

# Influence of classroom motivational climate and teaching style on university students' self-regulation and performance

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Recibido: Febrero 2021 / Evaluado: Junio 2021 / Aceptado: Julio 2021

**Abstract.** The teacher actions in classroom has important effects on students' educational processes and performance, thus it is crucial to train teachers so that they implement the most efficient instructional strategies. This study explores the influence of the university instructional environment, defined by the Teaching Styles and the Classroom Motivational Climate, on the perception of motivational changes, emotion, and motivation self-regulation, academic performance, and how students' initial motivational orientations mediate this influence. A total of 214 students from the faculty of Education of a Colombian university participated in the study. Three predictive models were analyzed. Results indicate, first, that motivational orientation mediates the perception of the instructional environment: avoidance orientation is associated with negative perception; second, both the Classroom Motivational Climate and the Teaching Style favor learning oriented motivation, learning-oriented emotion self-regulation style, and the students' attribution of motivational changes to the teacher; third, Classroom Motivational Climate seems to mitigate avoidance oriented self-regulation style. Finally, the Teaching Style is the only variable that positively and significantly predicts academic performance.

**Keywords:** teaching style; classroom motivational climate; motivation; achievement goal orientations; emotion self-regulation; motivation self-regulation.

## [en] Influencia del clima motivacional de clase y el estilo de enseñanza en la autorregulación y el rendimiento de estudiantes universitarios

**Resumen.** Comprender la influencia que tienen las acciones del maestro en el aula en los procesos educativos de los estudiantes permite proyectar acciones de formación y cualificación docente para mejorar la enseñanza. Este trabajo estudia la influencia del entorno instruccional en la universidad, definido por el Estilo de Enseñanza y el Clima Motivacional de Clase, sobre la percepción de los cambios motivacionales, la autorregulación de emociones y el rendimiento académico, y cómo esta influencia es mediada por la orientación motivacional inicial de los estudiantes. Participaron 214 estudiantes de la Facultad de Educación de una universidad colombiana. Se analizaron tres modelos predictivos. Los resultados indican: primero, la orientación motivacional modera la percepción del entorno instruccional: la orientación a la evitación se asocia a una percepción negativa; segundo, el Clima Motivacional de Clase y el Estilo de Enseñanza favorecen la motivación orientada al aprendizaje, el estilo de autorregulación de las emociones orientado al aprendizaje, y la satisfacción con el docente; tercero, el Clima Motivacional de Clase parece mitigar el estilo de autorregulación orientado a la evitación. Finalmente, el Estilo de Enseñanza es la única variable que predice de forma positiva y significativa el rendimiento académico.

**Palabras clave:** estilo de enseñanza; clima motivacional de clase; motivación; orientación motivacional; autorregulación emocional; autorregulación motivacional

**Summary:** 1. Potential influence of the university classroom instructional environment on emotional and motivational self-regulation and academic performance. 2. Classroom interrelated variables. 3. Research goals and hypotheses. 4. Method. 4.1. Sample. 4.2. Instruments. 4.3. Procedure. 4.4. Data analysis. 5. Results. 5.1. Relationship between CMC-Q and TSIHE-Q: Discriminant validity. 5.2. Teaching Style and Classroom Motivational Climate: effects on dependent variables. 6. Discussion. 6.1. Relationship between CMC-Q and TSIHE-Q. 6.2. Teaching Style and Classroom Motivational Climate: relations to dependent variables. 6.3. Educational implications. 7. Conclusion. 8. References.

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**Cómo citar:** Abello, D. M.; Alonso-Tapia, J.; Panadero, E. (2022). Influence of classroom motivational climate and teaching style on university students' self-regulation and performance. *Revista Complutense de Educación*, 33(3), 399-412.

## 1. University classroom instructional environment effects on students' self-regulation and academic performance

Completing higher education studies is not an easy endeavor. Obtaining a degree requires initial motivation and maintaining a sustained effort during various tasks, courses, and academic periods for several years. Moreover, having an initial motivation is not enough to maintain the required effort throughout this educational level (Wolters, 2003). Students face several difficulties and challenges during university studies that can negatively influence their emotions, an influence that can decrease motivation, leading to academic failure and dropout (Reeve, Jang, Carrell, Jeon, & Barch, 2004; Koivuniemi, Panadero, Malmberg, & Järvelä, 2017; Tinto, 2017). Consequently, students must modulate these emotions intentionally and employ strategies that allow maintaining a high level of motivation to continue striving until they complete the challenging task (Baez-Estradas & Alonso-Tapia, 2017; García-Pérez, Fraile & Panadero, 2021; Macklem, 2015). Therefore, it is crucial to understand students' academic emotions when facing a challenge and identify adequate strategies to modulate them while enhancing motivation.

Given the need just mentioned, in recent years, attention has been turned toward *emotional and motivational self-regulation* because of their impact on learning, achievement, and academic success (Schwinger, Steinmayr, & Spinath, 2009; Wolters, 1999). Students' ability to manage their levels of motivation and emotion is an essential component in engagement and self-regulated learning models (Panadero, 2017). The level of engagement of a person to fulfill their intentions is influenced by using different strategies to regulate emotions and motivation. Having an initial motivation and setting goals must be supplemented with an engagement process, ensuring that the proposed goals are pursued and achieved (Wolters, 1999).

Although emotion and motivation regulation are internal processes, contextual factors can facilitate or hinder this process by influencing the specific types of regulation strategies they activate (Panadero, 2017). How teachers structure the class influences students' goals and how they face difficulties (Macklem, 2015; Meyer & Turner, 2006). Though several researchers have studied emotion and motivation regulation combined with the ideal instructional environment, few studies relate the three variables (Fried, 2011). Therefore, this study tries to contribute to filling that gap. Our aim is to analyze how the university instructional environment can influence emotional and motivational self-regulation and, directly or indirectly, academic performance.

## 2. Classroom interrelated variables

Our study then explores several variables and their relationship, as shown in *Figure 1*. *Teaching Style* and *Classroom Motivational Climate* refers to different sets of variables defined by teachers' action patterns that configure the instructional environment. These two concepts explore how teaching is delivered and structured while influencing students' motivation, emotion, and performance. As the two concepts refer to various aspects of the instructional environment, it is expected that analyzing both will allow a better understanding of how classroom dynamics affect students. Next, we will present the set of variables considered in the study and the theoretical model that relates them.

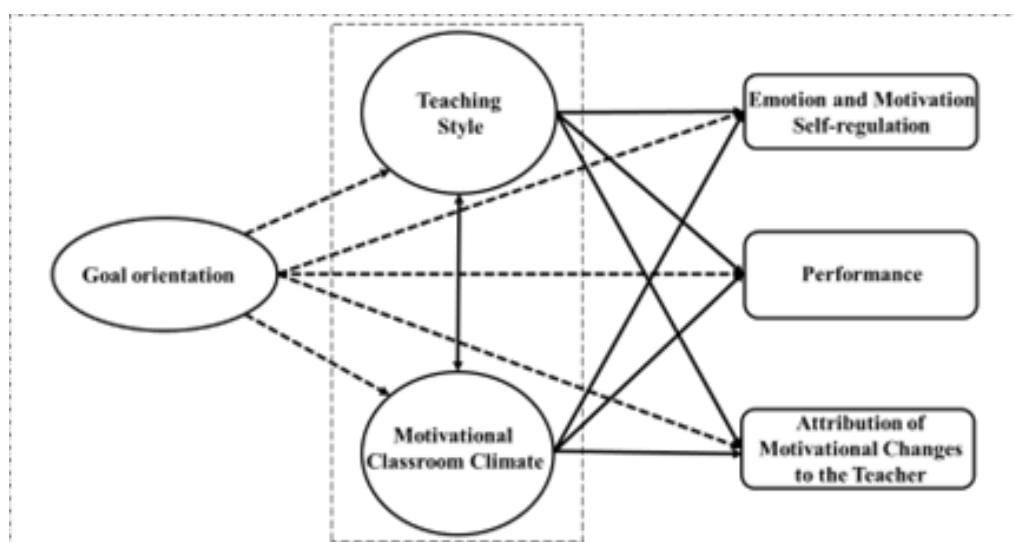


Figure 1. Main variables of the study and their theoretical relationships

Note: Dashed arrows correspond to the effects of moderating variables.

*Teaching Style (TS)*. Teaching Style was initially defined as the way a teacher teaches (Fischer & Fischer, 1968). According to these authors, it is possible to recognize and differentiate educators by their TS, referred colloquially as the teaching footprint as teachers employ different instructional approaches that structure the classroom and how students approach that subject.

Several authors have further explored this concept (Camargo & Hederich, 2007; Gafoor & Babu, 2012; Rendón, 2013). The proposal of Abello, Alonso-Tapia, and Panadero (2020), based on the work of Abello, Hernández, and Hederich (2011) and summarized in Table 1, has reliable empirical support.

Table 1. TS dimensions (Abello et al., 2020)

Dimension	Description
Teacher-Student interaction	Students' perception of their teachers' emotional openness.
Decision-Making negotiation	Students' perception of the level at which the teacher negotiates the classroom rules and decisions with their students.
Teaching structuring	Students' perception of the course level structure describing the degree to which the student perceives regular teaching patterns.
Behavioral control	Students' perceptions of the teachers' control over their students' behavior during class time.

The variables in Table 1 comprise the TS that promotes learning and is the basis of the *Teaching Styles Inventory for Higher Education (TSIHE)*. The scales are based on the impact that these aspects, as mentioned earlier, have on promoting a learning approach in the classroom. Next, we briefly present the scales. a) Teacher-student interaction: teachers that are social, emotionally close to their students and create an open social climate promote more engagement and persistence in academic tasks which increases performance (Khandaghi & Farasat, 2011). b) Teaching structuring: structured classes and with clear learning goals make students feel safer and comfortable, which diminish stress and increases motivation and performance (Antonioni & Kalinogloua, 2013). c) Decision-making: measures students participation in creation of rules, feel they can influence decisions, and perceive a flexible structure (Frunzã, 2014). d) Behavioral control: when teachers are strict with misbehavior and assure the conditions that allow students to follow attentively teachers' explanations or the activities proposed, students feel safe and comfortable because they understand how the teacher operates (Fontana, 1994). The TSIHE (Abello, et al., 2020) proposed a bifactor model that allows assessing the four scales separately, and, at the same time, the combined effect of all of the TS, which provides a measure of the degree to which TS is learning-oriented.

*Classroom Motivational Climate (CMC)*. Ames (1992) introduced this concept and found that the Classroom Motivational Climate could favor performance or mastery goals reliant on six patterns of teacher's activity: task, authority, recognition, grouping, evaluation, and time. She proposed that the patterns related to each of these areas could favor mastery orientation. Alonso-Tapia and Fernandez-Heredia (2008) research operationalized the CMC around sixteen teacher's action patterns shown in Figure 2. A revision of different studies in which the CMC-Q has been used (Alonso-Tapia, 2016) concluded that the higher the degree in which the CMC is learning-oriented, the higher the degree in which students' increases in interest, effort, perceived ability, success expectancies, self-regulation (planning) and resilience are attributed to teachers' work. Classroom climate focused on learning/mastery goals could stimulate that same kind of goal within students and positively influence learning processes and academic performance (Alonso-Tapia, Ruiz, & Huertas, 2020; Givens, 2012).

*Motivation*. Students have different personal goals when they enter the classroom (Elliot, 2005), thus their interpretation of TS and The CMC is conditioned by such goals. While there is direct empirical evidence that goal orientations influence the CMC (Alonso-Tapia, 2016; Alonso-Tapia, et al., 2020), evidence on the influence of TS is still missing. We hypothesized here that the same effect could happen, that is that TS, and thus, goal orientations, are an index of students' motivation and, therefore, they were included as mediator variables.

*Emotion and motivation self-regulation*. One of the reasons with a student is not doing well is that is having problems regulating their emotions and motivation, especially in a highly demanding context as higher education (Howell & Buro, 2011; Montes, Prettel, & Boutureira, 2018; Webster & Hadwin, 2015). Because of this research on the regulation of emotions and motivation has increased as self-regulation has a significant impact on learning and academic performance (Harley, Pekrun, Taxer, & Gross, 2019; Panadero, 2017; Schwinger et al., 2009).

Academic challenges in higher education provide a great source of diverse emotional experiences (García-Pérez et al., 2021; Koivuniemi et al., 2017). These emotions vary in magnitude and frequency, influencing educational achievement. In general, positive emotions help the learning process, and negative emotions emerge as barriers to learning and performance (Reindl, Tulis & Dresel, 2020). Emotions impact students' analysis capacity, problem-solving, regulatory process, and intrinsic motivation (Pekrun & Linnenbrink-Garcia, 2012). Emotions can then benefit or hinder motivation and learning. Their adverse effects, however, can be avoided depending on how students self-regulate emotions and motivation (Panadero, 2017). Emotional regulation occurs when a person performs conscious and voluntary actions over the emotions they experience. When a student struggles during an academic task, emotions arise; hence, s/he must modulate the physiological response and use strategies according to the context to

achieve the proposed goals (Gross, 2013). Because of all of these reasons, emotional and motivational self-regulation is used as a dependent variable in this study.

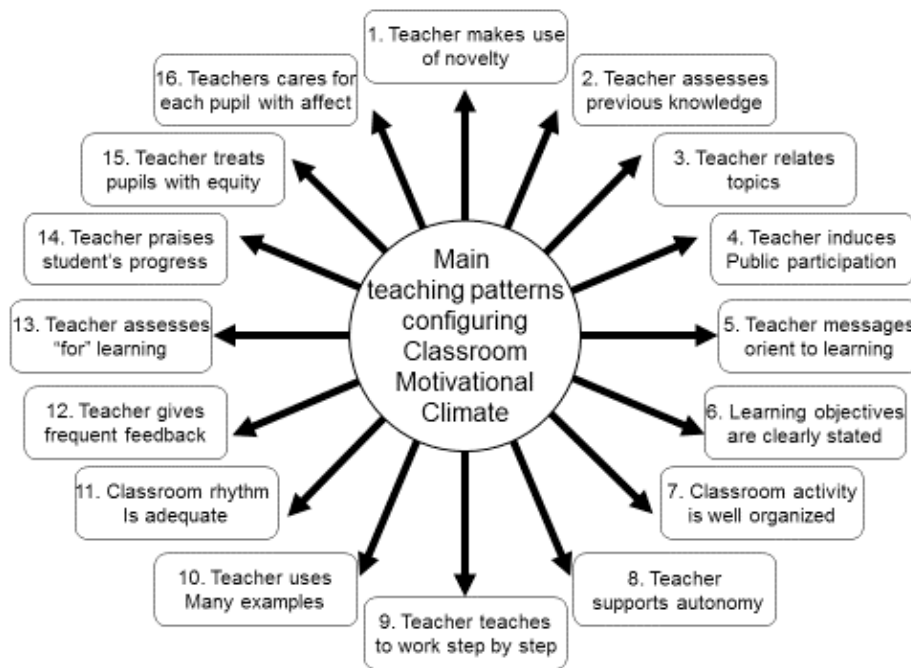


Figure 2. Essential components of the CMC (Alonso-Tapia, 2016)

To assess emotional and motivational self-regulation, the EMSR-Q (Alonso-Tapia, Panadero & Ruiz, 2014) was selected. Data from EMSR-Q had shown that self-messages that students use when coping with challenging emotions vary depending on students’ motivational orientation. Based on that, the authors defined two emotion and motivation self-regulation styles: *Avoidance Self-Regulation Style (A-SRS)* and *Learning Self-Regulation Style (L-SRS)*; the complete structure of the questionnaire is shown in Figure 3. Alonso-Tapia et al. (2014) found that the two styles of the EMSR-Q correlate significantly with the CMC, positively in the case of L-SRS and negatively in the case of A-SRS. However, its relationships with the TS have not been established.

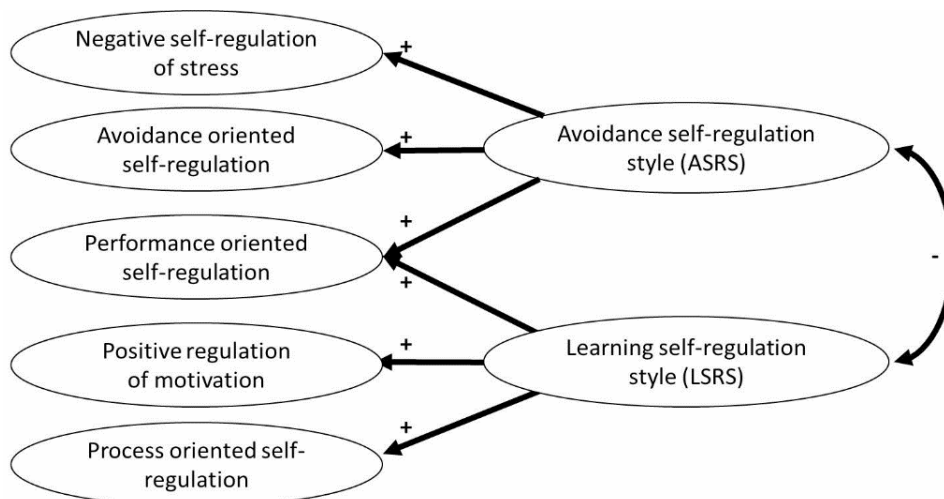


Figure 3. Emotion and motivation self-regulation model (Alonso-Tapia et al., 2014)

*Academic performance.* Academic performance is usually measured using grades (GPA) and is greatly influenced by different intervening variables that are difficult to isolate in this study, such as performance anxiety, teachers’ subjective assessment, previous knowledge, intelligence, among others. Nevertheless, academic performance measured as GPA is a variable with significant ecological validity and has been used as a criterion variable; therefore, we decided to include it.

*Student attribution of motivational changes to the teacher.* Good teaching positively influences several motivational variables: interest, effort, self-efficacy, success expectancy, and satisfaction (Alonso-Tapia, 2016). Conse-



quently, these variables are interesting to be explored as dependent variables. However, due to the nature of our study, based on correlations between data gathered on only one occasion, it is impossible to measure how these variables change. Nevertheless, it is possible to obtain indirect evidence if we ask students about the degree of change –low or high– in interest, effort, self-efficacy, success expectancies, and satisfaction due to the quality of teachers work (Alonso-Tapia & Fernandez, 2008; Alonso-Tapia et al. 2020). Therefore, it was decided to include the attribution of motivational changes to teachers' work as a dependent variable.

### 3. Research goals and hypotheses

According to the nature of the variables included in the model shown in Figure 1, this study has three specific objectives:

- 1) To analyze the relationship between TS and the CMC. It is hypothesized that those two variables will have a positive relationship, while discriminant validity will show them that they are distinct constructs whose effects on criterion variables are at least partially different.
- 2) To analyze TS and the CMC's relationships with emotional and motivational self-regulation, student attribution of motivational changes to the teacher, and academic performance. It is expected that the higher the scores in TS and CMC –that is, the higher teaching environments are learned-oriented–, the higher will be the scores in learning self-regulation, attribution of motivational changes to teachers' work and performance, and the lower the scores on avoidance self-regulation.
- 3) To test the mediating role of goal orientations in the above relationships. It is expected that the higher the learning orientation, the higher will be the positive perception of the TS and the CMC. On the other hand, the higher the avoidance orientation, the lowest is the positive perception of the TS and the CMC.

## 4. Method

### 4.1. Sample

The study was conducted at the Faculty of Education of the *Universidad Pedagógica Nacional de Colombia*, comprising three degrees: Special education, Child education, and Community education. The sampling was conducted ensuring representation of all year levels in the degrees. A total of 214 students completed the four questionnaires (CL=95%; E=6.2%). The average age of the students was 22.2 (SD=3.3), and 93.5% of students were women; this distribution is similar to that of the Faculty (87%-13%).

### 4.2. Instruments

*Teaching Style Inventory for Higher Education* (TSIHE) (Abello et al., 2020). This questionnaire contains 28 items with four scales: decision-making negotiation ( $\omega = 0.96$ ), behavioral control ( $\omega = 0.96$ ), teaching structuring ( $\omega = 0.96$ ), and teacher-student interaction ( $\omega = 0.97$ ). Higher scores in each scale show a TS favoring learning.

*Classroom Motivational Climate Questionnaire* (CMC-Q) (Alonso-Tapia & Fernández-Heredia, 2008). The CMC-Q is a 32-items questionnaire that measures the sixteen teaching patterns shown in Figure 2. High results in this questionnaire show a CMC that invites the student to adopt mastery or learning goals. The CMC-Q has good psychometric qualities, evidenced in various studies (Alonso-Tapia, 2016). In this study, the adjusted version for the Colombian higher education context was used (Abello, Alonso-Tapia, & Panadero, 2021), which has a good-fit index and reliability ( $\omega = 0.97$ ).

*Situated Goals Questionnaire for University students* (SGQ-U) (Alonso-Tapia, Nieto, Merino-Tejedor, Huertas, & Ruiz, 2018). This questionnaire was used to identify students' goal orientations. It has 30 items grouped in six scales that, in turn, define tree goal orientations. First, *Learning Orientation*, which includes the scales "desire to learn" and "desire to be useful." Second, *Performance Orientation*, which includes the scales "desire to obtain good grades" and "desire to pass." Third, *Avoidance Orientation*, which includes the scales "desire to avoid failing publicly" and "desire to give up work." All the scales and the whole instrument have reliability indexes over .75.

*Attribution of Motivational Changes to the Teacher Questionnaire* (AMCT-Q) (Alonso-Tapia, 2016; Abello et al., 2021). This instrument has 22 items grouped in six scales: a) Expectations of success ( $\omega = 0.85$ ); b) interest in the subject ( $\omega = .89$ ); c) perceived ability ( $\omega = .89$ ); d) effort ( $\omega = .88$ ); e) student's satisfaction with teacher's work ( $\omega = .85$ ), and f) self-regulation ( $\omega = 0.94$ ). Students are asked to report to what degree their motivational changes are due to teachers' work quality.

*Emotion and Motivation Self-regulation Questionnaire* (EMSR-Q). (Alonso-Tapia, Panadero, & Ruiz, 2014; Alonso-Tapia, Abello, & Panadero, 2020). This questionnaire contains 20 items that are self-directed messages triggered when difficulty emerges during an academic task. The instrument has five scales that converge into two styles of self-regulation (Figure 3 and Table 2 for reliability indexes).

*Performance.* The final grade given to the students by the teacher whose TS and CMC were to be evaluated was used as a performance measure.

### 4.3. Procedure

After completing the university's ethical procedure, the study was presented to teachers and students who participated voluntarily. The students filled in the Goal Orientation Questionnaire (i.e., SGQ-U) before their first lecture to assess general motivational orientation. The other four instruments were filled in after half of the semester was over so that students had enough time to know the instructional strategies of the teachers they were evaluating. Questionnaires were filled in paper during lectures.

### 4.4. Data Analysis

Regarding missing data, we followed the procedure proposed by Rubin (1976). Cases with more than 5% of missing data were eliminated. In the remaining cases with missing data given the MCAR (Missing Completely At Random) condition, the statistical mean was used to complete them.

Path analysis was conducted based on its usefulness to illustrate the number of problems involved in the causal relationship, structure the relationships to be analyzed graphically, and indicate the possible causal relationships between the variables. Three models were tested. The first two models used the TS (M1) and the CMC (M2) to test their predictive power without combining them. The last model integrated both variables to test their combined effects. The estimation method used was Maximum Likelihood, after verifying that the data met the appropriate conditions for it. To accept or reject the model, the criteria proposed by Hair, Black, Babin and Anderson (2010), were used:  $\chi^2/df < 5$ ; GFI, IFI and CFI  $> .90$ ; RMSA  $< .08$ ; SRMR  $< .08$ . The AMOS 22 software was employed to run the statistical analyses.

## 5. Results

### 5.1. Relationship between CMC-Q and TSIHE-Q: Discriminant validity

As aforementioned, the TS and the CMC are parts of a whole construct understood as the Classroom environment. To identify discriminant validity between the TSIHE and the CMC-Q, we use the Fornell Larcker criterion (Hair Jr, Hult, Ringle, & Sarstedt, 2016). As shown in *Figure 4*, the square root of the AVE of each variable is higher than the correlation between them; therefore, it is possible to affirm, by empirical standards, that each construct is distinct from the other and captures different aspects of the classroom environment.

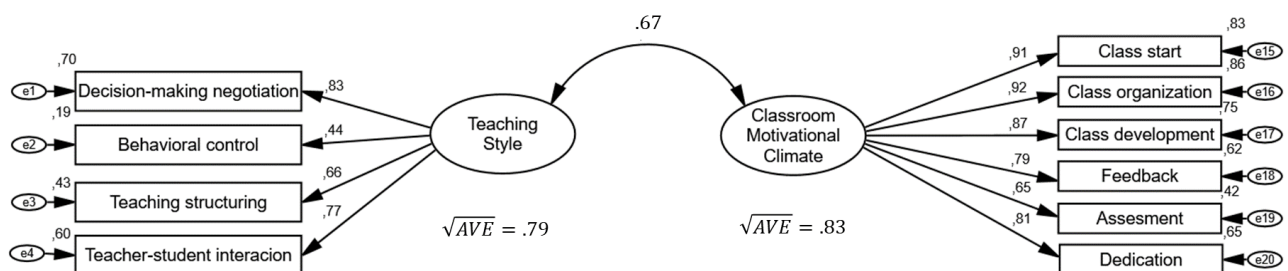


Figure 4. Discriminant validity between TSIHE and CMC-Q

### 5.2. Teaching Style and Classroom Motivational Climate: effects on dependent variables

Although discriminant validity between TSIHE and CMC-Q has been established, both variables share 44% of the variance. Therefore, individual models were analyzed for each construct to identify each one's effects. Then, an integrated model was proposed, in which the joint predictive power of both the Teaching Style and the Classroom Motivational Climate was analyzed.

*Model of TS Influence (M1).* Figure 5 shows the regression weights, and Table 2, the fit indexes. As can be seen,  $\chi^2$  was significant, probably due to the sample size. However, the ratio  $\chi^2/df$  and the remaining adjustment indexes were in the desirable range, which allows accepting the model.

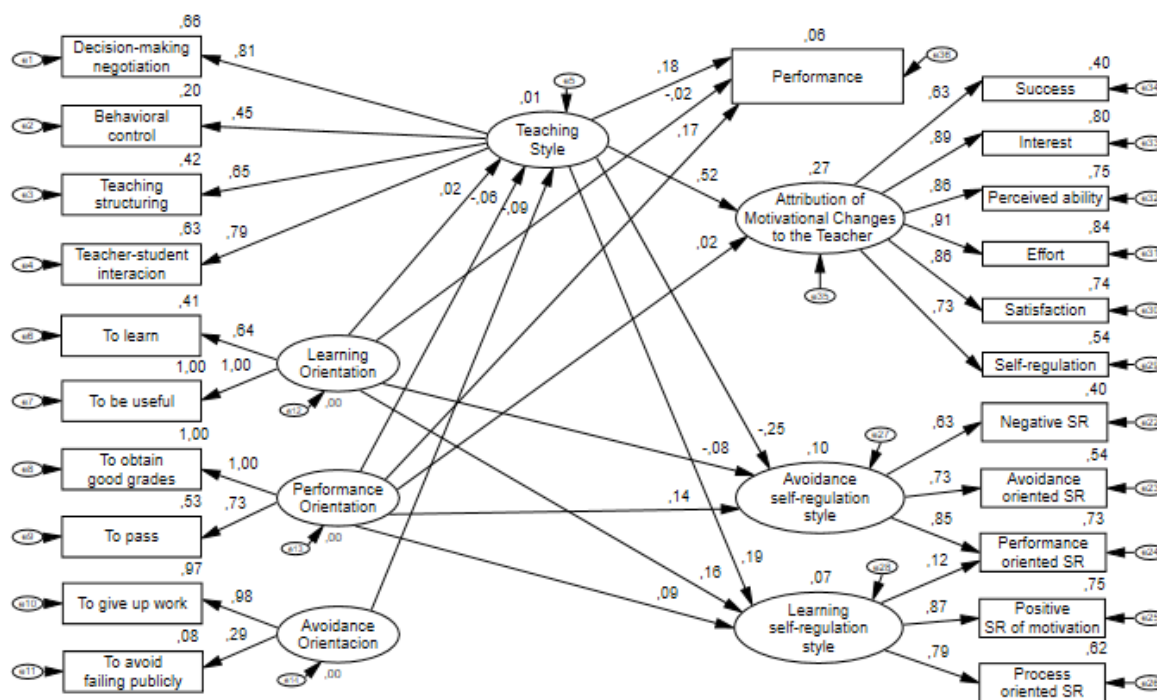


Figure 5. Model of TS effects (M1): Regression weights

Table 2. Goodness-of-fit statistics of each model of the relationship between instructional environment and personal variables

	$\chi^2$	Df	p	$\chi^2/df$	TLI	CFI	RMSEA	SRMR
M1 <sup>1</sup> (N = 214)	371.28	197	<.001	1.89	.90	.9	.06	.08
M2 (N = 214)	455.84	242	<.001	1.88	.92	.93	.06	.08
M3 (N = 214)	578.54	332	<.001	1.74	.91	.92	.06	.08

<sup>1</sup> M1: Model centered on teaching style (TS); M2: Model centered on classroom motivational climate (CMC); M3: Model combining both environmental classroom variables.

None of the three goal orientations had a significant effect on TS. Therefore, no indirect effects of goal orientations can be mediated through this variable. However, performance orientation had a direct effect on performance: ( $\lambda=.17$ ;  $p=.011$ ).

Teaching Style’s effect on performance was significant ( $\lambda=.18$ ;  $p=.018$ ). However, the combination of TS and goal orientation effects only explained 6% of the variance of performance. TS had an important effect on the degree to which students attributed changes in motivational variables to teachers’ work ( $\lambda=.52$ ;  $p<.001$ ), explaining 27% of this dependent variable. Finally, TS had a significant negative effect on Avoidance-SR ( $\lambda = -.25$ ;  $p = .002$ ) and a positive effect on Learning-SR ( $\lambda = .19$ ;  $p = .027$ ).

*Model of CMC Influence (M2).* Figure 6 shows the regression weights, and Table 2, the fit indexes. As can be seen,  $\chi^2$  was significant, probably due to the sample size. However, the ratio  $\chi^2/df$  and the remaining adjustment indexes were in the desirable range, which allows the model to be accepted.

Regarding goal orientation effects, performance and avoidance orientation had significant and negative effects on the CMC (PO:  $\lambda = -.15$ ;  $p=.005$ ; AO:  $\lambda = -.98$ ;  $p=.005$ ). Therefore, these goal orientations can have indirect effects on the other variables of the model through the CMC if this has significant direct effects on the dependent variables. Besides, performance orientation directly affected academic performance ( $\lambda=.15$ ;  $p=.026$ ), although the impact was small.

As for the CMC direct effects on dependent variables, three results were found. First, its predictive weight on academic performance was null. Therefore, it cannot convey indirect effects from goal orientations. Second, the CMC had a strong positive direct effect on the degree to which students attributed changes in motivational variables to teachers’ work ( $\lambda=.65$ ;  $p < .001$ ). However, given the direct negative effect of avoidance orientation on the CMC ( $\lambda =$

-.98;  $p=.005$ ), this last variable was conveying a small negative indirect effect of Avoidance orientation on students' attributions of their motivational changes to teachers' work (standardized indirect effect = -.64). In the same way, CMC conveyed an indirect effect of performance orientation (standardized indirect effect = .10).

Third, the CMC had a direct negative effect on avoidance self-regulation style ( $\lambda = -.28$ ;  $p = .001$ ) and a positive direct effect on learning self-regulation style ( $\lambda = .19$ ;  $p = .016$ ). Therefore, given the direct negative effect of performance and avoidance orientations on the CMC above mentioned, this last variable conveyed the indirect effects of goal orientations, first, on Avoidance-SR (PO-ASR: standardized indirect effect = -.04; AO-ASR: standardized indirect effect = -.28), and second, on Learning-SR (PO-LSR: standardized indirect effect = .03; AO-LSR: standardized indirect effect = -.19).

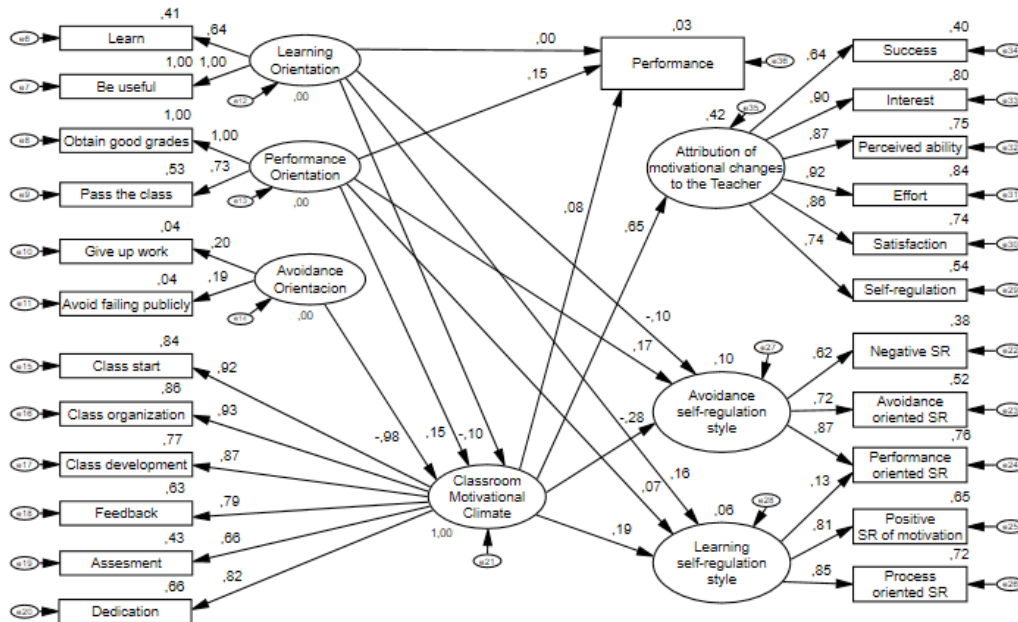


Figure 6. Model of CMC effects (M2): Regression weights

*Combined model: TS and CMC combined effects (M3).* Figure 7 shows the regression weights, and Table 3, the fit indexes. Some relationships were eliminated to adjust the model because, in the preliminary analysis, they exhibited no significant effect. As can be seen,  $\chi^2$  was significant, probably due to the sample size. However, the ratio  $\chi^2/df$  and the remaining adjustment indexes were in the desirable range, which allows the model to be accepted. Correlations between variables in the model are included in the Appendix.

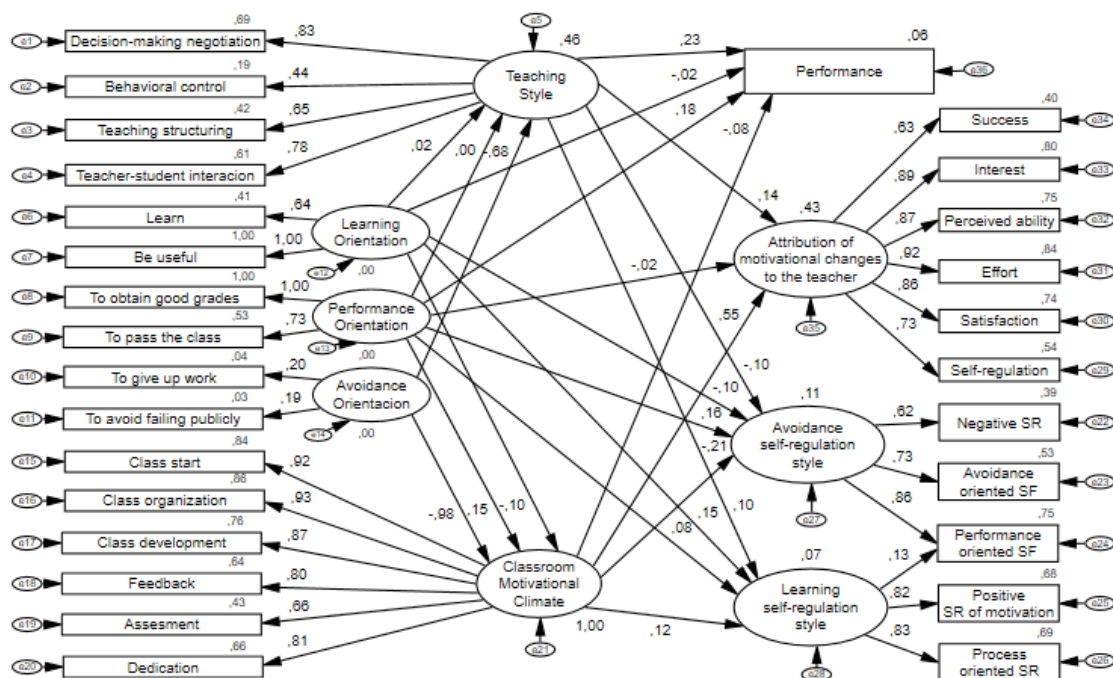


Figure 7. An integrated model of the instructional context effects (M3): Regression weights



Regarding goal orientations, four significant effects were found. The most substantial effect was a negative one from avoidance orientation on the CMC ( $\lambda = -.98$ ;  $p = .005$ ) and TS ( $\lambda = -.68$ ;  $p = .006$ ). In addition, we found a negative effect from performance orientation on the CMC ( $\lambda = .15$ ;  $p = .023$ ).

As for TS and CMC direct effects on dependent variables, TS had a small positive effect on performance ( $\lambda = .23$ ;  $p = .039$ ). TS showed no significant effect on the attribution of motivational changes to teachers' work, contrary to what happened in M1, but now the effect from the CMC on such attribution was still higher ( $\lambda = .65$ ;  $p < .001$ ), explaining 42% of the variance. As for self-regulation style, the negative effect of the CMC on Avoidance-SR was slightly lower than in the second model ( $\lambda = -.26$ ;  $p = .062$ ). A direct effect from performance orientation on Avoidance-SR was found ( $\lambda = .17$ ;  $p = .018$ ). Table 3 synthesizes all three models' significant effects to help to compare the results found in each model.

Table 3. Comparison of significant effects in models M1, M2, M3

Predictors		Criteria	Model 1		Model 3		Model 2	
			$\lambda$	p	$\lambda$	p	$\lambda$	p
TS	→	Performance	.18	.018	.23	.039	-	-
TS	→	Attribution	.52	<.001	.14	NS	-	-
TS	→	Avoidance SR	-.25	.002	-.10	NS	-	-
TS	→	Learning SR	.19	.027	.10	NS	-	-
LO	→	Learning SR	.16	.042	.15	.044	.16	.037
PO	→	Performance	.17	.011	.18	.010	.15	.026
PO	→	CMC	-	-	.15	.023	.15	.022
PO	→	Avoidance SR	.14	.049	.16	.029	.17	.018
AO	→	TS	-.09	NS	-.68	.006	-	-
AO	→	CMC	-	-	.98	.005	.98	.004
CMC	→	Attribution	-	-	.55	<.001	.65	<.001
CMC	→	Avoidance SR	-	-	-.26	.062	-.28	<.001
CMC	→	Learning SR	-	-	.12	NS	.19	.016

*Note:* TS: Teaching style; LO: Learning orientation; PO: Performance orientation; AO: Avoidance orientation; CMC: Classroom motivational climate; SR: self-regulation

## 6. Discussion

This study aimed to investigate the potential causal relationships between the university instructional environment's, on one side, and academic performance, attribution of motivational changes to teacher work, and emotional and motivational self-regulation on the other. Next, we will discuss the main findings.

### 6.1. Relationship between CMC-Q and TSIHE-Q

The TS and CMC are two different concepts with some similarities because both relate to actions teachers deploy in the classroom. Having had the opportunity to measure and confront both concepts in the same sample has helped determine, both, their construct and predictive validity.

First, the discriminant validity results emphasize the need to consider the components assessed by each questionnaire as to understand how the classroom environment affect students' educational processes. Additionally, they also serve to decide the main components of such environments that should be modified to improve students' interest, motivation, engagement, self-regulation, and learning.

Second, on one hand, the CMC predicted general student satisfaction with the teacher in line with previous works (Alonso-Tapia & Fernández-Heredia, 2009; Alonso-Tapia, Ruiz, et al., 2020; Leal-Soto & Alonso-Tapia, 2017). On the other hand, TS has predicted academic performance, as found in previous studies (Bota & Tulbure, 2015; Frunzã, 2014), better than the CMC. Therefore, our initial hypothesis is supported by our results, which allows us to affirm that the joint use of both questionnaires' provides a more comprehensive understanding of what happened in the classroom.

## 6.2. Teaching Style and Classroom Motivational Climate: relations to dependent variables

Regarding the moderating role of goal orientations, the results are partially different from those expected and found in previous studies (Alonso-Tapia & Fernández-Heredia, 2009; Alonso-Tapia & Nieto, 2019; Alonso-Tapia, Ruiz, et al., 2020; Leal-Soto & Alonso-Tapia, 2017). Learning orientation did not have a significant and positive relation with CMC. Avoidance orientation had a negative relationship with how students perceived CMC and TS but in this last case, the relation was significant only in the final model. The fact that students with an avoidance orientation negatively perceived the CMC is related to some teaching patterns stressed by teachers, especially asking students to act with autonomy and participate in public presentations or discussions, in line with Morgan, Kingston, and Sproule (2005) results. Thus, students with avoidance orientation do not want to be involved in activities that expose them in front of teachers and classmates. When teachers stimulate creativity, promote autonomy, and encourage the presentation and argumentation of one's ideas, such students tend to give up work and are afraid to be publicly exposed.

The CMC perception depends more on personal goal orientation than TS, perhaps due to the nature of the teaching components characteristics covert by each concept. Also, CMC predicted better the students' attribution of motivational changes to the teacher than TS. These results could happen because TS-measures are more focused on classroom general management aspects (decision making, behavior control, student interaction allowed or promoted, and degree of structure). In contrast, the CMC-Q questions are more focused on teaching development's specific characteristics across the class and the course (See Figure 2).

As for TS and CMC combined direct effects on dependent variables, both were the main predictors of students' attribution of motivational changes to the teacher. We found that the students' perception about the teachers' influence on their learning was not aligned with the final grade –i.e. performance. At this time, we do not have a plausible hypothesis other than grades not necessarily always reflect deep learning (Soderstrom & Bjork, 2015).

Regarding performance, it was expected a positive and significant statistical effect from TS and CMC on it. However, only TS showed such an effect, but very small. These results could be explained because the TSIHE is more focused on classroom management aspects than the CMC-Q. If the teacher has a well-structured class, with clear and easily predicted actions, the classroom's rules are precise, changes are negotiated, etc., these help students' regulation. If the teacher executes all these actions with a social and empathic approach, students find fertile ground to structure their behavior to achieve teacher expectations and obtain higher grades.

On the other hand, performance orientation, directly and indirectly, affects academic performance in all three models, but minimally (less than 4%). The impact of performance orientation has been discussed widely, but the previous studies do not present conclusive results. For instance, our findings are contrary to the studies by Cellar et al. (2011), but in line with the one reported by Maehr and Zusho (2009) and Harackiewicz, Barron, Tauer, and Elliot (2002). Three possible factors can influence these results. First, the criteria each participant teacher chose to grade students were too dissimilar. Second, there was a low power of discrimination of teachers' grades because the measurement range had little variability. Third, the assessment system is more adjusted to performance orientation than on learning (Soderstrom & Bjork, 2015). This outcome means students recognize exam structures and contents and prepare for those requirements, acting as expected by teachers regardless of whether they learn in the process.

Concerning the student attribution of motivational changes to the teacher, TS and CMC had a positive significant effect, as expected. These results are in line with previous CMC studies for different educational levels (Alonso-Tapia & Fernández-Heredia, 2009; Alonso-Tapia & Nieto, 2019; Alonso-Tapia, Ruiz, et al., 2020; Leal-Soto & Alonso-Tapia, 2017). This result shows that for students, the aspects that configure a CMC learning-oriented, are more important than aspects defining the TS, even if the first does not directly impact grades. Besides, our results are compatible with the hypothesis that the CMC has even the power to minimize the negative effects of avoidance goals. This means that teachers' actions to improve CMC can help them to reverse the student's apathy and to promote engagement as also suggested by Alonso-Tapia, Ruiz, et al. (2020).

Regarding emotion and motivation self-regulation, our findings showed that the instructional environment has a significant though small effect on it, supporting the initial hypothesis. These results are compatible with the idea that TS and CMC tend to encourage students to use learning oriented self-regulation strategies and discourage to use avoiding self-regulation strategies when facing challenges during academic tasks. In general, these results are in line with those found in previous studies, such as Alonso-Tapia et al. (2014). This result suggests the need to work with teachers to create a CMC learning oriented and use a TS that promotes adequate students' self-regulation styles.

## 6.3. Educational implications

Three educational implications will be discussed. First, teachers need to receive training that helps to acknowledge, understand, and modify their TS and CMC. Such training should take place in pre-service and in-service programs. Second, training programs must be based on pedagogical knowledge on how the acquisition and use of self-regulation learning strategies can be favored (for an extensive review, see Muijs et al. 2014). Third, the use of adequate instruments as the TSIHE and the CMC-Q is essential to provide teachers reliable information about students' perceptions of their class actions and self and co-reflection spaces.

## 6.4. Limitations

The study has three main limitations. First, the study is based on a cross-sectional design, making it impossible to produce causal statements. Second, the way academic performance was measured (final course grade) can influence the results because the criteria chosen by each teacher may have been very different (Randall & Engelhard, 2010). Third, the sample is restricted to the faculty of education, which is primarily female; therefore, the generalization of the results to other faculties with a larger male population is difficult.

## 7. Conclusion

Findings from this study suggest three main conclusions. First, the classroom instructional environment affects the type of self-regulation style students adopt to face academic challenges. To favor students' self-regulation of their emotions and motivation teachers should focus on the positive aspects of their learning and process. For achieving this, teachers can use the elements of CMC as guidelines to structure lectures and the TS to structure and guide the entire course.

Second, TS favors academic performance, mainly when the teacher makes the student participate in instructional decisions, is emotionally accessible to their academic and non-academic needs, and follows routines and processes visible and clear to the students.

Third, the use of the questionnaires can help teachers to improve their teaching actions. The SGQ-U provides the teacher information to recognize which specific goals are activated by the academic activities to make changes for improving the students' desire to learn. Finally, the joint use of CMC-Q and the TSIHE-Q offers a more comprehensive understanding of the classroom, and both are the main predictors of students' attribution of motivational changes to the teacher. Knowing that both instruments provide critical information, future studies must use both variables to have a broad comprehension of the classroom.

## 8. References

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## 9. Apendix

Table 4. Correlations between variables in the complete model (M3).

	<b>LO</b>	<b>PO</b>	<b>AO</b>	<b>CMC</b>	<b>TS</b>	<b>LSR</b>	<b>ASR</b>	<b>ATT</b>
PO	0,00							
AO	0,00	0,00						
CMC	-0,09	0,15	-0,98					
TS	0,02	-0,00	-0,68	0,66				
LSR	0,14	0,09	-0,18	0,18	0,18			
ASR	-0,07	0,13	0,27	-0,24	-0,24	-0,05		
ATT	-0,05	0,06	-0,64	0,64	0,51	0,12	-0,17	
PER	-0,01	0,16	-0,07	0,09	0,17	0,04	-0,01	0,07

Note: LO: learning orientation; PO: performance orientation; AO: avoidance orientation; CMC: classroom motivational climate; TS: teaching style; LSR: learning self-regulation; ASR: avoidance self-regulation; ATT: attribution of changes to teacher's work; PER: performance.