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# Teachers' and hearing and speech specialists' attitudes towards and knowledge of sustainable inclusive education for students using hearing devices

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## ABSTRACT

This study analysed the teachers and hearing and speech specialists' (HSSs) attitudes towards and knowledge of sustainable inclusive education for children with hearing loss in the Canary Islands. The study sample comprised 297 teachers and HSSs. The authors designed the Inclusion Questionnaire (InQ). It was found that teachers and HSSs' attitudes and knowledge centred on seven attitudes: sustainable professional development, self-efficacy in teaching competencies, inclusive leadership, assistive electronic technology, challenges around family involvement, embedding and sustaining reflexive practice, and technological usability and universal accessibility. The alpha coefficient for the total InQ was .841. These InQ factors have been developed with reliability and logical validity. There were differences in items under three factors among female and male teachers and HSSs. Teachers and HSSs also showed differences in the variables of age, work experience, and professional experience with students using hearing devices. Recommendations for inclusive values and sustainable educational change are suggested.

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## KEYWORDS

Teachers; hearing and speech specialists; attitudes; inclusive education; children using hearing devices

## Introduction

Goal 4 of the United Nations Sustainable Development Goals aims to 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' (United Nations 2018, 6). Accordingly, refocused efforts in the professional development of teachers and school learning resources are seeking to improve the quality of education and to provide more sustainable inclusive education (SIE) programmes. *Sustainable development* is associated with the dream of quality education aimed at increasing pupils' knowledge and understanding of key concepts such as diversity and connectedness (Redman, Wiek, and Redman 2018). By advocating that students with hearing loss should study in inclusive schools and benefit from their socialisation processes, SIE ensures that all children with auditory difficulties enjoy the basic right to equitable quality education. SIE also advocates in favour of anti-segregation equality through

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peacebuilding and sustainable development. In line with the United Nations' (2018) declaration, researchers have conceptually meta-analysed the SIE affecting teachers' attitudes and professional development, students' values, and practice skills for sustainability (Van Mieghem et al. 2018).

### *Literature review*

#### *Attitudes towards and knowledge of SIE: the case of teachers and hearing and speech specialists (HSSs)*

In the initial teacher training in many countries (e.g. China, Germany, Italy, etc.), SIE includes specific educational programmes that rigorously address the detection, discrimination, identification, and comprehension of pupils with special education needs (SEN) in schools. Professional competency is an ongoing process of learning that strives to guarantee the acquisition and interpretation of information, and competent performance adjusted to needs, deliberative processes, and assessment. The most valuable source of knowledge for teachers and HSSs is self-reflection on the scope of their own competencies. A teacher's professional competencies include class management and knowledge of students and learning styles; such competencies are seen as a key predictor of effective inclusion (Deng et al. 2017). The study of teacher-related factors (e.g. sentiments, attitudes, concerns, and perceived self-efficacy) is important for the successful implementation of inclusion (Miesera et al. 2019). Furthermore, a higher self-efficacy in regard to collaborating with parents and other school-based team members is the only predictor associated with more positive attitudes and with fewer concerns about inclusive education for students with SEN (Montgomery and Mirenda 2014).

The study of pre-service teachers' attitudes towards students' inclusion and equity symbolises a substantial shift from a preoccupation with behaviour to a concern with what pre-service teachers know, and how their knowledge and values affect their willingness and ability to implement an inclusive approach towards creating classroom experiences, especially for students with disabilities (Walton and Rusznyak 2020). Furthermore, pre-service teachers must be aware of all categories of disability. This expertise reflects the ability of pre-service teachers to systematically clarify what works with students and to identify the learning styles and behaviours of individual students (Woolf 2019).

The problematic working conditions of HSSs were examined by Billingsley et al. (2020) and Saloviita (2020), who worked to further the research agenda that supports special educators' work environment. The content knowledge and the skillset necessary for working with children using hearing devices depends on contextual factors such as the educational placement and the mode of communication used (Veyvoda, Kretschmer, and Wang 2019). According to the empirical research reviewed by these authors, HSSs working in public schools lack the specific knowledge and experience they need for sufficient hearing restitution and language treatment of children using hearing devices.

#### *Empowering inclusive leadership in schools*

Current scholars and researchers have rejected models of competency-based teacher education (Zierer 2015), because such programmes reduce the teachers' role to that of a technician, as opposed to those of major social actors, professionally autonomous decision

makers, and empowered leaders. Many teachers and HSSs are deeply affected by the context in which they work. Teacher professionalisation and inclusive leadership have both shared new curriculum that increase the standards for certain content, leading the need for teachers to work collaboratively with HSSs to assure that the needs of students with hearing loss are met (e.g. through co-teaching, collaboration) (Billingsley et al. 2020). Thus, inclusive leadership is understood as a domain that helps plan and meet individual needs of children with hearing loss in classrooms and schools with broad and flexible support where students have the freedom to create and recreate themselves to become custodians of sustainable societies in the future (Amin, Till, and McKimm 2018).

The evolution of inclusive leadership leads to a new challenge that reflects the moral sensitivity of a reconsidered/re-evaluated teacher and HSS to satisfy the needs of *all* students. Inclusive leadership evokes a transformative education paradigm or a measure of satisfaction of how schools often take centre-stage in decisions about who leads a school initiative to satisfy the needs of all students and educators. These changes are highly dependent on the strength of the school actors' involvement and the perception of diversity as well as the organisation and ownership of innovation in the school.

From educational planning to policymaking, inclusive leadership facilitates equality of opportunity, full participation, independent economic life, and self-sufficiency. It also contributes towards a favourable school climate characterised by critical interactive processes and trusting relationships. Inclusive leadership is related to school professionals' credibility and a vision of a non-hierarchical network of collaborative learning and language therapeutic schools (Moran and Larwin 2017).

### *Potential applications of information and communication technology (ICT) to obtain desired exit performance*

The desired exit performance of ICT is to adapt classroom materials to match learner characteristics. Parents, teachers, and HSSs emphasise that adolescents with cochlear implants (CIs) or hearing aids (HAs) demonstrate perseverance behaviours while learning rehabilitation takes place at school. The current SIE includes multi-channel dialogues between teachers and HSSs, between children and primary care support staff, and among teachers, HSSs, children, and parents. It incorporates, based on the needs of the child, dialogues of the student with HSSs or different personnel engaged in various medical subspecialties (Rekkedal 2012). These dialogues advocate the establishment of varied curriculums, teaching strategies, and ICT resources, as well as professional development of teachers and HSSs to know about the intervention processes that can be used in classrooms and schools (Jachova and Kovacevic 2010).

The aim of the current study is to develop, refine, and validate the *Inclusion Questionnaire (InQ)* to compare the attitudes towards and knowledge of teachers (classroom teachers who have full responsibility in the classroom and communicate with parents) and HSSs (teachers who have a certificate to practice speech therapy within the school system) teaching students using CIs or HAs in inclusive schools in Canary Islands. The investigation was conducted in three phases. The first phase involved the development of an initial item pool after reviewing the relevant literature. In the second phase, an item analysis was accomplished, and the factor structure was determined using exploratory factor analysis (EFA) after data collection. In the third stage, a

comparison of the factor selected *InQ* items were assessed by teachers and HSSs according to four demographic and professional features: gender, age, years of work experience (WE), and professional experience with students using hearing devices (PE).

## Materials and methods

### Participants

The Council of Education of the Canary Islands provided the sample of public teachers and HSSs teaching children with hearing loss. The sample comprised 297 teachers and HSSs working with children and adolescents using hearing devices in Gran Canaria and Tenerife (Table 1). A large majority of participants were female ( $n = 84\%$ ) and aged 50–59 years (58%). Most teachers ( $n = 72.6\%$ ) had at least 10 years of WE, and the majority of teachers ( $n = 61.3\%$ ) had 3 or fewer years of PE.

### The Canary Islands context

Law 6/2014, of 25 July 2014, on Non-University Education indicates that a quality education system is one that guarantees equity and excellence and offers each person the educational attention that he or she needs (Article 3.a). Within this general framework, the attitudes, and expectations that teachers have towards the diversity of students, the educational practices that are developed, and the availability and use of resources become especially relevant (DECREE 25/2018). Education of children with hearing loss is a decisive factor in changing the classroom environment concerning the types of curriculum tasks and materials that teachers and HHs should utilise.

### Procedure

The researchers contacted the Council of Education of the Canary Islands to request the cooperation of teachers, HSSs, and children with hearing loss. Classroom teachers participated under the premise that they taught students with hearing loss and that they

**Table 1.** Sample description.

Variables		Sample description	
		Teachers $N = 164$ (55.21%)	Participants HSSs $N = 133$ (44.78%)
Gender	M	26 (15.9%)	12 (15.9%)
	F	138 (84.1%)	121 (84.1%)
Age	29 years and less	3 (1.8%)	
	30–39 years	40 (24.4%)	23 (16.7%)
	40–49 years	35 (21.3%)	14 (12.3%)
	50–59 years	73 (44.5%)	78 (58.0%)
	60 years and more	13 (7.9%)	18 (13.0%)
WE	3 and fewer years	18 (11.0%)	10 (7.2%)
	4–6 years	3 (1.8%)	8 (5.8%)
	7–10 years	24 (14.6%)	5 (3.6%)
PE	10 years and more	119 (72.6%)	17 (13.0%)
	3 and fewer years	100 (61.3%)	55 (41.3%)
	4–6 years	28 (17.2%)	11 (8.0%)
	7–10 years	23 (13.5%)	17 (13.0%)
	10 years and more	13 (8.0%)	50 (37.7%)

were willing to engage in the study. HSSs taught and helped students with their clinical practice. Participation in the survey was voluntary and the subjects were free to withdraw at any time. Teachers and HSSs received an information sheet that explained the objectives of the study. The survey questions were also read out. The questionnaire took approximately 45 minutes to complete. Data were collected through the researchers' visits. All information collected was kept confidential.

### Measures

We designed the *InQ* in two steps. First, the researchers carried out a detailed search of educational databases (e.g. Education Resources Information Center (ERIC), Google Scholar, and Web of Science (WoS)). Articles and papers were initially identified based on combinations of keywords and a thesaurus (e.g. inclusive education, SIE, and inclusive questionnaires and scales). The search produced a large number of articles. We adapted items from other attitudes and concerns scales found in different international research (Chao et al. 2018; Deng et al. 2017; Moran and Larwin 2017). In addition, we considered a few core indicators that we derived from the model created by Booth and Ainscow (2002). *InQ* comprised a series of questions that required teachers to identify their attitudes, knowledge, and values, which were a key lever of sustainable inclusion and development.

Second, after the initial draft, the questionnaire underwent rigorous review resulting in some iterations. Initially, five colleagues participating in an inclusive education research group analysed the questionnaire. Their responses suggested Section 1 in which participants knew the aims of the questionnaire. Furthermore, a focus group comprising of 12 teachers and HSSs who did not participate in the study tested the questionnaire. This group provided verbal and written feedback about the structure and layout (distribution of questions related to dimensions; they rejected items concerning learning styles, challenging behaviours, risk assessments, etc.), participant overload (the time it took to participants to complete the questionnaire), and appropriateness of language (using professional and familiar vocabulary). As a result, we changed some terminology in sections 3 and 4 of the questionnaire. Finally, the instrument is a 59-item *InQ*.

The questionnaire was divided into four sections and was designed to obtain the following information. Section 1. Introductory statement indicated the questionnaire's purpose, meaning, and guarantee of confidentiality. Section 2. Demographic information of teachers and HSSs, including questions on gender, age, WE, and PE. Section 3. It comprised of 53 statements grouped into 6 dimensions (e.g. opinions on inclusive development and resources, teacher training needs, the use of training in teaching, family commitment, and students' listening difficulties) to assess attitudes towards and knowledge of SIE among teachers and HSSs. The respondents answered on a 4-point Likert scale ranging from 'never' to 'always'. Finally, Section 4 included 6 items (e.g. the use of the Roger system or a digital blackboard). It distinguished between the use and assessment of ICT resources for students. The response format was a 4-point scale ranging from 'very adequate' to 'very inadequate'.

### Data analysis

First, we coded the *InQ* data by entering the answers into the Statistical Package for Social Sciences (SPSS 16.0) for Mac. Next, we analysed the *InQ* through an Exploratory Factor

Analysis (EFA) to determine the groups of significant latent variables existing among the *InQ* items (Deng et al. 2017). Finally, we checked the scores obtained for normal distribution with the Kolmogorov–Smirnov test. As the scale scores showed normal distribution, parametric tests were used through the analyses. The variables age, gender, WE, and PE were considered. For the comparison based on gender, the student's *t*-test for independent samples were used. In addition, statistical comparisons were carried out by one-way analysis of variance (ANOVA) for comparisons of age, WE, and PE among the study groups.

## Results

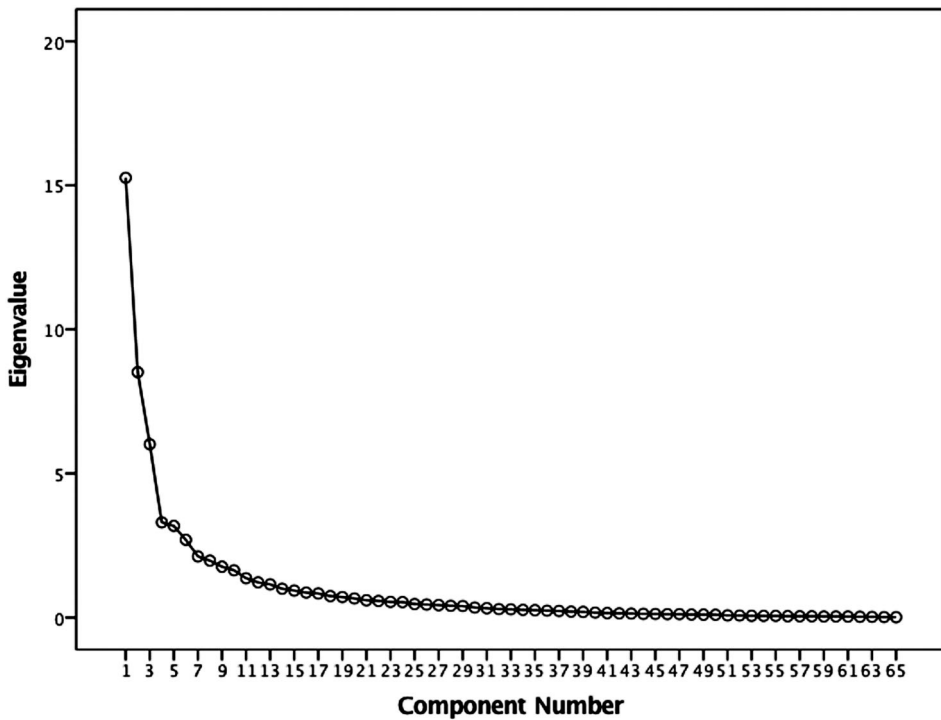
### Factor structure

A Principal Component Analysis was conducted on 59 items with orthogonal rotation (varimax). The values of 0.766 for the Kaiser-Meyer-Olkin (KMO) indicated that the proportion of variance in the variables was caused by underlying factors. According to Kaiser, as cited in Field (2009, 647), this value was above the acceptable limit of 0.5, and Hutcheson and Sofroniou (1999) also considered values between 0.7 and 0.8 as good. Thus, it allowed for the application of factor analysis. This was also supported by Bartlett's test of sphericity [ $X^2(2080) = 22006,100, p < .001$ ], indicating that the correlation matrix was factorable. Cronbach's alpha provided a reliability estimate of .841, which maximised the generalizability of the factors. To determine the number of factors necessary to represent the data, we examined the percentage of the total variance explained by each factor. We obtained 7 factors (sustainable professional development, self-efficacy in teaching competencies, inclusive leadership, assistive electronic technology, challenges around family involvement, embedding and sustaining reflexive practice, and technological usability and universal accessibility), explaining 58.063% of the variance (Table 2). This decision was also reflected in the scree plot which showed the 7 factors extracted that explain the highest variances (Figure 1).

The common variances were very high (except for some exceptional items that fluctuated between 0.700 and 0.998) which implied that all items were represented in the space

**Table 2.** Total variance explained.

Factors/ components	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	15,263	23,481	23,481	13,550	20,846	20,846	9758	15,012	15,012
2	8516	13,101	36,582	8717	13,411	34,257	9028	13,889	28,901
3	6016	9255	45,837	5661	8709	42,966	5351	8232	37,133
4	3303	5082	50,919	3036	4671	47,637	4329	6659	43,793
5	3181	4894	55,812	2735	4207	51,845	3319	5107	48,899
6	2695	4146	59,959	2189	3368	55,213	3045	4684	53,584
7	2121	3263	63,222	1853	2850	58,063	2912	4479	58,063
8	1975	3038	66,260						
9	1762	2711	68,971						
10	1639	2521	71,493						
11	1363	2097	73,590						
12	1219	1876	75,465						
...	...	...	...						
65	,014	,021	100,000						



**Figure 1.** Scree plot of eigenvalues  $>1$  for the factor structure of the *InQ*.

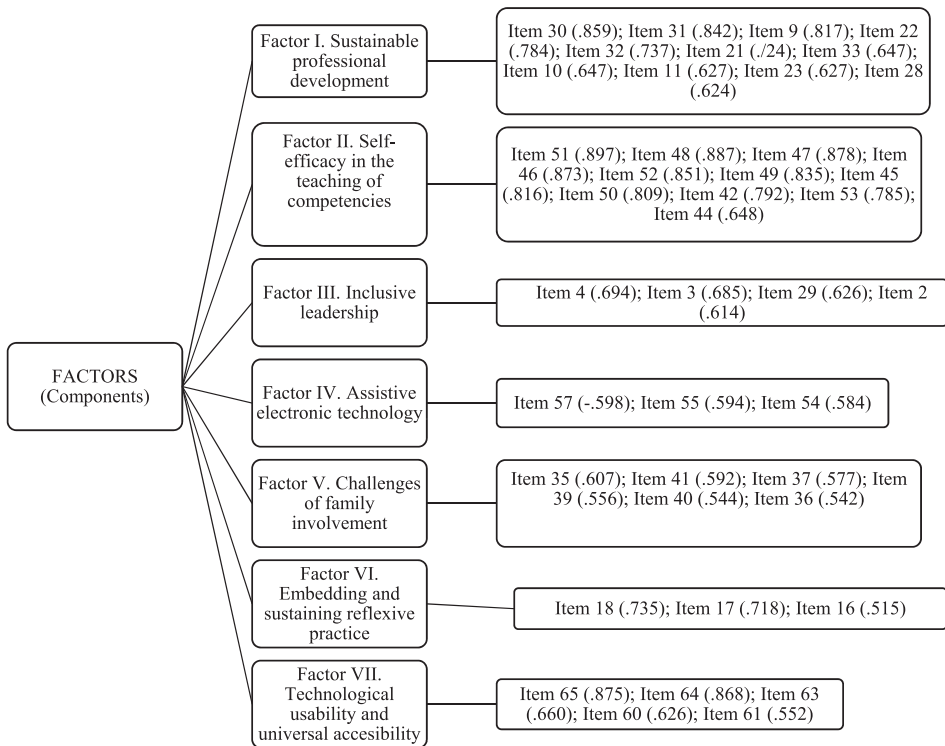
of the factors. Once the factorial analysis of the main components was conducted, it was possible to simplify the information through the matrix of correlations. This matrix helped explain why some items related more to one another and lesser to others. We used varimax orthogonal rotation that was intended to separate the maximum possible factors resulting from the *InQ*. Thus, we interpreted and identified the substantially significant factors while grouping items with a large load concerning the same factor. The weights closest to 0 were considered low. Those closest to 1 allowed the factors to be defined. We selected factors with a factor loading  $>0.40$ , according to the cut proposed by Yong and Pearce (2013, 84–85). The Appendix lists the items of the 7 factors and Figure 2 represents the 7 factors and the weights of the 43 items.

### **Findings on the demographic and professional variables of teachers and HSSs**

Table 3 shows the significant differences between the two groups of participants in terms of gender, age, WE, and PE variables for each factor.

There are significant differences between genders in regard to the scores for Factor I. Specifically, there is a significant difference between male and female teachers. In addition, there is a difference between male and female HSSs. There are also significant differences between ages in regard to the scores for item 32 where the HSSs aged 50–59 years and those teachers aged 30–39 years had the highest means scores. There are also significant differences in the variable WE for item 31 where HSSs with 10 or more years of WE had higher mean scores, and teachers with 3 or fewer years of WE achieved higher





**Figure 2.** Seven-Factor solution of *InQ*. The boxes represent the seven factors (components). Item numbers and loadings are also indicated.

mean scores. Finally, there are significant differences in the variable PE for HSSs for item 30 specifically, HSSs with 3 or fewer years of PE had higher mean scores, and teachers with 7–10 years of PE had higher mean scores.

There are significant differences in scores by age in Factor II. There is a significant difference between HSSs in the variable WE. Thus, HSSs with 3 or fewer years of WE had higher mean scores. Furthermore, there were significant differences between HSSs for item 46 for the variable PE, where HSSs and teachers with 7–10 years of PE experience achieved higher mean scores. HSSs showed significant differences in the variable WE, as those with 3 or fewer years of experience achieved higher mean scores. At the same time, the teachers with 7–10 years of experience attained higher mean scores. HSSs and teachers with 3 or fewer years attained higher mean scores for the variable WE. Finally, there are significant differences in item 45 for HSSs in the variable PE, where those with 3 or fewer years of PE obtained higher mean scores. There were also significant differences between teachers, where those with 7–10 years of experience attained higher mean scores.

There are significant differences between genders in regard to the scores for Factor III. Specifically, there is a significant difference between male and female teachers. There are significant differences between ages in item 29 for HSSs, where the group aged 60 years and older had higher mean scores. There are significant differences between teachers for the same item, as the group aged 30–39 years obtained higher

**Table 3.** Findings on the demographic and professional variables of teachers and HSSs.

Factors	Variables	Items	Participants	<i>t</i> / <i>F</i>	<i>p</i>	<i>df</i>	<i>M</i>	<i>SD</i>		
Factor I	Gender	30	Teachers	2038	.044	97	1 (3,63) > 2 (3,16)	1 (.619) / 2 (.876)		
			HSSs	3352	.001	128	1 (3,68) > 2 (3,00)	1 (.646) / 2 (.907)		
	Age	10	Teachers	1923	.022	106	1 (3,69) > 2 (3,34)	1 (.479) / 2 (.700)		
			HSSs	5158	.000	130	1 (4,00) > 2 (3,22)	1 (.000) / 2 (.709)		
		22	Teachers	11,906	.002	4, 161	2 (3,00) > 3 (3,11)	2 (.000) / 3 (1.022)		
			HSSs	9521	.000	4, 127	2 (3,00) > 5 (2,92)	2 (.000) / 5 (.494)		
		32	Teachers	13,346	.006	4, 151	3 (2,35) < 4 (3,35)	3 (.786) / 5 (.906)		
			HSSs	5563	.001	4, 119	4 (3,35) > 5 (2,39)	4 (.906) / 5 (.778)		
	33	Teachers	10,378	.001	4, 151	3 (3,29) > 5 (2,31)	3 (1.001) / 5 (.480)			
		HSSs	14,883	.000	4, 129	2 (3,24) > 3 (2,06)	2 (.995) / 3 (1.029)			
	Factor II	WE	31	Teachers	8738	.000	3, 129	3 (2,06) < 4 (2,87)	3 (1.029) / 4 (.851)	
				HSSs	6254	.001	3, 129	4 (3,52) > 5 (2,62)	4 (.669) / 5 (.506)	
		PE	30	Teachers	6813	.000	3, 153	2 (3,52) > 3 (2,35)	2 (.814) / 3 (.786)	
				HSSs	8763	.000	3, 129	2 (3,52) > 5 (2,72)	2 (.814) / 5 (.895)	
		31	Teachers	7500	.000	3, 143	3 (2,35) < 4 (3,53)	3 (.786) / 4 (.702)		
			HSSs	8738	.000	3, 129	1 (3,83) > 3 (3,25)	1 (.383) / 3 (.897)		
		Factor III	WE	46	Teachers	2053	.014	3, 112	1 (3,83) < 4 (2,95)	1 (.383) / 4 (.850)
					HSSs	5570	.001	3, 127	1 (3,60) > 4 (2,70)	1 (.843) / 4 (.827)
49			Teachers	5426	.002	3, 112	1 (3,36) < 3 (3,55)	1 (.788) / 3 (.686)		
			HSSs	5943	.001	3, 125	1 (3,36) < 4 (4,00)	1 (.788) / 4 (.000)		
45			Teachers	9283	.000	3, 127	1 (3,49) > 3 (2,44)	1 (.515) / 3 (.856)		
			HSSs	9493	.000	3, 127	1 (3,49) > 4 (2,98)	1 (.515) / 4 (.812)		
Factor IV	PE	46	Teachers	7265	.000	3, 143	1 (3,24) > 4 (3,00)	1 (.826) / 4 (.756)		
			HSSs	2053	.014	3, 127	1 (3,00) > 3 (1,94)	1 (.964) / 3 (.236)		
	49	Teachers	6102	.002	3, 142	3 (1,94) < 4 (2,98)	3 (.236) / 4 (.729)			
		HSSs	5326	.002	3, 112	1 (3,27) < 3 (3,49)	1 (.458) / 3 (.583)			
	45	Teachers	4262	.006	3, 150	1 (3,10) < 3 (2,00)	1 (.738) / 3 (.000)			
		HSSs	9283	.000	3, 127	2 (3,50) > 3 (2,00)	2 (.577) / 3 (.000)			
Factor V	Age	29	Teachers	8,99	.006	4, 156	1 (3,00) < 3 (3,48)	1 (.000) / 3 (.602)		
			HSSs	17,533	.000	4, 129	1 (3,56) > 3 (2,00)	1 (.527) / 4 (.707)		
	WE	4	Teachers	3446	.019	3, 135	1 (3,56) > 4 (2,66)	1 (.527) / 4 (.775)		
			HSSs	16,123	.000	3, 135	1 (3,13) < 3 (3,26)	1 (.640) / 3 (.864)		
	29	Teachers	10,234	.000	3, 129	1 (3,13) > 4 (2,67)	1 (.640) / 4 (.835)			
		HSSs	4904	.003	3, 341	2 (4,00) > 3 (2,20)	2 (.000) / 3 (.447)			
	PE	4	Teachers	8246	.000	3, 162	2 (4,00) > 4 (2,48)	2 (.000) / 4 (.674)		
			HSSs	3446	.019	3, 135	3 (2,92) > 4 (2,62)	3 (.644) / 4 (.506)		
	Factor VI	Age	18	Teachers	8,99	.006	4, 156	1 (2,82) > 3 (2,13)	1 (.782) / 3 (.342)	
				HSSs	17,533	.000	4, 129	3 (3,15) > 4 (3,08)	3 (.875) / 4 (.862)	
		WE	4	Teachers	3446	.019	3, 135	1 (2,98) > 3 (2,19)	1 (.842) / 3 (.403)	
				HSSs	16,123	.000	3, 135	3 (2,68) < 4 (2,92)	3 (.893) / 4 (.644)	
29		Teachers	10,234	.000	3, 129	1 (2,88) > 3 (2,38)	1 (.781) / 3 (.602)			
		HSSs	4904	.003	3, 341	1 (3,35) > 3 (2,68)	2 (.622) / 3 (.684)			
PE	4	Teachers	8246	.000	3, 162	2 (2,81) > 3 (2,29)	2 (.512) / 3 (.588)			
		HSSs	3446	.019	3, 135	2 (2,81) < 4 (3,27)	2 (.512) / 4 (.447)			
Age	18	Teachers	8,99	.006	4, 156	2 (2,81) < 5 (3,89)	2 (.512) / 5 (.323)			
		HSSs	17,533	.000	4, 129	4 (3,27) < 5 (3,89)	4 (.447) / 5 (.323)			
WE	4	Teachers	3446	.019	3, 135	1 (4,00) > 2 (3,21)	1 (.000) / 2 (.726)			
		HSSs	16,123	.000	3, 135	2 (3,21) < 3 (3,33)	2 (.726) / 3 (.816)			
29	Teachers	10,234	.000	3, 129	3 (3,33) < 4 (3,82)	3 (.816) / 4 (.446)				
	HSSs	4904	.003	3, 341	1 (4,00) > 2 (3,67)	1 (.000) / 2 (.516)				
PE	4	Teachers	8246	.000	3, 162	1 (4,00) > 3 (3,60)	1 (.000) / 3 (.548)			
		HSSs	3446	.019	3, 135	1 (3,22) > 4 (2,96)	1 (.428) / 4 (.832)			
Age	18	Teachers	8,99	.006	4, 156	1 (2,80) < 4 (3,35)	1 (.422) / 4 (.533)			
		HSSs	17,533	.000	4, 129	1 (3,72) < 3 (3,86)	1 (.607) / 3 (.351)			
WE	4	Teachers	3446	.019	3, 135	3 (3,72) < 4 (3,86)	3 (.607) / 4 (.351)			
		HSSs	16,123	.000	3, 135	1 (3,96) > 2 (3,78)	1 (.186) / 2 (.441)			
29	Teachers	10,234	.000	3, 129	2 (3,78) < 3 (4,00)	2 (.441) / 3 (.000)				
	HSSs	4904	.003	3, 341	2 (3,78) < 4 (3,98)	2 (.441) / 4 (.139)				
PE	4	Teachers	8246	.000	3, 162	2 (3,35) > 3 (2,68)	2 (.622) / 3 (.684)			
		HSSs	3446	.019	3, 135					

(Continued)

**Table 3.** Continued.

Factors	Variables	Items	Participants	<i>t</i> / <i>F</i>	<i>p</i>	<i>df</i>	<i>M</i>	<i>SD</i>
			HSSs	8957	.000	4, 132	2 (2,87) < 3 (3,50) 2 (2,87) < 4 (3,60) 4 (3,60) > 5 (3,11)	2 (.573) / 3 (.516) 2 (.573) / 4 (.610) 4 (.610) / 5 (.900)

Non-significant: n. s.

Factor IV: n. s.

Factor VII: n. s.

Gender 1. Male 2. Women

Age 1. 29 and fewer years 2. 30–39 years 3. 40–49 year 4. 50–59 year 5. 60 years and more

WE = 1. 3 and fewer years 2. 4–6 years 3. 7–9 years 4. 10 years and more

PE = 1. 3 and fewer years 2. 4–6 years 3. 7–9 years 4. 10 years and more

mean scores. There are significant differences between HSS groups for the variable WE in item 4, where HSSs with three or fewer years of WE experience and those with 10 or more years of WE experience attained higher mean scores. At the same time, there are significant differences between teachers for the same item, where those with 3 or fewer years of experience obtained higher mean scores. Finally, there are significant differences between HSSs in the variable PE, where HSSs with 3 or fewer years of experience and teachers with 7–9 years of experience show significant differences for item 4.

There are significant differences between genders in regard to scores for Factor V. More specifically, there is a significant difference between male and female HSSs. Finally, there are significant differences between ages for the scores for Factor VI HSSs aged 50–59 years and teachers aged 30–39 years had higher mean scores.

## Discussion

The purpose of this investigation is twofold: to validate the *InQ* and to compare the teachers' and HSSs' attitudes and knowledge towards teaching students using CIs or HAs according to four variables: gender, age, WE, and PE.

### *Factors empowering teachers and HSSs in SIE*

As many as 82.2% of the respondents are female. Female teachers and HSSs selectively acquire values and attitudes, interests, knowledge, and competencies – in short, the culture – that prevails in the groups of inclusive schools of which they are members. For female teachers and HSSs, teaching students who use hearing devices involves agreeing upon a common body of knowledge, values, and shared standards of practices within the profession. Based on our findings we believe that the empowerment and autonomy of female teachers and HSSs are essential for the achievement of SIE.

Self-efficacy in teaching students' competencies measures students' difficulty in learning sub-skills, as well as other perceived complex problem-solving and challenging tasks in children and adolescents with hearing devices. The effectiveness of key professional competencies is associated with positive attitudes towards SIE (Billingsley et al. 2020; Saloviita 2020). The opposite occurred in Chao et al. (2018), which considered the inclusive teaching of primary school teachers and the conduct management of secondary school teachers as least effective professional actions.

Inclusive teachers and HSSs address the challenge of students' employability, the task of working collaboratively, and the duty of proposing adequate and sufficient technological services and resources. Inclusive leadership practices harmonise with the strategy of commitment. We argue that educational sustainability implies the survival, protection, and well-being of an entire educational community. Further, participatory working conditions, feelings of uncertainty, professional development, and collaboration with teacher empowerment influence the commitment on part of teachers and HSSs to implement innovations in SIE. The commitment approach to sustainable organisational design is important while analysing the conditions for the implementation of large-scale inclusive school innovations.

Students who use hearing devices need time, space, resources, and professionals working in teams. Teachers and HSSs consider technological resources as factors for classroom information and communication that are attributed to the support or detracting of an effective learning experience over which they have no control. A listening environment is essential for students with hearing loss. Professionally designed resources are necessary to improve student auditory perceptions. The quality of sound creates positive attitudes in students who use hearing devices towards using assisted technologies (Rekkedal 2012). Assistive electronic technology creates classroom environment conditions rather than given teaching orders.

A student's academic performance is important to the parents. This study shows that families request and attend personal tutor meetings as they consider the academic performance of their children important and regularly supervise their children's homework. Fathers and mothers alike dealt indiscriminately with the academic affairs of their children.

Interaction is a part of sustainable education (Redman, Wiek, and Redman 2018). The fundamental challenge is to change perceptions and mindsets across all sectors and social media. The use of and access to visual support, images/presentations, digital whiteboards, magnetic loops, Roger system, and the frequency modulation (FM) systems facilitate and motivate the physical, cognitive, and social development of students who use hearing devices. These resources form the basis for smart technology systems that connect students and reduce discomfort among children and adolescents with auditory difficulties.

### ***Comparative assessment of teachers and HSSs***

The attitudes towards and knowledge of CIs, sustainable diversity, and the importance on academic performance as placed by parents differed among the participants based on gender. Differences were more outstanding among teachers than among HSSs.

Teachers aged 30–39 years and HSSs aged 50–59 years felt that they needed training to implement sustainable management practices in the classroom. However, HSSs aged 60 years and above and teachers aged 30–39 years considered themselves as sufficiently qualified to meet the challenge of employability and diversity in the classroom and school.

HSSs with 10 or more years' experience and teachers with 3 and fewer years' experience indicated that they had not received training on sustainable organisational measures at school. Both groups knew that children with CIs or HAs answered curriculum questions adequately. The HSSs with 3 and fewer years' experience and those with 10 years'

experience and more agreed that attention to sustainable diversity was a prominent feature of their teaching practice, similar to teachers with 3 and fewer years' experience.

HSSs with 3 and fewer years' experience, and teachers with 7–10 years' experience felt that they had not been trained on CIs. The HSSs with 3 and fewer years' experience found improvements in the attention and understanding of children with CIs or HAs when there was background noise, which was not perceived by the teachers. For teachers with 7–10 years of experience, children with CIs or HAs receive easy to follow instructions to start a learning task.

### **Limitations**

This study has several limitations. First, teachers and HSSs participated voluntarily in this study and therefore the sample was slightly skewed. Second, the results only reflect the participants' attitudes towards the theory and principles of inclusion. Third, the study avoids a detailed characterisation of teacher and HSS practice and has neglected in-depth interviews with teachers and HSSs. Fourth, the construct validity of the role of *InQ* must be investigated to provide a rational foundation for its predictive validity. Finally, although part of the current study is intended to compare the attitudes of male and female teachers and HSSs, the results are not substantial enough for male participants, in order to draw sufficient conclusions about attitudes.

### **Conclusions**

The results from this study raise two important issues in relation to SIE. First, Canary teachers and HSSs have fully acknowledged being learners who have acquired seven attitudes by validating claims through critical reflection of *InQ*, namely sustainable professional development, self-efficacy in the teaching of competencies, inclusive leadership, assistive electronic technology, challenges of family involvement, embedding and sustaining reflexive practice, and technological usability and universal accessibility. These *InQ* factors have been developed with reliability and logical validity. They integrate a framework for teachers and HSSs teaching SIE to students with hearing devices, which promotes the vision and mission of schools for all. Our second observation relates to the professionals working in inclusive schools. Canary female and male teachers and HSSs have differed on items of three factors. Teachers and HSSs have differed in some factor items related to age, WE, and PE.

### **Recommendations**

First, the resulting *InQ* factors form the core personalised approach that can help value all students equally. These factors should underpin SIE in other Spanish political regions. Second, the *InQ* factors help compare teachers and HSSs in public and private inclusive schools. Third, *InQ* factors suggest diverse training actions for education programmes that are adjusted to different participants' ages. Fourth, *InQ* factors are important for professional primary and secondary teacher development (e.g. direct teams that support collaboration with teachers and HSSs can lay the foundations of empowerment in sustainable inclusive schools). Finally, the new framework of *InQ* claims that the practice

of teachers and HSSs form a key component in gearing public school systems towards inclusive values and sustainable educational change.

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## Appendix

*InQ* items for the seven factors.

### **Factor I. Sustainable professional development**

- 30. I consider that I should receive training in specific knowledge of cochlear implant.
- 31. I should receive training on sustainable organisational measures that are to be taken in my school.
- 9. Attention to diversity requires previous experience with students with CIs or HAs.
- 22. I raise my voice as a communication strategy.
- 32. I should receive training on sustainable management practices that are to be taken in my classroom.
- 21. I try to have the student with hearing loss see my face and lips while speaking as part of my communication strategy.
- 33. I should receive training on specific electronic technologies that can support those with hearing loss.
- 10. I have knowledge of sustainable diversity to support students with CIs or HAs.
- 11. I believe that the training received on hearing with CIs or HAs and its educational response is not enough.
- 23. I speak at a slower pace as part of my communication strategy.
- 28. I check to see if the students with CIs or HAs have understood all the questions.

### **Factor II. Self-efficacy in teaching competencies**

- 51. Students with CIs or HAs have improved attention while listening to activities in small groups.
- 48. I have improved my comprehension of comments from children with CIs or HAs.
- 47. The school has the electronic and technological applications that are necessary for students with CIs or HAs to attend.
- 46. Children with CIs or HAs answer questions in more satisfactory ways.
- 52. Children with CIs or HAs are socially more involved in conversations with their peers.
- 49. Attention and understanding of children with CIs or HAs improved even when background noise was present.
- 45. Children with CIs or HAs follow instructions faster or easier, before starting work.
- 50. The ability to actively prevent against children with CIs or HAs has improved.
- 42. Children with CIs or HAs seem to understand classroom instructions better.
- 53. Children with CIs or HAs seem to have improved learning rhythm.
- 44. Children with CIs or HAs stay in the task longer and do not need to be re-directed much.

### **Factor III. Inclusive leadership**

- 4. Attention to sustainable diversity must occupy a relevant role in my teaching practice.
- 3. Attention to sustainable diversity in the classroom enriches the entire educational community.
- 29. I consider myself sufficiently qualified to face the challenge of employability and diversity in my classroom and school.
- 2. Attention to students with CIs or HAs must be the responsibility of all teachers and the educational community.

### **Factor IV. Assistive electronic technology**

- 57. My opinion on the use of electronic technology in the classroom: Digital board.
- 55. My opinion on the use of electronic technology: Roger system.
- 54. My opinion on the use of electronic technology: Magnetic loop.



***Factor V. Challenges to family involvement***

- 35. Parents attend meetings called by teachers.
- 41. Parents participate in school activities (shows, sports, extracurricular activities, etc.)
- 37. Parents supervise students' homework.
- 39. The father is the one who deals with his academic affairs.
- 40. A student's academic performance is important to the parents.
- 36. Parents request meetings with teachers to review issues related to children.

***Factor VI. Embedding and sustaining reflexive practice***

- 18. I make tracking schemes on the board.
- 17. I write the keywords or ideas on the board.
- 16. I prepare challenging activities with different levels of difficulty.

***Factor VII. Technological usability and universal accessibility***

- 65. Assessment of electronic technology in the classroom: Visual support.
- 64. Assessment of electronic technology in the classroom: Images/presentations with images.
- 63. Assessment of electronic technology in the classroom: Digital blackboard.
- 60. Assessment of electronic technology in the classroom: Magnetic loop.
- 61. Assessment of electronic technology in the classroom: Roger system.