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# Psychometric Validation of the *Motivated Strategies for Learning Questionnaire* with Mexican University Students

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# Abstract

**Introduction.** The *Motivated Strategies for Learning Questionnaire* (MSLQ) is a self-report instrument designed to assess students' motivation and learning strategies (cognitive, meta-cognitive, and resource management). In the present study, we focused on translate, adapt and validate the MSLQ to Mexican educational context.

**Method.** The original version of the MSLQ was translated and adapted to mexican educational context under the name of *Cuestionario de Motivación y Estrategias de Aprendizaje* (CMEA) taking into account 22 guidelines established by the International Test Commission (ITC) and subsequently administered to mexican students (*N*=1,140) of a southeastern university of México.

**Results.** Results allow concluding that the items were grouped in each of the factors using factorization of major axes. Internal consistency rates obtained were acceptable.

**Discussion and conclusion.** The results show great power providing useful information about how this instrument can answer our initial question of self-regulated learning: How do students can become experts in their own learning processes?


**Keywords:** MSLQ, psychometric properties, self-regulated learning, university students.

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# Validación Psicométrica del *Motivated Strategies for Learning Questionnaire* en Universitarios Mexicanos

## Resumen

**Introducción.** El *Motivated Strategies for Learning Questionnaire (MSLQ)* es un instrumento de autorreporte que mide la motivación y las estrategias de aprendizaje (cognitivas, metacognitivas y de contexto) de los estudiantes. El presente estudio tuvo por objetivo traducir, adaptar y validar el MSLQ al contexto educativo mexicano.

**Método.** La versión original del MSLQ fue traducida y adaptada al español de México con el nombre de *Cuestionario de Motivación y Estrategias de Aprendizaje* (CMEA) tomando en cuenta las 22 pautas o directrices que establece la International Test Commission (ITC) y posteriormente administrada a estudiantes ($N$=1,140) de una universidad del sureste de México.

**Resultados.** Los resultados permiten concluir que los ítems fueron agrupados en cada uno de los factores mediante la factorización de ejes principales. Los índices de consistencia interna obtenidos con el CMEA fueron aceptables.

**Conclusión.** Los resultados, muestran una gran potencia del instrumento de proporcionarnos información útil para contar con un instrumento de medida que nos permita encontrar respuesta a la pregunta inicial de los trabajos de autorregulación del aprendizaje: ¿Cómo los estudiantes llegan a ser expertos o desarrollar la destreza de regular sus propios procesos de aprendizaje?

**Palabras Clave:** MSLQ, propiedades psicométricas, aprendizaje autorregulado, estudiantes universitarios.

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## Introduction

It is increasingly clear that improving learning and academic performance of students must necessarily take into account the cognitive and motivational components of learning, which in other words is to say, as did Pintrich and De Groot (1990a) that knowledge and regulation of cognitive and metacognitive strategies are associated with students that are motivated and interested in the work and academic activities. In addition, some other researchers (Paris, Lipson & Wixson, 1983; Pintrich, 1989; Pintrich & De Groot, 1990b; Zimmerman, 2008) consider it necessary to integrate both aspects of learning in the development of suitable models for the process of learning, as students will need to have both will and skill in order to obtain academic success, and optimal results.

The relationship between motivation and cognition was the central theme in the work of Dr. Paul Pintrich, whose main contribution to educational psychology has been the proposal of a model of social learning and cognitive contextual skills as the dominant paradigm. Multiple large publications demonstrate the relationship between the "cold" cognition and 'hot' motivation by putting a special emphasis on the importance of the dynamics between motivation and cognition in the lifetime learning performance of the students.

Countless articles written since the untimely death of Dr. Paul Pintrich in 2004 have highlighted the enormous influence his work exerted and continues to exert in educational research and practice as clearly demonstrated by the works of: Dunn, Lo, Mulvenon, & Sutcliffe, 2012; Garcia & McKeachie, 2005; Greene & Azevedo, 2007; Limón, 2004; Núñez, Solano, Pienda & Rosário, 2006; Om-mundsen, 2006; Schmitz & Wiese, 2006; Schunk, 2005; Schunk & Zimmerman, 2007; Stoeger & Ziegler, 2007; Taylor, 2012; Van Den Hurk, 2006; Winne, et al., 2006; Zimmerman, 2008; Zimmmerman & Keating, 2006. One of his greatest legacies to the practice of educational psychology and empirical research on learning and motivation in college students was the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia & McKeachie, 1991, 1993), a measuring instrument of self-report of 81 items that measures the use of learning strategies and the level of student motivation. It incorporates aspects of self-regulation of learning in a metacognitive self-regulation subscale, which emphasizes the relationship between motivation and cognition (Schunk & Zimmerman, 1994; Zimmerman & Schunk, 1989).

The MSLQ has been translated into several languages and used by hundreds of researchers and teachers around the world to emphasize the nature of motivation and the use of learning strategies in different types of contexts and populations, to help refine the understanding of motivational theoretical constructs to explain how they are different from each other, what are the individual differences in self-regulated learning and to evaluate the effects of different cognitive and motivational aspects of instruction (Garcia & McKeachie, 2005).

Previous to the appearance of the MSLQ, most of the research on learning in college students and the development of measurement tools focused on individual differences in learning styles (introversion-extraversion, field dependence-independence, Myers-Briggs profiles) whose relationships with study behavior or cognitive processing of students was not entirely clear (Lockhart & Schmeck, 1984; Torrance, Reynolds, Riegel & Ball, 1977). Furthermore, the study skills inventories used at that time to measure student learning (Brown & Holtzman, 1967; Christensen, 1968; Goldman & Warren, 1973) were criticized for being theoretical (Weinstein & Underwood, 1985). Given the situation prevailing at that time, there was an urgent need for an instrument to measure motivation and learning strategies used by students.

Given the increasingly widespread idea in the educational context that it is the student who must set goals, monitor and evaluate their academic performance, that is to say to self-regulate their learning, and in the absence of valid and reliable instruments that would serve this purpose, the aim of this research was to translate, develop and gather information about the initial psychometric questionnaire Motivation and Learning Strategies (CMEA), a translation, adaptation and validation of the Scale Motivated Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia & McKeachie, 1991, 1993).

The MSLQ was developed using a cognitively-social point of view of motivation and learning strategies from which the student is taken as a subject actively processing information and whose beliefs and cognitions are important mediators of instructional information and the characteristics of the task (Garcia & Pintrich, 1991)

Moreover, the social-cognitive perspective in which the MSLQ is based assumes that motivation and learning strategies are not traits of students but that motivation is dynamic and limited by the context and that the learning strategies can be learned and are under the control of the student. That is, students' motivation varies across courses (eg., more interest and value

in a freely chosen course and not on required course, most effectively in an easy Psychology course compared to difficult Math or Physics course) and their learning strategies may vary depending on the nature of the academic task (multiple choice exam vs exam test) (Garcia & McKeachie, 2005).

A feature of the MSLQ is that it was designed to focus on a level of the course as it was felt that the course was the most appropriate level of analysis, which is located between a very general overview of all the situations and impractical level and restricted to each of the specific situations of each course. This operationalization of motivation and cognition also distinguished the MSLQ from other instruments of self-report widely use: the Learning and Study Strategies Inventory (LASSI, Weinstein, Schulte, & Palmer, 1987) which measures the learning strategies attitudes to study in a very general level.

The MSLQ has two sections: one of motivation and other of learning strategies. The first section is formed by 31 items divided into six subscales that measure the goals, beliefs, values, control thoughts, and beliefs about the skills to succeed and test anxiety. The second section includes 31 items relating to the use made by students of different cognitive and meta-cognitive strategies and also includes 19 items about managing different learning resources by students, with a total of 50 items divided into 9 subscales.

Research on self-regulated learning and academic performance arose more than two decades ago to answer the question of how students came to develop expertise in their own learning processes in a way that has been developed gradually as result of the development of theoretical paradigms and different methodologies (Boekaerts, Pintrich & Zeidner, 2000; Zimmerman & Schunk, 1989, 2001)

Most of the academic self-regulation theorists conceptualize learning as a multidimensional process involving personal (cognitive, motivational and emotional), behavioral and contextual components (Zimmerman, 1986, 1989, 1994). That is, in order to master the academic ability, students must apply cognitive strategies to a task within a given context. To achieve this requires repeated learning trials, because to be an expert in using learning strategies involves coordinating personal, behavioral and contextual and environmental components, each of which alone is dynamic, but also when they are interacting together. As a result of this changing and diverse intrapersonal, interpersonal and the context conditions, self-

regulated students should review constantly their effectiveness in achieving their academic goals.

## Method

*Participants*

Participants were 1140 graduates enrolled in different faculties and pursuing in twelve different degrees at the Universidad Autónoma de Yucatán (UADY). Students in the sample were selected using a stratified proportional sampling procedure in order to include enough samples sub-groups of students of both sexes, representing the diversity of the different degrees of knowledge in areas that UADY is organized and the five courses that are organized most of the educational programs of the degrees. To answer the questionnaire they were invited to participate voluntarily. Confidentiality of their answers was secured.

From the total of participants, 609 subjects (53.4%) were women and 531 (46.6%) were men. The 98% of them were found in the age range of 17 to 55 years with a mean of 20.89 years: with a standard deviation of 2.91 and a variance of 8.49. Taking into account the course they were enrolled, the sample was distributed as follows: 272 (23.9%) in the first year, 271 (23.8%) in the second year, 282 (24.7%) in the third year, 244 (21.4%) in the fourth year and 71 (6.2 %) in the fifth year. For areas of knowledge were distributed as follows: Sciences and Engineering, 255 (22%), Social and Humanities, 297 (26%), Health Sciences, 320 (28%), Economic and Administrative and Habitat Design, 268 (24%).

A sample of college students were selected because we believed that is in this level of education where there is more control of the learning process on the part of students. That is, the demands of this level pose on the college student more control over their motivation, cognitive strategies, metacognitive and context for obtaining an acceptable level of educational attainment.

*Instrument*

For the formation of the final version of the instrument was preserved the theoretical structure of the original English version, consisting of 81 items divided into 15 subscales. Finally, it was shaped the questionnaire with the translated items and developed a booklet composed of an 81 item final questionnaire. An answer sheet was also prepared to be read by

optical reader to facilitate the capture of the information, which included a personal data section, which asked students their age, sex and name of the degree. The scale used to obtain the responses of students was conducted in a continuous seven points, as in the original scale, where 1 meant "Nothing certain in me" and 7, "Completely true of me". See Table 1 and 2. Table 1 presents the item distribution for the Motivation Scale forming the final instrument. Table 2 presents the item distribution for the Learning Strategies Scale that makes the final instrument.

***Table 1.*** **Distribution of items according to their membership of the Motivation Scale**

| Motivation Scale | Item | Total |
|---|---|---|
| Intrinsic goal orientation (OMI) | 1, 16, 22, 24 | 4 |
| Extrinsic goal orientation (OME) | 7, 11, 13, 30 | 4 |
| Task value (VT) | 4, 10, 17, 23, 26, 27 | 6 |
| Control of learning beliefs (CC) | 2, 9, 18, 25 | 4 |
| Self-efficacy for learning (AEPA) | 5, 6, 12, 15, 20, 21, 29, 31 | 8 |
| Test Anxiety (AE) | 3, 8, 14, 19, 28 | 5 |
| Total | | 31 |

***Table 2.*** **Distribution of items according to their membership of the Learning Strategies Scale**

| Learning Strategies Scale | Item | Total |
|---|---|---|
| Rehearsal (RE) | 39, 46, 59, 72 | 4 |
| Elaboration (ELA) | 53, 62, 64, 67, 69, 81 | 6 |
| Organization (ORG) | 32, 42, 49, 63 | 4 |
| Critical Thinking (PC) | 38, 47, 51, 66, 71 | 5 |
| Metacognitive self-regulation (ARM) | 33, 36, 41, 44, 54, 55, 56, 57, 61, 76, 78, 79 | 12 |
| Time and study environment (ATA) | 35, 43, 52, 65, 70, 73, 77, 80 | 8 |
| Effort regulation (RE) | 37, 48, 60, 74 | 4 |
| Peer learning (AC) | 34, 45, 50 | 3 |
| Help seeking (BA) | 40, 58, 68, 75 | 4 |
| Total | | 50 |

*Procedure*

The original version of the MSLQ (Motivated Strategies for Learning Questionnaire) was translated with Dr. Pintrich permission and was adapted and validated into Spanish in Mexico under the name of Cuestionario de Motivación y Estrategias de Aprendizaje (CMEA). The procedure followed for the translation and adaptation of the MSLQ was carefully done and taking into account the 22 rules or guidelines established by the International Test Commission (ITC) for the translation and adaptation of measurement instruments from one language to another and from one culture to another (Muñiz & Hambleton, 1996).

For the translation and adaptation of the instrument were used the following steps: initially, a team of four experts and bilingual Mexican were selected and MSLQ were given in the order to translate the 81 items in their Spanish form. Three of the four experts were university professors and experts in school Psychology and teacher and / or university researchers, with over 15 years' experience in teaching and school and psychological counseling with mid-level and higher students. One was a English professor with extensive experience in university teaching. In selecting the team of translators is care that they all knew not only the language but who are familiar with both cultures as stated the first guideline suggested by ITC. To ensure that the translators have some knowledge of test construction methodology was selected academics that their training had teaching experience in the development and manufacture of test and evaluation questionnaires. Once the team had finished the translation proceeded to determine the quality of the translation by the similarities between them. As a result of this procedure, the 81 items were translated into Spanish.

A common technique in the translation of test is called back translation. To carry out this phase of the translation was selected again to a team of three expert translators fluent English speakers and Spanish in order to translate them back into the original language the 81 items. The goodness of the translation is judged by the degree of overlap with the original version.

In this phase of the process of translation and back translation, we found that there were some items that lack of relevance to the context and level of education which would administer the questionnaire for validation, did not correspond to the reality of the students of

the study population, and represent no significant behaviors for them. As a result, it was decided to adapt the content of some of the items, based on the project responsible experience and her knowledge of educational context of the study population. For example, the 69 item preparation subscale "I try to understand the material in this class making associations between the readings and the concepts of the conference" was changed to "I try to understand the content of this class, my reading and linking concepts of the conferences."

The changes that were made to the original translation of the items, with the purpose of which were adapted for use on the population of Mexican students, included the replacement of words (eg, the item 27 of the task value subscale "Understanding the focus of this course is very important for me," was replaced by "Understanding the content of this course is very important to me"), and alternative translations (eg, item 24 of the intrinsic goals orientation subscale "When you have the opportunity in this class, I will choose courses from which to learn, even if I get a good grade guarantee" was adapted as "When you have the opportunity in this course will choose tasks or activities that allow me to learn new stuff but I guarantee good grades ", the content is more in keeping with the circumstances of the study population school, and essentially mirrors the content of the original item.

Once carried out the above steps was decided to explore the validity of content of the items already translated for which, were given the questionnaire to three university teachers and were asked their assessment of whether they considered each subscale items belonged to the original. Were provided with the conceptual definition of each of the scales to guide your decision. Overall the three teachers agreed that mediate reactive subscale construct to which they belonged.

As a result of the above procedure gave the questionnaire translated and ready to be tested in a pilot phase with a sample of college students. The purpose of the pilot study was to document (a) the clarity of the instructions, of the reactants and the answer sheet, and (b) the level of understanding of the utterances of the items.

For the administration of the instrument in the pilot phase of the study, we selected a simple random sample of 80 students of the psychology career of UADY, comprising 60 women and 20 men, whose ages ranged between 17 and 29 years with a mean of 28.8, 21 fashions and a standard deviation of 2. The questionnaires were administered by the teachers

responsible for each of the groups during school hours for which they were given specific instructions to take note of all the questions that arise during the administration of both the form and content of the questionnaire.

Finally, the CMEA was administered to 1,140 students who were explained the purpose of the study and were asked for their voluntary participation. The instructions given to the students were read by the head of the investigation, directly of the questionnaire format. The average time of application was 20 minutes. Also, the questionnaire included a question to identify students who wanted to know their results so a report of the results could be send to them.

The administration of the instrument was conducted at the facilities of the faculties, particularly in the classroom of students and teachers' own group, during normal class schedule because, as mentioned Garcia & Pintrich (1991), expected that the presence of peers, the teacher, course books and materials, encourage subjects to think of their current beliefs and behavior for that course.

*Statistical Analysis*

After gathering information from the CMEA, it was performed an analysis of descriptive variables for gender, age, qualification and course, and proceeded to perform the respective analyzes. Then we conducted a factor analysis of the structure of each of the subscales, an estimate of the errors associated with the factor loadings, and a calculation of the correlation of each item with the total subscale to which the item belongs, without include it. It was also estimated the reliability index of Cronbach Alpha for each subscale and Scales Motivation and Learning Strategies totals. All statistical analyzes were performed using SPSS (Statistical Package for Social Sciences) for Windows, version 15.0.

## Results

*Content validity*

Since the 81 items that shaped the final format of the questionnaire of motivation and learning strategies (CMEA) were translated into Spanish and adapted to from the MSLQ (Motivated Strategies for Learning Questionnaire) in its original English version and back trans-

lated again following the recommendations of the International Test Commission (ITC), it was felt that this procedure would ensure the validity of their content in order to ensure appropriate inclusion in the final form of the instrument, mostly due to content analysis held them to translate and adapt the educational context of the sample of Mexican students.

However, it was decided to explore the content validity of the items that have already been translated by the method of valuation of expert judges, for which, we asked ten teachers and / or university researchers with experience and recognition in the area of processes and theories of learning and / or psychometrics participation in this phase of the project. It was explained to each of them separately as part of a research project being undertaken a validation phase of the items of a diagnostic questionnaire on learning strategies and motivational orientation of university students for which required so carefully valued the contents of each statement as to its relevancy as item to measure the original construct and therefore belonging to the subscale. It was provided to each of the expert judges, a game of cards containing statements translated items belonging to each subscale, a sample of the type of items belonging to the subscale and the conceptual definition of each of the subscales to guide its decision.

The expert judges participated in the assessment and classification of items within the theoretical dimensions, as an adapted variant of Q-sorting technique. Was defined as an acceptance criterion a interrater agreement greater than 80% in the assessment and classification of items. Also the percentage of interrater judges' agreement, we estimated the index item dimension consistency of Rovinelly Hambleton (1986). Overall, there was a general arrangement of more than 90% of expert judges that the items were translated as an indicator of the construct of the subscale to which they belonged.

As a result of the above process, and once the items were translated, back-translated, adapted and validated by expert judges, the final questionnaire was designed self-report format composed of 81 items to be tested in a pilot phase with a sample of university students. It preserved the structure of the fifteen subscales and the location of each of the 81 items from the original English version.

*Factorial validity*

Under the assumption that each of the 15 subscales measuring a single construct and different from each other, factor analyzes were run by factorization of principal axes, given

the lack of normality of the responses to the items, to determine if this course was fulfilled and the factor loadings of the items in this factor only theoretical. At all times the index was estimated Kaiser-Meyer-Olkin (KMO) test susceptibility to this type of data analysis and a Bartlett test of sphericity to avoid spurious solutions. All subscales were adequate statistical power in these tests to trust their factor analyzes. Below are the results of the factorial analysis summarized in Table 3 and Table 4. In all cases the items associated with its principal factor with factor loadings greater than 0.4.

**Table 3. Adequacy for factor analysis and explained variance after adjustment factor analysis model with a single factor grouping items.**

| Motivation Scale | No. of items | *KMO* | % Variance explained |
|---|---|---|---|
| Intrinsic goal orientation | 4 | 0.689 | 32.2 |
| Extrinsic goal orientation | 4 | 0.719 | 36.6 |
| Task value | 6 | 0.889 | 56.6 |
| Control Beliefs | 4 | 0.689 | 23.3 |
| Self-efficacy for learning | 8 | 0.884 | 43.6 |
| Test Anxiety | 5 | 0.734 | 35.6 |
| Total | 31 | | |

***Table 4.*** **Adequacy for factor analysis (KMO) and explained variance after adjustment factor analysis model with a single factor grouping items**

| Learning Strategies Scale | No. of items | *KMO* | % Variance explained |
|---|---|---|---|
| Rehearsal | 4 | 0.709 | 38.0 |
| Elaboration | 6 | 0.768 | 34.0 |
| Organization | 4 | 0.694 | 45.2 |
| Critical Thinking | 5 | 0.768 | 39.7 |
| Metacognitive self-regulation | 9* | 0.828 | 28.7 |
| Time and study environment | 6* | 0.730 | 21.3 |
| Effort regulation | 4 | 0.682 | 22.3 |
| Peer learning | 3 | 0.610 | 32.3 |
| Help seeking | 3* | 0.637 | 30.2 |
| Total | 44 | | |

** Note: Some items were removed with little association with the rest of the subscale to raise their psychometric indices*

*Reliability*

The internal consistency of the questionnaire was obtained by the reliability index of Cronbach Alpha for each of the 15 subscales and Motivation Scale and Strategies Learning Scale separately. Tables 5 and 6 show the number of items and the reliability indices of Cronbach Alpha for each of the subscales of the section of Motivation and Learning Strategies respectively and the total scale.

**Table 5. Reliability indices and Cronbach Alpha reagent number Motivation Scale subscale**

| Motivation Scale | No. of items | Cronbach Alpha Index |
|---|---|---|
| Intrinsic goal orientation | 4 | .65 |
| Extrinsic goal orientation | 4 | .65 |
| Task value | 6 | .87 |
| Control Beliefs | 4 | .52 |
| Self-efficacy for learning | 8 | .85 |
| Test Anxiety | 5 | .72 |
| Total | 31 | |

**Table 6. Alpha reliability indices and number of items Cronbach Scale subscale Learning Strategies**

| Learning Strategies Scale | No. of items | Cronbach Alpha Index |
|---|---|---|
| Rehearsal | 4 | .71 |
| Elaboration | 6 | .72 |
| Organization | 4 | .72 |
| Critical Thinking | 5 | .76 |
| Metacognitive self-regulation | 9* | .77 |
| Time and study environment | 6* | .65 |
| Effort regulation | 4 | .48 |
| Peer learning | 3 | .56 |
| Help seeking | 3* | .43 |
| Total | 44 | .90 |

** Note: Some items were removed with little association with the rest of the subscale to raise their psychometric indices*

Indices of internal consistency (Cronbach's alpha) shown in Table 5 corresponding to the Motivation Scale, ranged from .87 to VT subscale and .52 for the subscale of CC. The Cronbach's alpha index of the total scale was .88. The rest of the subscales were higher rates of 65 pretty good for this type of questionnaires. For the Learning Strategies Scale shown in Table 6 consistency indices ranged from .77 for ARM to .43 scale in the case of BA subscale. The internal consistency index strategies scale was .90. This case highlights the result of learning strategies subscales (REP, ELA, ORG and PC) and ARM subscale resulting in higher rates of .70.

## Discussion and conclusions

In this study, we report the process of translation and adaptation to a Mexican educational context, one of the most widely used self-report questionnaires in educational learning environments to assess motivation and use of cognitive strategies, metacognitive and context you: the Motivated Strategies for Learning Questionnaire (MSLQ). The careful translation into Spanish items from Mexico, their adaptation to the educational context of the sample of Mexican students and the rigorous administration of the instrument, all aimed at ensuring that these conditions were not a source of error with respect to the original test, resulted in the confirmation of the factor structure of the instrument's original six subscales of motivation and learning strategies in September, as well as internal consistency indices, which were satisfactory.

The results obtained in relation to the factorial validity, factorial structure replicated under which sits the MSLQ (Pintrich, Smith, Garcia & McKeachie, 1991, 1993) and now the CMEA. We further show that the items were grouped in each of the factors using principal axis factoring, demonstrating the unidimensionality of the subscales partnering items properly. The above results samples disagree with those reported by other authors in different educational contexts (Cardoso, 2008; Martínez & Guy, 2000; Roces, Tourón & González, 1995). The anterior result should be viewed with caution because even Garcia & McKeachie (2005) report that the MSLQ, administered to different populations as high school students or university, emerge different factor structures (Pintrich & De Groot, 1990a, Pintrich et. al 1991) but the results fit within the overall conceptual model and recommend that future research is necessary to address these differences to determine if they are the result of changes in the method

or really reflect differences in the development of motivation and cognition (Garcia & McKeachie, 2005).

Similarly, the whole process of construction and adaptation of Mexican educational context items, positively influenced the reliability of the information, and that comparing the internal consistency of some of the subscales, was better than some reported in Anglo contexts (Pintrich, Smith, Garcia & McKeachie, 1991, 1993), Hispanics (Roces, Tourón & González, 1995; Martínez & Guy, 2000), Latinos (Cardozo, 2008) and Chinese (Sachs, Law, and Chan, 2001). Furthermore, and in general terms, the results of internal consistency scores obtained with the CMEA were acceptable and quite similar to those reported for the MSLQ and even in some subscales were superior. Example of this is the case of the subscale OME, wherein the CMEA index was $r = 0.65$ and $r = 0.62$ for MSLQ. For REP subscale, $r = .71$ and $r = .69$ and MSLQ ORG, $r = .72$ and $r = .64$ MSLQ respectively (Garcia & McKeachie, 2005). Recognizing the socio-economic and cultural differences among target populations of both studies and not be tempted to compare the results at the time of interpretation, the above comparison is justified because the psychometric characteristics of the instruments are similar in the construct being measured and the internal structure of the scale that was the basis for the development of the instrument.

At present, in the middle and higher level of education of Mexico, has begun a transformation aimed at achieving graduate profiles in terms of skills for independent learning and therefore, the CMEA represents a valuable alternative to measurement, evaluation and intervention in the development of competencies for autonomous and self-regulated learning of students (Martín, Bueno & Ramírez, 2010)

In addition, an instrument to assess motivation, learning and self-regulatory strategies and managing the learning context by college students, will provide valuable information to the focus areas to support students in their learning process learning that has established itself as one of the goals of contemporary college education, so that every day in the classroom is a new experience that promotes in the student academic conduct autonomous and self-regulating.

The results obtained in this study support the use of the CMEA as a valid and reliable measure of motivation and use of learning strategies of the students in the Mexican educational context. However, it must be noted that like all self-report questionnaires CMEA has limitations and it requires new studies using confirmatory factor analysis and even larger

samples of students and educational levels in order to obtain more solid psychometric information. Regarding deleted items not charged in any of the factors pro-posed, it is necessary to revise the wording and re-test them in future research to test its internal consistency with the other items in the subscale to which they belong, to use the questionnaire in subsequent applications.

We suggest continuing with studies exploring more thoroughly, the properties psychometric instrument by current statistical methods, to get established in a reliable and valid factor structure and internal consistency of the CMEA for use in larger studies and different populations and even different modalities of teaching and distance education. The results reported in this investigation show a powerful instrument to provide useful information to have a measuring instrument that allows us to find an answer to the initial question of the work of self-regulated learning: How students become experts in their own learning processes?

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