggesting that «learning» is the objective to achieve with academic tasks (MGS) is a component of CMCQ.

Second, the correlations between CMCQ and MGS on one side and the criterion variable «Satisfaction with teacher» (SWT) are significant and positive. However, they are significantly different both, in SS and HS, as tested after transforming them in Fisher-Z (SS: $r_{cmcq\text{-}swt}$= .823, $r_{mgs\text{-}swt}$= .726, Z= 4.16; HS: $r_{cmcq\text{-}swt}$= .827, $r_{mgs\text{-}swt}$= .713, Z= 4.05). That is, inside the same sample, CMCQ correlates in grater degree with the criterion variable than MGS.

Third, the correlations between CMCQ and MGS on one side and SM on the other present a pattern parallel to the one just described: Both are significant and positive in SS and HS, but again CMCQ correlates in a greater degree than MGS, though the difference is significant only in SS (SS: $r_{cmcq\text{-}sm}$= .586, $r_{mgs\text{-}sm}$= .477, Z= 2.50; HS: $r_{cmcq\text{-}sm}$= .586, $r_{mgs\text{-}sm}$= .505, Z= 1.65).

Fourth, the correlations of both variables with PAVS are positive and significant though quite lower in SS, and negative but only significant in the case of CMCQ in HS. Differences between correlations in both samples are significant (SS: $r_{cmcq\text{-}pavs}$= .194, HS: $r_{cmcq\text{-}pavs}$= -.195, Z= 4.92; SS: $r_{mgs\text{-}pavs}$= .248, HS: $r_{mgs\text{-}pavs}$= -.029, Z= 3.5). This fact means that, whereas in SS students perceive that the more oriented to learning is classroom motivational climate the more messages they received suggesting the importance of trying not to look dumb, in HS this relation seems to be just the opposite.

Table 4
Reliability of scales used in the study (Cronbach α) and correlations between them[1]

	CMCQ	Mastery goal structure	Avoidance goal structure	Performance goal structure	Student' motivation	Satisfaction with teacher
CMCQ	*.925* *.927*	.841**	.194**	-.408**	.586**	.823**
Mastery goal structure	.839**	*.752* *.762*	.248**	-.311**	.477**	.726**
Avoidance goal structure	-.195**	-.029	*.557* *.637*	.124**	.163**	.165**
Performance goal structure	-.465**	-.291**	.360**	*.543* *.705*	-.278**	-.343**
Student' motivation	.586**	.505**	-.123	-.339**	*.667* *.637*	.520**
Satisfaction with teacher	.827**	.713**	-.126	-.300**	.536**	*.763* *.808*

[1] Cronbach α indexes are in the diagonal. The top indexes correspond to Secondary School (SS), and the bottom indexes to High School (HS). Correlations in the right-top triangle corresponds to SS, whereas indexes in the left-bottom triangle correspond to HS

[2] ** Value significant at .01 level, * Value significant at .05 level

Regression analyses

Results of regression analyses (table 5) show, first, that the amount of criterion variance explained is very high in both samples. However, if MGS is used instead of CMCQ together with the remaining predictors, this amount decreases in a significant degree in SS (Z= 3.5) but not in HG (Z= 1.27). Second, besides CMCQ or MGS, in SS only SM increases the amount o variance explained. In HS, on the other side, depending on whether CMCQ or MGS are used, only the weighs of PAPS or SM increase the amount of variance explained in a significant way.

ANOVA of CMC differences between teachers

Scores of teachers from 26 different classrooms were analyzed. Differences in CMC were highly significant ($F_{gl:\ 24,\ 614}$= 24.23, p<.0001). The rank of teachers' scores went form 1.56 to 7.14.

Discussion and conclusions

The problem faced in this study was to develop instruments for assessing teaching patterns that configure different learning environments. What contribution has been made to solve this problem?

First, it has been shown that the main types of teaching patterns that contribute to favour learning are perceived by students in such a way that can be considered to configure a classroom motivational climate oriented to learning. Results of CFA and reliability analyses support this conclusion.

Second, the different validity analyses have shown that the CMCQ and the MGS scale developed by Midgley et al. (2000) are related in the expected way. However, the predictive power of CMCQ is significantly greater both in SS and HS. Also, the regression analyses have shown that the remaining predictors of CGS questionnaire do not contribute to predict students' satisfaction, at least in SS, a result probably due to the significant correlations between Performance Approach and Performance

Table 5
Regression analysis. Criterion: satisfaction with teacher's work

Sample	R^2	P	Predictors. Standardized regression coefficients: Learning Climate (CMC)	Avoidance goal structure	Performance goal structure	Student's motivation
Secondary School	.625***	.000	.767***	.001	-.070	.102***
High School	.699***	.000	.828***	.006	.113**	.089
			Mastery goal structure	**Avoidance goal structure**	**Performance goal structure**	**Student's motivation**
Secondary School	.485***	.000	.558***	.025	-.047	.176***
High School	.559***	.000	.683***	.020	.040	.122***

[1] *** p<.001; ** p<.01; * p<.05

Avoidance with CMC and MGS. This result suggests that SS students tend to perceive classroom in a dichotomous way, as Ames and Archer (1988) have suggested.

Third, the significant positive correlations in SS and HS between CMC and Student Motivation —a measure that includes items assessing perceived ability, interest, expectancies of success and disposition to effort— were expected. However, such correlations may be due to one of two possibilities or to both of them. On one side, it may be that the increase of motivational characteristics favouring learning makes students more attentive to classroom characteristics that contribute to it. On the other side, it may be that such correlations are due to the positive effect of CMC on motivational characteristics. Evidence coming from related studies (Roeser, Midgley, & Urdan, 1996) seems to suggest that both possibilities might be true. Nevertheless, future studies aimed at clarifying this point are needed.

Forth, data related to teacher's differences in CMC show that such differences exist, being highly significant. Thus, the CMCQ allows detecting teachers that need to revise their teaching patterns. Teachers' profiles in the sixteen variables can also be of help for this task, as they allow the identification of strong and weak points. However, they have not been described due to space problems, and to the fact that the definitive standardization process is still in progress.

Finally, the significant differences found in several analyses between SS and HS suggest the importance of studying systematically which factors —different from the individual teacher— affect significantly the perceived CMC. For example, autonomy is a factor that influences the motivational value of classroom climate only in HS. That is, a particular teaching characteristic may or may not affect perceived classroom climate depending on students' personal characteristics —motives, values, etc.

In conclusion, the CMCQ is a reliable instrument that covers many of the types of teaching patterns that favour a classroom climate oriented to learning. Evidence about different facets of its validity has shown that it has a pattern of relations with motivational variables coherent with that of similar questionnaires (CGS-S, Midgley et al., 2000), predicts very well students' satisfaction with teacher's work, and allows detecting teachers that should reflect on and revise their teaching patterns. However, studies on internal and external factors affecting CMC scores and on CMC effects on motivation and achievement are needed.

References

Alonso-Tapia, J. (Ed.) (1992). *Motivar en la adolescencia: teoría, evaluación e intervención* [Motivation in adolescence: Theory, assessment and intervention]. Madrid: Servicio de Publicaciones de la Universidad Autónoma.

Alonso-Tapia, J. (2002). Knowledge assessment and conceptual understanding. In M. Limón & L. Mason (Eds.): *Reframing the processes of conceptual change* (pp. 389-413). Dordretch: Kluwer.

Alonso-Tapia, J. (2005). *Motivar en la escuela, motivar en la familia* [*Motivation in school and family*]. Madrid: Morata.

Alonso-Tapia, J., & López, G. (1999). Efectos motivacionales de las actividades docentes en función de las motivaciones de los alumnos [Effects of teaching patterns as a function of student motivation]. In J.I. Pozo & C. Monereo (Eds.): *El aprendizaje estratégico* (pp. 35-57) [Strategic Learning]. Madrid: Santillana.

Alonso-Tapia, J., & Pardo, A. (2006). Assessment of learning environment motivational quality from the point of view of secondary and high school learners. *Learning and Instruction, 16*, 1-15.

Alonso-Tapia, J., & Ruiz, M.A. (2007). Motives related to learning and perceptions of environment motivational quality: How do they interact in university students? *Psicothema, 19*(4), 602-608.

Ames, C. (1992). Achievement goals and the classroom motivational climate. In D.H. Schunk & J.L. Meece (Eds.): *Students perceptions in the classroom* (pp. 327-348). New York: Lawrence Erlbaum.

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*, 260-267.

Anderman, E.M., & Midgley, C. (2004). Changes in self-reported academic cheating across the transition from middle school to high school. *Contemporary Educational Psychology 29*, 499-517.

Assor, A., & Kaplan, H. (2001). Mapping the domain of autonomy support. In A. Efklides, J. Kuhl & R.M. Sorrentino (Eds.): *Trends and prospects in motivational research* (pp. 101-120). The Netherlands: Kluwer.

Clogg, C., Petkova, E., & Haritou, A. (1995). Statistical methods for comparing regression coefficients between models. *The American Journal of Sociology, 100*(5), 1261-1293.

Dweck, C. (1986). Motivational processes affecting learning. *American Psychologist, 41*, 1040-1048.

Elliot, A.J. (2005). A conceptual history of achievement goal construct. In A.J. Elliot & C. Dweck (Eds.): *Handbook of competence and motivation* (pp. 52-72). New York: Guilford.

Good, T.L., & Brophy, J.E. (2000). *Looking into classrooms.* New York: Longman.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., & Tathan, R.L. (2006). Multivariate data analysis. Upper Saddle River, NJ: Pearson-Prentice Hall.

Harackiewicz, J.M., Barron, K.E., Pintrich, P.R., Elliot, A.J., & Trash, T.M. (2002). Revision of achievement goal theory: Necessary an illuminating. *Journal of Educational Psychology, 94*(3), 638-645.

Kaplan, A., Middleton, M.J., Urdan, T., & Midgley, C. (2002). Achievement goals and goal structures. In C. Midgley (Ed.): *Goals, goal structures and patterns of adaptive learning* (pp. 21-55). Hillsdale, NJ: Erlbaum.

Meece, J.L., Anderman, E.M., & Anderman, L.H. (2006). Classroom goal structure, student motivation and academic achievement. *Annual Review of Psychology, 57*, 487-503.

Midgley, C., Maher, M.L., Hruda, L.Z., Anderman, E., Anderman, L., Freeman, K.E., Gheen, M., Kaplan, A., Kumar, R., Middleton, M.J., Nelson, J., Roeser, R., & Urdan, T., (2000). *Manual for the patterns of Adaptive Learning Scales.* University of Michigan.

Midgley, C., Kaplan, A., Middleton, M., Maher, M.L., Urdan, T., Anderman, L.H., Anderman, E., & Roeser, R. (1998). The development and validation of scales assessing students' achievement goal orientations. *Contemporary Educational Psychology, 23*, 113-131.

Roeser R.W., Midgley, C., & Urdan, T.C. (1996). Perceptions of the school psychological environment and early adolescents' psychological and behavioral functioning in school: The mediating role of goals and belonging. *Journal of Educational Psychology, 88*, 408-22.

Schnotz, W., & PreuB, A. (1997). Task-dependent construction of mental models as a basis for conceptual change. *European Journal of Psychology of Education*, *12*(2), 185-211.

Self-Brown, S.R., & Mathews-II, S. (2003). Effects of classroom structure on student achievement goal orientation. *Journal of Educational Research*, *97*(2), 106-111.

Underwood, T. (1998). The consequences of portfolio assessment: A case study. *Educational Assessment, 5*(3), 147-194.

Urdan, T., & Turner, J.C. (2005). Competence motivation in the classroom. In A.J. Elliot & C. Dweck (Eds.): *Handbook of competence and motivation* (pp. 297-317). New York: Guilford.