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Validation of the quality assessment scale for university centers

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ABSTRACT: *This paper presents the validation process of a tool created to assess the quality of education at university centers. These centers have certain peculiarities due to their regional insertion and their multidisciplinary character.The development of this instrument is justified by the need to have valid tools for the internal quality assessment of higher education.The validation study included the content and construct analysis to determine the tool validity. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to study the factorial construct validity. The EFA finds three factors (Teaching, Knowledge of University Life and Activities of the Center and Study Environment), which are corroborated by CFA.The procedure for creating the scale gives an account of its content validity. The scale has very good psychometric characteristics and their adjustment rates are almost all within the desirable values, therefore, it presents a good construct validity.*

KEYWORDS: *university center assessment, scale validation, factorial analysis.*

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I. INTRODUCTION

In the last decade of the 20th century, most European countries established quality assessment systems in higher education. These systems were also developed in other parts of the world, generally carried out by national agencies that operated with a considerable degree of autonomy (Brennan and Shah, 2000). Currently, most Latin American countries have institutions dedicated to the quality assessment of higher education. However, the number of internal evaluations has also increased, in some cases derived from the external evaluation processes themselves and in other cases, due to the lack of adequate evaluation systems for this level of education.

The internal assessment arises, then, as an alternative where quality assessment agencies of higher education do not operate, as in the case of Uruguay.

The context in which this quality assessment at university center is developed has its particularities and differences with the rest of the 'traditional' centers. The process of decentralization of the largest university in Uruguay (University of the Republic) led to the creation of regional centers that operate in a specific territory, linking with local agents to build and carry out proposals that articulate the different university teaching functions, research and extension (Udelar, 2012).

The regional university centers are services of the University of the Republic (Udelar), assimilated to a faculty. Its governing bodies are similar to those of any faculty: they have a Regional Council, a Regional Director and a Faculty Cloister. They may have one or more venues, that is, units that coordinate all the university activities located in a specific area. In addition, they have a multidisciplinary character because they bring together activities from different areas. The way of management at University, which has the students forming part of the co-government of the institution and at the same time being beneficiaries of the educational policies makes it necessary and relevant that they assess the university center where they are educated. For this reason, the scale for the quality assessment at university center that was developed has as source of information to the students.

The objective of this paper is to show the process of validation of a tool created to assess the quality of the education at university center.

The concept of quality assessment has had a strong development in recent years, starting from a concept oriented towards the processes assessment (Birnbaum, 2000; Van Vught, 1994) to a more comprehensive vision that takes into account the objectives themselves (Pérez Juste, 2000) and the different actors that participate in the educational process (Westerheijden, 2007).

The internal quality assessment is justified as a prior and essential process in front of an external evaluation, and also, as a necessary tool for the collection of information for continuous improvement. Brennan (1997) states that internal assessment should not be disregarded, institutions should develop them in order to obtain information to improve and do them systematically, gathering information in all aspects. Sometimes the internal assessments are considered as lacking utility because those who carry out the evaluations are involved

with the institution.However, the internal evaluation or self-evaluation is considered as an essential step in the evaluation of the quality. For Salazar and Caillón (2012) internal assessment allow to guide the improvement process, even without external participation, in addition to providing information required by external agencies or the government.

The development of this assessment tool to assess quality is based on 10 standards that were previously established by a panel of experts (Rodríguez, 2017).

The validity study of a tool ensures that it measures what it really aims to measure, and also, it is related to the type of conclusions or inferences that can be made from the scores obtained.

The validation process of this tool focused on the content validity and the construct validity. Content validity is the most direct and immediate way to verify the proximity of the items that constitute the test to the construct that is intended to be measured (Paz, 1996). Construct validity refers to collecting empirical evidence that guarantees the existence of a construct under the conditions required for a scientific model or theory (Muñiz, 1998).

II. METHODOLOGY

The methods used to validate the instrument will be briefly described below.

First, to achieve content validity and justify that the set of items that constitute the test shape a representative sample of the universe of contents to be evaluated, and therefore, provide evidence on the representativeness of the content of the scale, we based on standards established by a panel of experts to assess the quality at university centers, described by Rodríguez (2017). Each standard gives rise to, at least, one item that represents it. In this way, a grid is created where the standards are transformed into a dimension to evaluate.

A group of experts assessed the congruence between the items and the standards, as well as their redaction. Content validity requires a prior definition of the domain that, in the case of this tool, was made from the conceptual framework and was expanded and corroborated by experts who participated in the Delphi Panel and in the focus groups (Rodríguez, 2016).

For the analysis of construct validity, factor analysis was used as a way to study the dimensions that underlie the relationships between several variables (Abad et al., 2011). The two types of factor analysis were used: exploratory and confirmatory. As a method for extracting factors, the principal component analysis was used, which maximizes the variance explained, followed by an oblique rotation.

To determine the number of factors to be retained, the scree graph was used. In a cartesian diagram, the number of the component is located on the abscissa axis and the corresponding eigenvalue on the ordinate axis. With this representation a decreasing line is obtained. The criterion indicates choosing the number of components at the point, beyond which the explained variance is small.

The confirmatory factorial analysis (CFA) was used in the sense handled by Arbuckle (2000), Cribbie (2007), Loehlin (2004). They conceive the models of structural equations for exploratory purposes in case there are no clearly established previous models, nor the theory be sufficiently solid. The CFA is framed into the analysis of structural equations and analyzes the relationship between a set of observed variables and a set of latent variables (factors). There are multiple indexes to determine the fit of the model. The criteria for adjusting the model as presented in Rial et al. (2006) were followed and some of the indices presented by these authors were used.

Reliability was also analyzed, that is, the degree to which the differences in the observed scores reflect differences in the true scores. For this, the Cronbach's Alpha coefficient was used to estimate the reliability.

Sample

A random sample representative of the student population was taken, stratified by career with proportional sampling. The sample size was 360 students, they answered 261, therefore, the response rate was 72.5%. Active students with more than a year and a half of study were taken into account.

III. FINDINGS

Content validity

The content validity of the scale is given by the procedure that was carried out for the elaboration of the tool, defining a universe of measurement that was validated by the consultation of experts.

Construct validity

As a way to know if the data matrix is suitable for a factorial analysis, the Kaiser-Meyer-Olkin sample adequacy measure was carried out. The overall value of the sample adequacy index of K-M-O for the university center assessment scale is 0.87, which according to the Kaiser classification can be considered as ‘wonderful’.

In the second place, the Barlett sphericity test was carried out. The value of the chi-square is 4753.17 with 561 degrees of freedom. The p-value is 0, therefore, we can reject the null hypothesis that the variables used in the analysis would not correlate in the population in which it was extracted the sample.

Exploratory Factor Analysis (EFA)

Based on the results of the KMO index and the Bartlett sphericity test, it is concluded that a factorial analysis is adequate.

The main components analysis is performed with oblimin rotation. The principal component method was used because the extraction principle that follows supposes maximizing the variance explained. An oblique rotation was used because there was an appreciable correlation between factors (García Jimenez, Gil Flores and Rodríguez Gómez, 2000). To determine the number of components to be extracted, a graph scree was made. From the Figure 1 it was decided to extract three factors.

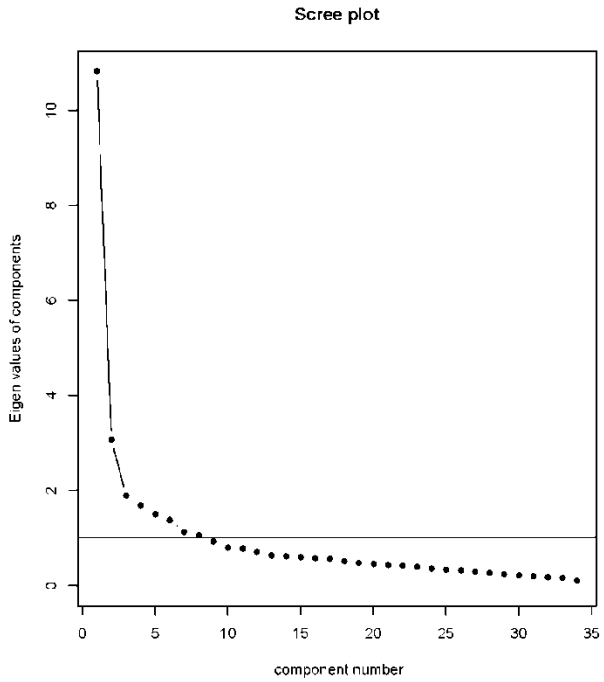

Figure 1: Graph scree to determine the number of components

The loadings of the items in each factor are shown in the Table 1. The variance explained and accumulated for each factor are shown in the Table 2.

The three factors extracted explain 41.9% of the total variance. The first factor explains 17.6% of the variance, the second 13% and the third 11.3%.

Table 1: Weights of each item in the factors

Item	Factor 1	Factor 2	Factor 3
item 1		0.624	
item 2		0.345	0.590
item 3		0.383	0.468
item 4		0.482	
item 5			0.666
item 6	0.348		0.488
item 7			0.533
item 8			0.744
item 9			0.757
item 10			0.611
item 11			0.571
item 12	0.761		
item 13	0.708		
item 14	0.787		
item 15		0.532	
item 16		0.626	
item 17	0.668		
item 18	0.494		
item 19		0.647	
item 20	0.602		
item 21	0.795		
item 22	0.863		
item 23	0.706		

item 24	0.695		
item 25		0.467	
item 26			
item 27			
item 28		0.717	
item 29		0.648	
item 30		0.303	0.339
item 31		0.555	
item 32	0.351		
item 33	0.550		
item 34		0.713	

Table 2: Percentage of variance explained for each factor

	Factor 1	**Factor 2**	**Factor 3**
SS loadings	5.982	4.410	3.846
Explained variance	0.176	0.130	0.113
Accumulated variance	0.176	0.306	0.419

Only loads greater than 0.30 were considered for the analysis. For this reason items 26 and 27 were eliminated since they do not charge more than 0.30 in any factor. Items 2, 3, 6 and 30 carry two factors, that's why they are eliminated.

In addition, items 4, 25, 28, 32 and 33 were removed because they had no theoretical correspondence with the variables that define the factor in which they loaded.

Interpretation of the factors obtained through Exploratory Factor Analysis:

Factor 1: items 12, 13, 14, 17, 18, 20, 21, 22, 23 and 24.

Teaching: This factor includes everything related to the teaching function. It has three aspects: the academic, the performance of teachers in relation to that function and the management of teaching. Within the academic aspect one understands what is related to the quality of teaching, the academic requirement and the study programs. A second aspect is formed by the items that value the teacher's training for the teaching, the strategies that they use to achieve the learning and the preparation of the classes. The third aspect its related to the management of teaching such as meeting deadlines for delivery of test and compliance with class schedules.

Factor 2: items 1, 15, 16, 19, 29, 31 and 34.

Knowledge of university life and activities of the center: In this factor are grouped the items that value the knowledge or information that the student handles on the development of university life and the different activities inherent to the university functions carried out by university center. Two dimensions can be differentiated in this factor, one about information concerning the center and the communication way and another dimension about the knowledge and perception of the students concerning the activities of research and extension.

Factor 3: items 5, 7, 8, 9, 10 and 11.

Study environment: This factor brings together all that is related to the necessary material resources, the efficiency of human resources dedicated to administration, the necessary environment to motivate study or work and the interpersonal relationships between the different actors for the development of the college life.

Confirmatory Factor Analysis (CFA)

The CFA requires starting from a theoretical model or from an exploratory factorial analysis. In our case, we start from hypotheses supported by enriched theories through the process of elaboration of the scale, which is part of its content validity, and in addition, we perform an exploratory factorial analysis in advance to obtain empirical data on the relationships between the variables.

The EFA is used to define the CFA model. This paper follows the proposal by Arbuckle (2000), Cribbie (2007) and Loehlin (2004) which present the conception of models of exploratory structural equations in the event that there are no clearly established previous models.

Then, with the previous EFA, the confirmatory factorial model is defined. Items 18, 8 and 22 are eliminated because they have covariance with items 17, 9 and 21 respectively.

Several indices were calculated, which are presented in the Table 3, in order to relate the empirical evidence to the structure of the scale.

Table 3: Fit indexes

Index	Value
Chi-square	310.1815 g.l= 167 p-value = 0
Goodness of fit	0.898
Adjusted goodness-of-fit index	0.871
RMSEA	0.057 90% CI: (0.04739224, 0.06730101)
Bentler-Bonett NFI	0.856
Tucker-Lewis NNFI	0.917
Bentler CFI	0.927
Bentler RNI	0.927
Bollen IFI	0.928
SRMR	0.0570
AIC	396.182
AICc	327.619
BIC	-619.093
CAIC	-786.093

It is recommended that the RMSEA index be greater than or equal to 0.05, in this case this criterion is fulfill. It is desirable that the Bentler CFI index is greater than or equal to 0.95. In this analysis it does not reach that value, 0.93 was obtained. For the SRMR index it is recommended that it be less than 0.10, the obtained value was 0.06. The NFI index is desirable to be between 0.90 and 0.95. The value obtained was 0.86, which is quite close to the lower bound. In the case of the NNFI index, it is recommended that it be greater than 0.95 and a value of 0.92 was obtained.

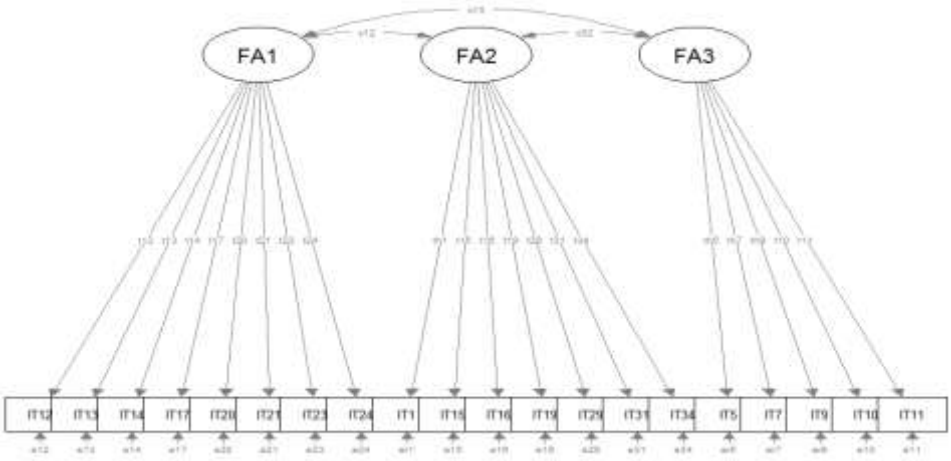

Figure 2: Theoretical model of Confirmatory Factor Analysis

Figure 2 shows the theoretical structure and the model with the estimated parameters are shown in the Figure 3.

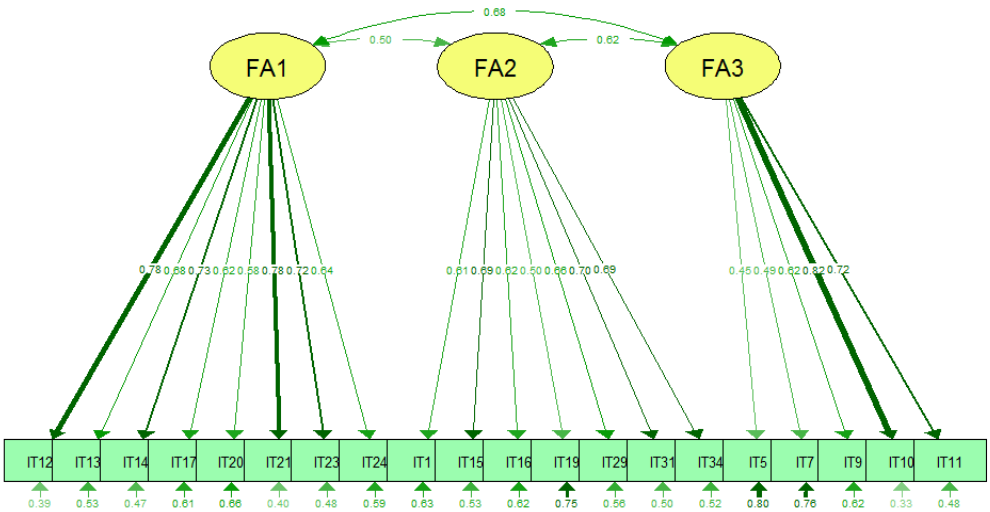

Figure 3: Confirmatory Factor Analysis

Interpretation of the factors of the Confirmatory Factor Analysis:

The CFA was done with three items less than the EFA, those eliminated were the items 8, 18 and 22. Therefore, the interpretation of the factors of the CFA does not have a substantial difference from that made for the EFA.

Factor 1 was composed by items 12, 13, 14, 17, 20, 21, 23 and 24. In factor 2 were items 1, 15, 16, 19, 29, 31 and 34. Finally, in factor 3 was composed by items 5, 7, 9, 10 and 11.

Reliability

The Cronbach's Alpha coefficient is excellent for the first factor and very good for the factors 2 and 3. The scale has a very good internal consistency.

Table 4: Alpha coefficient by factor

Teaching	Knowledge of university life and activities of the Center	Study Environment
0.90	0.84	0.83

Results of the application of the school quality assessment scale for students

In order to present a way of interpreting the results of the application of the center evaluation scale, the factors obtained from the confirmatory factor analysis are used. The items have response options from 1 to 5. To obtain the score in a factor, the average of the items score is considered.

Five levels of achievement of center quality are considered: well below the acceptable level (values between 1 and 1.65), unacceptable (values between 1.65 and 2.65), acceptable (values between 2.65 and 3.65), satisfactory (between 3.65 and 4.65), excellent (between 4.65 and 5).

Teaching: In this factor, the average score obtained was 3.66, barely exceeding the satisfactory level of achievement level. The median score was 3.75.

Knowledge of university life and activities of the Center: In this factor the average score was 3.14, remaining within the level of acceptable achievement. The median was 3.29.

Study environment: For this factor the average score was 3.47, also remaining at the level of acceptable achievement. The median value is 3.5.

IV. DISCUSSION

The application of the university center assessment scale to a sample of students provides information on the psychometric characteristics of the tool.

Scale fit indices are almost all within the desirable values. The scale presents a good construct validity. It also has very good internal consistency, therefore, given that its validity and reliability are very good, it can be said that the tool has a good technical quality. The reliability of the scale, that is, the degree of precision with which the scale measures the construct, measured through the Cronbach's Alpha coefficient, is excellent for the first factor and very good for the following two.

The construct validity analyzed through an EFA in the first place, and a CFA in second place, found three factors that have their sustenance in the theory.

After the factor analyzes, the scale is made up of three factors that explain 42% of the variance, which can be considered very appropriate. The factors are: *Teaching*, *Knowledge of University Life and Activities of the Center* and *Study Environment*.

The *Teaching* factor is the one with the greatest weight that reaches almost 18% of the variance. For this sample of students the most important factor of a university center is teaching. It is the most visible university function for students and in some cases, the only one to which they have access or knowledge. This is also why the items related to research and extension are those related to their knowledge of the center's activities. The academic-curricular and the performance of the teachers dimensions, who form two of the three dimensions that be part of the factor, were considered in the model proposed by Toro (2012) for the internal quality assessment.

The factor *Knowledge of University Life and Activities of the Center* brings together the basic aspects of access to information and communication, but also in this factor is related to the remaining university functions that do not correspond to teaching, that is, research and extension. These functions are not fully integrated into the curriculum and therefore, are viewed by students as activities that they do not always directly participate.

The *Study Environment* factor coincides in content with elements of the ISO 9000: 2000 model. The ISO standard asks the management to ensure that the environment is adequate and positively influences the performance of all the components of the organization (Pérez Juste, 2005).

The factors represent well the construct for the student population, that is, these three factors are those that account for the quality of a university center for the students.

It was possible to obtain a scale of quality assessment at university center with very good psychometric characteristics and adapted to the context in which it is going to be applied, therefore, the inferences that are made from the obtained results will be valid.

REFERENCES

[1]. Brennan, J., & Shah, T. (2000). *Managing quality in higher education: An international perspective on institutional assessment and change*. Open University Press.
[2]. Universidad de la República (2012). *Hacia la Reforma Universitaria. La Política de Regionalización y Descentralización de la Udelar 2007-2011*. N°14. Montevideo: Rectorado Universidad de la República.
[3]. Birnbaum, R. (2000). The life cycle of academic management fads. *The journal of higher education*, *71*(1), 1-16.
[4]. van Vught, F. A. (1994). Intrinsic and extrinsic aspects of quality assessment in higher education. *In: Westerheijden, DF, J. Brennan and PAM Maassen (eds.), Changing Contexts of Quality Assessment*, 31-50.
[5]. Pérez Juste, R. (2000): La Calidad de la Educación. In R. Pérez Juste et al., *Hacia una Educación de Calidad. Gestión, instrumentos y evaluación*, (pp.20-28), Madrid: Narcea.
[6]. Westerheijden, D. F. (2007). States and Europe and quality of higher education. In *Quality assurance in higher education* (pp. 73-95). Springer, Dordrecht.
[7]. Brennan, J. (1997). Introduction. In Brennan, J.; De Vries, P. & Williams, R. (Eds.) *Standards and quality in higher education*. Londres: Jessica Kingsley.
[8]. Salazar, J.M. &Caillón, A. (2012). *Modelos de aseguramiento de la calidad en la Educación Superior. El aseguramiento externo de la calidad en la Educación Superior*. Santiago de Chile: CINDA/RIL.
[9]. Rodríguez Morales, P. (2017). *Evaluación interna de la calidad de centros universitarios de la Universidad de la República, Uruguay*. Revista Calidad en la Educación Superior, 8(2), 87-119. Retrieved from: http://investiga.uned.ac.cr/revistas/index.php/revistacalidad/issue/view/196/showToc
[10]. Paz, M. D. (1996) Validez. In J. Muñiz (Coord). *Psicometría*. Madrid: Universitas.
[11]. Muñiz, J. (1998). Teoría Clásica de los Tests. Madrid: Pirámide.
[12]. Rodríguez Morales, P. (2017). *Evaluación interna de la calidad de centros universitarios de la Universidad de la República, Uruguay*. Revista Calidad en la Educación Superior, 8(2), 87-119. Retrievedfrom: http://investiga.uned.ac.cr/revistas/index.php/revistacalidad/issue/view/196/showToc
[13]. Rodríguez Morales, P. (2016). *Creación y establecimiento de estándares para la evaluación de la calidad de la educación superior: Un modelo adaptado a los centros universitarios de la Udelar* (Tesis doctoral). Universidad Nacional de Educación a Distancia, Madrid. Retrieved from: http://e-spacio.uned.es/fez/view/tesisuned:Educacion-Pcrodriguez
[14]. Abad, F., Olea, J., Ponsoda, V. & García, C. (2011). *Medición en Ciencias Sociales y de la Salud.*Madrid: Síntesis.
[15]. Arbuckle, J. L. (2000). *Exploratory structural equation modelling*. Fordham University. Department of Psychology, Colloquium Series.
[16]. Cribbie, R. A. (2007). Multiplicity control in structural equation modeling. *StructuralEquationModeling*, *14*(1), 98-112.
[17]. Loehlin, J. C. (2004). *Latent variable models: An introduction to factor, path, and structural equation analysis*. PsychologyPress.
[18]. Rial Boubeta, A., Varela Mallou, J., Ábalo Piñeiro, J. & Lévy Mangin, J.P. (2006). El análisis factorial confirmatorio. In J.P. Lévy Mangin (Coord). *Modelización con estructuras de covarianzas en Ciencias Sociales*. Madrid: Netbiblio.
[19]. García Jímenez, E., Gil Flores, J. & Rodríguez Gómez, G. (2000). *Análisis Factorial. Cuadernos de Estadística 7*. Madrid: La Muralla.
[20]. Arbuckle, J. L. (2000). *Exploratory structural equation modelling*. Fordham University. Department of Psychology, Colloquium Series.
[21]. Cribbie, R. A. (2007). Multiplicity control in structural equation modeling. *StructuralEquationModeling*, *14*(1), 98-112.
[22]. Loehlin, J. C. (2004). *Latent variable models: An introduction to factor, path, and structural equation analysis*. PsychologyPress.
[23]. Toro, J.R. (2012). *Gestión interna de la calidad en las instituciones de Educación Superior*. Santiago de Chile: CINDA/RIL.
[24]. Pérez Juste, R. (Coord) (2005): *Calidad en educación, calidad de la educación*, Madrid: Asociación Española para la Calidad.

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