






Regular Article

Validation of a self-assessment survey on knowledge and perceptions of LGBTIQ+ student inclusion in education degree programs

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ABSTRACT

Introduction: the aim of this paper is to present the findings of the validation process of the *Self-Assessment Questionnaire on University Students' Knowledge and Perceptions Regarding the Inclusion of LGBTIQ + Students*. **Method:** this was an instrumental study. The reference population comprised students on bachelors', masters' and MEd degrees in Spanish education faculties. The pilot sample consisted of 334 people. For validation, *construct validity* was tested firstly with an exploratory factor analysis (EFA) and subsequently with a confirmatory factor analysis (CFA). Cronbach's Alpha was used to establish reliability. **Findings:** the EFA yielded three major factors for the *Knowledge Scale* and four for the *Perceptions Scale*, verifying their correspondence with the conceptual structure of the questionnaire. The CFA indicated a good fit for the model, with acceptable incremental fit measures (TLI, ILI, CFI: .90) and RMSEA and SRMR residuals (.06). Likewise, the parsimony indices were high (above .07). Reliability was found to be excellent (with values above .90) for all the scales studied. **Conclusion:** the *Self-Assessment Questionnaire*, in the light of the validation process carried out, constitutes a robust, reliable and valid instrument for determining education students' knowledge and perceptions of LGBTIQ + diversity and its inclusion in their academic-professional profiles.

1. Introduction

UNESCO (2016b, 2017), amongst the Sustainable Development Goals (SDGs) set in its 2030 Agenda, includes the aspiration to “achieve gender equality” in the fifth SDG, while the 4th aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (see Tables 3-5).

Assuming a gender perspective in education entails correcting all types of inequality by favouring access to and use of resources that facilitate equality between women, men and no-binary people, promoting the values of equality and respect, and empowering women and no-binary people to participate equally in all areas. Thus, if education is to be inclusive and universally accessible, then logically it should take concrete steps towards ensuring equity in attention to gender and sexual diversity (GSD), which has hitherto been invisibilized and discriminated against (Toro-Alfonso, 2012). Similarly, in the face of gender-based violence, teachers should be more aware of the dynamics taking place

in their classrooms, in addition to their own prejudices and behaviours, in order to combat violence (UNESCO-ONU Mujeres, 2019).

Attention to GSD has emerged in recent years as a pressing need, not only in social but also in educational contexts, and especially for those groups that have had to face situations of vulnerability derived from their gender identity or sexual orientation. In this regard we can highlight situations stemming from LGBTIQ + phobia, bullying, and exclusion due to discrimination (INJUVE/CIS, 2011; Pichardo et al., 2015; UNESCO, 2016a). This problem has been identified as one of social justice and law (Arrubia, 2018; Rojas et al., 2019), in terms of the recognition of GSD in equality and equity with all citizens.

A study by García-Cano et al. (2018) investigated the situation regarding attention to affective and sexual diversity¹ in Spanish universities. Although the authors note that progress towards eradicating discrimination has been made in Spanish legislation (University Student Statute - Royal Decree 1791/2010; Organic Law March 2020 on education; Law August 2017 guaranteeing the rights, equal treatment and

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¹ The authors suggest an alternative practice “that stimulates, encourages and promotes thinking and talking about affective-sexual diversity and LGBTI + gender identities in the university environment beyond universalising discourses” (García et al., 2018, p. 23).

Table 1
Questionnaire dimensions and variables.

DIMENSIONS	VARIABLES/measures	Item	
Demographic variables	Age	4	
	Religion	13	
	Political orientation	14	
	Family situation and accommodation	6	
	Occupational status	7	
Educational variables	University	1	
	Degree	2	
	Year	3	
	Pre-university education	15	
Gender and sexual diversity	Gender	5	
	Sexual orientation	12	
	knowledge of LGBTIQ + people	16	
	GSD – study program	8	
	GSD – subjects	9	
	GSD – professional usefulness	10	
	GSD – barriers in the curriculum	11	
KNOWLEDGE	Meaning of the acronym LGBTIQ+	II. 1 to	
	Queer theory	II.20	
	Heteronormativity		
	LGBTIQ + phobia		
	Cissexism		
	Heterosexism		
	Cisgender		
	Bi-gender		
	Fluid gender		
	Intergender		
	Transgender		
	Transsexuality		
	Androcentrism		
	Asexuality		
	Demisexuality		
	Pansexuality		
	Gender dysphoria		
	LGtBIQ + people's identity		
	Differences between gender identity and sexual orientation		
	PERCEPTIONS	Differences affective development-sexual orientation-gender identity	III.1 to III.20
		Equal rights-sexual orientation-gender identity	
		Differences in teacher treatment based on sexual orientation-gender identity	
		Relationship with sexual orientation	
Use of language			
Sharing LGBTIQ + spaces			
LGBTIQ + friendships			
LGBTIQ + physical contact			
LGBTIQ + acceptance			
LGBTIQ + relationships			
Knowledge-LGBTIQ + phobia			
Peers- LGBTIQ + phobic conflict			
GSD-Attention study programs			
Faculty-training GSD			

Table 2
Sample appropriacy test results.

KMO and Bartlett tests	Knowledge	Perceptions
Kaiser-Meyer-Olkin measure sample suitability	.927	.870
Bartlett sphericity test	Approx. Chi-squared gl	3100.834 190
	Sig.	.000 .000

Table 3
Total variance explained by factors: GSD Knowledge Scale.

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	8.535	42.675	42.675	8.025	40.125	40.125
2	1.537	7.686	50.361	1.056	5.281	45.406
3	1.174	5.869	56.230	.639	3.197	48.604

non-discrimination of LGBTI people in Andalusia) and in other initiatives, both national and regional, the truth is that there are few studies on discrimination in universities. In this context, important work on homophobia in university classrooms has been done by Penna (2015), identifying both gaps in curricula and a lack of training amongst university faculty on affective and sexual diversity. Also, we should note, in line with García-Cano et al. (2018), not only the need for the development of curricular content related to affective and sexual diversity, but also the importance of the institutionally recognized education professional's role in terms of the visibility, awareness and recognition of the inclusive perspective; a role that faculty should internalize with the aim of addressing these issues (Ward & Gale, 2016).

The literature on the LGBTIQ+ (lesbian, gay, bisexual, trans, intersex and queer) community reviewed by Pérez-Jorge et al. (2020) included very few studies of teacher education specifically addressing these issues. These authors advocate adequate and appropriate training for teachers to ensure respect for the LGBTIQ + community, to provide a suitable educational approach to it, and to promote peaceful coexistence among students, regardless of sexual orientation or gender identity. In this regard, cisheteronormativity (Allen, 2018; Sánchez Sáinz, 2019) is evident in the non-recognition of gender and sexual diversity, manifesting itself, for example, in an absence of curricular content and study programs incorporating LGBTIQ + issues and situations.

Liscano and y Jurado (2016) also report a series of studies from the field of higher education, mainly focused on LGBTIQ + phobic bullying, equality policy, homogenizing discourses on gender and self-determination, family values, non-discriminatory educational climates, acceptance, equality and prejudice. They remark that, in general, teachers recognize the importance of accepting and working on

Table 4
Configuration matrix ML oblique rotation: GSD Knowledge Scale.

Items	Factor		
	1	2	3
10. Concept of intergender	.805		
15. Concept of demisexuality	.716		
13. Concept of androcentrism	.610		
9. Concept of fluid gender	.591		
16. Concept of pansexuality	.513		
17. Concept of gender dysphoria	.476		
5. Concept of cissexism	.448		-.405
8. Concept of bi-gender	.345	.302	
19. Identity of LGBTIQ + people	.328		
12. Concept of transsexuality		.701	
11. Concept of transgender		.683	
14. Concept of asexuality		.618	
20. Difference between gender identity and sexual orientation		.408	-.396
18. Concept of sexual diversity		.313	
3. Concept of heteronormativity			-.821
4. Concept of LGBTIQ + phobia			-.523
7. Concept of cisgender		.338	-.506
2. Queer theory		.419	-.499
1. Meaning of LGBTIQ + acronym			-.426
6. Concept of heterosexism			-.395

Note: In the case of the GSD Knowledge Scale, as the table above shows, three factors were extracted, explaining a total variance of 56.23 %. The extracted factors, in line with the prior conceptual structure, were titled: Factor 1: Gender Identity; Factor 2: Sexual Orientation; Factor 3: Discrimination.

Table 5
Total variance explained by factors: GSD Perceptions Scale.

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	7.646	38.229	38.229	1.830	9.148	9.148
2	2.248	11.242	49.471	6.410	32.050	41.199
3	1.559	7.795	57.266	2.134	10.670	51.869
4	1.294	6.472	63.737	1.318	6.588	58.457
5	1.078	5.388	69.126	.885	4.427	62.884
6	1.041	5.205	74.330	.698	3.491	66.376

difference and discrimination in their classrooms, while at the same indicating that they do not feel competent to achieve this.

Given the diversity of concepts in this area of theory, we use the acronym LGBTIQ + to refer to people who represent a broad set of realities that break with hegemonic/heteronormative norms of gender and sex. We are aware that this does not make all desires and identities visible, but we believe that any other formula would be practically unintelligible and would not ensure that all possible orientations were covered. For this reason we have added a plus sign to the acronym; i.e., to reflect all the sexual orientations (including asexuality) and identities that are not clearly cis. Likewise, given the diversity of existing concepts and terms referring to attention to the LGBTIQ + community in the educational field, here we have opted for the concept of GSD because we understand that it encompasses issues relating to the specific diversity of people centred on sexual characteristics, sexual orientation and gender identity.

Universities, like other public sector organizations, have the legal responsibility to be proactive in promoting equity, equality and social justice, key concepts that guide processes of socio-educational inclusion. The universities, as arenas for professional education, bear an even greater responsibility, especially in terms of training education professionals who will work at all levels of the education system in the future (Acosta-Leal et al., 2020).

It is in this context, then, that the training of teachers and other education professionals should take student diversity, and specifically in our case, gender and sexual diversity, into account (Staley & Leonardi, 2021). This should appear clearly in the curricula that prepare students for the different professional roles in the sphere of education, ensuring the inclusion of contents and competencies that promote diversity as a measure of equity and social justice in educational institutions (Miralles-Cardona, Cardona-Molto, & y Chiner, 2020).

Future teachers' practices will depend on their assumption of a specific professional identity, way of thinking and set of social representations that act as mediators of the purposes of educational actions. These identities may potentially imply the perpetuation of a status quo dominated by oppressive norms in relationships within schools (Kumashiro, 2004), and may generate fear and anxiety in educators due to lack of knowledge (Bochicchio et al., 2019).

In training for teachers and other education professionals, attention to GSD is approached via what students already know or by incorporating new knowledge. A study conducted by Baker et al. (2018) shows that trainee teachers can learn to build genuine relationships that do not conform to gender stereotypes, moving away from preconceived binary notions of gender and recognizing that their professional identity impacts interactions with their students and therefore their learning, and that while advocating attention to diversity, teachers may maintain their privileges as such.

Furthermore, it should be remembered, following Hwang and Evans (2011), that among teachers there is still a gap between theory and practice, between thought and action, between attitudes and the willingness to accept the commitment to inclusive practices (Fernández Rotaecche et al., 2021). Bracho and Hayes (2020) define the development of professional identity as the acquisition of multitude of skills and forms of knowledge that are learned in becoming an experienced teacher. In

this sense, since teaching roles and identities are dynamic, it is important to bear in mind the competencies that teachers have for addressing GSD in educational interactions, specifically general and cross-curricular competencies such as attention to and respect for diversity.

It should also be noted that education professionals' codes of conduct require them to respect diversity in their practice; and that this also features in the legislation, for example Organic Law 3, December 29th 2020, which on five occasions explicitly refers to the need to make visible and address the needs of LGBTIQ + students. This means, then, recognizing the potential implicit in the tension between marginalization and inclusion, and opting for the latter.

In what appears to be reactive regulation, focusing on action to safeguard the rights and duties of all citizens, we find limitations when it comes to incorporating mechanisms for pre- and in-service teacher education. Therefore, we would ask whether there is sufficient information and instruction available in university education students' training to enable them to address issues arising from affective and sexual diversity, providing them with the skills they need to tackle these issues appropriately and thereby to safeguard individuals' rights.

In this study, then, we center on the construction of part of an information-gathering instrument designed to investigate this area, focusing on education students' knowledge and perceptions in the sphere of attention to GSD.

2. Method

The design and validation of the *Self-Assessment Questionnaire on Education Students' Knowledge of the Inclusion of LGBTIQ + Students* formed part of the development of an information-gathering instrument for a broader piece of research, a cross-sectional explanatory study with a mixed methods approach. The purpose of this study was to ascertain education students' and teachers' levels of information and training for addressing issues of attention to affective and sexual diversity, providing them with the competencies they need for appropriate approaches in pre- and in-service teacher education and in professional practice. Specifically, the questionnaire endeavoured to respond, in part, to one of the specific objectives of the study: to determine education students' knowledge and perceptions regarding attention to gender and sexual diversity and their inclusion in the academic-professional teaching role.

2.1. Participants

The reference population were students in their last two years of bachelors' and masters' degrees in the education faculties of Spanish public universities. The sampling system for the pilot questionnaire was non-probabilistic by convenience (accessibility-volunteers).

The initial sample for piloting the instrument was 334 people. In terms of gender, the sample paralleled the target student population as a whole, with 69.56 % females, 30.14 % males and .3 % non-binary. Participants' average age was 23.82 years, and all were education students in the last two years of their courses: 61.1 % bachelors' degrees and 38.9 % masters'. Of these, 39.2 % stated that they had a paid job, with an average of 20.50 working hours. Most lived with their parents

Table 6
Configuration matrix ML oblique rotation: GSD Perceptions Scale.

	Factor					
	1	2	3	4	5	6
11. I would feel comfortable if I found out that my best friend was LGBTIQ+	.842					
12. I feel comfortable with physical contact with LGBTIQ + people	.834					
14. I relate to LGBTIQ + people easily	.785					
10. I feel comfortable sharing spaces with LGBTIQ + people	.740					
13. I show acceptance of LGBTIQ + people	.662					
7. I relate easily to people regardless of their sexual orientation	.535					
19. Sexual-generic diversity should receive attention in study programs		.778				
16. I talk about LGBTIQ + topics naturally		.617				
15. I talk about LGBTIQ + phobia naturally		.612				
20. Teachers should have training in gender and sexual diversity		.562				
17. Knowledge about LGBTIQ + people reduces LGBTIQ + phobia		.560				
18. My friends are receptive in cases of conflicts caused by LGBTIQ + phobia		.357				
6. In my view there should be differences in the way teachers treat people for reasons of gender identity			.968			
5. In my view there should be differences in the way teachers treat people for reasons of sexual orientation			.831			
8. The language used by teachers should be free of stereotypes regarding sexual orientation and gender identity				-.929		
9. The language used by students should be free of stereotypes regarding sexual orientation and gender identity				-.819		
1. In my view there are differences in affective development according to sexual orientation					.998	
2. In my view there are differences in affective development according to gender identity					.846	
3. In my view there should be equality of rights regardless of sexual orientation						-.898
4. In my view there should be equality of rights regardless of gender identity						-.616

Note: The titles of the six factors extracted were: Factor 1: Relationships; Factor 2: Way of Acting; Factor 3: Dealing with teachers; Factor 4: Teacher Language; Factor 5: Development; Factor 6: Equal Rights.

(55.6 %), while others lived with friends (22.8 %), with a partner (7.9 %), alone (7 %) or in other situations (6.7 %). Their overall self-assessment of the adequacy of their training for addressing issues of LGBTIQ + inclusion was 3.35 (on a scale of 1 – none – to 5 – high).

Table 7
EFA statistical measures: GSD Knowledge Scale.

Measure	Acronym	Criterion of fit	KNOWLEDGE	
			Initial	Final
Reason for X2	PCMIN/DF	≤ 2 adequate ≤ 3 acceptable ≤ 5 reasonable	5.7	5.0
Comparative fit index	IFI	1 perfect	.91	.93
	TLI	≥ .95 excellent	.89	.91
	CFI	≥ .9 acceptable	.91	.93
Parsimony indices	PRATIO	≥ .7 adequate (close to 1)	.83	.76
	PNFI		.74	.70
	PCFI		.75	.70
Squared residuals approximation mean	RMSEA	≤ .05 adequate	.07	.06
	LO90	≤ .08 acceptable	.06	.06
	HI90		.07	.07
Standardized index of squared residuals means	SRMR	≤ .05 adequate ≤ .1 acceptable	.05	.04

2.2. Instrument

The *Self-Assessment Questionnaire on Knowledge and Perceptions regarding the Inclusion of LGBTIQ + Students* is divided into two main dimensions: education students' level of *knowledge* (20 items); and their *perceptions* (20 items). It also features twelve additional items on demographic and educational variables and four further open-ended questions. In constructing the questionnaire, the general foundations discussed above were taken as a basis, in addition to a number of other studies and specific instruments dealing with the dimensions, variables and indicators involved (Table 1), all of which enabled us to specify our information needs. In the area of knowledge these were: *Questionnaire for Primary School Pre-Service English-Language Teachers on Sexual Identity Issues*, Barozzi, 2016; *Self-Efficacy Scale on Working with and for LGBTQ Students*, Brant, 2017; *Core Self-Evaluations Scale*, Carroll, 2019; *Affective and Sexual Diversity in Teacher Education Questionnaire*, Gallardo & Escolano, 2009; *Education in Sex and Gender Diversity among Primary-School Teachers*, Sánchez Torrejón, 2021; *Questionnaire on Knowledge and Attitudes Regarding Sex and Gender Diversity*, Verdejo-Muñoz, 2020; and in the area of perceptions: *Trainee Teacher Approaches to Gender Diversity*, Boichichio et al., 2019; *Core Self-Evaluations Scale*, Carroll, 2019; *Social Distance towards Trans People Scale (SD-T)*, Esteban et al., 2020; *University Inclusion Perceptions Scale (UIPS)*, Fiuza-Asorey, Losada-Puente, Sierra Martínez, & Baña, 2023; *Social Representations and Cultural Practices towards the LGBTI Population*, Liscano, 2016; *Evaluation Scale Sensitive to Gender Equality Training (ESSGET)*, Miralles-Cardona et al., 2020; *Attitudes toward Sexual and Gender Diversity Rights*, Morales et al., 2020; *Questionnaire on Teacher Training in Affective and Sexual Diversity*, Penna, 2012; *Questionnaire on Attitudes to the LGBTQ + Community (QA-LGBTQ+)*, Pérez-Jorge, 2020; *Attention to Diversity Beliefs, Attitudes and Practices among University Teachers Scale*, Ramos Santana et al., 2021; *Questionnaire on Prejudices towards Homosexual People*, Robles, 2014; *Survey of Young University Students' Attitudes towards Sexual Diversity and Gender Identity*, Vaquero, 2021 (see Table 2).

2.3. Procedure

In order to validate the questionnaire, construct validity and reliability analyses were carried out. Here we refer to the representativeness of the set of items in relation to the factors that we set out to measure. Construct validity was tested in two stages: firstly, an exploratory factor analysis (EFA) and secondly a confirmatory factor analysis (CFA) (Ferrando & y Lorenzo-Seva, 2014; Ferrando et al., 2022; Lloret-Segura et al., 2014).

It should also be noted that the *validity of the content* had previously been carried out by *expert judgement* under the criteria of *unambiguity, relevance and importance* of each of the items. This was done with 10 national and international experts with an expertise coefficient on the

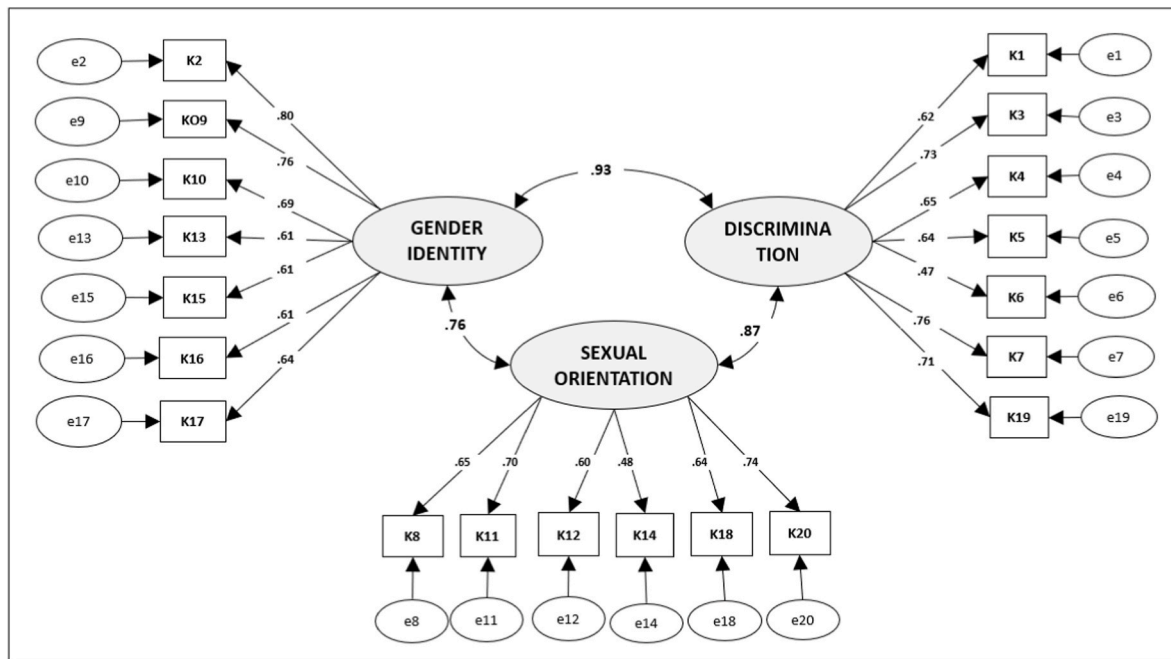


Fig. 1. Structural measurement model: GSD Knowledge Scale.

Table 8
EFA statistical indices: GSD Perceptions Scale.

Measure	Acronym	Criterion of fit	PERCEPTIONS	
			Initial	Final
Reason for X2	PCMIN/DF	≤ 2 adequate ≤ 3 acceptable ≤ 5 reasonable	6.9	2.7
Comparative fit index	IFI	1 perfect	.89	.97
	TLI	≥ .95 excellent	.87	.96
	CFI	≥ .9 acceptable	.89	.97
Parsimony indices	PRATIO	≥ .7 adequate	.82	.70
	PNFI	(close to 1)	.71	.70
	PCFI		.73	.70
Squared residuals approximation mean	RMSEA	≤ .05 adequate	.09	.05
	LO90	≤ .08 acceptable	.09	.04
	HI90		.10	.06
Standardized index of squared residuals means	SRMR	≤ .05 adequate ≤ .1 acceptable	.10	.05

subject of .91. The results of this validation are taken into account when carrying out the confirmatory factor analysis.

To test the reliability of the questionnaire scale Cronbach's Alpha was used.

The data analysis was performed with FACTOR using IBM SSPS Statistics 29 and IBM SPSS Amos 29 software, with the corresponding factor analyses and reliability tests.

3. Results

3.1. Exploratory factor analysis (EFA)

First, an Exploratory Factor Analysis (EFA) was performed in accordance with the characteristics of the situation (type of data, sample size, univariate statistics, linear model) with the *maximum likelihood* extraction method and *oblique rotation* procedure (Ferrando et al., 2022; Lloret-Segura et al., 2014).

Kaiser-Meyer-Olkin statistical tests were applied previously to verify the appropriacy of the sampling (KMO >.75; good). Bartlett's sphericity

test was used to check whether there were common factors in order to perform a factor analysis, $X^2 = (p < .000; \text{valid})$. The resulting values indicated that the data were suitable for factor analysis.

For the extraction of factors we assumed that the factor solution explained at least 50 % of the total variability (Tabachnick & Fidell, 2001), taking into account the additional rotated matrix noted above.

In the case of the GSD Perceptions Scale, as the following table shows, six factors were extracted, explaining a total variance of 74.33 %.

3.2. Confirmatory factor analysis (CFA)

After the EFA, a confirmatory factor analysis was conducted to validate the structure of the theoretical dimensions measured by the questionnaire scales, and to verify their correspondence with the factors extracted by the EFA, estimating a measurement model composed of observed variables (items) and latent factors (dimensions) (Ferrando y Lorenzo-Seva, 2014).

In order to perform this analysis, there had to be no missing cases in any of the items; hence all those cases where there were any losses were eliminated, obtaining a final sample result of $n = 990$ students.

The CFA of the GSD Knowledge Scale corroborated the factor structure yielded by the EFA and, in turn, was in accordance with the conceptual structure of the scale mentioned above (see Table 6).

Table 7 presents the comparative data of the initial and final fit models. As can be seen, the PCMIN/DF indicated an acceptable and reasonable goodness of fit; also the incremental fit indices (IFI, TLI, CFI) were acceptable, at above .90. With respect to the residuals, an adequate overall RMSA was obtained with a value of .06, and the SRMR, with a value of .04, was also adequate. Likewise, the parsimony indices were higher than .7 (PRATIO of .76, PNFI and PCFI of .70), thus being considered adequate.

Fig. 1 presents the structural model that confirmed the factor structure of the instrument, showing that both the regression weights or factor loadings of the items and the factors extracted were all above .6, except in some cases that were close to .5, and were thus in accordance with the theoretical structure.

With regard to the Perceptions Scale, the CFA also corroborated the factor structure yielded by the EFA and, in turn, was in accordance with the conceptual structure discussed above.

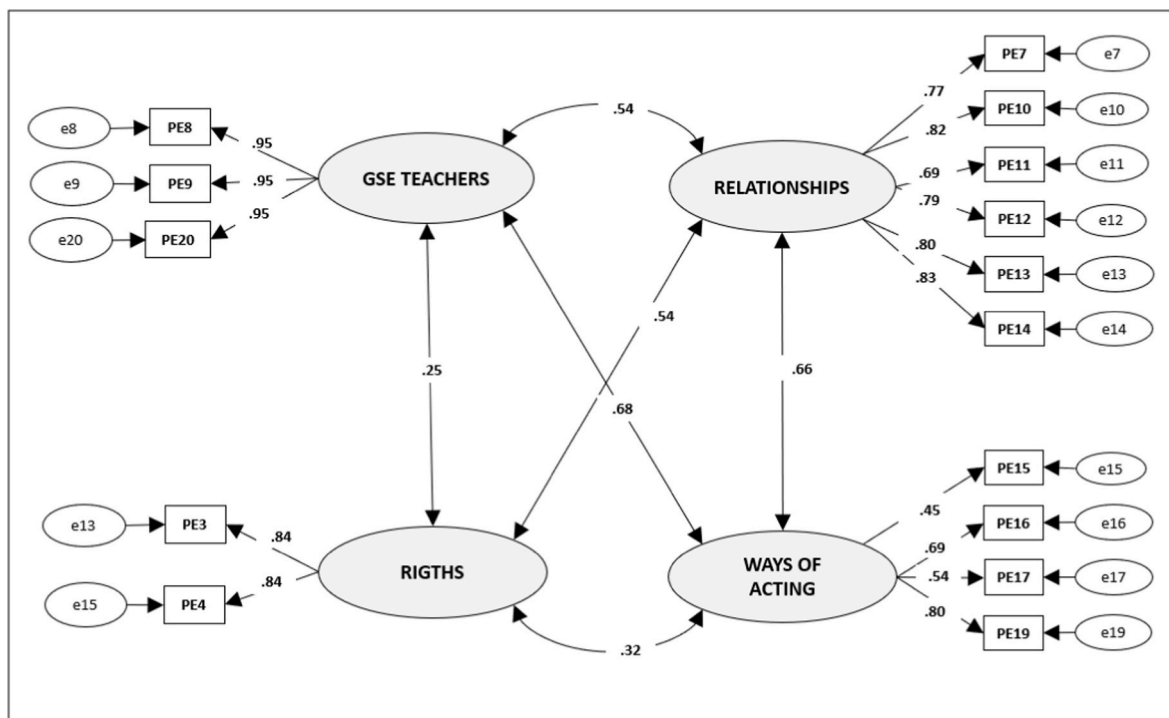


Fig. 2. Structural measurement model: GSD Perceptions Scale.

Table 9
Reliability analysis statistics.

Scales	N of elements	Cronbach's Alpha
GSD Knowledge Scale	20	.926
GSD Perceptions Scale	20	.864

In order to perform this analysis, there had to be no missing cases in any of the items; hence all cases where there were any losses were eliminated, obtaining a final result of a new sample of n = 624.

Table 8 shows the comparative data of the initial and final fit models. As can be seen, the PCMIN/DF indicated an acceptable goodness of fit; also the incremental fit indices (IFI, TLI, CFI) were excellent, at around .95. With respect to the residuals, an acceptable overall RMSA was obtained, with a value of .06; and the SRMR, with a value of .05, was also adequate. Likewise, the parsimony indices were all above .07, (PRATIO at .70, PNFI at .70 and PCFI at .71), and were thus considered adequate.

Fig. 2 shows the structural model that confirmed the factor structure of the instrument after eliminating four items, demonstrating that both the regression weights or factor loadings of the items and the factors extracted were all above .5 (except in two approximate cases), and thus in accordance with the theoretical structure.

3.3. Reliability

With regard to reliability, the table below shows the results obtained from the statistical analysis. The questionnaire's level of internal consistency was found to be very high (above .86) according to the Alpha coefficient obtained. From this, it followed that we could classify the reliability of the Knowledge and Perceptions Scales as excellent and good, respectively (α values > .70, acceptable; α values > .80 good; and α values > .9 excellent; Cortina, 1998; Nunnally & Bernstein, 1994).

In addition, high internal consistency was found, with strong homogeneity in the scores of each of the items. For this reason, we maintained the same items after the revision carried out in the prior validation of the questionnaire by expert judgment (ten experts).

4. Discussion and conclusions

In addition to the general foundation discussed above, the design of the *Self-Assessment Questionnaire on Knowledge and Perceptions Regarding the Inclusion of LGBTIQ + Students* was based on other specific studies and instruments relating to the relevant dimensions, variables and measures, namely: *knowledge* (Barrozzi, 2016; Brant, 2017; Carroll, 2019; Gallardo & Escolano, 2009; Sánchez Torrejón, 2021; Verdejo-Muñoz, 2020) and *perceptions* (Bochicchio et al., 2019; Brant, 2017; Carroll, 2019; Esteban et al., 2020; Fiuza-Asorey et al., 2023; Jones et al., 2021; Liscano, 2016; Mena Ramos & García Sanz, 2017; Miralles-Cardona et al., 2020; Morales-Rodríguez, Rodríguez-Clares, & García-Muñoz, 2020; Penna, 2012; Pérez-Jorge, 2020; Ramos Santana et al., 2021; Robles, 2014; Vaquero, 2021).

This frame of reference made it possible to structure the self-assessment questionnaire according to the different dimensions and measures mentioned previously (Table 1), and, consequently, to articulate the two scales (GSD Knowledge and GSD Perceptions), providing them with internal coherence through their theoretical conceptualization.

The construct validity, established using the exploratory factor analysis (EFA) with Varimax rotation, grouped together the items that correlated strongly with each other, yielding three factors in the Knowledge Scale (Gender Identity, Discrimination and Sexual Orientation) and four factors in the Perceptions Scale (Relationship, Performance, GSD Teachers, Development and Rights). Thus we can affirm that the extracted components explained all the variables contained in the study.

Furthermore, the confirmatory factor analysis (CFA) corroborated the factor structure yielded by the EFA. This is evidenced by the model shown in Figs. 1 and 2, as well as by the data in Tables 9 and 10, where the comparative data of the initial and final model are presented, concluding that satisfactory levels of final fit were obtained (Byrne, 2016). In fact, the PCMIN/DF had already indicated a reasonable goodness of fit (Kline, 2016). The incremental fit indices (IFI, TLI and CFI) were acceptable at above .90 (Byrne, 2016; Whittaker, 2012) in Knowledge, and excellent at around .95 in Perceptions. Regarding

Table 10
Results for scale reliability.

ITEMS	Scale mean element eliminated	Variance element eliminated	Total correlation elements	Cronbach's Alpha element eliminated
KNOWLEDGE				
C1.	64.43	254.976	.585	.923
C2.	66.23	243.637	.677	.921
C3.	65.04	242.516	.680	.921
C4.	64.97	246.084	.629	.922
C5.	66.35	244.255	.643	.922
C6.	65.53	248.618	.496	.925
C7.	65.21	237.523	.717	.920
C8.	65.13	248.454	.586	.923
C9.	65.35	241.741	.681	.921
C10.	66.23	243.550	.657	.921
C11.	64.44	252.463	.604	.923
C12.	64.20	260.234	.530	.925
C13.	66.22	243.557	.580	.923
C14.	64.15	263.882	.396	.926
C15.	66.47	245.158	.576	.923
C16.	65.36	245.151	.560	.924
C17.	65.53	243.310	.579	.923
C18.	64.59	251.119	.608	.923
C19.	64.90	247.205	.675	.921
C20.	64.37	252.959	.608	.923
PERCEPTION				
PA1.	77.95	87.449	.206	.872
PA2.	77.94	87.554	.199	.873
PA3.	76.14	90.718	.372	.862
PA4.	76.20	89.131	.410	.860
PA5.	79.72	94.131	.048	.875
PA6.	79.77	94.282	-.053	.873
PA7.	76.38	85.583	.562	.855
PA8.	76.47	83.669	.583	.854
PA9.	76.47	84.098	.603	.853
PA10.	76.33	84.203	.652	.852
PA11.	76.35	84.584	.581	.854
PA12.	76.40	83.304	.695	.850
PA13.	76.30	84.684	.705	.852
PA14.	76.32	84.124	.733	.851
PA15.	76.94	80.772	.539	.855
PA16.	76.67	80.366	.706	.848
PA17.	76.83	82.743	.502	.857
PA18.	77.20	84.929	.429	.859
PA19.	76.81	80.604	.609	.852
PA20.	76.50	82.878	.661	.851

residuals, values below .08 were obtained (Kline, 2016; Whittaker, 2016), with an overall acceptable RMSEA with values below .06; and the SRMR was also acceptable with values below .05. Likewise, the parsimony indices were high (PRATIO, PNFI and PCFI) at around .8 and close to 1 (Ho, 2006).

The strong appropriacy of the theoretical model to the definition made by the CFA around the structural equations model (Fernández-Cruz et al., 2018) is therefore clear. In fact, as indicated previously, the dimensions and profiles established were closely adjusted to the theoretical model. Hence, based on these theoretical references, we can affirm the consistency and robustness of the factors that configure the initial structure of items, dimensions and scales making up The Self-Assessment Scales.

With respect to reliability, with values above .93 and .86 respectively, we can classify it as excellent (Cortina, 1998; Nunnally & Bernstein, 1994; Kline, 1999).

In summary, the self-assessment scales evaluated, in the light of the design and validation process carried out, constitute a robust, reliable and valid instrument for the assessment of knowledge and perceptions regarding attention to GSD among university education students, while also representing an important contribution from the theoretical point of view.

4.1. Limitations and future prospects

The study was conducted in five universities, while not affecting the overall conclusions of our research, it constrains the generalizability of the results to other contexts. Future research should validate it in various higher education institutions and degree programmes. The measurement model developed is based on self-reported data from students, which may be subject to social desirability biases or variations in individual interpretations of the scale items. The study is complemented by qualitative analyses using mixed methodological approaches to provide a richer understanding of attention to GSD.

Finally, it is also worth noting some further implications, particularly related to the use and application of the Self-Assessment Questionnaire and the scales that make it up. Thus, it satisfies the objective of gathering sufficient information from university education students, in this case on the practical GSD context of their training and, at the same time, of ascertaining the knowledge and perceptions they have for addressing issues arising from attention to GSD, providing them with the search for competencies they need for appropriate approaches in their training, development and professional performance. This will give rise, with good judgement and common sense, to proposals for training actions stemming from individual initiative in addition to those proposed by the higher education institutions themselves.

All of this will result in the increased visibility of gender and sexual diversity as a mechanism for strengthening equity in the exercise of rights, in guiding processes for the improvement of training plans and programmes in education sciences faculties in relation to attention to gender and sexual diversity. Also to the recognition of the preventive-social facilitating role of the faculties themselves, as centres for the training of education professionals, in favour of educational improvement in the face of diversity in general and GSDs in particular, and finally, to the deepening of the training provided to students of different degrees and specialities and to social and institutional change in the university in favour of equity, equality and social justice.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

Declaration of the use of AI assisted technologies

During the preparation of this work the author(s) didn't used AI assisted technologies.

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Ethics statement

The work involved human participants. We confirm that the research adhered to the Declaration of Helsinki and that informed consent was obtained from all participants.

CRedit authorship contribution statement

José Tejada-Ferández: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Methodology,

Investigation, Formal analysis, Data curation, Conceptualization. **Pedro Jurado-de-los-Santos**: Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Antoni Navío Gámez**: Writing – review & editing, Validation, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Robert G. Valls-Figuera**: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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