Sanz-Leal, M. and Orozco, M. L. (2025). Validation in Spanish of a Global Competence Scale in Pre-service and In-service Teachers. *Revista de Investigación Educativa, 43.* DOI: https://doi.org/10.6018/rie.564141

Validation in Spanish of a Global Competence Scale in Pre-service and In-service Teachers

Validación en español de una escala de Competencia Global en docentes en formación y en servicio

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Abstract

Global competence as a learning objective is increasingly required by different educational institutions. Assessing this competence is a challenge due to its complexity and valid instruments are needed. As there are no instruments in Spanish to assess this competence in higher education, this study was designed to adapt and validate a scale on global competence within the Spanish context. The sample included 736 participants, 358 in-service teachers and 378 trainee teachers. The results of the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) supported a one-factor structure that differs from the original model. The one-factor model achieves a good fit once one item related to intercultural communication is removed. The CFA shows that the 8-item scale attains sufficient goodness-of-fit and good reliability, although the 7-item model achieves better goodness-of-fit while maintaining good reliability. Finally, the results of the Multigroup Confirmatory Factor Analysis (MCFA) supported the configurational and metric invariance of the measurement model according to gender. External validity confirms the correlation between global competence and the values of universalism and benevolence (Transcendence). It is concluded that the 7-item global competence scale presents adequate

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psychometric properties and good reliability for measuring global competence in higher education. Future studies could explore the improvement of the intercultural communication dimension of this scale in the Spanish version.

Keywords: global education; intercultural education; higher education; teacher education; teacher appraisal.

Resumen

La competencia global como objetivo de aprendizaje es cada vez más requerida por distintas instituciones educativas. Evaluar esta competencia supone un reto por su complejidad y para ello se necesitan instrumentos válidos. Al no encontrar instrumentos en castellano que permitan evaluar esta competencia en educación superior se diseña este estudio que se centra en adaptar y validar una escala sobre Competencia Global al contexto español. La muestra incluyó 736 participantes, 358 docentes en servicio y 378 docentes en formación. Los resultados del análisis factorial exploratorio (AFE) y confirmatorio (AFC) apoyaron la estructura de un factor que difiere del modelo original. El modelo de un factor alcanza un buen ajuste una vez eliminado un ítem relacionado con la comunicación intercultural. El AFC muestra que la escala de 8 ítems alcanza una bondad de ajuste suficiente y una fiabilidad correcta, aunque el modelo con 7 ítems alcanza mejor bondad de ajuste manteniendo una buena fiabilidad. Finalmente, los resultados del análisis factorial confirmatorio multigrupo (AFCM) apoyaron la invarianza configuracional y métrica del modelo de medida según sexo. La validez externa confirma la correlación entre la competencia global y los valores de universalismo y benevolencia (Transcendencia). Se concluye que la escala de 7 ítems de Competencia Global presenta adecuadas propiedades psicométricas y buena fiabilidad para medir la Competencia Global en educación superior. Futuros estudios podrían explorar la mejora de la dimensión de comunicación intercultural de esta escala en la versión en castellano.

Palabras clave: educación global; educación intercultural; enseñanza superior; formación de profesores; evaluación del profesor.

Introduction and objectives

In the face of growing global challenges that threaten our common future, UNESCO (2022) calls for a qualitative leap to reinvent higher education as a basis for building a safe, more just, democratic and sustainable world. The phenomenon of globalisation requires competences in people that enable us to understand and solve global problems of a social, political, cultural, economic and environmental nature (OECD, 2018). Therefore, there is a worldwide call to develop global competence at all levels of education and therefore in teachers (Hauerwas et al., 2023).

The use of the term global competence as a learning objective has spread exponentially in recent years following its assessment in 2018 as a transversal competence in the Programme for International Student Assessment (PISA). This concept emerged in the USA between the 1980s and 1990s linked to international education, language learning and

elite training (Sanz-Leal et al., 2021). It is a concept that has often been used interchangeably with global education, intercultural competence, global awareness, global citizenship, global literacy or international education, although there are distinctions between them (Li, 2013).

Concept of global competence

At present, the conceptual frameworks and definitions offered by supranational institutions that influence local policies (Sanz-Leal et al., 2021) such as the OECD or the Asian Society are the most referenced internationally, in Spanish-speaking contexts (Esteban and Colpaert, 2022) in European (Karanikola et al., 2022; Parmigiani et al., 2022) Asian (Han and Zhu, 2022; Sakamoto, 2022) or English-speaking (Majewska, 2022) studies.

The OECD defines global competence as:

> "a multidimensional and lifelong learning objective. Globally competent individuals can examine local, global and intercultural issues, understand and appreciate different perspectives and worldviews, interact successfully and respectfully with others, and act responsibly towards sustainability and collective well-being" (OECD, 2018, p.5).

The Asian Society defines it as "the ability and willingness to understand and act on global problems" (Boix-Mansilla and Jackson, 2011, p.13).

There are different motivations that justify the need to develop this competence, Boix-Mansilla and Jackson (2011) differentiate three: the global economy and the changing demands of work, global migration with the consequent diversity as the norm, and climate instability and environmental management. Indeed, there are often contradictions or competing motives for training in this competition such as the quest for greater social justice or global economic competitiveness (Sanz-Leal et al., 2021). Some authors warn that "global competencies have been co-opted by a neoliberal educational agenda that focuses almost exclusively on developing skills" that serve the global economy (Byker, 2016, p. 264).

Bearing in mind that a competence in itself is a complex construct to be observed and assessed, global competence is even more complex (Parmigiani et al., 2022). Its dimensionality: knowledge, skills, attitudes and values (OECD, 2018), the diverse and sometimes contradictory motivations already mentioned, or the multiple perspectives from which it can be approached (Beneitone and Yarosh, 2021), are evidence of its complexity and the challenge involved in assessing it.

Assessment and measurement of global competence

The OECD (2018) has designed a cognitive assessment and a background questionnaire for 15-year-old students to assess Global Competence, and the Asian Society proposed an age-adaptive instrument for students aged 4-18 (Parmigiani et al., 2022).

In higher education, Li (2013) used a 17-item Global Competence questionnaire to assess a collaboration between Chinese and US students. Liu et al. (2020) constructed a questionnaire to measure Global Competence in graduate students with a Chinese sample,

based on a 5-point Likert scale, which included three areas "knowledge and understanding, skills, attitudes and values" (p. 4) that has been used in the study by Karanikola et al. (2022).

Morais and Ogden (2011) in their paper "Initial Development and Validation of the Global Citizenship Scale" identified global competence as one of the three general dimensions of global citizenship: "social responsibility, global competence, and global civic engagement" (p. 447). They understand global competence as "having an open mind while actively seeking to understand the cultural norms and expectations of others and drawing on this knowledge to interact, communicate and work effectively outside one's own environment" (Morais and Ogden, 2011, p. 448). The scale, which was validated with university students participating in study abroad, has been used for the same purpose by Hyett et al. (2019) or Kishino and Takahashi (2019) who used only the global competence subscale.

The authors of this study carried out a systematic literature review to explore how teachers are trained in this competence and how the level of Global Competence of teachers and their teaching can be assessed. This study identified that a distinction can be made between personal Global Competence, i.e. whether teachers have the knowledge, skills, attitudes and values that characterise this competence, and whether they are willing and able to teach for Global Competence (Sanz-Leal et al., 2023). A greater number of qualitative than quantitative research and an emerging evaluation based on a mixed methods design (Kerkhoff, 2020; Kishino and Takahashi, 2019) involving the collection or analysis of quantitative and qualitative data simultaneously or sequentially with different objectives (triangulation, complementarity, development, initiation or expansion) (Bryman, 2006) were also found (Bryman, 2006). In addition, the quantitative instruments found were mostly in English, with no instruments in Spanish.

These results, the deficit detected in teacher training in this area (Pegalajar et al., 2022) and the scarce research on the assessment of Global Competence in teacher training (García-Esteban and Colpaert, 2022) in the Spanish-speaking context motivated the decision to provide validated instruments to facilitate this task. For this reason, the authors decided to adapt and translate into Spanish the subscale on global competence that Morais and Ogden provide in their scale on global citizenship and that several authors use in the evaluation of teachers (Kerkhoff, 2020; Kilinc and Tarman, 2019). Therefore, the study presented here consists of the validation in Spanish of the global competence subscale (GCS) of Morais and Ogden (2011) that can be used in higher education.

Several issues motivated the choice of this instrument, as it is a 9-item scale that can be applied together with other scales to establish relationships between variables, such as the level of competence and its teaching in in-service teachers or the perceived self-efficacy of trainee teachers.

Another motivation was that this scale takes into account the intercultural perspective understood as the ability to see the world from other perspectives, understanding and valuing other people's worldviews, being able to interact openly, effectively and appropriately across cultural differences. This perspective is an integral part of global competence (OECD, 2018) as is the awareness of recognising one's own biases and prejudices that limit the ability to participate in intercultural encounters or the need to know and act on global issues or problems. Issues on which there seems to be consensus

in defining global competence (Beneitone and Yarosh, 2021; Sakamoto, 2022).

Finally, it highlights how the moral dimension has always been linked to global citizenship education (Pashby et al., 2020) and individual values as a dimension of global competence, (OECD, 2018; van Werven et al., 2021) influencing the attitudes and behaviours of globally competent teachers (Tichnor-Wagner et al., 2019).

The OECD states: "The most costly, but perhaps also the most urgent, effort will be to evaluate and experiment with new methods to further improve the measurement of the social-emotional, attitudinal and value dimensions of global competence" (2018, p. 61). This led us to test an instrument to assess this valuational dimension of global competence.

Schwartz's (2012) theory of values in its original version defines ten major values according to the motivation underlying each of them. These 10 basic human values are grouped into four higher-order values: Transcendence (universalism + benevolence); Personal advancement (power + achievement + hedonism); Conservation (tradition + conformity + security) and Openness to change (stimulation + self-direction) (Schwartz, 2021).

The purpose of this article is to report on the cross-cultural adaptation and psychometric empirical validation of a scale on global competence, as well as the relationship of global competence to higher-order and original individual values. The aim is to provide a valid and reliable instrument for assessing the development of global competence in teacher education.

Method

Design

The present study is instrumental in that it is an analysis of the psychometric properties of a self-report scale including translations and adaptations of existing instruments (Ato et al., 2013).

Evidence of construct and concurrent validity and internal consistency reliability of the instrument is presented.

Sample

The sample included 736 participants, 151 pre-school and primary school teachers, 207 secondary school, baccalaureate and vocational education and training (VET) teachers and 378 students from different training programmes (Master's degree in teaching, Bachelor's degree in pre-school and primary education and Bachelor's degree in pedagogy) (see Table 1). The sample of in-service teachers was obtained through non-probability random sampling and the sample of trainee teachers was based on convenience sampling.

Table 1

Socio-demographic variables

In-service teachers	**n**	**%**	**Trainee teachers**	**n**	**%**
Sex			Sex		
Woman	247	69,00%	Woman	276	73,00%
Man	111	31,00%	Man	100	26.5%
			Another	2	.5%
Origin			Origin		
Spain	349	97.5%	Spain	357	94.4%
Foreign	9	2.5%	Foreign	21	5.6%
TOTAL	358	48.6 %	TOTAL	378	51.4%

Instruments

Global Competence Scale (GCS)

The Global Competence subscale of Morais and Ogden's (2011) global citizenship questionnaire is composed of 9 items which are further distributed into three subscales of 3 items each.

> Self-awareness (CO). Individuals recognise their own limitations and ability to participate successfully in an intercultural encounter.
> Intercultural Communication (IC). Students demonstrate a variety of intercultural communication skills and have the ability to participate successfully in intercultural encounters.
> Global knowledge (GC). Students show interest in and knowledge of global issues and events.

The response mode is presented on a 5-point Likert scale: from "Strongly Disagree" to "Strongly Agree" with no reverse items. Morais and Ogden reported an acceptable Cronbach's alpha for each factor and for each sub-dimension, CO = .69, CI = .76 and CG = .67 as well as an acceptable goodness of fit.

Values Questionnaire (PVQ40)

The 40-item Portrait Values Questionnaire (PVQ40) (Schwartz, 2021) was used to assess basic human values as a reference test for criterion validity (Ramada-Rodilla et al., 2013). The values scale is validated in several languages including Spanish (Schwartz, 2012) and has been used to assess whether there is a relationship between individual values and attitudes towards cultural diversity (Grigoryan and Schwartz, 2021). The 40-question Spanish version provided in Zlobina (2004) was used, as well as its indications

for calculating the score. This analysis also seeks to explore whether the scale (PVQ40) of individual values proposed by Schwartz (2021) can be used to assess or predict the value dimension of global competence.

Procedure

The instruments were administered online via a link to a form designed with Microsoft Forms that included socio-demographic questions: age, sex, level of education or degree, origin of birth. All participants in the study did so voluntarily, giving their consent after being informed of the objectives, confidentiality and anonymity, as established by the Ethics Committee that approved the study.

The validation process followed the phases proposed by Ramada-Rodilla et al., (2013), i) cultural adaptation, taking into account the idiomatic turns of phrase, the cultural context and the educational system, and ii) validation in Spanish, to assess the degree of preservation of the psychometric properties of the survey in English through an exploratory analysis, a confirmatory analysis and an analysis of the reliability and validity of the test.

In the first phase, the items of the global competence subscale were translated into Spanish following the procedure: (a) two bilingual teachers independently translated the items from the source language into Spanish; (b) subsequently, both translators and one of the authors of this study jointly reviewed both translations, reaching consensus and producing a common Spanish version; (c) then, a third bilingual teacher, unaware of the original version of the items, performed a reverse translation from Spanish into English; (d) finally, the whole team reviewed the conceptual, semantic and idiomatic equivalence between the translated version and the original items. Prior to its application, a pre-test was carried out with 25 participants to assess the quality of the translation, its cultural appropriateness and the applicability of the questionnaire resulting in a final version.

Data analysis

For construct validity, an exploratory factor analysis (EFA) was performed with the software FACTOR v. 12.02.01 (Ferrando and Lorenzo-Seva, 2017). It was applied on a random sample of 50% (n=368) of the study sample generated with the Solomon method that optimally divides the sample into two equivalent halves and guarantees representativeness, presenting a communality ratio index of .99 very close to 1 (Ferrando et al., 2022). The Kaiser-MeyerOlkin (KMO) sample adequacy test and Bartlett's test of sphericity tested the suitability of the data matrix for the exploratory factor analysis.

The degree of fit to the data is estimated according to the index most directly related to that magnitude, which is the *Root Mean Square of Residuals* (RMSR) and the weighted root mean square residual (WRMR). The expected mean value of RMSR for an acceptable model is = 0.0522 (Ferrando et al., 2022), to represent a good fit in the WRMR values lower than 1.0 have been recommended (Yu and Muthen, 2002).

The criterion to consider a factor loading relevant was set at 0.30 (Ferrando and Lorenzo-Seva, 2014). Skewness and kurtosis values are provided as evidence of normal distribution.

The AFE was developed with a Parallel Analysis (PA) through a 500 *bootstrap* based on polychoric correlations and with a robust ULS (Unweighted Least Squares) extraction method. This process is recommended for Likert - 5 items (Ferrando and Lorenzo-Seva, 2014). The ULS extraction method is considered optimal in cases where the factored scale is assumed to have a low number of factors and not very large samples (Ferrando et al., 2022).

Confirmatory factor analysis (CFA) was conducted with JASP 0.16.4 software on the other half of the study sample (n=368), the fit was estimated through the ML maximum likelihood method. Authors Xia and Yang (2019) suggest that the ML estimation method is more sensitive than the ULS or DWLS methods to the goodness-of-fit indices suggested by Hu and Bentler (1999) (CFI and TLI ≥ .95 and RMSEA ≤ .06). In turn, Harrington (2009) suggests that from a sample of 200 subjects any of these methods is applicable in a CFA.

The goodness of fit of the model was assessed by the following indices and criteria: a) comparative fit index (CFI) and Tucker-Lewis index (TLI), an acceptable fit is indicated by values ≥ .90 and a good fit is determined by values ≥ .95; b) root mean square error of approximation (RMSEA): an acceptable fit is determined by values ≤ .08 and a good fit is indicated by values ≤ .05 (Hu and Bentler, 1999).

Third, to test the fit of the scale according to gender (male and female), an invariance test was applied with a restrictive progression analysis sequence. Starting with the configurational model, followed by the metric, scalar and finally the strict model (Dong and Dumas, 2020).

For comparisons between nested models, invariance is assumed to occur when the CFI difference is $\Delta \leq .01$ (Chen, 2007).

Test-retest reliability was tested using Cronbach's alpha and McDonald's Omega reliability indices using the JASP 0.16.4 software.

Finally, for criterion validity, by means of Spearman's correlation -since the items are ordinal-, we compared the degree to which the result of the subscale agrees with the dimensions of openness to change and transcendence of the values questionnaire, using it as a reference test. We expected a positive correlation with these dimensions and a negative or non-existent correlation with the rest of the values (self-preservation and self-advancement). In this way, concurrent and predictive validity was tested (Ramada-Rodilla et al., 2013).

Results

Results of the Exploratory Factor Analysis

The exploratory pre-analysis with 9 items of the original subscale shows a sufficient KMO (.79) and Bartlett's test of sphericity yielded a Chi-square value = 719.1 (df = 36; p<.001).

Second, the parallel analysis recommends the extraction of a single factor with the percentage of variance explained being higher (44.43%) than that explained by the randomly generated factor (25.01%). This result differs from the original scale conceptualised and validated in English which includes three sub-dimensions (Morais and Ogden, 2011).

The Measure of Sampling Adequacy (MSA) suggests that item 2.1 (Unconsciously, I adapt my behaviour and gestures when interacting with people from other cultures) shows anomalous behaviour. This indicator offers values below .50 suggesting that the item does not measure the same domain as the rest of the items in the set or that it is not functioning correctly (Ferrando et al., 2022).

The test was then subjected to an AFE by removing the anomalous item and the extraction of a single factor. The new KMO index yielded a better result (.82) and Bartlett's test of sphericity produced a Chi-square value = 636.2 (df = 28; p<.001) with the percentage of variance explained being 50.57%.

The root mean square root of the residuals, (RMSR = 0.06) and the weighted root mean square residual, (WRMR = .055) are tested. The RMSR is in an appropriate range (0.050 - 0.076) and the WRMR is below the recommended value (1.0) reflecting a good model fit (Yu and Muthen, 2002). The test loadings ranged from minimum and maximum values of 0.37 to over 0.71 (Table 2).

Table 2

Descriptive data of the scale for the studied sample

Item	M	SD	As	k	F1	Community
1.2 I know how to develop a place to help mitigate a global environmental or social problem.	3.18	.70	-.36	-.013	.44	.29
1.3 I know a number of ways in which I can be an agent of change in some of the world's most vexing problems.	3.45	.86	-.38	-.40	.67	.61
1.4 I can make other people take into account global issues of concern to me.	3.74	.53	-.62	.82	.71	.53
2.1 I unconsciously adapt my behaviour and gestures when interacting with people from other cultures.	3.29	1.04	0.502	-.282	-	-
2.2 I tend to adapt my way of communicating to the cultural background of other people.	3.75	.60	-.96	1.54	.37	.42

2.3 I can communicate in different ways with people from different cultures.	3.88	.60	-.79	1.34	.51	.59
3.1 I am informed about current issues affecting international relations.	3.84	.73	-.83	.74	.60	.50
3.2 I am comfortable expressing my views on a pressing *global* issue in front of a group of people.	3.71	.81	-.79	.49	.52	.44
3.3 I am able to write an opinion letter to a local media outlet expressing my concerns about inequalities and global issues.	3.42	1.01	-.38	-.31	.55	.50

Results of the Confirmatory Factor Analysis

Following the results obtained in the EFA, the three-factor model suggested by Morais and Ogden (2010) and the one-factor model obtained in the EFA through a CFA were tested for further evidence. Table 3 shows that, according to the fit criteria, the original three-dimensional model does not achieve a sufficient fit. Excluding item 2.1, which showed anomalies in the EFA, the fit improves markedly; however, the intercultural communication dimension would be left with only two items, failing to meet the minimum necessary (Ferrando et al., 2022). Furthermore, the reliability of this dimension was calculated and was found to be unsatisfactory (α = .49), so this model would not be acceptable.

When the nine-item unidimensional model is tested, it does not achieve a sufficient overall fit. However, if the anomalous item 2.1 is excluded again, the model improves to a moderate fit. After that, the model was tested with 7 items by first excluding item 2.2 and then excluding item 2.3 which belongs to the same original dimension and in both cases the model improves, with item 2.2 showing the best fit. Despite this result, the factor loading of item 2.2 (.22) does not reach the established minimum of .30. Because of this, it is decided to retain the one-factor model composed of 7 items including item 2.3.

Table 3

Goodness-of-fit indices and comparison of CFA and MCFA models

Model	**Goodness-of-fit indices**					**Comparison**	
	X^2	**X^2 /df**	**IFC**	**TLI**	**RMSEA**	**ω**	**α**
Reference models							

Model A - 3 factors - 9 items	71.564	2.98	.901	.852	.073		
Model B - 3 factors - 8 items	33.720	1.98	.962	.938	.052		
Model C - 1 factor - 9 items	83.326	3.08	.883	.844	.075		
Model D - 1 factor - 8 items	39.515	1.97	.956	.938	.052	.742	.736
Model E - 1 factor - 7 items (2.3)	30.268	2.16	.961	.941	.056	.743	.740
Model F - 1 factor - 7 items (2.2)	21.807	1.55	.979	.969	.039	.724	.717
						Models	**ΔCFI**
Model E1 (configurational)	47.628	1.70	.952	.928	.062		
Model E2 (metric)	53.201	1.56	.953	.942	.055	E2 vs E1	.001
Model E3 (scalar)	68.377	1.70	.930	.927	.062	E3 vs E2	.023
Model E4 (strict)	76.812	1.63	.927	.934	.059	E4 vs E3	.003

Note: N=368

The results of the multigroup invariance of the factor structure between males and females shown in Table 3 support measurement invariance at the configurational and metric level, but not at the scalar invariance level. This suggests that the overall unifactorial model fits well for both males and females confirming construct validity.

Reliability

The internal consistency of the 8-item model measured with McDonald's ω for ordinal scales is ω =.742 and Cronbach's Alpha is α = .736. For the 7-item model including 2.2 (I tend to adapt my way of communicating to other people's cultural background) the reliability is ω =.724 and α = .717.724 and α = .717. For the 7-item model including 2.3 (I am able to communicate in different ways with people from different cultures) McDonald's ω is ω = .743 and Cronbach's Alpha is α = .740. Both indicators show good scale reliability for all three models. Thus, although the model that includes item 2.2 offers higher goodness of fit reduces reliability, the opposite is true for the 8-item model and the 7-item model that includes item 2.3 where goodness of fit indicators are reduced, but reliability increases (See Table 3).

Concurrent validity

Regarding concurrent validity, the results showed that the 8-item scale correlates positively and at a medium level with the dimension of Transcendence (Benevolence + Universalism) ($r736$ = .338; p<.001) and the dimension of Openness to Change ($r736$ = .286; p<.001). There is no statistically significant correlation with the values of Personal Promotion ($r736$ = -.043; p<.246) and Conservation ($r736$ = -.040; p<.275). However, there is a low level negative correlation with the value Power ($r736$ = -.112; p<.002).

Both the 7-item GCS scale (2.2) and (2.3) correlate positively and at a medium level with

the Transcendence dimension (*r736* =.326; *p*<.001) and (*r736* =.334; *p*<.001) respectively. The correlation of both scales is also positive at a low mean level with the Openness to Change dimension (*r736* =.259; *p*<.001) and (*r736* =.279; *p*<.001). The Promotion values show statistically significant correlation with GC (2.2) (*r736* = -.076; *p*<.039) at a low and negative level. However, they show no correlation with GC (2.3) (*r736* = -.056; *p*<.132). Finally, the Conservation values show no correlation with either of the two scales CG (2.2) (*r736* = -.067; *p*<.070) CG (2.3) (*r736* = -.052; *p*<.158).

Discussion

The first objective of this study was to validate the Global Competence subscale (Morais & Ogden, 2011) in the Spanish context with in-service and pre-service teachers. This objective was partially achieved by having a scale to measure Global Competence that achieves a good fit and reliability index, although it does not coincide with the reference test in terms of dimensionality. Moreover, as an original and important contribution, it is the first time that invariance analyses have been carried out for this scale, which seems to measure the same construct for both men and women, but does not achieve sufficient invariance to allow comparisons between them. Metric invariance suggests similar factor loadings across groups to make comparisons of correlations and path coefficients. However, not meeting scalar invariance does not achieve confidence to make comparisons between groups. Chen et al. (2005) argued that comparison of means between groups could be meaningful after confirming the existence of scalar invariance. Further research is needed to study the equivalence of the scale according to different groups.

Global competence involves knowledge, attitudes, skills and values (OECD, 2018; Tichnor et al., 2019) to address today's global challenges. Based on this approach, we are aware that the assessment of this competence is a complex process that needs to be approached from a broad perspective. The original subscale by Morais and Ogden (2011) proposes three dimensions that are related and are assessed by three items each. This limited number of items per dimension runs the risk of losing multidimensionality as has occurred in this study. The fact that one of the items in the intercultural communication dimension functioned anomalously made it difficult to test the multidimensionality of the original model.

A possible reason for the poor performance of this item is the unconscious use of words or cultural background that may have been interpreted differently, although it is difficult to know this. Further studies should propose adaptations of the items in this dimension, as well as propose new items to test its functioning and to achieve a substantial weight in the factor indicating intercultural communication.

The GC scale proposes the dimensions: global awareness, global knowledge and intercultural communication, which are already complex in that they include cognitive and attitudinal aspects. Several authors focus on the emotional dimension related to this competence (Hauerwas et al., 2023). Therefore, a possible line of enquiry for the future may be to include questions in the survey that delve deeper in this sense and allow the affective component of this competence and the intercultural communication dimension to be measured.

In the Spanish-speaking context for which the scale is being validated, there are several

empirical studies on the assessment of teachers' intercultural perceptions, attitudes and competences and their training which offer precise criteria that may be of help in formulating new items in this dimension.

Pareja de Vicente et al. (2019) state that "cultural communication is a complex quality that is linked to predisposition, receptivity and a proactive approach to cultural interaction" (p. 76), which requires a positive and constructive appreciation of cultural difference. Considering interaction with people from different cultures as enriching and as a source of personal and professional development is seen by various authors as a positive attitude towards cultural diversity (Domínguez-Garrido et al., 2020; Tichnor-Wagner et al., 2019). As explained by Rodríguez et al. (1997) in their study on the development of a scale of attitudes towards multicultural education:

> "The measurement of attitudes, together with interests and values, is part of the affective domain of people. Attitudes are "learned (not innate) and stable (although they can change) predispositions to react in a favourable or unfavourable valuative way to an object"". (Rodriguez et al., 1997, p. 104).

For this reason, a tentative item that we propose and that could guarantee the application of this instrument would be: *I consider that interacting, relating and communicating in my environment with people from different cultural backgrounds enriches me and favours my personal development*.

In addition, other authors such as Domínguez-Garrido et al. (2020) also point to the need for critical reflection on one's own individual beliefs about cultural differences. In his survey on teaching for global readiness, Kerkhoff (2017) includes a question to teachers on how often they reflect on their own assumptions and biases or prejudices. Perhaps another item that could be applied in the intercultural communication dimension could be related to personal reflection on our assumptions or biases towards people from different cultures.

Furthermore, with respect to the affective dimension, the results of the correlation analysis for concurrent validity support the theoretical framework of this study and indicate that the values of universalism and benevolence are positively related to the level of global competence and can function as predictors of global competence. The values are present throughout the global competence framework of the PISA study (OECD, 2018). Specifically, point 48 of the framework outlines the importance of valuing human dignity and cultural diversity as factors contributing to global competence. "People who cultivate these values are more aware of themselves and their environment and are strongly motivated to fight against exclusion, ignorance, violence, oppression and war (p. 25).

Although the level of correlation is not high, it may suggest that this global competence instrument assesses an approach to global competence that is aligned with social justice rather than global economic competitiveness, which would relate more to power values, achievement or hedonism.

Finally, it is necessary to point out that in this study the 40-question version based on the original theory of Schwartz (2021) was applied, and although the same author points out that the refined version does not intend to contradict the original, it does offer values with greater "heuristic and predictive power". Future studies could use the refined version to provide a more precise account of the relationship between the continuum of human

values and global competence and its dimensions.

Conclusions

In conclusion, this study offers a promising instrument in Spanish to assess GC in higher education, although with some limitations that should be explored in future studies. The present results have implications for teacher training, which entails the necessary implementation of contents and methodologies that foster global competence and education in humanistic values in the curricula. The affective and emotional dimension must be taken into account both in training programmes and in the evaluation of their impact and relationship with the acquisition and development of GC as a learning objective. The scale of GC can help to evaluate programmes and methodologies that facilitate the development of this competence in university students and more specifically in future teachers.

References

Ato, M., López, J. J., & Benavente, A. (2013). A classification system for research designs in psychology. *Anales de Psicología, 29*(3)1038-1059. https://doi.org/10.6018/analesps.29.3.178511

Beneitone, P., and Yarosh, M. (2021). A Comparative analysis of global competences within the framework of internationalized curricula. *Tuning Journal for Higher Education, 8*(2), 25-53. https://doi.org/10.18543/tjhe-8(2)-2021pp25-53

Boix-Mansilla, V., and Jackson, A. (2011). *Preparing Our Youth to Engage the World: Educating for Global Competence*. The Asian Society. https://asiasociety.org/files/book-globalcompetence.pdf

Bryman, A. (2006). Integrating quantitative and qualitative research: how is it done? *Qualitative Research, 6*(1), 97-113. https://doi.org/10.1177/1468794106058877 423-432.

Byker, E. J., and Marquardt, S. K. (2016). Using critical cosmopolitanism to globally situate: Multicultural education in teacher preparation courses. *Journal of Social Studies Education Research, 7*(2), 30-50. https://eric.ed.gov/?id=EJ1121646

Chen, F. F. F., Sousa, K. H., & West, S. G. (2005). Teacher's Corner: Testing Measurement Invariance of Second-Order Factor Models. Structural Equation Modeling: *A Multidisciplinary Journal, 12*(3), 471-492. https://doi.org/10.1207/s15328007sem1203_7

Domínguez-Garrido, M. C. D., Ruiz-Cabezas, A., Domínguez, M. C. M., Dueñas, M. C. L., Pérez Navío, E., and Rivilla, A. M. (2020). Teachers' Training in the Intercultural Dialogue and Understanding: Focusing on the Education for a Sustainable Development. *Sustainability*, *12*(23), 9934. https://doi.org/10.3390/su12239934

Dong, Y., and Dumas, D. (2020). Are personality measures valid for different populations? A systematic review of measurement invariance across cultures, gender, and age. *Personality and individual differences*, *160*, 109956. https://doi.org/10.1016/j.paid.2020.109956

Ferrando, P. J., and Lorenzo-Seva, U. (2014). Exploratory item factor analysis: Some

additional consideration. *Anales de Psicología, 30*(3), 1170-1175. https://doi.org/10.6018/analesps.30.3.199991

Ferrando, P. J., and Lorenzo-Seva, U. (2017). Program FACTOR at 10: Origins, development and future directions. *Psicothema, 29*(2), 236-240. https://doi.org/10.7334/psicothema2016.304

Ferrando, P. J., Lorenzo-Seva, U., Hernández-Dorado, A., and Muñiz, J. (2022). Decalogue for the Factorial Analysis of Test Items. *Psicothema, 34*(1), 7-17. https://doi.org/10.7334/psicothema2021.456

García-Esteban, S., and Colpaert, J. (2022). Integrating the Global Competence with Telecollaboration in CLIL Teacher Training. *Revista de Educación a Distancia, 22*(69). https://doi.org/10.6018/RED.491281

Grigoryan, L., & Schwartz, S. H. (2021). Values and attitudes towards cultural diversity: Exploring alternative moderators of the value-attitude link. *Group Processes and Intergroup Relations, 24*(6), 966-981. https://doi.org/10.1177/1368430220929077

Han, S., and Zhu, Y. (2022). (Re)conceptualizing 'global competence' from the students' perspective. *Asia Pacific Journal of Education*, 1-13. https://doi.org/10.1080/02188791.2022.2148091

Harrington, D. (2009). *Confirmatory factor analysis*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195339888.001.0001

Hauerwas, L. B., Gomez-Barreto, I. M., Boix Mansilla, V., & Segura Fernández, R. (2023). Transformative Innovation in teacher education: Research toward a critical global didactics. *Teaching and Teacher Education, 123*, 103974. https://doi.org/10.1016/J.TATE.2022.103974

Hu, L.-t., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Hyett, N., Lee, K. M., Knevel, R., Fortune, T., Yau, M. K., & Borkovic, S. (2019). Trialing virtual intercultural learning with Australian and Hong Kong allied health students to improve cultural competency. *Journal of Studies in International Education, 23*(3), 389-406. https://doi.org/10.1177/1028315318786442

Karanikola, Z., Katsiouli, G., and Palaiologou, N. (2022). "Teachers' Global Perceptions and Views, Practices and Needs in Multicultural Settings." *Education Sciences, 12*, 280. https://doi.org/10.3390/educsci12040280

Kerkhoff, S. (2017). Designing global futures: A mixed methods study to develop and validate the teaching for global readiness scale. *Teaching and Teacher Education*, *65*, *91-106.* https://doi.org/10.1016/j.tate.2017.03.011

Kerkhoff, S. (2020). Collaborative Video Case Studies and Online Instruments for Self-Reflection in Global Teacher Education. *Journal of Technology and Teacher Education, 28*(2), 341-351. https://www.learntechlib.org/primary/p/216212/

Kilinc, E., and Tarman, B., (2019). Global citizenship versus patriotism. The Correlation Between Turkish Preservice Teachers' Perception of Patriotism and Global Citizenship. In, *Competing Frameworks: Global and National in Citizenship Education* (pp. 217-238). https://bit.ly/3LwTYFu

Kishino, H., and Takahashi, T. (2019). Global citizenship development: Effects of study

abroad and other factors. *Journal of International Students, 9*(2), 535-559. https://doi.org/10.32674/jis.v9i2.390

Li, Y. (2013). Cultivating Student Global Competence: A Pilot Experimental Study. *Decision Sciences Journal of Innovative Education, 11*(1), 125-143. https://doi.org/10.1111/j.1540-4609.2012.00371.x

Liu, Y., Yin, Y., and Wu, R. (2020). Measuring graduate students' global competence: Instrument development and an empirical study with a Chinese sample. *Studies in Educational Evaluation, 67,* 100915. https://doi.org/10.1016/j.stueduc.2020.100915

Majewska, I. A. (2022). Teaching Global Competence: Challenges and Opportunities. *College Teaching, 71*(2), 1-13. https://doi.org/10.1080/87567555.2022.2027858

Morais, D. B., and Ogden, A. C. (2011). Initial Development and Validation of the Global Citizenship Scale. *Journal of Studies in International Education, 15*(5), 445-466. https://doi.org/10.1177/1028315310375308

OECD (2018). *The OECD PISA Global Competence Framework: Preparing our Youth for an Inclusive and Sustainable World*. OECD. https://www.oecd.org/education/Global-competency-for-an-inclusive-world.pdf

Pareja de Vicente, D., Leiva Olivencia, J. J., & Matas Terrón, A. (2019). Perceptions on cultural diversity and intercultural communication of future teachers. *Revista Electrónica Interuniversitaria Interuniversitaria de Formación del Profesorado*, *23*(1). https://doi.org/10.6018/reifop.403331

Parmigiani, D., Jones, S.-L., Silvaggio, C., Nicchia, E., Am-brosini, A., Pario, M., Pedevilla, A., and Sardi, I. (2022). Assessing Global Competence Within Teacher Education Programs. How to Design and Create a Set of Rubrics With a Modified Delphi Method. *SAGE Open,* 12(4). https://doi.org/10.1177/21582440221128794

Pashby, K., da Costa, M., Stein, S., & Andreotti, V. (2020). A meta-review of typologies of global citizenship education. *Comparative Education, 56*(2), 144-164. https://doi.org/10.1080/03050068.2020.1723352

Pegalajar Palomino, M. del C., Burgos García, A., and Martínez Valdivida, E. (2022). Education for Sustainable Development and Social Responsibility: keys to initial teacher training from a systematic review. *Revista de Investigación Educativa*, *40*(2), 421-437. https://doi.org/10.6018/rie.458301

Ramada-Rodilla, J. M., Serra-Pujadas, C., and Delclós-Clanchet, G. L. (2013). Cultural adaptation and validation of health questionnaires: Review and methodological recommendations. *Salud Publica de México, 55*(1), 57-66. https://doi.org/10.1590/S0036-36342013000100009

Rodríguez, M., Cabrera, F., Espín, J. V., and Marín, M. A. (1997). Elaboration of a scale of attitudes towards multicultural education. *Revista de investigación educativa*, *15*(1), 103-124.

Sakamoto, F. (2022). Global competence in Japan: What do students really need? *International Journal of Intercultural Relations, 91*, 216-228. https://doi.org/10.1016/J.IJINTREL.2022.10.006

Sanz-Leal, M., Orozco Gómez, M. L., and Toma, R. B. (2021). Conceptual construction of global competence in education. *Teoría De La Educación. Revista Interuniversitaria, 34*(1), 83-103. https://doi.org/10.14201/teri.25394

Sanz-Leal, M., Orozco-Gómez, M. L., & Llorente, A. (2023). Developing and measuring

global competence in teachers: A systematic review. *Revista De Iniciação à Docência*, *8*(1), e11526, 1-22. https://doi.org/10.22481/riduesb.v8i1.11526

Schwartz, S. H. (2012). An Overview of the Schwartz Theory of Basic Values. *Online Readings in Psychology and Culture, 2*(1). https://doi.org/10.9707/2307-0919.1116

Schwartz, S. H. (2021). A Repository of Schwartz Value Scales with Instructions and an Introduction. *Online Readings in Psychology and Culture, 2*(2). https://doi.org/10.9707/2307-0919.1173

Tichnor-Wagner, A., Parkhouse, H., Glazier, J., & Cain, J. M. (2019). *Becoming a globally competent teacher*. Ascd

UNESCO, (2022). *Beyond the boundaries. New ways of reinventing higher education*. Working paper for the World Conference on Higher Education. 18-20 May 2022.

van Werven, I. M., Coelen, R. J., Jansen, E. P., & Hofman, W. H. A. (2023). Global teaching competencies in primary education. Compare: *A Journal of Comparative and International Education, 53*(1), 37-54. https://doi.org/10.1080/03057925.2020.1869520

Xia, Y., and Yang, Y. (2019). RMSEA, CFI, and TLI in structural equation modeling with ordered categorical data: The story they tell depends on the estimation methods. *Behavior Research Methods, 51*(1) 409-428. https://doi.org/10.3758/s13428-018-1055-2

Yu, C., and Muthen, B. (2002). *Evaluation Cutoff Criteria of Model Fit Indices for Latent Variable Models with Binary and Continuous Outcomes.* (Doctoral dissertation). https://www.statmodel.com/download/Yudissertation.pdf

Zlobina, A. (2004). The value theory of S. Schwartz. In I. Fernández, S. Ubillos, D. Páez and E.M. Zubieta (Coord.), *Psicología social, cultura y educación* (pp. 73-88). Pearson Educación.

Date received: 5 April, 2023.
Review date: 5 June, 2023.
Acceptance date: 20 December, 2023.