

# Psychometric properties of the questionnaire of educational inclusion (CIE) for university contexts

## Propiedades psicométricas del cuestionario de inclusión educativa (CIE) para contextos universitarios

Sandra-Milena Carrillo-Sierra<sup>1</sup>, Eliana María Ramírez-Ramírez<sup>2</sup>, Angélica Silvana Sanabria-Medina<sup>3</sup>, Jesús Forgiony-Santos<sup>4</sup>, Diego Rivera-Porras<sup>5</sup>

### SUMMARY

*This study aimed to analyze the psychometric properties of the Questionnaire of Educational Inclusion (CIE) for University Contexts, applied to a sample of 171 university professors, stratified random sampling with proportional allocation. The CIE questionnaire's factorial structure, reliability, and validity were evaluated. The 4-factor model, including four scales Attitudes, Knowledge, Practice, and Context was tested by Confirmatory Factor Analysis (CFA). The scale shows adequate psychometric properties, the CFA presents goodness of fit indices (NFI=0.95; CFI=0.95 IFI= 0.90; MFI=0.80). This version of the instrument is useful for research in the field of*

*educational psychology and especially in institutional improvement processes for the development of inclusive higher education.*

**Keywords:** *Inclusive education, inclusive education, university, higher education, knowledge, teaching practices, teacher's attitude.*

### RESUMEN

*Este estudio tuvo como objetivo analizar las propiedades psicométricas del Cuestionario de Inclusión Educativa (CIE) para Contextos Universitarios. aplicado a una muestra de 171 profesores universitarios, mediante un muestreo aleatorio estratificado con asignación proporcional. Se evaluó la estructura factorial. La fiabilidad y la validez del cuestionario CIE. El modelo de 4 factores, que incluye cuatro escalas Actitudes, Conocimiento, Práctica, Contexto, se probó mediante Análisis Factorial Confirmatorio (AFC). La escala muestra propiedades psicométricas adecuadas, el AFC presenta índices de bondad de ajuste (NFI=0.95;*

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ORCID: 0000-0001-9848-2367<sup>1</sup>

ORCID: 0000-0001-5831-2427<sup>2</sup>

ORCID: 0000-0003-1070-4186<sup>3</sup>

ORCID: 0000-0002-2686-7679<sup>4</sup>

ORCID: 0000-0003-2169-3208<sup>5</sup>

<sup>1</sup>Universidad Simón Bolívar. Facultad de Ciencias Jurídicas y Sociales. Cúcuta - Colombia.

E-mail: [scarillo@unisimonbolivar.edu.co](mailto:scarillo@unisimonbolivar.edu.co)

<sup>2</sup>Universidad Simón Bolívar. Facultad de Ciencias Jurídicas y Sociales. Cúcuta - Colombia.

E-mail: [e-ramirez@unisimonbolivar.edu.co](mailto:e-ramirez@unisimonbolivar.edu.co)

<sup>3</sup>Universidad Simón Bolívar. Facultad de Ciencias Jurídicas y Sociales. Cúcuta - Colombia.

E-mail: [a\\_sanabria@unisimon.edu.co](mailto:a_sanabria@unisimon.edu.co)

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<sup>4</sup>Universidad Simón Bolívar. Facultad de Ciencias Jurídicas y Sociales. Cúcuta - Colombia.

E-mail: [j.forgiony@unisimonbolivar.edu.co](mailto:j.forgiony@unisimonbolivar.edu.co)

<sup>5</sup>Universidad Simón Bolívar. Facultad de Ciencias Jurídicas y Sociales. Cúcuta - Colombia.

E-mail: [d.rivera@unisimonbolivar.edu.co](mailto:d.rivera@unisimonbolivar.edu.co)

\*Corresponding author: Universidad Simón Bolívar. Facultad de Ciencias Jurídicas y Sociales. Cúcuta - Colombia. Av 3 No. 13-34 La Playa-Cúcuta - Norte de Santander. [scarillo@unisimonbolivar.edu.co](mailto:scarillo@unisimonbolivar.edu.co)

*CFI=0.95 IFI= 0.90; MFI=0.80). Esta versión del instrumento es útil para la investigación en el campo de la psicología de la educación, y especialmente en los procesos de mejora institucional para el desarrollo de la educación superior inclusiva.*

**Palabras clave:** *Educación inclusiva, educación inclusiva, universidad, educación superior, conocimiento, prácticas docentes, actitud del profesor.*

## INTRODUCTION

Currently, higher education is devoid of training for inclusive education, hence the importance of adapting the Educational Inclusion Questionnaire (CIE) conducted by (1) to the Colombian university context, to contribute to the processes of inclusion in higher education based on knowing the attitudes, knowledge, and practices of the main actor in the teaching-learning process, the university professor.

The concept of “inclusive education” appeared in the international context. In the scenario of the World Conference on Education for All and mobilized several countries to develop regulations mainly focused on guaranteeing the rights of persons with disabilities as in Latin American countries such as Salvador, Brazil, Honduras, Argentina, Brazil, Paraguay, Peru, Uruguay, Colombia, Venezuela, unlike the United States, which focused its interest in teacher training and education actions to bring teachers closer to the attention to diversity and respect for human rights (2-4).

However, the historical existence of attitudinal barriers has generated segregation, exclusion to heterogeneous populations and diverse functionality, to the point of vulnerability, being a large social gap due to non-inclusive educational practices and its reduction would require consensus and actions by government authorities, educational communities, and citizenship, for the development and sustainability of inclusive quality education (5,6).

In other words, the rigidity of the current school system and its practices makes it difficult to provide educational responses to the cultural and social diversity of the Colombian nation (7). Hence, it is evident the need to achieve the

contribution of teachers for inclusive education by solving their training and qualification needs, favoring the development of new skills and attitudes that eliminate social and cultural barriers. Therefore, it demands active participation in the search for profound changes in the initial and continuous training of university teachers (8).

This work is framed in educational psychology as a necessary and relevant discipline for the promotion of the processes of development learning and socialization (9,10), and is based on the principles of psychometrics for the processes of construction adaptation and validation of instruments and scales for measuring psychological attributes such as attitudes, knowledge and practices of teachers concerning inclusive education (11).

For the respective adaptation of the instrument, we proceeded to validate the aspect and content based on the relevance and clarity of the language for the university context, in terms of reliability, we used Cronbach’s Alpha coefficient. For internal consistency, we used Spearman’s Correlation, and for validation, we calculated the KMO and Bartlett’s Sphericity tests and the Factor Analysis with Varimax Rotation verifying that the structure found reproduces that of the theory or base construct (12).

Regarding the theoretical construct (13), states that attitudes consist of a system of beliefs and cognitions that generates a predisposition to an action or situation related to affective factors that are in favor or against. Therefore, the teacher in his or her direct contact with students can reflect the attitude that he or she assumes towards inclusive education being positive or negative (14,15).

Knowledge is a relevant factor in the teaching-learning process since it is processed. Transferred or generated from the teacher-student relationship. Concerning the knowledge that a teacher should possess for the development of his or her functions in the classroom (16). The following categories are proposed: General knowledge of pedagogy, which consists of the principles, strategies, and the way to organize classes, considering how to teach (17). Another category is the knowledge of the contents of the subjects to be taught which is related to the selection of pedagogical-didactic materials and the methodological system to be used to teach. Furthermore, knowledge of the

students, understanding of how their students learn, and the strengths and aspects to improve that each one has. In agreement. Gumucio (18) affirms that “the degree of knowledge found makes it possible to situate the areas in which information or educational efforts are needed” (p. 5). With the above it can be deduced that teachers’ knowledge of all aspects and situations that may arise in the classroom and of the general and individual characteristics of students, especially of people with disabilities, significantly influence the teaching-learning process (19).

Also, pedagogical practices are an important part of the development of inclusive education because through them it is evident if the teacher and the institution have the appropriate tools and knowledge to provide quality education. According to the above-mentioned, educational practices reflect the state of the culture and inclusive policies within the institution (20). In other words and institution that promotes inclusive education must have qualified personnel with the knowledge and experience necessary to enable the participation of its students inside and outside the school context.

Finally, according to the above, inclusive education is understood as a process that aims at the presence. Participation, and learning of students without distinctions, which requires the will, knowledge. Management, and resources for its progress and sustainability, leading to achievements such as educational quality measured in terms of qualified teachers and graduation competencies of students. student access and retention and institutional visibility for its significant teaching practices and production of new knowledge (21,22).

## METHODOLOGY

For considering the adaptation of the Educational Inclusion Questionnaire (CIE) carried out by (1,23), to the Colombian university context a non-experimental research process of descriptive scope with a psychometric procedure based on the Classical Test Theory and Item Response Theory (24). And according to the considerations and recommendations for the

adaptation and validation of scales for measuring psychological attributes (12) the following steps were followed (Table 1).

Following the adjustments to the preliminary instrument, the field study was conducted with the final version of the Educational Inclusion Questionnaire (CIE) adapted to university contexts (65 items) in semester two of 2019-1. The reference population was teachers linked to a private university (182), aged 20 to 70 years, located in the municipality of San José de Cucuta. The sample was determined by stratified random sampling with proportional allocation with 95 % confidence and 5 % error, determining the number of teachers by 10 strata corresponding to undergraduate careers offered by the institution. The sample size obtained was 171 university teachers (Table 2).

Once the instruments had been applied, the data obtained were tabulated and then the statistical analyses were carried out. Descriptive statistics were calculated for all the items under study (means and standard deviations), and the internal consistency was analyzed using Cronbach’s alpha coefficient and the bivariate correlations of all the variables. To test the factorial structure, first, the Kaiser, Meyer, and Olkin test and Bartlett’s test of sphericity were performed, both tests to verify the feasibility of performing the confirmatory factor analysis- CFA, to verify internal consistency and the correlation index was calculated.

Finally, the systems of initial and final variables are comparable (Table 3), and the psychometric properties of the questionnaire can be determined which will be presented in detail in the results section.

## RESULTS

To standardize the scale three phases were developed. The first phase consisted of identifying the confidence levels of the instrument; the second was a reliability analysis and the third was a determination of the internal consistency of the Educational Inclusion Questionnaire in university contexts (Table 4).

The final psychometric properties of the

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Table 1

Steps and procedures for adaptation of the Questionnaire of Educational Inclusion (CIE)

Step	Procedure	Technique -materials	Remarks
Instrument Selection	Verification of the psychometric properties of the instruments.	Educational Inclusion Questionnaire (CIE) (23,25) Educational Inclusion Questionnaire (CIE) for Colombian school contexts (1).	The existing adaptation of the CIE was only suitable for school contexts at the elementary and high school levels. Therefore, the original CEI was taken.
Appearance validity	Expert judgment and piloting,	It initially consisted of validation by experts, who evaluated the assertiveness of the items in the instrument, followed by a pilot test, in which 25 teachers and Higher Education Institutions completed the Questionnaire for Educational Inclusion (CIE). Fourteen items were discarded after the pilot test.	Acceptability and applicability (26).
Content validity			
Construct validity	Normality test Bartlett's test for sphericity Maximum likelihood and generalized least squares orthogonal methods; the most widely used is the Varimax method. Confirmatory factor analysis (CFA).	The structure found is expected to reproduce that of the underlying theory or construct.	The factors and dimensions of the instrument do reproduce the basic theoretical foundations.
Internal consistency and reliability	Rational equivalence method (internal consistency).	Its basic approach is that all items can be considered as parallel instruments, and the joint correlation coefficient will allow determining the total reliability of the test (27).	Cronbach's alpha coefficient of 0.89 High,

Source: Adapted from (12).

Questionnaire on Inclusive Education for university contexts are presented below, in correspondence with the recommendations for questionnaire adaptation processes and phases developed:

The reliability of the instrument. Both the items and scale in general. Have a very high level of confidence ( $\alpha \geq 0.80$ ) as do the Attitudes and knowledge dimensions. while the practices and context dimensions have High reliability ( $\alpha \geq 0.70$ ) (Table 5).

Table 2  
Stratified random sampling with proportional allocation

Stratum	Identification	No. of subjects in the stratum	Proportion	Stratum sample
1	Administration	8	0.04	4
2	CBSH	29	0.09	9
3	CNI	6	0.04	4
4	Law	46	0.31	33
5	EMP	4	0.04	4
6	ING	11	0.06	6
7	Research	8	0.05	5
8	Psychology	35	0.20	22
9	Social Work	24	0.17	18
Review number of subjects in strata		171	1.00	105

Source: Own elaboration

Table 3  
Variable system (initial version) vs. variable system (final version)

Variable	Dimensions	Indicators	Items Initial Version	Items Final Version
Inclusive education	Attitudes	Willingness to interact with people with diverse needs.	1 to 18 and 77	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17
Concept A process that addresses and responds to the diversity of needs of all learners (Booth & Shaw, 2000) (Dussan, 2010)	Knowledge	Interest in receiving training on educational inclusion models.	19 to 36 and 76	18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38
	Practices	Teacher-student interaction. Curricular content for classroom application.	37 to 50 and 78	39-40-41-42-43-44-45-46-47-48-49-50-51
	Contexts	University and social context.	51 to 65 65 to 75 and 79	52-53-54-55-56-57-58-59-60-61-62-63-64-65

Source: Own elaboration.

On the other hand. When analyzing the relationship between the test dimensions, significant correlations were found between all its components ( $Rho \geq 0.20$ ;  $\alpha < 0.05$ ), which allows

inferring that the scale has adequate internal consistency when observing the interaction between all its components (Table 6).

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Table 4

Phases and Psychometric Properties of the Educational Inclusion Questionnaire (CIE) for University Contexts

Phases	Procedure	Result
1. Reliability analysis	Cronbach's alpha.	0.89 high.
2. Reagent discard	Factorial analysis of the scale.	14 reagents were discarded.
3. Determination of internal consistency Structural model	Calculations of the proposed structural model. We proceeded to identify which reagents make up each component.  Confirmatory factor analysis.	4 components on the scale.   The factors and dimensions of the instrument do reproduce the basic theoretical foundations.

Source: Own elaboration

Table 5

Reliability analysis

Dimension	N of elements	Cronbach's alpha	Level
Attitudes	17	0.83	Very high
Knowledge	21	0.89	Very high
Practices	21	0.72	High
Context	14	0.71	High
Total	65	0.89	High

Source: Own elaboration

Table 6

Internal consistency

Spearman's Rho		Attitudes	Knowledge	Practices	Context
Attitudes	Correlation coefficient	*	0.25	0.27	0.26
	Sig. (bilateral)	*	0.01	0.01	0.01
	N	*	105	105	105
Knowledge	Correlation coefficient	0.25	*	0.31	0.45
	Sig. (bilateral)	0.01	*	0.001	0.001
	N	105	*	105	105
Practices	Correlation coefficient	0.27	0.31	*	0.44
	Sig. (bilateral)	0.01	0.001	*	0.001
	N	105	105	*	105
Context	Correlation coefficient	0.26	0.45	0.44	*
	Sig. (bilateral)	0.01	0.001	0.001	*
	N	105	105	105	*

Source: Own elaboration

Upon analyzing the items that make up each component and the theoretical constructs used for the construction of the scale four dimensions of Educational Inclusion in university contexts were established. the first was called “Attitudes” and consisted of components 1 (17 items) and the second was called “Knowledge” and consisted of components 2 (21items) as well as the third scale “Practices”, and finally, the fourth-dimension context consisted of component 4 (14 items) (Figure1). The first

refers to the Attitudes and/or disposition of the teachers to interact with the population with diverse needs and the second to the level of knowledge experiential and conceptual. which allows situating the teachers’ actions regarding inclusion and interest in receiving training on models of educational inclusion. The third to practices understood as the development of actions favoring educational inclusion and the fourth to the context of possibilities of reducing inequalities in the university and social context.

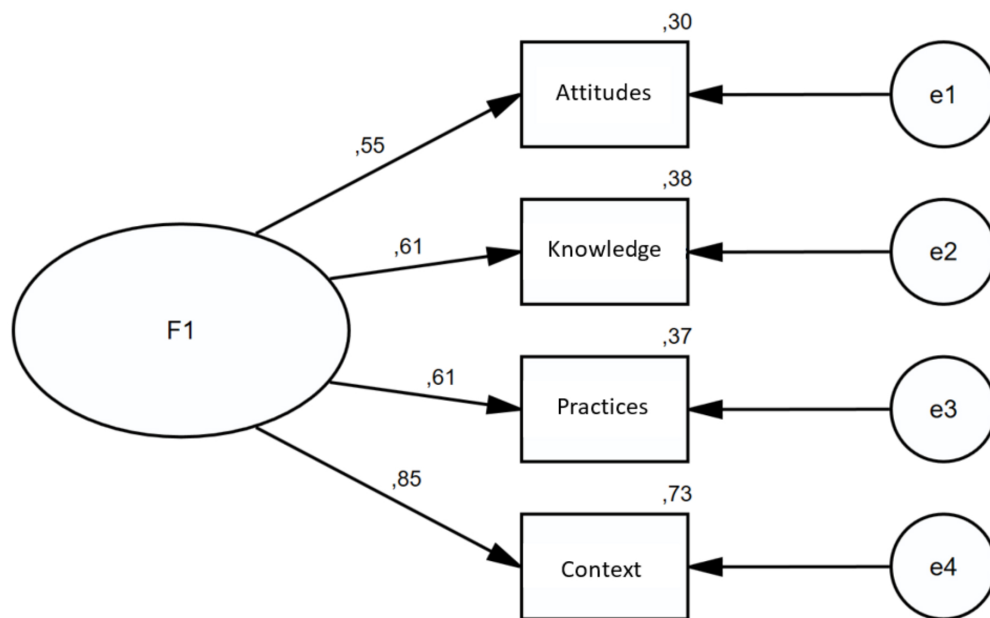


Figure 1. Source: Own elaboration.

Table 7

Internal consistency

Index	Abbreviation	Criteria	Value	Decision
Chi Square	$\chi^2$	$\geq 0.05$	1.10	Complies
Level of Significance	P	0.57		
Bentler-Bonett Normed Fit Index	NFI	$\geq 0.95$	0.99	Complies
Comparative Fit Index	IFC	$\geq 0.95$	1.00	Complies
Bollen's Fit Index	IFI	$\geq 0.90$	1.00	Complies
McDonald's Fit Index	MFI	$\geq 0.80$	0.99	Complies
Joreskog-Sorbom's Fit Index	GFI	$\geq 0.95$	1.00	Complies
Joreskog-Sorbom's Fit Index	AGFI	$\geq 0.95$	0.97	Complies
Root Mean-Square Residual	RMR	Next to 0	0.01	Complies
Root Mean-Square Error of Approximation	RMSEA	$< 0.05$	0.001	Complies

Source: Own elaboration

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Finally, the goodness-of-fit indices were tested and it was found that the factor structure complies with the X<sup>2</sup>, NNFI, CFI, IFI, MFI, RMR, SRMR, and RMSEA; likewise, it meets the criteria for the Chi-Square ( $\chi^2$ ),

Bentler-Bonett Non-Normed Fit Index (NNFI), Joreskog-Sorbom's Fit Index (AGFI), Root Mean-Square Residual (RMR) and the Root Mean Square Error of Approximation (RMSEA) (Table 7).

Tabla 8  
Interpretation

Dimension	N of elements	Minimum	Maximum	Level	Concept
<b>Attitudes</b> 1-2-3-4-5-6-7- 8-9-10-11-12- 13-14-15-16-17	17	17	30	Very low	The willingness of teachers to interact with a population with diverse needs.
		31	44	Under	
		45	58	Moderate	
		59	72	High	
		72	85	Very high	
<b>Knowledge</b> 18-19-20-21- 22-23-24-25- 26-27-28-29- 30-31-32-33- 34-35-36-37-38	21	21	37	Very low	Experiential and conceptual knowledge that allows situating the teacher's actions regarding inclusion and Interest in receiving training on models of educational inclusion.
		38	54	Under	
		55	71	Moderate	
		72	88	High	
		89	105	Very high	
<b>Practices</b> 39-40-41-42- 43-44-45-46- 47-48-49-50-51	21	21	37	Very low	Development of actions in favor of educational inclusion
		38	54	Under	
		55	71	Moderate	
		72	88	High	
		89	105	Very high	
<b>Context</b> 52-53-54-55- 56-57-58-59- 60-61-62-63- 64-65	14	14	25	Very low	Possibilities for reducing inequalities in the university and social context.
		26	37	Under	
		38	49	Moderate	
		50	61	High	
		62	70	Very high	
<b>Total</b>	65	65	117	Very low	Favorability of Educational Inclusion (CIE) in the University Context
		118	170	Under	
		171	223	Moderate	
		224	276	High	
		277	325	Very high	



## DISCUSSION

The validation of a scale is a methodological contribution for the respective fields of study and actors interested in promoting educational inclusion processes. In Colombia, the Higher Education Inclusion Index (INES) was recently validated to provide a tool to higher education institutions, which added to the Questionnaire of Educational Inclusion (CIE) for University Contexts proposed in this research, making it possible for higher education institutions to understand the conditions in which they find themselves with respect to the attention to diversity (Ministry of Education, n.d.; Ministerio de Educación, 2013).

To develop inclusive actions an initial diagnosis and shared leadership are necessary to generate cultural guidelines that mobilize organizational changes and favor the sustainability of inclusive actions together with institutional policies (28).

The questionnaire of inclusive education in university contexts allows collecting data from the fundamental actor of the teaching-learning process. Such as the teacher, information that favors the identification of initial and continuous training needs of university teachers (8).

Regarding the initial training understood as a training course aimed at future teachers of learning support, the study by (29) confirms that attention to concerns, attitudes towards inclusion, and teachers' perceptions of effectiveness is fundamental in inclusive processes; therefore, they formulated a deepening course that positively influenced the participants' intentions to teach inclusively in classrooms. Consequently, with continuing education (30), proposed virtual training and summer schools to impact teachers' knowledge and perceptions of self-efficacy to work with students with disabilities in inclusive settings with positive effects after implementation. Similarly, the course on historical contextualization of school inclusion proposed by (31) shows that teacher training allows participants to reflect on the inclusion process and the work of teachers in this inclusive environment.

It should be noted that teacher training is a field for which this questionnaire of educational inclusion in university contexts, especially in terms of the possibility of evaluating both the needs and the effects of the training processes led by educational institutions governmental or interested entities (32). The study by (32) evaluated the impact of a training course on teachers' self-efficacy to improve teaching-learning strategies and classroom management to help students with diverse educational needs. The course proved to have a significant impact on teachers' self-efficacy and confidence in teaching students with diverse educational needs.

## CONCLUSIONS

The Educational Inclusion Questionnaire (CIE) for University Contexts demonstrates adequate psychometric properties, with overall reliability according to Cronbach's Alpha of 0.89, with a high level of confidence, in addition, the AFC presents goodness-of-fit indexes (NFI=0.95; CFI=0.95; IFI=0.90; MFI=0.80; GFI=0.95; AGFI=0.95). Therefore, it is concluded that the instrument is useful for research on inclusive education in Colombian university contexts and measurement of the impact of future training actions aimed at a group of university teachers.

The theoretical constructs used for the construction of the questionnaire and its subscales "Attitudes", "Knowledge", "Practices" and University contexts, are consistent with each other, as well as relevant according to the review of teacher training programs implemented at the international level, as well as with the guidelines of the higher education inclusion initiative in the aspect of teacher participation and indicators of frequency and existence of inclusive teachers and practices.

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