# TEACHING MANAGEMENT SCALE OF META-REGULATED LEARNING IN LAW

**MARYBEL ESTHER MOLLO-FLORES**

Correo: mmollo@ulima.edu.pe

ORCID: https://orcid.org/0000-0002-6384-5866

Universidad de Lima, Lima-Perú

**ANGEL DERONCELE-ACOSTA (CORRESPONDING AUTHOR)**

Correo: angel.deroncele@usil.pe

ORCID: https://orcid.org/0000-0002-0413-014X

Universidad San Ignacio de Loyola, Lima-Perú

**ROGER PEDRO NORABUENA-FIGUEROA**

Correo: roger.norabuena@upsjb.edu.pe

ORCID: https://orcid.org/0000-0003-3731-9843

Universidad Privada San Juan Bautista, Lima, Perú.

**EDWIN RAMIREZ-ASIS**

Correo: ramirezas@crece.uss.edu.pe

ORCID: https://orcid.org/0000-0002-9918-7607

Universidad Señor de Sipan, Chiclayo, Peru.

**EMERSON DAMIÁN NORABUENA FIGUEROA**

Correo: enorabuenaf@unmsm.edu.pe

ORCID: https://orcid.org/0000-0003-2909-7080

Universidad Nacional Mayor de San Marcos, Lima, Perú.

***Abstract:*** *Students' deep reflection in their learning process is fundamental; however, there are still not enough advances on how teachers can promote this process in virtual and hybrid environments. The aim of the study was to design and validate the scale of teaching management of meta-regulated learning in ICT-mediated learning contexts. The sample consisted of 244 university teachers from Lima-Peru, and the statistical packages SPSS v26, AMOS v24 and R-Project v.1.2 were used. The reliability and validity analysis of the final construct was carried out by calculating Cronbach's alpha, the Omega coefficient, and the Theta coefficient. The results confirm that the original five-factor structure was re-signified into four final factors (teaching management of self-regulation, teaching management of meta-reflection, teaching management of collaboration and teaching management of metacognition). It is, therefore, a valid instrument because it captures specific teaching skills for the management of meta-regulated learning in students. It provides important information to teachers to implement preventive and intervention actions to improve students' intention to learn, as well as to evaluate their own teaching, considering that more research is needed to examine how students perceive various components in the process of learning to learn.*

***Keywords:*** *professor; college student; times self-study; social interaction; critical thinking, law.*

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## 1. INTRODUCTION

Meta-regulated learning (MRL) is a new theoretical construct that integrates the theoretical dimensions: cognition, metacognition, self-regulation, collaboration and meta-reflection [1], it is recognized as a field of action of meaningful learning which is concretized in the acquisition of new information through previous knowledge that serves as anchor ideas, being the basis of new knowledge, which produces a transformation of the cognitive and emotional structure [2, 3, 4, 5, 6, 7].

The transformation of the cognitive structure occurs through the metacognitive thinking system [8, 9], self-regulation [10, 11] and collaborative work [12, 13]. In this sense, "cognition is intrinsically intertwined with learning, for as humans have new experiences, they come to new appreciations and concepts" [14, p.10], hence metacognitive strategies help to organize, monitor, and evaluate this learning; to this is added the role of motivation in the performance of the cognitive task [8, 9, 15, 16].

Metacognition is understood for this study as a higher order cognitive ability [17] that defines knowledge as representations of reality [4, 5, 6, 7, 18, 19, 20] that an individual has stored in memory and that includes other sub-systems that process, transform, combine, and construct those knowledge representations [9]. Metacognition is responsible for monitoring, evaluating, and regulating all types of thinking. It is responsible for execution control [8]. Metacognitive learning strategies are developed under actions aimed at knowing one's own mental processes that are redirected to achieve learning goals, which constantly requires a process of self-regulation [21, 22, 23].

Self-regulated learning (SRL) occurs at the meta-cognitive, motivational, and behavioral level of the learner [24, 25, 26, 27] upon reflection of their own learning processes to adjust their actions and goals to achieve desired results in their academic performance [28, 29, 30].

Self-regulation, then, studies how and when learners set goals and then systematically carry out cognitive, affective, and behavioral processes, practices and procedures that bring them closer to those goals [31]. Self-regulation organizes cognitive processes, metacognitive and motivational aspects into an overview of how students understand and then pursue attainable learning goals [32, 33], these processes are structured as part of critical thinking as a higher order cognitive process that promotes the ability to reflect in order to seek effective solutions and solve problems, hence revealing a connection between self-regulation and reflection as an important basis for training at the university level [1].

In addition to the above, there is a process of vital importance that configures the relational level of the educational actors, we refer to the process of collaboration, understood for this study as a collective process of interaction and mutual commitment in the performance of tasks [34], working as a team interdependently, sharing individual and team responsibilities, achieving a stimulating social interaction, managing and evaluating each other internally [35]; In other words, the more students participate in the learning process, the more they will be able to interpret what they learn in a meaningful way [36, 37]. In this sense, collaboration is a process where everyone participates collectively for the achievement of goals, i.e., if students actively participate with others in the learning process, they will be more able to interpret what they learn in a meaningful way [37, 38, 39]. Therefore, attention should be paid to how social interaction develops in work groups, encouraging group cohesion, trust, respect, and a sense of belonging to the group, to establish a sense of learning community [1].

Once conceptualized the elements of meta-regulated learning: cognition, metacognition, self-regulation, collaboration and meta-reflection, there is no doubt that these processes must be monitored, managed, since they do not occur spontaneously, much less in the learning process in the university context, hence, having an instrument that allows to evaluate how the teaching management of all these components is performed, is revealed as an opportunity to better understand the role of teachers in the teaching-learning process and how they could contribute in a more significant way. Hence, the proposed instrument not only allows for the evaluation of the students' management of meta-regulated learning, but also offers a path of how this process should be developed. Hence, the objective of the present study is to determine the construct validity of the scale of teacher management of meta-regulated learning.

## 2. MATERIALS AND METHODS

A total of 244 university teachers from Lima participated in the present study. The study sample was subjected to a descriptive analysis to know the descriptive particularities of the data, to later choose the appropriate method for estimating the parameters of the factor analysis (exploratory and confirmatory). Then, the exploratory factor analysis was performed with prior compliance with the KMO statistics (Kaiser - Meyer - Olkin sample adequacy measure) and Bartlett's test of sphericity. Within the exploratory factor analysis, the iterative process of the ratios of variances, communalities and extraction methods was observed, to guarantee suitability and stability in the results obtained, and thus, finally obtain the underlying dimensions and their respective items. Subsequently, a confirmatory factor analysis was performed to confirm the underlying structure found in the exploratory factor analysis. Finally, the reliability indicators of the final questionnaire are shown.

## 3. RESULTS

### 3.1 Descriptive analysis

The instrument items present a mean ranging from 3.25 (item 11) to 4.82 (item 2), with standard deviations ranging from .42 to 1.07, negative skewness in all items and kurtosis varying from a platykurtic to a leptokurtic distribution, and adequate corrected homogeneity indices, all values above .900 and an overall Cronbach's alpha value of .908. The items do not approximate a univariate normal distribution.

**Table 1**. *Descriptive results*

| Item | Min. | Max. | Median | Standard deviation | Asymmetry | Kurtosis | Ihc | Kolmogorov - Smirnov Value | gl | Sig. | Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| p1 | 1 | 5 | 3.90 | .897 | -.529 | .050 | .907 | .224 | 244 | .000 | No normal |
| p2 | 3 | 5 | 4.82 | .416 | -2.178 | 4.037 | .908 | .500 | 244 | .000 | No normal |
| p3 | 2 | 5 | 4.08 | .790 | -.544 | -.178 | .904 | .252 | 244 | .000 | No normal |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| p4 | 1 | 5 | 4.30 | .699 | -.916 | 1.574 | .907 | .257 | 244 | .000 | No normal |
| p5 | 3 | 5 | 4.64 | .552 | -1.255 | .611 | .906 | .421 | 244 | .000 | No normal |
| p6 | 2 | 5 | 4.76 | .475 | -2.012 | 4.846 | .906 | .469 | 244 | .000 | No normal |
| p7 | 3 | 5 | 4.27 | .637 | -.309 | -.676 | .904 | .290 | 244 | .000 | No normal |
| p8 | 1 | 5 | 4.04 | .860 | -.628 | -.057 | .904 | .235 | 244 | .000 | No normal |
| p9 | 2 | 5 | 4.00 | .706 | -.147 | -.567 | .904 | .268 | 244 | .000 | No normal |
| p10 | 1 | 5 | 4.16 | .898 | -.930 | .452 | .904 | .253 | 244 | .000 | No normal |
| p11 | 1 | 5 | 3.25 | 1.003 | -.034 | -.312 | .905 | .227 | 244 | .000 | No normal |
| p12 | 1 | 5 | 3.99 | .877 | -.603 | .055 | .904 | .231 | 244 | .000 | No normal |
| p13 | 2 | 5 | 4.30 | .671 | -.527 | -.378 | .903 | .268 | 244 | .000 | No normal |
| p14 | 2 | 5 | 4.19 | .730 | -.436 | -.582 | .903 | .236 | 244 | .000 | No normal |
| p15 | 1 | 5 | 4.26 | .768 | -.982 | 1.141 | .905 | .258 | 244 | .000 | No normal |
| p16 | 1 | 5 | 3.90 | 1.015 | -.840 | .229 | .905 | .257 | 244 | .000 | No normal |
| p17 | 1 | 5 | 3.57 | 1.073 | -.404 | -.471 | .906 | .205 | 244 | .000 | No normal |
| p18 | 1 | 5 | 4.33 | .812 | -1.283 | 1.838 | .907 | .299 | 244 | .000 | No normal |
| p19 | 1 | 5 | 4.02 | .977 | -.797 | .006 | .903 | .226 | 244 | .000 | No normal |
| p20 | 3 | 5 | 4.43 | .654 | -.734 | -.511 | .904 | .331 | 244 | .000 | No normal |
| p21 | 1 | 5 | 4.30 | .763 | -.967 | .909 | .903 | .282 | 244 | .000 | No normal |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| p22 | 1 | 5 | 3.65 | 1.053 | -.459 | -.267 | .907 | .191 | 244 | .000 | No normal |
| p23 | 1 | 5 | 4.05 | .885 | -.806 | .566 | .902 | .238 | 244 | .000 | No normal |
| p24 | 2 | 5 | 4.02 | .819 | -.355 | -.687 | .901 | .224 | 244 | .000 | No normal |

In contrast to the univariate normality test of the data, the results obtained with the multivariate normality tests corroborate the absence of multivariate normality approach.

**Table 2.** *Multivariate normality test*

| Test | | statistical | *p*-value | Result |
|---|---|---|---|---|
| Mardia | Skewness | 4906.468 | < .001 | No normal multivariante |
| | Kurtosis | 24.224 | < .001 | No normal multivariante |
| Royston | | 1743.187 | < .001 | No normal multivariante |
| Henze-Zirkler | | 1.169 | < .001 | No normal multivariante |
| Energy | | 4.837 | < .001 | No normal multivariante |

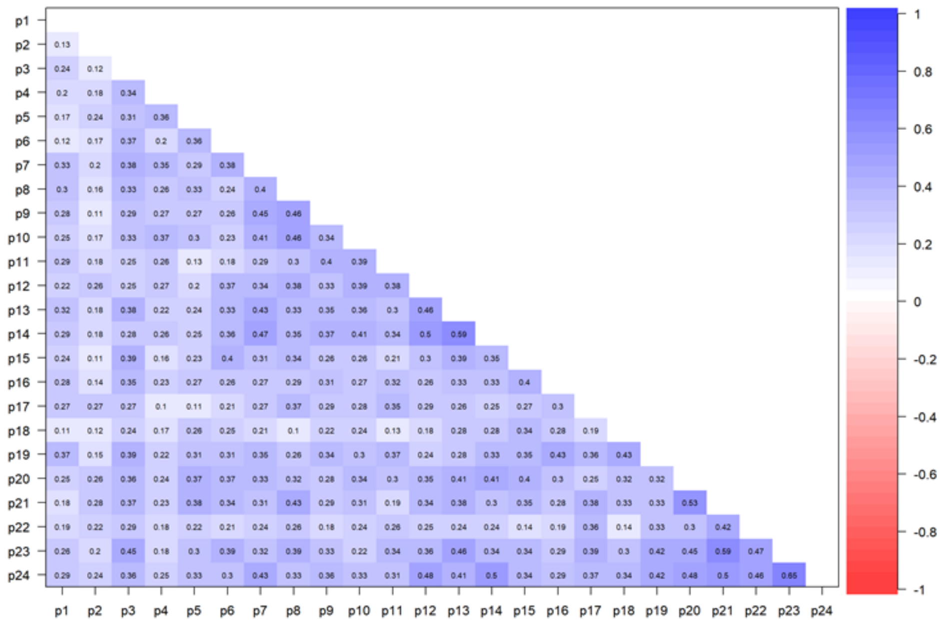


***Figure 1****. Bivariate correlations between the data with respect to the questionnaire applied to the teachers.*

The correlations between the items are positive and range from .099 to .646. From Table 3, it is observed that the model is not additive according to the results of Tukey's activity test (sig. < .0001), which indicates that there is interaction between the items and the respondents. Likewise, according to Hotelling's T-squared test, it indicates that the items of the scale or questionnaire items do not have the same mean. On the other hand, Kendall's W concordance coefficient (.145) presents a low concordance value, indicating that the scores on the items are different.

**Table 3.** *ANOVA with Tukey's test for non-additivity*

| **Sources of variation** | | | **Sum of squares** | **gl** | **Root mean square** | **F** | **Sig** |
|---|---|---|---|---|---|---|---|
| Inter subjects | | | 1233.135 | 243 | 5.075 | | |
| Intrasubjects | Between elements | | 705.098 | 23 | 30.656 | **1196.285** | **.000** |
| | Residue | Non-additivity | $55.815^{b}$ | 1 | 55.815 | **122.464** | **.000** |
| | | Balance | 2546.836 | 5588 | .456 | | |
| | | Total | 2602.652 | 5589 | .466 | | |
| | Total | | 3307.750 | 5612 | .589 | | |
| **Total** | | | **4540.885** | **5855** | **.776** | | |

Note: Overall mean = 4.14

Hotelling's t-square test: F = 41.511; gl1 = 23; gl2 = 221; sig. < .001.

a. Concordance coefficient of W = .155.

b. Tukey's estimate of power at which observations must be made to achieve additivity = 3.535.

**3.2 Exploratory factor analysis**

The exploratory analysis of the data consisted of the application of exploratory factor analysis by means of principal component analysis as a method of extracting dimensions due to the lack of the need to comply with multivariate normality. Likewise, Promax rotation with Kaiser normalization with Kappa value = 4 was used in order to obtain the underlying dimensions of the questionnaire that measure the cognitive learning strategies achieved by the students directed to the teachers. The questionnaire was initially composed of 24 items and after an iterative process, those items with problems or potential problems were eliminated according to the variance ratio indicator, leaving 20 items.

Table 4 shows the variance ratio of the iterative process of elimination and conservation of the items, in which the items: p4, p5, p12, p18, p21, p10, p23 and p24 did not present problems in their factor loadings, i.e. in the whole iterative process they presented factor loadings higher than 0.30. On the other hand, items: p3, p8, p10, p17, p19 and p20 were eliminated for presenting values in their variance ratio lower than 2, while items p1, p2 and p16 were eliminated for presenting low communality problems. Likewise, items p6, p9 and p18 were retained because they do not present stability problems in their factor loadings, despite the fact that they are items that present communalities lower than .50. Finally, items: p7, p11 and p13, do not present discrimination problems in their factor loadings, despite having two factor loadings higher than .30, since the indicator of the variance ratio is higher than 2.00.

**Tabla 4.** *Iterative process of the variance ratio of the exploratory factor analysis of the questionnaire.*

| **Items initials** | **Ratio of variances** | | | | | | | | | | **Items end** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Iterations** | | | | | | | | | | |
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | |
| p1 | | | | | | | **Low community** | | | | |
| p2 | 3.352 | 1.479 | 1,600 | 1.406 | 2.200 | **Low community** | | | | | |
| p3 | | | | | | 1.652 | 1.500 | **1.278** | | | |
| p4 | **No problems in factor loadings** | | | | | | | | | | **p4** |
| p5 | **No problems in factor loadings** | | | | | | | | | | **p5** |
| p6 | 1.159 | 1.637 | | | | | | | | | **p6** |
| p7 | | 1.597 | | | | | 2.074 | 2.163 | 2.625 | 2.639 | **p7** |
| p8 | | | | | | 1.937 | **1.207** | | | | |
| p9 | | | | | | | 3.346 | | | | **p9** |
| p10 | 1.800 | 2.142 | 1.329 | **1.317** | | | | | | | |
| p11 | | | | | | | | | | 4.535 | **p11** |
| p12 | **No problems in factor loadings** | | | | | | | | | | **p12** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| p13 | | | 1.927 | 2.220 | 1.982 | 1.511 | 2.238 | 2.441 | 2.656 | 2.549 | **p13** |
| p14 | | | | | | 3.110 | | | | | **p14** |
| p15 | 4.063 | 4.359 | | | | | | | | | **p15** |
| p16 | 1.878 | 2.009 | 1.700 | 1.734 | | | | **Low community** | | | |
| p17 | **1.102** | | | | | | | | | | |
| p18 | **No problems in factor loadings** | | | | | | | | | | **p18** |
| p19 | 1.760 | **1.218** | | | | | | | | | |
| p20 | | | **1.198** | | | | | | | | |
| p21 | **No problems in factor loadings** | | | | | | | | | | **p21** |
| p22 | | | 8.212 | | | 7.927 | 8.912 | 7.319 | 7.794 | | **p22** |
| p23 | **No problems in factor loadings** | | | | | | | | | | **p23** |
| p24 | **No problems in factor loadings** | | | | | | | | | | **p24** |

Note: based on factor loadings greater than 0.30.

As shown in Table 5, the values of the communalities extracted from the iterative process are higher than .50 with the exception of two items p6, P9 and p18 that present communalities of .479; .481 and .469 respectively. However, these three items were retained, because they present stability and adequate factor loadings for the final exploratory factor analysis model. Likewise, items p1, p2 and p16 were eliminated because they presented low communality values.

**Table 5.** *Iterative process of the communalities of the items of the exploratory factor analysis.*

| **Items initials** | **Community Iterations** | | | | | | | | | | **Items end** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | |
| p1 | .419 | .465 | .413 | .428 | .358 | .361 | | | | | |
| p2 | ,358 | .358 | .547 | .539 | .334 | | | | | | |
| p3 | .451 | .450 | .530 | .529 | .444 | .462 | .467 | .468 | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| p4 | .619 | .596 | .597 | .596 | .606 | .583 | .596 | .687 | .686 | .687 | **p4** |
| p5 | .644 | .626 | .625 | .624 | .631 | .608 | .604 | .605 | .681 | .682 | **p5** |
| p6 | .483 | .517 | .491 | .515 | .453 | .466 | .440 | .437 | .439 | .479 | **p6** |
| p7 | .506 | .502 | .495 | .496 | .504 | .502 | .507 | .515 | .514 | .536 | **p7** |
| p8 | .474 | .466 | .513 | .512 | .442 | .476 | .479 | | | | |
| p9 | .464 | .466 | .484 | .478 | .483 | .490 | .512 | .477 | .479 | .481 | **p9** |
| p10 | .515 | .520 | .521 | .523 | | | | | | | |
| p11 | .531 | .538 | .497 | .504 | .493 | .492 | .501 | .524 | .534 | .558 | **p11** |
| p12 | .616 | .619 | .629 | .637 | .481 | .503 | .545 | .544 | .529 | .536 | **p12** |
| p13 | .623 | .614 | .592 | .595 | .568 | .585 | .583 | .581 | .581 | .597 | **p13** |
| p14 | .663 | .652 | .677 | .678 | .572 | .612 | .630 | .627 | .614 | .635 | **p14** |
| p15 | .549 | .573 | .597 | .596 | .589 | .572 | .586 | .626 | .621 | .581 | **p15** |
| p16 | .502 | .494 | .437 | .442 | .399 | .392 | .394 | .397 | .391 | | |
| p17 | .568 | | | | | | | | | | |
| p18 | .489 | .491 | .447 | .450 | .467 | .482 | .495 | .450 | .482 | .469 | **p18** |
| p19 | .659 | .670 | | | | | | | | | |
| p20 | .518 | .514 | .516 | | | | | | | | |
| p21 | .647 | .644 | .655 | .642 | .641 | .648 | .643 | .643 | .654 | .654 | **p21** |
| p22 | .583 | .634 | .627 | .634 | .603 | .644 | .645 | .658 | .658 | .678 | **p22** |
| p23 | .680 | .715 | .751 | .763 | .703 | .728 | .731 | .732 | .730 | .732 | **p23** |
| p24 | .615 | .648 | .648 | .654 | .653 | .659 | .658 | .666 | .666 | .662 | **p24** |

Note: based on factor loadings greater than .30.

As can be seen in Table 6, the factor loadings show stability when extracted by the different methods that do not require compliance with multivariate normality, since their values are similar and are well discriminated in a single underlying dimension.

**Table 6.** *Stability of factor loadings by different extraction methods.*

| | **Extraction method** | | | | |
|---|---|---|---|---|---|
| **Items** | **Principal component analysis** | **Unweighted least squares** | **Principal axis factorization** | **Alpha factorization** | **Image factoring** |
| **p4** | .795 | .525 | .530 | .489 | .303 |
| **p5** | .697 | .554 | .548 | .604 | .276 |
| **p6** | .586 | .499 | .500 | .467 | .424 |
| **p7** | .525 | .468 | .466 | .478 | .410 |

| | | | | | |
|---|---|---|---|---|---|
| **p9** | .592 | .482 | .480 | .514 | .407 |
| **p11** | .765 | .604 | .602 | .643 | .492 |
| **p12** | .666 | .553 | .554 | .545 | .503 |
| **p13** | .568 | .474 | .477 | .432 | .449 |
| **p14** | .690 | .646 | .648 | .585 | .584 |
| **p15** | .759 | .649 | .647 | .722 | .451 |
| **p18** | .704 | .464 | .464 | .459 | .359 |
| **p21** | .658 | .561 | .561 | .576 | .501 |
| **p22** | .903 | .670 | .670 | .695 | .568 |
| **p23** | .752 | .790 | .790 | .777 | .640 |
| **p24** | .600 | .565 | .565 | .569 | .519 |

Note: The extraction methods presented do not require multivariate normality.

Table 7 shows the distribution of the items in the underlying dimensions of the stable and discriminant factor loadings. The first dimension is represented by items: p7, p9, p11, p12, p13 and p14. The second dimension is made up of items: p21, p22, p23 and p24, the third dimension is made up of items p6, p15 and p18; and finally, the fourth dimension is made up of items p4 and p5.

**Table 7.** *Exploratory factor analysis of the questionnaire*

| **Items** | **Dimensions** | | | | **Ratio of variances** |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | |
| p7 | .525 | | | .323 | 2.64 |
| p9 | .592 | | | | |
| p11 | .765 | | -.359 | | 4.54 |
| p12 | .666 | | | | |
| p13 | .568 | | .356 | | 2.55 |
| p14 | .690 | | | | |
| p21 | | .658 | | | |
| p22 | | .903 | | | |
| p23 | | .752 | | | |
| p24 | | .600 | | | |
| p6 | | | .586 | | |
| p15 | | | .759 | | |
| p18 | | | .704 | | |
| p4 | | | | .795 | |
| p5 | | | | .697 | |

Note: Factor loadings ≥ .30. Extraction method: unweighted least squares. Rotation method: Promax with Kaiser normalization (Kappa = 4). Kaiser-Meyer-Olkin measure of sampling adequacy (.880). Bartlett's test of sphericity (Approx. Chi-square = 1201.319; gl = 105; Sig. < .0001). Total variance explained (59.781%).

### 3.3 Confirmatory factor analysis

The results of the exploratory factor analysis were validated and contrasted by means of confirmatory factor analysis, in order to confirm the underlying structure found in the exploratory factor analysis.

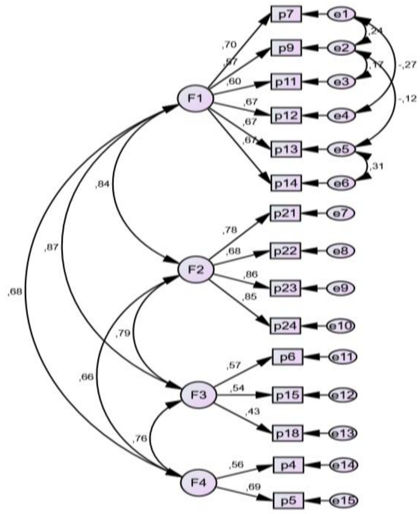


**Figura 2.** Diagram of the confirmatory factor analysis (standardized coefficients).

**Table 8.** *Coefficients of the confirmatory factor analysis*

| Relation | | | Coefficient | | S.E. | C.R. | *p*-value |
|---|---|---|---|---|---|---|---|
| | | | Estimated | Standardized | | | |
| p9 | <--- | F1 | .919 | .565 | .080 | 11.498 | *** |
| p11 | <--- | F1 | 1.402 | .600 | .138 | 10.184 | *** |
| p12 | <--- | F1 | 1.275 | .671 | .106 | 11.977 | *** |
| p13 | <--- | F1 | 1.025 | .668 | .084 | 12.180 | *** |
| p21 | <--- | F2 | 1 | .784 | | | |
| p22 | <--- | F2 | 1.392 | .683 | .090 | 15.462 | *** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| p23 | <--- | F2 | 1.367 | .855 | .073 | 18.620 | *** |
| p24 | <--- | F2 | 1.333 | .847 | .082 | 16.265 | *** |
| p6 | <--- | F3 | 1 | .566 | | | |
| p15 | <--- | F3 | 1.626 | .540 | .219 | 7.418 | *** |
| p18 | <--- | F3 | 1.499 | .430 | .212 | 7.070 | *** |
| p4 | <--- | F4 | 1 | .564 | | | |
| p5 | <--- | F4 | .910 | .690 | .130 | 7.011 | *** |
| p7 | <--- | F1 | 1 | .700 | | | |
| p14 | <--- | F1 | 1.079 | .666 | .092 | 11.725 | *** |

Note: Free asymptotic distribution estimation method

From Table 8 and Figure 4, it can be observed that all coefficients are significant and directly related. All the covariance relationships are significant, which means that indirectly there are variables that share something in common through their random errors (Table 9).

**Table 9.** *Covariance relationships in confirmatory factor analysis*

| Covariability | | | Coefficient | | S.E. | C.R. | *p*-value |
|---|---|---|---|---|---|---|---|
| | | | Estimated | Standardized | | | |
| F1 | <--> | F2 | .178 | .836 | .017 | 10.386 | *** |
| F1 | <--> | F3 | .082 | .873 | .014 | 5.819 | *** |
| F1 | <--> | F4 | .104 | .684 | .017 | 5.959 | *** |
| F2 | <--> | F3 | .091 | .790 | .012 | 7.292 | *** |
| F2 | <--> | F4 | .122 | .656 | .017 | 7.082 | *** |
| F3 | <--> | F4 | .063 | .761 | .013 | 4.713 | *** |
| e5 | <--> | e6 | .074 | .305 | .017 | 4.269 | *** |
| e2 | <--> | e5 | -.033 | -.124 | .014 | -2.431 | .015 |
| e1 | <--> | e2 | .058 | .241 | .017 | 3.460 | *** |
| e1 | <--> | e4 | -.068 | -.272 | .018 | -3.879 | *** |

| | | | | | | |
|---|---|---|---|---|---|---|
| e2 | <--> | e3 | .076 | .173 | .024 | 3.102 | .002 |

Tabla 10. *Indicadores de bondad de ajuste del análisis factorial confirmatorio*

| Name | Measure of adjustment | Value | Acceptable limit* |
|---|---|---|---|
| Normalized goodness-of-fit index | NFI | .788 | ≥ .90 |
| Goodness-of-fit index | GFI | .951 | ≥ .90 |
| Comparative fit index | CFI | .891 | ≥ .90 |
| Tucker-Lewis index | TLI | .855 | ≥ .90 |
| Incremental goodness-of-fit index | IFI | .896 | ≥ .90 |
| Adjusted goodness-of-fit index | AGFI | .926 | ≥ .85 |
| Relative goodness-of-fit index | RFI | .718 | ≥ .90 |
| Mean square error of approximation | RMSEA | .056 | ≤ .05 |
| Square root of the mean square error | RMR | .050 | ≤ .10 |

* Byrme (2010). Structural Equation Modeling with AMOS. 2da. Ed. New York. Routledge Taylor & Francis Group

According to the fit indicators, it can be said that the confirmatory factor model is adequate since it meets 3 of the 9 goodness-of-fit indicators.

**3.4 Subsequent reliability analysis**

According to the reliability statistics, it can be said that the questionnaire is reliable and presents internal consistency at the global level; however, it is weak in the third and fourth dimensions.

**Table 11.** *Reliability of the questionnaire of cognitive learning strategies achieved by students addressed to teachers.*

| Reliability | Variable | Dimension | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| Cronbach's Alpha | .867 | .787 | .799 | .573 | .518 |
| Omega Coefficient | .878 | .802 | .811 | .600 | .529 |
| Theta Coefficient | .737 | .858 | .876 | .789 | .809 |
| **# items** | **15** | **6** | **4** | **3** | **2** |

The final version of the meta-regulated learning teacher management scale is presented below.

**Table 11.** *Teaching management scale of meta-regulated learning*

| Dimension | Items | Never | Almost never | Sometimes | Almost always | Always |
|---|---|---|---|---|---|---|
| **Factor 1: Self-regulation teaching management** | 7. I promote that students can detect needs and opportunities for improvement during their performance in class. | | | | | |
| | 9. I plan activities with explicit objectives to promote my students' disposition towards their learning. | | | | | |
| | 11. The evaluation and feedback design allows my students to detect their difficulties and potentialities at the moment of learning and to make decisions for continuous improvement. | | | | | |
| | 12. I identify my students' expression of emotions by raising questions and recalling past events on the topic covered in class. | | | | | |
| | 13. When I introduce new knowledge, I start with relevant tasks and problems that motivate my students to learn, self-assess and self-regulate their learning process. | | | | | |
| | 14. I promote the motivation of my students to develop and improve their competencies. | | | | | |
| **Factor 2:** | 21. I design assignments and activities for my students to | | | | | |

| | |
|---|---|
| **Meta-reflection teaching management.** | reflect on during the development of the assignments. |
| | 22. I develop activities with a large amount of information for my students to summarize or find key ideas and make effective decisions when performing them. |
| | 23. Based on what my students have learned, I carry out activities for them to make deductions and comparisons with other real contexts. |
| | 24. During class, I encourage my students to achieve a new reinterpretation and appreciation of new knowledge, introducing them to other contexts. |
| **Factor 3: Collaborative teaching management** | 6. I constantly provide examples to my students during teamwork so that they understand their learning achievement and design collective strategies to reach these goals. |
| | 15. I promote small work teams and identify the performance of my students through the activities they perform. |
| | 18. I make it easy for students to group freely and promote the internal management of the work team so that they can achieve the development of a task together. |
| **Factor 4: Meta-cognition teaching management.** | 4. I identify together with my students the key moments of the class and we organize them for better learning. |

| | |
|---|---|
| | 5. The activity guides I develop connect theory with practice through explicit directions for my students. |

*Note:* The instrument was validated in higher education teachers.

## 4. DISCUSSION AND CONCLUSIONS

The instrument analyzed is a valuable tool in that it evaluates the teacher's management of the student's meta-regulated learning; In the current era, it is a challenge to ensure that the students of generation Z, "centennials" or "The App Generation" can reflect on their learning; therefore, identifying the key aspects so that the teacher can dynamize processes of self-regulation, meta-reflection, cola-boration and metacognition, offers ample possibilities to ensure that students become the main leaders of their learning and clarifies the role of the teacher in this process.

Several instruments that relate teachers, students and learning are based on students' perception [40]; therefore, the present study opens a space for analysis from the teachers' perspective, considering that this instrument can provide teachers with important information to implement preventive or intervention actions to improve students' intention to learn, while they can use them to evaluate their own teaching and to investigate their own classrooms [40].

Related to the learning process, a recent study found that student experience and satisfaction scored high with an average of over 75%, however, as the authors state, there is still room for improvement, as more research is needed to examine how students perceive various components of "satisfaction" within learning environments [41].

The present study assumes as a solid approach that "teaching students in reflection requires specific teaching competencies" [42, p.155], hence, the bet is placed on this teaching management tool for meta-regulated learning that offers these alternatives to teachers to favorably influence in dynamizing the process of learning reflection in their students.

The study cited above developed and validated a rating scale focused on students' perceptions of their teachers' competencies to foster reflective learning in small groups and found as results the need to support self-knowledge; create a safe environment and encourage self-regulation [42].

Other studies provide valuable insights into the perceptions of university students and teachers on the roles of teachers in promoting self-directed learning [43], recognizing the need to train teachers to personalize learning support [44]. Thus, it is required to delve more and more deeply into the teaching style of university teachers and the agent engagement of their students in learning as an integrated perspective of the achievement goal theory [45], while continuing to deepen the role of university tutors as facilitators of reflective learning of students [46].

A revealing study shows the influence of teachers on motivation and academic stress and its effect on the learning strategies of university students [47], which continues this line that highlights the important mediating and moderating role of the teacher; in turn, the importance of autonomy in scaffolding as learning in the negotiation of teacher-student meanings in a university classroom is recognized [48] and advances in how teachers support the development of lifelong learning of university students are acknowledged [49]. This requires continuing to examine the process of learning to learn in the university from the perspectives of faculty and students [50]. In this regard a recent study with had as its main purpose to compare the effectiveness of Student-Centered Learning over Teacher-Centered Learning, which has been implemented to teach economics subjects in a private university in Sarawak [51]. The study shows that Student-Centered Learning has proven to be a more effective way in students' learning and that teachers could adopt the blended methodology but more inclined to student-centered teaching and learning [51, p. 147].

Finally, it is concluded that, of the five factors proposed at the theoretical level for teacher management of meta-regulated learning, the statistical analysis allowed the resignification of four final factors: 1.-teacher management of self-regulation, 2.-teacher management of meta-reflection, 3. -teaching management of collaboration and 4.- teaching management of metacognition, disseminating cognition as a transversal element in the whole construct, which is associated with the theoretical foundations of the study when it is stated that "cognition is intrinsically intertwined with learning" [52, p.10 Cognition and learning are central concepts in educational psychology [53] that find effective dynamizes in creative self-efficacy, psychological empowerment and motivation for self-learning [54]. This opens a new scenario in the post-pandemic stage, since teachers no longer manage learning only in face-to-face contexts, but it is increasingly common to perform in virtual environments, so they must be prepared to dynamize online learning in a collaborative manner [55], making use of learning analytics techniques to enhance interaction in learning ecosystems [56], and for this purpose recent research is committed to the integration of technology, pedagogy, and content, concretized in the TPACK model [57], to this end, the paradigm of didactic intervention will be transformed, orienting it towards more active mixed methodologies [58]. All this calls for rethinking educational research and practice in universities, considering that it will be easier for teachers to manage meta-regulated learning if they consolidate themselves as scientific research leaders committed to the positive transformation of the university context [59]. However, understanding that universities have their own dynamics, we call for future studies that can determine the construct validity of the scale of teacher management of meta-regulated learning in other contexts at other educational levels.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.
**Data Availability Statement:** The data used are available, please contact the corresponding author.
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