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Psychometric Properties of the Questionnaire "Demands and Potentials of ICT and Apps for Assisting People with Autism" (DPTIC-AUT-Q)

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Abstract: Background: In education, Information and Communication Technology (ICT) has gone from being a convenient option to a permanent necessity. For students and people with functional diversity, it is of seminal importance. It is therefore worth learning how professionals perceive digital tools and apps for people and students with functional diversity and autism: its requirements and potential. As no instrument to measure this exists, we have designed a questionnaire on the requirements and potentials of ICT and apps for assisting people with autism (DP-TIC-AUT). Methods: Our questionnaire has been subjected to content validity using a panel of experts, and construct validity, using Exploratory Factor Analysis and Confirmatory Factor Analysis, and Cronbach's alpha and Composite Reliability. Results: Optimal results were obtained in the above values, thus confirming the validity of DP-TIC-AUT for use in the contexts of its validation. Conclusions: DP-TIC-AUT is a valid instrument. This opens up a range of possibilities for research, firstly descriptive, then of other kinds, and for the adaptation of the instrument to other contexts. This is the first step in improving the creation and use of ICT for people with autism.

Keywords: psychometric properties; validation; functional diversity; autism; ICT; apps

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1. Introduction

We live and coexist in a society that is based on technology and depends on the benefits it offers. It has been called a knowledge society [1,2] or an information society [3]. It is based on information about and the communication of social, economic and cultural relations [4]. The momentum of information and communication technology (ICT) has brought about changes in the way we organize and manage life in the community and how we deal with tasks of daily living.

The use of technological media as a bridge to enhance learning and integrated development in formal and non-formal education, and in healthcare, has grown in importance over the years. It is evident how technology has progressed and connected with all types of social groups, creating environments that promote the learning and social inclusion of people with special needs. Thus, designing environments of learning and development that are accessible to everyone is and will be the main objective of the knowledge society. In the field of education, it is known as Universal Design for Learning.

One result is the advance in educational technology and teaching methodologies based on digital tools, which have changed teaching–learning processes from more traditional to more innovative approaches.

These new approaches give the student a leading role along with the teacher, requiring the latter to have greater digital knowledge and to know how to adapt their methodology

depending on the new demands of society. Given that the new technologies are everywhere in our environment, teachers and students need to be involved in their responsible and educational use, because they improve the quality of education [5] enabling better learning and greater interaction [6]. This is also a response to the new ideas of neuroeducation derived from neurolearning. In short, this is how the students of today learn; hence, this is how they should be taught.

Conceptual Framework

The training of teachers in technology has been the subject of debate on innumerable occasions and in many contexts, since education-related university degrees have subjects involving ICT. Despite the fact that the law on education in Spain emphasises the need for teachers to be digitally competent [7], the reality is less than satisfactory [8,9], and even less so for students with functional diversity [10]. The near lack of any general ICT subject in teacher training is clearly insufficient for an aspect that has revolutionized teaching and the universal design for learning.

Diversity and Inclusion Technology (DIT) (known as "Tecnologías de Apoyo a la Diversidad" (TAD) in Spanish [11]) has emerged to promote access to information and technology for people with functional diversity, among others. As ICT provides benefits to functionally diverse students, so the coming of DIT gives them even more support, enabling their interaction, social participation [12], inclusion [13], and an independent life [14]. This technology has a design and format adapted to the needs or potential of the user, fomenting the development of cognitive skills, communication and language [14], among other aspects. In other words, it overcomes the Barriers to Learning and Participation (BLP) and comprises a proactive measure for attending to diversity known as the Universal Design for Learning (UDL).

More specifically, for people with autism, this technology can create a bridge to enhance communicative development and interaction with the environment. Wing [15] defines it as a set of symptoms associated with three dimensions (autistic triad): impairments and delay in language and communication, both verbal and non-verbal; impairments in the social sphere, more specifically in interpersonal reciprocity; and impairments in behaviour and thinking. Adding to this, APA [16] includes restrictive patterns regarding the diversity of behaviours, activities and interests.

Similarly, many studies—national and international—have shown scientific evidence on the benefits of ICT and apps in psychopedagogical therapy for people with autism, providing encouraging results following their use. Flores et al. [17] worked on new forms of augmentative and alternative communication with children with ASD, comparing use of the iPad with use of pictograms in physical format. The results show that communicative behaviours increase after use of the iPad. Desai et al. [18] increased the alternative communication skills of a student with autism and another with cerebral palsy through using the iPad. Mercado et al. [19], through the videogame "BCI" that addressed neurofeedback therapies, managed to improve attention, attentional control and sustained attention in children with severe autism. Wedyan et al. [20], following the use of an augmented reality device for children with autism focused on the development of facial expressions, show improvement in social interactions, speech and facial expressions. Jiménez-Lozano et al. [21], using communication apps, discerned improvements in the prerequisites of language, communicative intent and behaviour. Fage et al. [22], through apps based on cognitive and care rehabilitation, show improvements in socio-adaptive behaviours and social response in the school environment. Teixeira and Cunha [23], using mathematics apps, produced positive results in the learning of mathematical skills, increasing attention, concentration, behaviour and motivation. Sweidan et al. [24] state that progress was obtained in basic linguistic, mathematical and social concepts through the use of apps for the learning of concepts of language, mathematics and social skills. Lázaro-Cantabrana et al. [25], meanwhile, confirmed improvements using an app for people with autism in the understanding of information and the capacity of expression and communication.

As well as the support that the different technological options offer for people with autism, they also provide an innovative and encouraging option for them [26–28], given that they are easily manipulated and combine the visual with the auditory format [28,29]. Thus they are adapted to their needs, with many advantages to using them. Parsons et al. [30] and Terrazas et al. [31] agree that they help to develop and promote social skills. Yet, not only do they develop aspects connected to the social and emotional sphere, but they also heighten motivation toward these types of tasks [26]. Guzmán et al. [32] state that "the use of technologies to improve and stimulate the communication of children with ASD, in particular, has exponentially increased in recent times" (p. 248), and it opens up a world of possibilities for developing other impaired skills, such as attention, anticipation, working memory, sequences of actions, organization of events, and so forth.

Recent studies have examined the use of technology in the area of non-formal education [33–36], while in formal education, studies have been carried out in ordinary classrooms [37–39] and in classrooms with students with functional diversity [40–43], revealing its possibilities and functionalities.

Taking the potential of technology in the field of education as a given, having teachers trained in different digital tools and in their use in the classroom with functionally diverse students is essential for the creation of accessible and synchronous environments with up-to-date learning based on ICT. Assessment of the digital training and competence of professionals who teach people with functional diversity has focused on teachers in training and in practice, and in formal education contexts. Various instruments of assessment have been designed and validated for this (Table 1). However, despite the need for there to be professionals with training and experience in ICT for their use with people with functional diversity, the reality is not as encouraging as one would expect. Even though they value ICT positively and see it as a powerful resource in the classroom, teachers do not use these technologies and/or have difficulty using them [44]. Authors such as Cabero-Almenara et al. [45] and Fernández-Batanero et al. [10] have found that there is limited training in technologies applied in the care of diversity for future teachers, and a lack of awareness of their benefits and functionalities. Randazzo and Oteri [46] found positive attitudes toward ICT among university teachers, but they neither use them nor have skill in doing so. This situation could be due to the training they received in higher education, which lacked teaching on how to make good use of virtual environments [12,47,48].

As we can see in Table 1, we have not been able to find studies or tools on assessment for professionals who look after people with functional diversity, and who also work in formal, non-formal and/or public health education contexts. Neither are there assessment instruments on the training in and use of ICT by the various professionals who work with people with autism. Nor, more specifically, are there any studies on the use of apps, despite their huge growth in the education, therapy and psychopedagogic intervention for people with autism [40,49–53]. It was therefore necessary to create an instrument that evaluates the opinion and training received on ICT and apps by the different professionals who work with people with functional diversity, in general, and with people with autism in particular, as well as their requirements and possible uses for better care.

The purpose of this study is the analysis of the psychometric properties of this instrument, the "Demands and Potentials of ICT and apps for attending to people with autism" questionnaire (DPTIC-AUT-Q). The objectives are: (a) to study the content validity through the agreement and consensus of a panel of experts; (b) to assess the stability of the questionnaire by measuring the agreement using the Intraclass Correlation Coefficient and the Kendall coefficient; (c) to corroborate the validity of the comprehension of the instrument through its application to a pilot sample; (d) to determine the multidimensionality of the construct through exploratory factor analysis; (e) to confirm the multidimensionality of the construct through confirmatory factor analysis; and (f) to analyse the reliability of the questionnaire.

Table 1. Previous studies on the use and perceptions of ICT by teachers.

Work	Participants	Evaluation Instrument	Main Objective
Al-Attiyah et al. [54]	Preschool and primary education teachers	Questionnaire regarding the use and opinion of assistive technologies	To research the perceptions on the use of assistive technologies in the teaching of children with special needs in early intervention programmes.
Alshurman et al. [55]	Special education school teachers	Questionnaire focused on communicative, academic, sensory, kinetic, social, self-care, daily life, organization and computer skills	To determine the role of assistive technology in the success of the Individual Education Program for disabled students in Jordan
Arouri et al. [56]	Preschool teachers	Questionnaire for measuring the degree of use of assistive technology, its use in classrooms and their preferences	To discover the opinions on the use of assistive technology for children with functional diversity
Blossom Cygnet et al. [57]	Special education teachers	Questionnaire addressing the knowledge of the skills for handling technological assistance and professional development	To examine the knowledge, skills and professional development for handling assistive technology in the field of special education
Cabero-Almenara et al. [45]	Teacher training students	Questionnaire "Conocimiento tecnológico de los alumnos del grado de Maestro sobre la utilización de las Tecnologías de la Información y Comunicación (TIC) para personas con necesidades educativas especiales (COTETICNE)" ("Technological knowledge of teaching degree students on the use of ICT for people with special educational needs")	To determine the knowledge held on the ICT applied to people with functional diversity
Chukwuemeka & Samaila [58]	Special education school teachers	Questionnaire on the frequency of use of ICT, perceptions about their use and the factors involved	To explore the perception and factors that limit the use of high-tech assistance technology resources in special education schools
Eden et al. [59]	Primary education teachers	Questionnaire linked to the general use of technology and experience, digital competence and attitudes toward iPads	To compare the attitudes, motivation and use of iPads by teachers to help teach children with learning difficulties and children with autism spectrum disorder
Emmers et al. [60]	Special education teachers	Sentiments, Attitudes, Concerns regarding Inclusive Education-Revised (SACIE-R) scales, self-efficacy for Inclusive Practice (TEIP) scale and self-constructed questionnaire	Discover the relationship between attitudes, self-efficacy and behaviour for inclusive education

Table 1. *Cont.*

Work	Participants	Evaluation Instrument	Main Objective
Fernández-Batanero y Bermejo [8]	Teachers	Questionnaire regarding the professional development of teachers and the ease and availability of ICT; discussion group	To discover the attitudes toward ICT and the factors involved in good educational practices with technological support
Fernández-Batanero et al. [10]	Primary education teachers	Questionnaire "Diagnóstico y formación del profesorado para la incorporación de las TIC en alumnado con diversidad funcional—DIFOTICyD" (Diagnosis and training of teachers for the incorporation of ICT for students with functional diversity")	To identify the technological training and knowledge concerning accessibility and ICT applied to people with visual, auditory, cognitive and/or motor impairments
Ortiz-Colón et al. [61]	Teacher training students and teachers	Questionnaire focused on ICT in the organization of educational content, the use of ICT in content design, and teacher training in ICT; interview; discussion group	To analyse the opinions and perceptions about training in ICT and the factors involved in its use
Ortiz-Jiménez et al. [62]	Education professionals	Questionnaire relating to didactic aspects, spaces and resources and teacher training in ICT; discussion group	To discover the perceptions concerning ICT for their use with students with functional diversity
Pegalajar [63]	Future teachers	Questionnaire regarding the didactic implications of ICT for inclusive education, the professional development of teachers in ICT, the attitude of teachers toward inclusion through ICT, and inclusive student practice through ICT	To discover the perceptions concerning ICT for the development of inclusive practices

2. Materials and Methods

2.1. Participants

A total of 328 professionals from areas of formal, non-formal and public health education participated in the pilot study. The criterion for inclusion was to have experience in working with people with functional diversity, in general, and with autism specifically. Consequently, the sample consisted of 122 participants, within the sample size of 100 or more sample units recommended by Hair et al. [64]. The age range was between 20 and 64 years old (M age = 37.88 years, SD = 10.21), of whom 18 were men (14.8%) and 104 were women (85.2%). Table 2 presents the sociodemographic data of the sample. All the participants had access to the internet and ICT at their place of work, mainly the computer (93.4%, n = 114), tablet (69.7%, n = 85) and projector (59.0%, n = 72).

The study used non-probability convenience sampling. To calculate the sample size, we used the formula for unknown populations—as it is difficult to compute the number of professionals that work with people with autism—and a confidence level of 95%, accepting a margin of error of 5.4% (N = 328) for the initial sample and 8.9% for the final sample (n = 122).

Table 2. Sociodemographic data of the 122 participants.

Variables		*N* (%)
Place of work	State school	78 (63.9)
	Charter school	17 (13.9)
	Association	13 (10.7)
	Special school	11 (9.0)
	Private clinic	9 (7.4)
	Private school	4 (3.3)
Position	Special education teacher	45 (36.9)
	Non-specialist teacher	26 (21.3)
	Speech therapist	14 (11.5)
	Hearing and language teacher	11 (9)
	Specialist teacher	8 (6.6)
	Integration Support Special Needs Teacher	6 (4.9)
	Specialized Special Needs Support Teacher	6 (4.9)
	Special education supervisor	5 (4.1)
	Therapeutic companion	4 (3.3)
	Occupational Therapist	4 (3.3)
	Pedagogue/Educationalist	1 (0.8)
	Psychopedagogue	1 (0.8)
Experience in functional diversity	≤5 years	56 (45.9)
	6–10 years	22 (18.0)
	11–20 years	27 (22.1)
	≥21 years	17 (13.9)
Experience with ASD	≤5 years	83 (68.0)
	6–10 years	21 (17.2)
	11–20 years	12 (9.8)
	≥21 years	6 (4.9)
Ages worked with	0–6 years	72 (59.0)
	7–12 years	100 (82.0)
	13–17 years	33 (27.0)
	18–65 years	10 (8.2)
	≥66 years	4 (3.3)

2.2. Evaluation Instruments

The "Demands and Potentials of ICT and apps for attending to people with autism" questionnaire (DPTIC-AUT-Q) uses a Likert scale, with five response options (1 = Strongly Disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly Agree). It

measures the agreement of professionals who work with people with functional diversity in general and with autism in particular on the requirements and possibilities of ICT and apps for improving assistance, and also on their digital training and use. The initial instrument was designed with 125 items organized into four subscales:

1. "Opinion, training and use of ICT by the professional to assist people with functional diversity", based on previous studies by Cabero-Almenara et al. [45], Fernández-Batanero et al. [8], Ortiz-Colón et al. [61] and Pegalajar [63], on attending to diversity and technology in the sphere of formal education. It consists of 26 items in three dimensions:
    a. Dimension I on the opinions of the professional on ICT (items I1 to I12);
    b. Dimension II regarding the professional's ICT training for working with people with functional diversity (items II13 to II20);
    c. Dimension III on the benefits that ICT provides for people with functional diversity (items III21 to III26).
2. "Training in and use of ICT by the professional to assist people with autism", comprising 40 items structured in three dimensions:
    a. Dimension IV regarding the professional's ICT training for working with people with autism (items IV1 to IV9);
    b. Dimension V on the purposes the professional uses ICT for in their work with people with autism (items V10 to V25);
    c. Dimension VI on the benefits provided by ICT for people with autism (items VI26 to VI40).
3. "Uses and benefits of apps in working with people with autism", comprising 24 items and two dimensions:
    a. Dimension VII regarding the purposes the professional uses apps for in assisting people with autism (items VII1 to VII15);
    b. Dimension VIII on the benefits that apps provide for people with autism (items VIII16 to VIII24).
4. "Uses and possibilities of specific apps for people with autism", consisting of 35 items in two dimensions:
    a. Dimension IX on the possibilities offered by specific apps for people with autism (items IX1 to IX21);
    b. Dimension X on the use the professional makes of specific apps for people with autism (items X22 to X35).

2.3. Procedure

The study was approved by the Human Research Ethics Committee [2002/CEIH/2021] of the University of Granada (Spain).

We contacted schools and associations that assist people with autism, during the first four months of 2021, asking for their collaboration and describing the aims of the study. The link to the questionnaire, designed using the LimeSurvey platform, was sent by email, along with the prior conditions of its voluntary nature, anonymity, and use. The access link was provided with a single-use numerical password. The information was gathered over a period of one month.

2.4. Design and Data Analysis

We conducted a cross-sectional study of instrument content and construct validity. It consisted of developing tests and devices, including both the design or adaptation and the analysis of their psychometric properties [65].

As a method to test the validity of the content, we used a panel of experts. To analyse the metric properties of each item, basic descriptive coefficients (mean, dispersion, kurtosis and skewness) were employed, with SPSS version 26.0. Kolmogorov–Smirnov and

Levene's tests were performed to confirm normality and homoskedasticity of the sample. The validity of the construction was carried out through exploratory factor analysis (EFA) with Factor Analysis version 10.10.01 [66], to determine the goodness of the fit and the validity of the scale [67–70], and confirmatory factor analysis (CFA) with M-PLUS, to establish the validity and reliability of the fit of the model [71,72]. The internal consistency of the instrument was calculated using Cronbach's alpha coefficient with SPSS version 26.0, and the Composite Reliability (CR).

3. Results

3.1. Content Validation

In order to validate the content, expert judgement was used—this being a validation method useful for verifying the reliability of a survey [73].

For the panel of experts, the sample selected followed criteria based on experience, scientific evidence, availability, reputation and motivation [74]. There were eight experts with professional experience and a career in the area of diversity outreach and the inclusion of students with functional diversity. Of these eight experts, four were men and four women, aged between 27 and 64 years old (M = 41.75; SD = 11.78), with a professional experience of between 2 and 42 years (M = 14.13; SD = 13.52), with initial qualification in Pedagogy (n = 4), Psychology (n = 2), Humanities (n = 1) and Psychopedagogy (n = 1). Of all the experts, five were university professors and three guidance counsellors in Educational Guidance Teams.

The approach taken with the panel of experts was mixed. For the quantitative assessment, the experts had to validate the items based on the following criteria: clarity, coherence, relevance and objectivity with the object of study, on a scale of 1 (lowest value) to 4 (highest value). For the qualitative evaluation, the experts used a section for observations where they could make suggestions for improvement and make extensive comments, as well as propose the elimination of items.

The content validity, and the degree of agreement between the experts, was verified through the measurement of the agreement percentage. The Intraclass Correlation Coefficient (ICC) and the Kendall coefficient were tested for each of the subscales described above. The values obtained for the ICC for each subscale were: Subscale 1 = 0.986; Subscale 2 = 0.994; Subscale 3 = 0.994 and Subscale 4 = 0.995, thus determining an excellent inter-rater reliability (>0.750) [75].

With respect to the Kendall coefficient (W), the values were significant, albeit low in all subscales: Subscale 1: 0.153 (clarity); 0.150 (coherence); 0.200 (relevance); 0.211 (objectivity); Subscale 2: 0.125 (clarity); 0.160 (coherence); 0.186 (relevance); 0.132 (objectivity); Subscale 3: 0.138 (clarity); 0.132 (coherence); 0.155 (relevance); 0.123 (objectivity); Subscale 4: 0.127 (clarity); 0.123 (coherence); 0.109 (relevance); 0.160 (objectivity).

After the panel of experts and the statistical results, none of the proposed items was eliminated.

3.2. Construct Validity

Before starting the EFA, the descriptive values of the study were calculated (Tables 3–6), following the steps recommended by experts [76], and values greater than −2.5 and +2.5 [77] in the dispersion tests (skewness and kurtosis) were eliminated. Four items were removed from Subscale 1 (I.4, I.5, III.22 y III.25), and one from Subscale 3 (VIII.22). Following the removal of these five items, the remaining items were renumbered.

Table 3. Description of the items of Subscale 1.

Variables	Mean	Standard Deviation	Variance	Skewness	Kurtosis
I.1	4.37	0.71	0.499	−0.809	−0.025
I.2	3.69	0.97	0.944	−0.492	0.003
I.3	4.18	0.81	0.661	−1.000	1.340
I.4	4.42	0.73	0.526	−1.492	3.566
I.5	4.45	0.76	0.580	−1.542	2.978
I.6	4.18	0.80	0.645	−0.924	1.178
I.7	4.45	0.72	0.514	−1.329	1.763
I.8	4.43	0.73	0.528	−1.120	0.777
I.9	4.43	0.72	0.511	−0.978	0.152
I.10	4.32	0.77	0.599	−0.734	−0.584
I.11	3.85	0.86	0.738	−0.186	−0.782
I.12	4.11	0.86	0.741	−0.604	−0.473
II.13	4.02	0.70	0.487	−0.182	−0.457
II.14	3.90	0.73	0.536	−0.231	−0.231
II.15	3.99	0.71	0.504	−0.270	−0.184
II.16	4.20	0.70	0.490	−0.439	−0.320
II.17	3.30	1.10	1.201	−0.305	−0.383
II.18	3.69	0.83	0.696	−0.488	−0.205
II.19	4.09	0.78	0.612	−0.792	0.630
II.20	4.08	0.80	0.638	−0.743	0.887
III.21	4.16	0.76	0.579	−0.843	1.441
III.22	4.53	0.72	0.515	−2.024	1.649
III.23	4.38	0.76	0.584	−1.440	2.950
III.24	4.48	0.66	0.433	−0.880	−0.323
III.25	4.49	0.72	0.516	−1.737	4.383
III.26	4.28	0.80	0.632	−1.046	1.341

Table 4. Description of the items of Subscale 2.

Variables	Mean	Standard Deviation	Variance	Skewness	Kurtosis
IV.1	3.57	0.99	0.990	−0.284	−0.539
IV.2	3.83	0.96	0.921	−0.788	0.512
IV.3	4	0.80	0.645	−0.292	−0.693
IV.4	3.75	0.71	0.505	−0.150	−0.139
IV.5	3.83	0.78	0.606	−0.436	0.017
IV.6	3.79	0.75	0.566	−0.574	1.003
IV.7	3.98	0.82	0.677	−0.512	−0.206
IV.8	4.07	0.75	0.558	−0.470	−0.049
IV.9	3.87	0.76	0.578	−0.464	0.152
V.10	4.35	0.69	0.478	−0.598	−0.752
V.11	4.43	0.70	0.495	−0.965	0.223
V.12	4.26	0.74	0.542	−0.586	−0.490
V.13	4.28	0.79	0.616	−0.955	0.537
V.14	4.25	0.82	0.670	−1.054	1.233
V.15	4.14	0.87	0.749	−1.053	1.501
V.16	4.22	0.91	0.835	−1.249	1.526
V.17	3.92	0.92	0.853	−0.604	−0.098
V.18	3.89	1	1.005	−0.784	0.248
V.19	3.64	1.12	1.257	−0.570	−0.344
V.20	3.75	1.05	1.096	−0.720	0.182
V.21	3.62	1.13	1.278	−0.643	−0.253
V.22	4.24	0.73	0.530	−0.923	1.910
V.23	3.84	0.99	0.981	−0.701	0.186
V.24	4.07	0.85	0.730	−0.708	0.340
V.25	4.10	0.86	0.734	−0.993	1.471

Table 4. *Cont.*

Variables	Mean	Standard Deviation	Variance	Skewness	Kurtosis
VI.26	3.98	0.90	0.801	−0.584	−0.372
VI.27	3.90	0.93	0.866	−0.614	−0.105
VI.28	3.91	0.96	0.926	−0.723	0.166
VI.29	3.81	1.02	1.030	−0.576	−0.129
VI.30	3.63	1.07	1.144	−0.575	−0.207
VI.31	4.25	0.79	0.617	−1.195	2.181
VI.32	3.91	0.96	0.926	−0.723	0.166
VI.33	4.02	0.87	0.760	−0.869	0.718
VI.34	3.93	0.94	0.888	−0.771	0.106
VI.35	3.80	1.03	1.052	−0.763	0.230
VI.36	4.16	0.80	0.651	−0.981	1.384
VI.37	4.18	0.88	0.777	−1.099	1.068
VI.38	3.80	1.07	1.135	−0.640	−0.313
VI.39	3.84	1.09	1.180	−1.123	0.811
VI.40	4.21	1	0.996	−1.558	2.479

Table 5. Description of the items of Subscale 3.

Variables	Mean	Standard Deviation	Variance	Skewness	Kurtosis
VII.1	4.04	0.79	0.623	−0.487	−0.215
VII.2	3.84	0.89	0.783	−0.345	−0.261
VII.3	3.90	0.90	0.807	−0.644	0.456
VII.4	3.89	0.96	0.913	−0.714	0.450
VII.5	3.73	1.04	1.083	−0.512	−0.345
VII.6	4.28	0.71	0.504	−0.750	0.382
VII.7	3.93	0.94	0.886	−0.886	0.868
VII.8	3.82	0.95	0.900	−0.936	1.053
VII.9	3.79	0.92	0.849	−0.811	0.802
VII.10	3.80	1.01	1.010	−0.842	0.675
VII.11	4.15	0.89	0.794	−0.873	0.376
VII.12	4.06	0.87	0.755	−0.733	0.341
VII.13	3.77	1.09	1.179	−0.677	−0.232
VII.14	3.88	1.03	1.053	−1.081	0.952
VII.15	4.12	1.02	1.043	−1.160	0.852
VIII.16	2.22	1.20	1.441	0.616	−0.687
VIII.17	4.40	0.85	0.725	−1.525	2.214
VIII.18	4.04	0.90	0.813	−0.712	0.105
VIII.19	4.25	0.86	0.738	−1.226	1.521
VIII.20	4.30	0.75	0.561	−0.913	0.578
VIII.21	4.54	0.68	0.467	−1.489	2.075
VIII.22	4.28	0.71	0.504	−1.034	2.505
VIII.23	3.47	1.08	1.168	−0.226	−0.675
VIII.24	4.26	0.78	0.613	−1.247	2.364

Table 6. Description of the items of Subscale 4.

Variables	Mean	Standard Deviation	Variance	Skewness	Kurtosis
IX.1	3.53	0.97	0.946	−0.168	−0.468
IX.2	3.71	0.93	0.870	−0.205	−0.818
IX.3	3.92	0.84	0.698	−0.300	−0.622
IX.4	3.34	0.95	0.903	0.121	−0.649
IX.5	3.58	0.91	0.822	−0.173	−0.405
IX.6	3.66	0.83	0.685	−0.282	−0.379

Table 6. *Cont.*

Variables	Mean	Standard Deviation	Variance	Skewness	Kurtosis
IX.7	3.70	0.75	0.569	−0.157	−0.246
IX.8	3.45	0.83	0.691	−0.121	−0.556
IX.9	3.88	0.79	0.630	−0.509	0.064
IX.10	3.51	0.76	0.574	0.254	−0.325
IX.11	3.70	0.75	0.569	−0.398	0.677
IX.12	3.75	0.74	0.546	−0.200	−0.162
IX.13	3.60	0.84	0.700	−0.268	0.428
IX.14	3.82	0.69	0.469	−0.083	−0.220
IX.15	3.71	0.78	0.613	−0.095	−0.422
IX.16	3.58	0.82	0.669	−0.214	0.061
IX.17	3.61	0.93	0.868	−0.408	0.161
IX.18	3.56	0.97	0.943	−0.661	0.406
IX.19	3.39	0.93	0.868	−0.231	−0.137
IX.20	3.45	0.97	0.945	−0.572	0.116
X.21	3.63	0.83	0.693	−0.110	−0.515
X.22	3.64	0.77	0.589	−0.307	0.455
X.23	3.74	0.71	0.499	−0.167	−0.098
X.24	3.82	0.70	0.491	−0.178	−0.092
X.25	3.87	0.81	0.660	−0.809	1.521
X.26	3.69	0.78	0.606	−0.379	0.484
X.27	3.63	0.81	0.659	−0.480	0.785
X.28	3.96	0.72	0.515	−0.357	0.073
X.29	3.71	0.76	0.582	−0.026	−0.425
X.30	3.70	0.72	0.518	−0.029	−0.287
X.31	3.55	0.86	0.741	−0.348	0.232
X.32	3.87	0.79	0.620	−0.303	−0.305
X.33	3.79	0.79	0.625	−0.548	0.137
X.34	3.58	0.85	0.720	−0.508	0.011
X.35	3.72	0.85	0.728	−0.681	0.768

For the EFA, the procedure for determining the number of dimensions was the method of parallel analysis (PA), to maximize factor simplicity, determining the factors as recommended for PA [78]. The method for factor extraction used was Robust Unweighted Least Squares (RULS), in order to attain better solutions in the ordinal data [79,80] with Promin rotation for Subscales 2, 3 and 4—since the factors were correlated between each other—and varimax for Subscale 1—as not all the factors were correlated or the correlations were very small. The Pearson correlation matrix was used on the basic assumption of normal distribution of the ordinal items. For Subscale 1, Bartlett's statistic (1299.0 (df = 231; p = 0.000010)) and the Kaiser–Meyer–Olkin test (KMO) (0.884, good) were used to check whether the sample came from populations with the same variance and whether it showed an appropriate fit for the sample. A good fit for the data to be subjected to factor analysis was found [81].

As can be seen in the matrix of rotated factors (Table 7), no item was eliminated since they all gave factorial weights with an absolute value higher than 0.30 [81–83]. Thus, after analysing and evaluating the weight of each variable according to the factor, the final version of Subscale 1 was as follows. The three factors obtained explained 60.38% of the total variance. Factor 1, denominated "Opinions", obtained an eigenvalue of 8.08 and explained 36.73% of the common variance. It included eleven items (V1, V4, V7–V11, V19, V20, V21 and V22), and analyses what the professionals think about ICT for working with people with functional diversity. Factor 2, called "Requirements and possibilities", obtained an eigenvalue of 3.08 and explained 14% of the common variance. It comprised four items (V2–V6), examining the demands and possibilities of ICT for its use in assisting people with functional diversity. Factor 3, denominated "ICT Training for Functional Diversity", obtained an eigenvalue of 2.13 and explained 9.65% of the common variance. It

had seven items (V12–V18), which evaluated the professionals' digital training for working with people functional diversity.

Table 7. Matrix of rotated factors Subscale 1.

Variables	Factor 1	Factor 2	Factor 3
V1.	0.510		
V4.	0.579		
V7.	0.830		
V8.	0.909		
V9.	0.915		
V10.	0.634		
V11.	0.737		
V19.	0.718		
V20.	0.783		
V21.	0.581		
V22.	0.812		
V2.		0.574	
V3.		0.698	
V5.		0.564	
V6.		0.416	
V12.			0.717
V13.			0.879
V14.			0.767
V15.			0.725
V16.			0.653
V17.			0.754
V18.			0.566

Regarding the goodness of fit indices of the model, the chi-square was 48.463, which was not significant ($p = 0.999990$), as per Bentler and Bonett [84]. The goodness of fit index (GFI) was 0.987, the adjusted goodness of fit index (AGFI) gave a value of 0.987, and the comparative fit index (CFI) was 0.999. These values are within the intervals recommended by Tanaka and Huba [68]. The root mean square of residuals (RMSR) was 0.001, indicating a good fit [69,85,86]. All these data show an excellent fit for these items and an acceptable model.

Two of the three factors were correlated: Factor 1–2 r = 0.209, $p < 0.05$ (BC Confidence Interval = 0.037–0.388) and Factor 1–3 r = 0.438, $p < 0.05$ (BC Confidence Interval = 0.285–0.628); whereas Factor 2–3 were not correlated, $r = 0.037$, $p > 0.05$ (BC Confidence Interval = −0.140–0.253).

In the case of Subscale 2, the Bartlett statistic (1230.0 ($df = 780$; $p = 0.000010$)) and the Kaiser–Meyer–Olkin (KMO) test (0.901) indicated a very good fit of the data to be submitted to factor analysis [81].

No item was removed since all factorial loads had an absolute value higher than 0.30 [81–83], as can be observed in the matrix of rotated factors (Table 8). The three factors obtained explained 58% of the total variance. Factor 1, called "Training in ICT for autism", obtained an eigenvalue of 17.36 and explained 43.40% of the common variance. It comprised nine items (V1–V10), which evaluated the digital training of the professionals for working with people with autism. Factor 2, denominated "Benefits of ICT for autism", obtained an eigenvalue of 3.82 and explained 9.55% of the common variance. It consisted of 15 items (V10–V16, V19–V24, V40), which examined the benefits of ICT for people with autism. Factor 3, called "Uses of ICT for autism", obtained an eigenvalue of 2.06 and explained 5.15% of the common variance. It comprised 16 items (V17–V18, V26–V39), which analysed the purpose the professionals used ICT for in their work with people with autism.

Table 8. Matrix of rotated factors Subscale 2.

Variables	Factor 1	Factor 2	Factor 3
V1.	0.643		
V2.	0.748		
V3.	0.711		
V4.	0.718		
V5.	0.453		
V6.	0.647		
V7.	0.798		
V8.	0.713		
V9.	0.740		
V10.		0.934	
V11.		0.986	
V12.		1.114	
V13.		0.668	
V14.		0.732	
V15.		0.708	
V16.		0.674	
V19.		0.433	
V20.		0.548	
V21.		0.442	
V22.		0.547	
V23.		0.487	
V24.		0.466	
V25.		0.527	
V40.		0.316	
V17.			0.502
V18.			0.493
V26.			0.602
V27.			0.643
V28.			0.657
V29.			0.602
V30.			0.881
V31.			0.589
V32.			0.719
V33.			0.834
V34.			0.939
V35.			0.760
V36.			0.619
V37.			0.645
V38.			0.746
V39.			0.738

The model demonstrated an excellent fit: the chi-square was 388.065, being non-significant ($p = 0.999990$) [61]; the GFI was 0.981, the AGFI gave a value of 0.977, the CFI was 0.999 and the Non-Normed Fit Index (NNFI) was 1.006. These values are within the intervals recommended by Tanaka and Huba [48]. The RMSR was 0.000, indicating a good fit [69,85,86].

A positive and direct relationship could be observed between all factors of Subscale 2, with significant results at the 0.05 levels. Factors 2–3 showed a good relationship ($r = 0.784$, $p < 0.05$, BC Confidence Interval = 0.781–0.807). Factor 1–2 ($r = 0.417$, $p < 0.05$, BC Confidence Interval = 0.296–0.609) and 1–3 ($r = 0.427$, $p < 0.05$, BC Confidence Interval = 0.253–0.607) presented a moderate positive correlation.

For Subscale 3, the Bartlett statistic (1272.2 ($df = 253$; $p = 0.000010$)) and the Kaiser–Meyer–Olkin (KMO) test (0.876) indicated a good fit of the data to be submitted to factor analysis [81].

One item was eliminated because its factorial load had an absolute value lower than 0.30 [81–83], as can be observed in the matrix of rotated factors (Table 9). The two factors

obtained explained 54.88% of the total variance. Factor 1, "Benefits of Apps for Autism", obtained an eigenvalue of 10.22 and explained 44.43% of the common variance. It consisted of 10 items (V6, V11–V20, V22), which investigated the benefits that apps provide for people with autism. Factor 2 "Uses of Apps in Autism" obtained an eigenvalue of 2.40 and explained 10.45% of the common variance. It comprised 12 items (V1–V5, V7–V10, V13–V14, V21), which analysed the purpose the professionals used apps for in their work with people with autism.

The resulting model was acceptable and presented excellent fit indices: chi-square was 165.268 (p = 0.986961) [84], the GFI was 0.977, the AGFI was 0.972, the CFI was 0.996, and the NNFI was 0.995 [68]. The RMSR was 0.031, indicating a good fit [69,85,86].

The two factors of Subscale 3 were positively and directly correlated, showing significance at 0.05 (r = 0.654, $p < 0.05$, BC Confidence Interval = 0.608–0.733).

Table 9. Matrix of rotated factors Subscale 3.

Variables	Factor 1	Factor 2
V6.	0.458	
V11.	0.428	
V12.	0.422	
V15.	0.375	
V16.	0.591	
V17.	0.654	
V18.	0.879	
V19.	0.943	
V20.	0.850	
V22.	0.497	
V1.		0.505
V2.		0.632
V3.		0.719
V4.		0.711
V5.		0.913
V7.		0.863
V8.		0.896
V9.		0.903
V10.		0.945
V13.		0.593
V14.		0.590
V21.		0.454

Finally, for Subscale 4, the Bartlett statistic (1214.6 (df = 595; p = 0.000010)) and the Kaiser–Meyer–Olkin (KMO) test [0.868] indicated a good fit of the data to be submitted to factor analysis [81].

One item was eliminated because its factorial load had an absolute value lower than 0.30 [81–83], as can be observed in the matrix of rotated factors (Table 10). The three factors obtained explained 58.51% of the total variance. Factor 1, "Functionality", obtained an eigenvalue of 14.95 and explained 42.10% of the common variance. It comprised eight items (V8, V10, V15–V20) on the functionality of specific apps for people with autism. Factor 2, "Applicability", obtained an eigenvalue of 3.26 and explained 9.31% of the common variance. It consisted of 12 items (V1–V7, V9, V11–V14) on the applicability of specific apps for people with autism. Factor 3, "Uses of Specific Apps for Autism" obtained an eigenvalue of 2.27 and explained 6.50% of the common variance. It consisted of 15 items (V21–V35), which evaluated what purpose the professionals use specific apps for in their work with people with autism.

Table 10. Matrix of rotated factors Subscale 4.

Variables	Factor 1	Factor 2	Factor 3
V8.	0.445		
V10.	0.433		
V15.	0.412		
V16.	0.501		
V17.	0.498		
V18.	0.714		
V19.	0.702		
V20.	0.674		
V1.		0.858	
V2.		0.898	
V3.		0.768	
V4.		0.693	
V5.		0.805	
V6.		0.603	
V7.		0.503	
V9.		0.561	
V11.		0.481	
V12.		0.556	
V13.		0.571	
V14.		0.479	
V21.			0.523
V22.			0.549
V23.			0.596
V24.			0.658
V25.			0.611
V26.			0.505
V27.			0.737
V28.			0.718
V29.			0.799
V30.			0.778
V31.			0.726
V32.			0.943
V33.			0.863
V34.			0.670
V35.			0.797

The model was adequate and presented some excellent fit indices: the chi-square was 255.361 (p = 0.999990) [84], the GFI 0.983, the AGFI 0.979, the CFI 0.999, and the NNFI 1.010 (Tanaka and Huba, 1985). The RMSR was 0.000, indicating a good fit [39,85,86].

The correlational analysis of the final version of Subscale 4 gave significant results at the 0.05 (bilateral) levels. All factors were correlated: Factor 1–2 r = 0.522, $p < 0.05$ (BC Confidence Interval = 0.455–0.651), Factor 1–3 r = 0.596, $p < 0.05$ (BC Confidence Interval = 0.531–0.685) and Factor 2–3 r = 0.503, $p < 0.05$ (BC Confidence Interval = 0.503–0.730).

3.3. Confirmatory Factor Analysis (CFA)

With the objective of contrasting the models built through EFA for each subscale of the questionnaire, we performed a CFA using M-PLUS.

For Subscale 1, the structure that we constructed from the one obtained in EFA can be seen in Figure 1. This shows that the quadratic correlations between the items and their factor are positive. In terms of the absolute fit measures, the chi-square value was statistically significant (χ^2 = 1592.286, p = 0.0000), and the value of the Root Mean Square Error of Approximation (RMSEA) was 0.001, indicating an excellent fit [64,87,88]. Regarding the incremental fit indices, the Comparative Fit Index (CFI) was 0.891 and the Tucker–Lewis index (TLI) was 0.878, indicating a reasonable model fit [89]. The Weighted Root Mean Square Residual (WRMR) was 1.039, whereby being close to 1 suggests a good

fit [90]. The results obtained through M-PLUS indicate a good fit of the model for Subscale 1 [64,72].

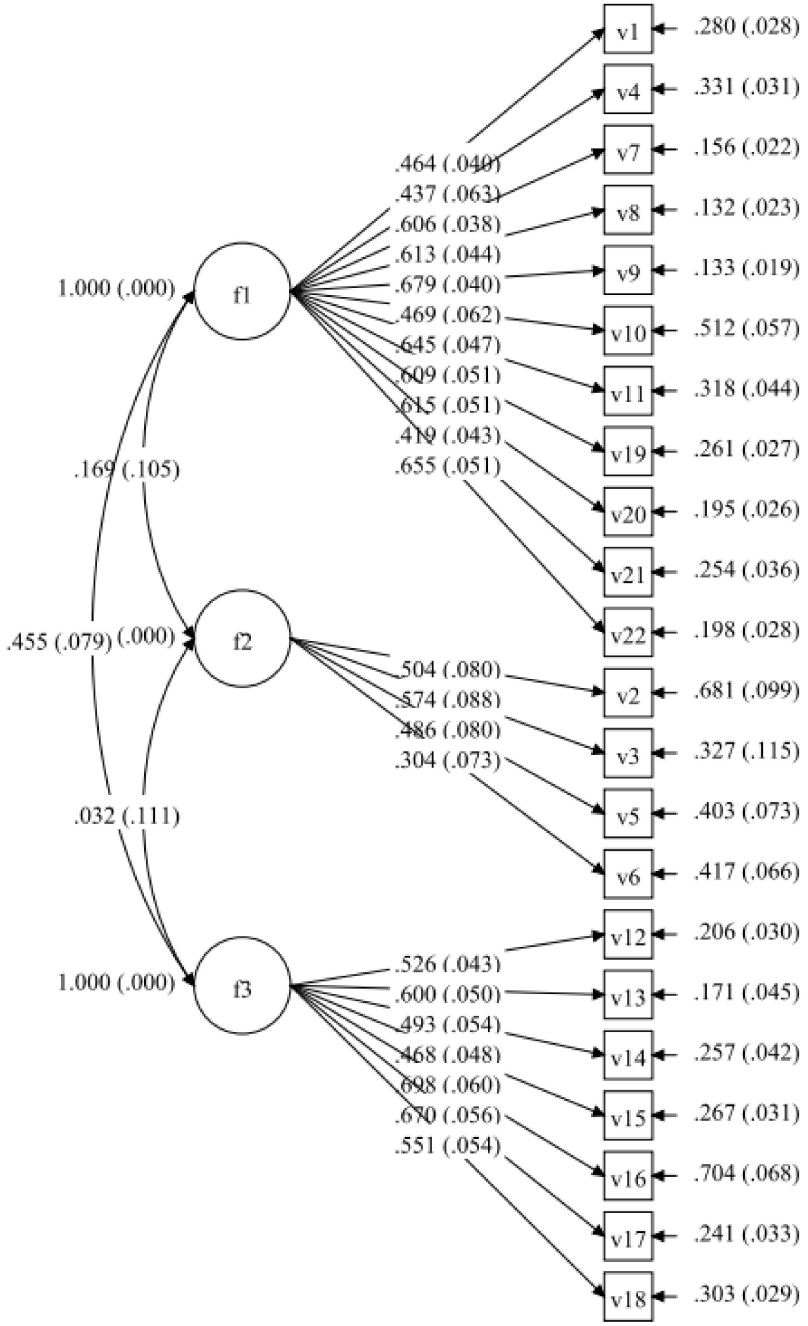

Figure 1. Proposed model. CFA for Subscale 1.

For Subscale 2, the structure that we constructed from that obtained in the EFA was as follows (Figure 2):

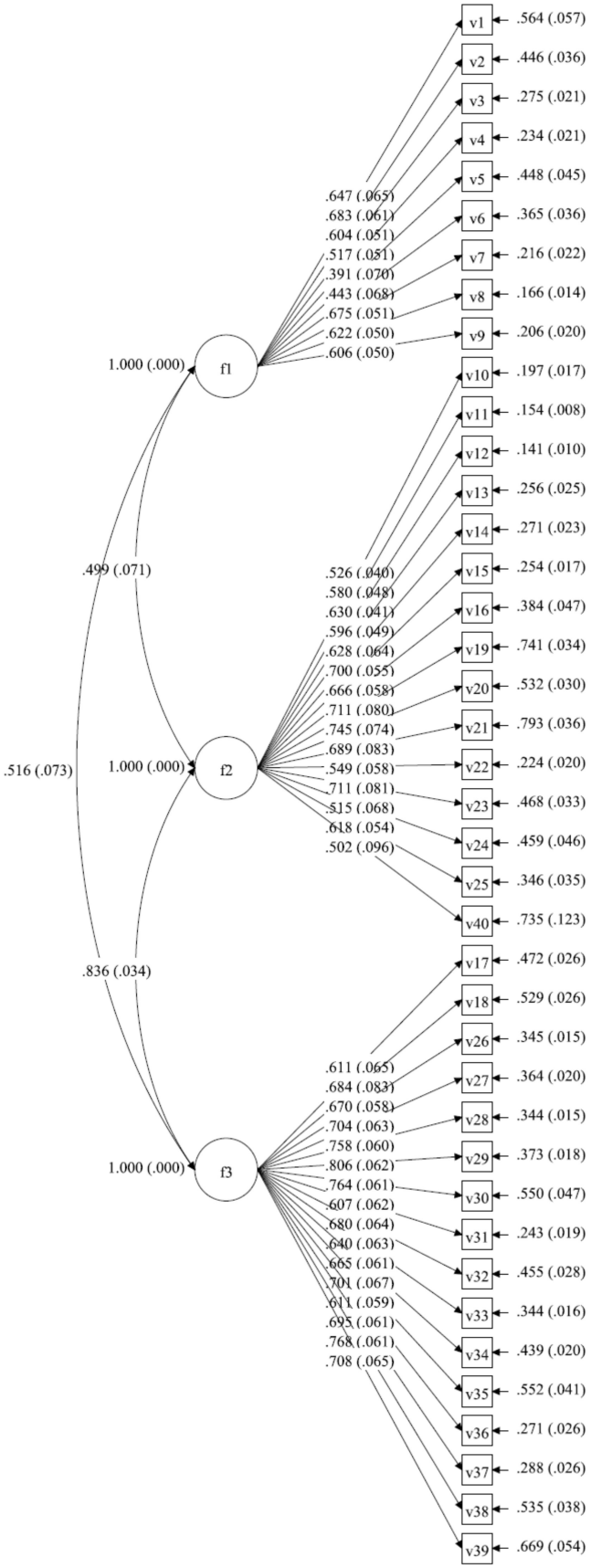

Figure 2. Proposed model. CFA for Subscale 2.

The results of the CFA for Subscale 2 were equally favourable and acceptable [64,72]: the chi-square value was statistically significant (χ^2 = 4158.964, p = 0.0000), while the RMSEA (0.048), SRMR (0.080) and WRMR (1.39) demonstrate the goodness of the model.

For Subscale 3, the structure that we constructed from that obtained in the EFA can be seen in Figure 3. The chi-square value was statistically significant ($p < 0.05$), and RMSEA (0.013), CFI (0.967) and TLI (0.903) indicate a good model fit [64,72].

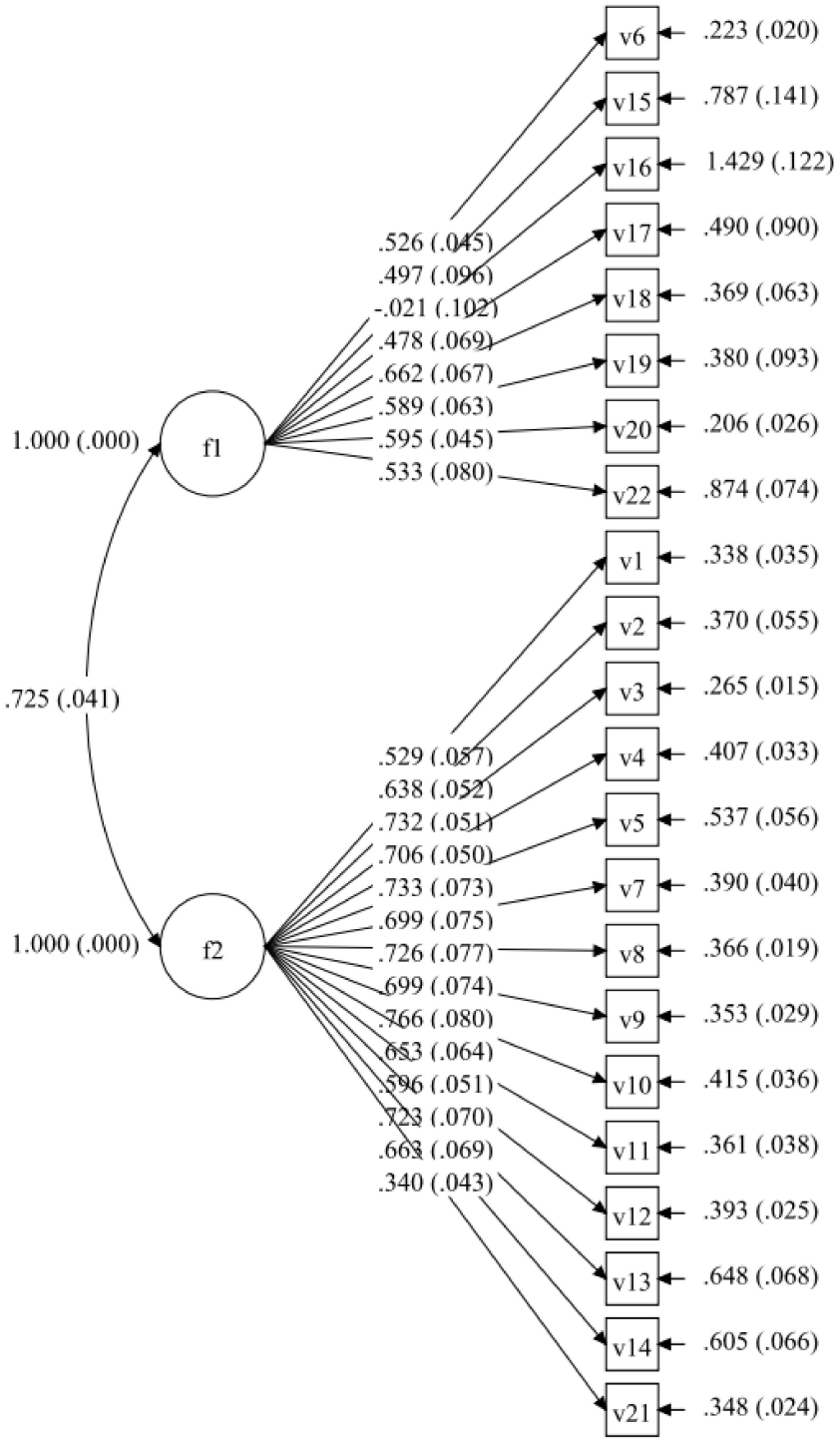

Figure 3. Proposed model. CFA for Subscale 3.

The structure constructed from that obtained in the EFA of Subscale 4 is as follows (Figure 4):

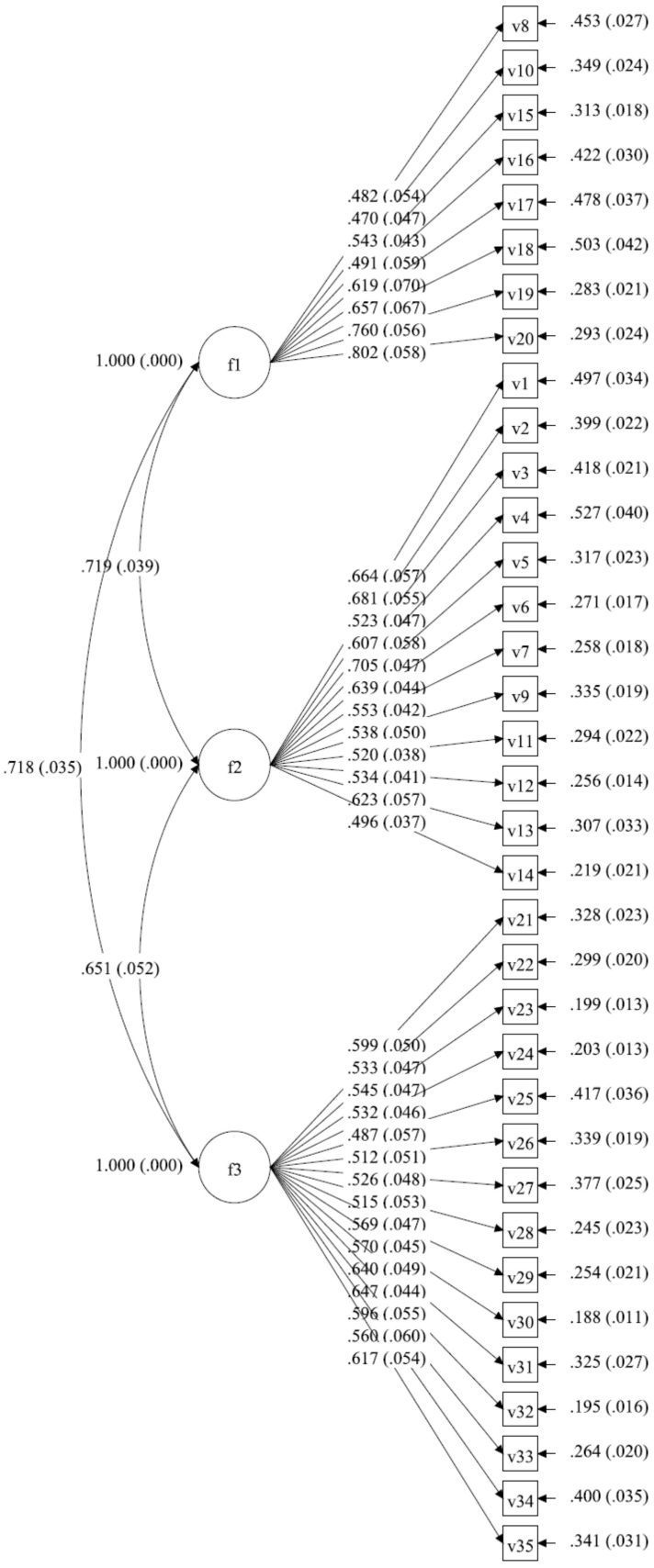

Figure 4. Proposed model. CFA for Subscale 4.

The results of the CFA for the Subscale 4 were favourable and acceptable [64–72]: the chi-square value was statistically significant ($p < 0.05$), RMSEA (0.011), SRMR (0.080), CFI (0.910) and TLI (0.900), demonstrating the goodness of the model.

3.4. Calculation of Reliability (CR)

Internal consistency was determined by using Cronbach's Alpha. Although Cronbach's alpha is the test method most commonly used by social researchers [91,92] show that in the CFA it is important to calculate the CR [93] data for each critical factor. In addition, the CR is considered more suitable than Cronbach's alpha because it does not depend on the number of attributes associated with each concept [94]. In general, the CR value is considered adequate when the value of each factor is greater than or equal to 0.70 [64,95,96], but up to 0.60 is acceptable [97,98].

As can be seen in Table 11, a satisfactory Cronbach's alpha—-values between 0.75 to 0.96—-and CR—-values between 0.66 to 0.95—-was obtained for each of the factors, indicating a good internal consistency of the questionnaire [67,91,92,95,97,98].

Table 11. Internal Consistency of the Instrument.

		Cronbach's Alpha	Composite Reliability
Subscale 1	Factor 1	0.95	0.93
	Factor 2	0.75	0.66
	Factor 3	0.91	0.88
Subscale 2	Factor 1	0.92	0.90
	Factor 2	0.96	0.94
	Factor 3	0.96	0.95
Subscale 3	Factor 1	0.92	0.76
	Factor 2	0.95	0.94
Subscale 4	Factor 1	0.91	0.88
	Factor 2	0.94	0.92
	Factor 3	0.95	0.94

4. Discussion and Conclusions

The main aim of the study was to test whether the "Demands and Potentials of ICT and apps for attending to people with autism" questionnaire (DPTIC-AUT-Q) was a suitable instrument for measuring different professionals' opinions on the potential and uses of ICT and apps, and their training in them, for working with people with functional diversity, in general, and autism in particular. There are no previous instruments similar to this one, thus no comparison of the psychometric values could be carried out. However, Subscale 1, which is more generic in nature, was constructed from other scales [10,45,61,63]. Below, therefore, we provide a justification for the decisions adopted in its validation. These decisions have been assessed in other studies on instrument validation and have been put forward by experts.

The instrument was subjected to validation by a panel of experts, and using EFA and CFA. Considering that they belong to different professional fields, the views of the expert panel gave greater validity and strength to the process of this study, contributing to the rigour of the questionnaire [73]. Following the analysis of the qualitative evaluations, through the comments and suggestions of the assessing experts for each item and for the questionnaire as a whole, the quantitative results were analysed. These were produced through the analysis of the mean with regard to clarity, coherence, relevance and objectivity of the item interpreted. In terms of modifying the wording or of deleting the proposed item, we took into account whether the item presented a mean that was equal or higher than 1.5 in clarity and/or coherence, and a score higher than 1.5 in standard deviation [99]. None of the 125 items was eliminated. The inter-rater reliability was excellent for ICC values above 0.750 [75] and had a significant Kendall's W. We can therefore conclude that there is

significant agreement between the ranges assigned by the experts for all the questionnaire subscales, and that the instrument has content validity.

Regarding construct validity, before carrying out the EFA, five items were removed due to their indices of skewness and kurtosis higher than −2.5 and 2.5 [77]. Following the EFA, item saturation problems were only observed in Subscale 3—-specifically, in Item VII.7, which did not obtain a statistically significant saturation, and it was therefore removed. The definitive version of the questionnaire has 119 items divided into four subscales (see Appendix A: final version).

The factorial structure of Subscale 1 maintained the three original dimensions, extracting three factors, although, as can be seen in Appendix A, some items have better saturation in another dimension: "Opinion", "Requirements and possibilities" and "ICT training for functional diversity". The validity of this structure was subsequently corroborated the CFA, with excellent model goodness-of-fit indices [64,72].

For Subscale 2, the EFA revealed a structure with three latent factors, which corresponded with the three established dimensions: "Training for autism", "Benefits of ICT for autism", and "Uses of ICT for autism". This was corroborated by the CFA, showing adequate model goodness-of-fit values [64,72].

Subscale 3 comprised two factors, coincident with the two dimensions: "Benefits of Apps for Autism" and "Uses of Apps in Autism". Confirmatory procedures demonstrated an adequate fit of the proposed model [64,72].

Lastly, the factorial structure of Subscale 4 comprised three factors, subdividing Dimension IX on the possibilities of specific aims for people with autism into two: "Functionality" and "Applicability". Dimension X, on "Uses of specific apps for autism" (Factor 3) was maintained. This structure was corroborated by the CFA, showing adequate goodness-of-fit values [64,72].

Regarding the internal consistency, the results obtained were satisfactory in terms of Cronbach's alpha coefficients and the CR for all factors, and can be considered highly reliable [64,91,92,95,97,98]. Only Factor 2 of Subscale 1 obtained lower values in both coefficients, albeit within acceptable limits [97,98].

The results demonstrate that the questionnaire—DPTIC-AUT-Q—has satisfactory psychometric quality. We can therefore conclude that, according to the empirical evidence, it can be used with guarantees in similar conditions to those presented here. Having established the instrument's validity, through the empirical evidence corroborated here, its approach and undertaking should be highlighted. It covers all the knowledge expected of a professional from the area of care for diversity and, more specifically, of autism. Throughout the design of the questionnaire, we have looked at those areas in which people with functional diversity and autism have the greatest difficulty and, therefore, greater reinforcement, effort and work, encompassing not only the teacher but specialists from formal, non-formal and healthcare contexts. Most of the national and international instruments we have examined do not specifically analyse the needs and characteristics of people with autism, nor the benefits apps offer them. Therefore, this questionnaire not only considers the requirements and uses derived from using ICT for people with functional diversity, but also examines those with autism and the apps aimed at them, unlike the previous studies we have reviewed.

In terms of limitations, we should point out that the selection of the participants was neither random nor probabilistic, and the final sample size was small, as there were fewer professionals than expected who met the inclusion criteria and worked with people with autism. Another limitation concerns the type of cross-sectional design: carrying out the survey at one single moment in time does not make it possible to verify the questionnaire's test–retest reliability. Another of the limitations is related to the geographical context of the participants, who are all residents of the city of Granada (Spain). In future studies, the application of the questionnaire should be expanded to other Spanish cities to confirm the results obtained here. A further limitation concerns the experts selected, as all of them belonged to the area of higher education and educational guidance teams, while specialists from

non-formal education and healthcare were not considered. The instrument's refinement through the different procedures outlined here make it both possible and recommendable to use it in other studies in order to replicate, validate and generalize its uses in other Spanish-speaking contexts.

Finally, we should mention the practical implications of applying DPTIC-AUT-Q. Its use will help improve the initial and lifelong training of the different professionals who work with people with functional diversity, and particularly with people with autism. It will also guide engineers and programmers to create technological products that are adapted to the needs and possibilities (suitable, functional and accessible) of these collectives.

5. Patents

The questionnaire has been registered in the Territorial Registry of Intellectual Property of Andalusia (Spain) under the title: "Demands and potential of ICTs and apps for the care of people with autism (DPTIC-AUT-Q)". Application Reference: RTA-2276-21. Request identifier: 750120.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Human Research Ethics Committee of the University of Granada (Spain) [2002/CEIH/2021 approved in February 2021].

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Final version of the questionnaire, "Demands and potentials of ICT and apps for assisting people with autism" (DPTIC-AUT-Q) ["Demandas y potencialidades de las TIC y las apps para la atención a personas con autism" (DPTIC-AUT-Q)].

For each statement, mark the box corresponding to your degree of agreement, according to your personal and/or professional criteria, based on the following scale [Marque para cada afirmación la casilla correspondiente a su grado de acuerdo, según su criterio personal y/o profesional, en base a la siguiente escala]:
1. Strongly disagree [Completamente en desacuerdo]
2. Disagree [En desacuerdo]
3. Neither agree nor disagree [Ni de acuerdo ni en desacuerdo]
4. Agree [De acuerdo]
5. Strongly agree [Completamente de acuerdo]

SUBSCALE 1. Opinion, Training and Uses of ICT by Professionals for Assisting People with Functional Diversity [SUBESCALA 1. Opinión, Formación y Usos de las TIC Por Parte del Profesional Para Atender a Personas con Diversidad Funcional]								
Dimension 1: Opinion [Dimensión 1: Opinión]								
Nº Initial Item [Nº Ítem inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***ICT for People with Functional Diversity . . . [Las TIC Para Personas con Diversidad Funcional . . .]***	**Scale [Escala]**				
				1	***2***	***3***	***4***	***5***
I.1.	V1.	1.	Improve the competences of the teacher [Mejoran las competencias del docente]					
I.6.	V4.	2.	Require advice on the search for, selection and evaluation of ICT resources for the teaching-learning process [Requieren asesoramiento sobre la búsqueda, selección y evaluación de recursos TIC para el proceso de enseñanza-aprendizaje]					
I.9	V7.	3.	Provide greater flexibility in the teaching-learning process [Aportan mayor flexibilidad en el proceso de enseñanza-aprendizaje]					
I.10.	V8.	4.	Make it possible to meet educational needs [Permiten responder a las necesidades educativas]					
I.11.	V9.	5.	Are easy to use in attending to diversity [Son fáciles de utilizar en el ámbito de la atención a la diversidad]					
I.12	V10.	6.	Enable inclusion [Favorecen la inclusión]					
II.13	V11.	7.	Offer multiple opportunities in attending to diversity [Ofrecen múltiples oportunidades en el ámbito de la atención a la diversidad]					
III.21	V19.	8.	Improve performance and efficacy [Mejoran el rendimiento y la eficacia]					
III.22	V20.	9.	Increase motivation in learning [Aumentan la motivación hacia el aprendizaje]					
III.25	V21.	10.	Make access to information possible [Posibilitan el acceso a la información]					
III.26	V22.	11.	Make it possible to achieve aims in a more flexible way [Permiten alcanzar los objetivos de forma más flexible]					
Dimension 2: Requirements and Possibilities [Dimensión 2: Requerimientos y Posiblidades]								
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***Demands and Necessities of ICT for Assisting People with Functional Diversity . . . [Demandas y Necesidades de las TIC Para Atender a Personas con Diversidad Funcional . . .]***	**Scale [Escala]**				
				1	***2***	***3***	***4***	***5***
I.2.	V2.	12.	They require greater commitment and effort in my work [Exigen mayor dedicación y esfuerzo en mi labor]					
I.3.	V3.	13.	They require specific training [Requieren formación específica]					
I.7.	V5.	14.	They need more material means and investment by management [Precisan mayores medios materiales e inversión por parte de la Administración]					
I.8.	V6.	15.	They help give more attention to diversity [Ayudan a prestar una mejor atención a la diversidad]					
II.14.	V12.	16.	I would know how to choose specific ICT according to their needs [Sabría seleccionar TIC específicas en función de sus necesidades]					
Dimension 3: Training in ICT for Functional Diversity [Dimensión 3: Formación TIC para Diversidad Funcional]								
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***ICT Training of Professionals for Assisting People with Functional Diversity . . . [Formación TIC del Profesional Para Atender a Personas con Diversidad Funcional . . .]***	**Scale [Escala]**				
				1	***2***	***3***	***4***	***5***
II.15.	V13.	17.	I know the main limitations that can condition its use [Conozco las principales limitaciones que pueden condicionar su uso]					
II.16.	V14.	18.	I know different internet sites where I can find specific resources [Conozco diferentes lugares de Internet donde poder localizar recursos específicos]					
II.17.	V15.	19.	I know how to design activities with non-specialist educational software [Sé diseñar actividades con software educativo generalizado]					
II.18.	V16.	20.	I feel prepared to help them in the use of technical aids and use of ICT [Me siento preparado para ayudarles en el uso de los apoyos técnicos y utilización de las TIC]					
II.19.	V17.	21.	It makes it easier for me to design and adapt activities [Me facilita el diseño y adaptación de las actividades]					
II.20.	V18.	22.	It helps me to carry out assessment [Me ayudan a realizar la evaluación]					

SUBSCALE 2: Training in and Uses of ICT by Professionals to Assist People with Autism [SUBESCALA 2. Formación y Usos de las TIC Por Parte del Profesional Para Atender a Las Personas con Autismo]								
Dimension 1: Training in ICT for Autism [Dimensión 1: Formación en TIC Para Autismo]								
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***ICT Training of Professionals for Assisting People with Autism . . . [Formación TIC del Profesional Para Atender a Personas con Autismo . . .]***	**Scale [Escala]**				
				1	***2***	***3***	***4***	***5***
IV.1.	V1.	23.	I know how to use specific software to create materials [Sé utilizar software específico para realizar materiales]					
IV.2.	V2.	24.	I am capable of making curricular adaptations using ICT [Soy capaz de realizar adaptaciones curriculares usando TIC]					
IV.3.	V3.	25.	They enable me to apply teaching strategies to facilitate their inclusion [Me permiten aplicar estrategias didácticas para facilitar su inclusión]					
IV.4.	V4.	26.	I can describe the main limitations that multimedia materials may contain [Puedo describir las principales limitaciones que pueden contener los materiales multimedia]					
IV.5.	V5.	27.	I know the possibilities of operative systems and browsers for modifying accessibility, speed, font size . . . [Conozco las posibilidades de los sistemas operativos y los navegadores para modificar la accesibilidad, la velocidad, el tamaño de la letra . . .]					
IV.6	V6.	28.	I know what difficulties that may arise for them in its use [Conozco las dificultades que les pueden surgir en su uso]					
IV.7	V7.	29.	I consider myself competent at locating specific materials on the web [Me considero competente para localizar en la red materiales específicos]					
IV.8	V8.	30.	I know what possibilities ICT offer them [Conozco las posibilidades que las TIC le ofrecen]					
IV.9	V9.	31.	I feel prepared to help them with the use of technological aids and their use [Me siento preparado para ayudarles con el uso de los apoyos tecnológicos y su utilización]					
Dimension 2: Benefits of ICT for Autism [Dimensión 2: Beneficios de las TIC Para Autismo]								
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***ICT for People with Autism . . . [Las TIC Para Personas con Autismo . . .]***	**Scale [Escala]**				
				1	***2***	***3***	***4***	***5***
V.10.	V10.	32.	It increases motivation [Incrementan la motivación]					
V.11.	V11.	33.	It supports learning [Apoyan el aprendizaje]					
V.12.	V12.	34.	It improves learning [Mejoran el aprendizaje]					
V.13.	V13.	35.	It facilitates independent learning [Facilitan el aprendizaje autónomo]					
V.14.	V14.	36.	It increases active participation [Aumentan la participación activa]					
V.15.	V15.	37.	It strengthens memory [Refuerzan la memoria]					
V.16.	V16.	38.	It improves attention [Mejoran la atención]					
V.19.	V19.	39.	It provides capabilities for relating with others [Aportan capacidades para relacionarse con los demás]					
V.20.	V20.	40.	It helps recognize emotions in others [Ayudan al reconocimiento de emociones en los demás]					
V.21.	V21.	41.	It helps to understand symbolic play [Ayudan a entender el juego simbólico]					
V.22.	V22.	42.	It increases skills linked to vocabulary acquisition [Incrementan habilidades vinculadas a la adquisición de vocabulario]					
V.23.	V23.	43.	It develops oral language in people with autism [Desarrollan el lenguaje oral en personas con autismo]					
V.24.	V24.	44.	It helps to ask for something in an instrumental way [Ayudan a pedir algo de modo instrumental]					
V.25.	V25.	45.	It enhances skills linked to reading and writing [Incrementan habilidades vinculadas a la lectura y escritura]					
VI.40.	V40.	46.	It promotes leisure and entertainment [Fomentan el ocio y entretenimiento]					
Dimension 3: Uses of ICT for Autism [Dimensión 3: Usos de las TIC en Autismo]								
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***Uses of ICT for People with Autism . . . [Usos de las TIC Para Personas con Autismo . . .]***	**Scale [Escala]**				
				1	***2***	***3***	***4***	***5***
V.17.	V17.	47.	To facilitate the perception of time [Facilitar la percepción del tiempo]					
V.18.	V18.	48.	To enhance communicative and social skills [Favorecer las destrezas comunicativas y sociales]					
VI.26.	V26.	49.	To develop communication [Desarrollar la comunicación]					
VI.27.	V27.	50.	To develop oral language [Desarrollar del lenguaje oral]					
VI.28.	V28.	51.	To develop understanding of emotions [Desarrollar la compresión de emociones]					
VI.29.	V29.	52.	To develop the expression of emotions [Desarrollar la expresión de emociones]					
VI.30.	V30.	53.	To manage time [Gestionar el tiempo]					

VI.31.	V31.	54.	To stimulate cognitive development [Estimular el desarrollo cognitivo]					
VI.32.	V32.	55.	To develop autonomy [Desarrollar la autonomía]					
VI.33.	V33.	56.	To carry out tasks related to planning [Realizar tareas relacionadas con la planificación]					
VI.34.	V34.	57.	To carry out tasks related to organization [Realizar tareas relacionadas con la organización]					
VI.35.	V35.	58.	To carry out tasks related to self-regulation [Realizar tareas relacionadas con la autorregulación]					
VI.36.	V36.	59.	To carry out tasks related to memory [Realizar tareas relacionadas con la memoria]					
VI.37.	V37.	60.	To facilitate learning how to read [Facilitar el aprendizaje de la lectura]					
VI.38.	V38.	61.	To facilitate learning how to write [Facilitar el aprendizaje de la escritura]					
VI.39.	V39.	62.	To facilitate learning arithmetic [Facilitar el aprendizaje del cálculo]					

SUBSCALE 3: Uses and Benefits of Apps in Assisting People with Autism [SUBESCALA 3. Usos y Beneficios de las Apps en la Atención de las Personas con Autismo]									
Dimension 1: Benefits of Apps for Autism [Dimensión 1: Beneficios de las Apps Para Autismo]									
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº final Item [Nº Ítem Final]**	***Apps for People with AUTISM . . . [Las Apps Para Personas con Autismo . . .]***	**Scale [Escala]**					
				1	***2***	***3***	***4***	***5***	
VII.6.	V6.	63.	Stimulate cogitive development [Estimula el desarrollo cognitivo]						
VII.11.	V11.	64.	Make it easier to carry out memory-related tasks [Facilita realizar tareas relacionadas con la memoria]						
VII.12.	V12.	65.	Facilitate learning how to read [Facilita el aprendizaje de la lectura]						
VII.15.	V15.	66.	Promote leisure and entertainment [Fomenta el ocio y entretenimiento]						
VIII.16.	V16.	67.	Complement the use of other, traditional means of working (book, blackboard, etc.) [Complementa el uso de otros medios de trabajo tradicionales (libro, pizarra . . .)]						
VIII.18	V17.	68.	Make psychopedagogic intervention more effective [Hace que la intervención psicopedagógica sea más efectiva]						
VIII.19.	V18.	69.	Are a complement for reinforcing what has previously been worked on [Es un complemento para reforzar lo trabajado con anterioridad]						
VIII.20.	V19.	70.	Are a way to consolidate concepts [Es una forma de afianzar conceptos]						
VIII.21.	V20.	71.	Are a motivating tool [Resulta una herramienta motivadora]						
VIII.23.	V22.	72.	Facilitate socialization [Facilita la socialización]						
Dimension 2: Uses of Apps for Autism [Dimensión 2. Usos de las Apps en Autismo]									
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***Uses of Apps for People with Autism . . . [Usos de las Apps Para Personas con Autismo . . .]***	**Scale [Escala]**					
				1	***2***	***3***	***4***	***5***	
VII.1.	V1.	73.	To develop communication [Desarrollar la comunicación]						
VII.2.	V2.	74.	To develop oral language [Desarrollar del lenguaje oral]						
VII.3.	V3.	75.	To develop understanding of emotions [Desarrollar la compresión de emociones]						
VII.4.	V4.	76.	To develop expression of emotions [Desarrollar la expresión de emociones]						
VII.5.	V5.	77.	To manage time [Gestionar el tiempo]						
VII.7.	V7.	78.	To develop autonomy [Desarrollar la autonomía]						
VII.8.	V8.	79.	To carry out tasks related to planning [Realizar tareas relacionadas con la planificación]						
VII.9.	V9.	80.	To carry out tasks related to organization [Realizar tareas relacionadas con la organización]						
VII.10.	V10.	81.	To carry out tasks related to self-regulation [Realizar tareas relacionadas con la autorregulación]						
VII.13.	V13.	82.	To facilitate learning how to write [Facilitar el aprendizaje de la escritura]						
VII.14.	V14.	83.	To facilitate learning arithmetic [Facilitar el aprendizaje del cálculo]						
VIII.22.	V21.	84.	To hold attention for longer time [Mantener la atención durante más tiempo]						

SUBSCALE 4: Uses and Possibilities of Specific Apps for People with Autism [SUBESCALA 4. Usos y Posibilidades de las Apps Específicas Para las Personas con Autismo]									
Dimension 1: Functionality [Dimensión 1: Funcionalidad]									
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***Functionality of Specific Apps for People with Autism . . . [Funcionalidad de las Apps Específicas Para Personas con Autismo . . .]***	**Scale [Escala]**					
				1	***2***	***3***	***4***	***5***	
IX.8.	V8.	85.	They enable universal accessibility (changes in font size, colour, graphic elements, etc.) [Permiten una accesibilidad universal (cambios del tamaño de letra, en el color, en los elementos gráficos, . . .)]						
IX.10.	V10.	86.	They function correctly [Funcionan correctamente]						
IX.15.	V15.	87.	They respect the pace of learning [Respetan el ritmo de aprendizaje]						
IX.16.	V16.	88.	They enable the user to add personalized images or pictograms [Permiten al usuario añadir imágenes o pictogramas personalizados]						
IX.17.	V17.	89.	They specify the age they are designed for [Especifican la edad a la que van destinadas]						
IX.18.	V18.	90.	They are available in several languages [Están disponibles en varios idiomas]						
IX.19.	V19.	91.	They track the user's progress [Realizan un seguimiento del trabajo]						
IX.20.	V20.	92.	They facilitate assessment and user progress tracking [Facilitan la evaluación y seguimiento del usuario]						
Dimension 2: Applicability [Dimensión 2: Aplicabilidad]									
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***Applicability of Specific Apps for People with Autism . . . [Aplicabilidad de las Apps Específicas Para Personas con Autismo . . .]***	**Scale [Escala]**					
				1	***2***	***3***	***4***	***5***	
IX.1.	V1.	93.	They can be found easily on Google Play or the App Store [Se encuentran con facilidad en Google Play Store o en App Store]						
IX.2.	V2.	94.	They are available on smartphones [Están disponibles para móvil]						
IX.3.	V3.	95.	They are available on tablets [Están disponibles para Tablet]						
IX.4.	V4.	96.	There are many of them [Son numerosas]						
IX.5.	V5.	97.	They are varied in terms of subject area (emotions, communication, time management, etc.) [Son variadas en cuanto a temática (emociones, comunicación, gestión del tiempo . . .)]						
IX.6.	V6.	98.	They include tasks that respond to their needs [Contienen tareas que responden a sus necesidades]						
IX.7.	V7.	99.	Their design is adapted to their characteristics [Tienen un diseño que se adapta a sus características]						
IX.9.	V9.	100.	They offer different codes of communication (visual, auditory) [Presentan diferentes códigos de comunicación (visual/auditivo)]						
IX.11.	V11.	101.	They are intuitive and easy to use [Son intuitivas y fáciles manejar]						
IX.12.	V12.	102.	They present their content in a clear and intuitive way [Presentan los contenidos de forma clara e intuitiva]						
IX.13.	V13.	103.	They specify what content they include [Especifican qué contenidos incluyen]						
IX.14.	V14.	104.	They include suitable content [Incluyen contenidos adecuados]						
IX.21.	V21.	105.	They offer a controllable environment and situation [Ofrecen un entorno y situación controlable]						
Dimension 3: Uses of Specific Apps for Autism [Dimensión 3: Usos de las Aplicaciones Específicas Para Autismo]									
Nº Initial Item [Nº Ítem Inicial]	**Nº EFA Item [Nº Ítem AFE]**	**Nº Final Item [Nº Ítem Final]**	***Uses of Specific Apps for People with Autism . . . [Usos de las Apps Específicas Para Personas con Autismo . . .]***	**Scale [Escala]**					
				1	***2***	***3***	***4***	***5***	
X.22.	V22.	106.	Work on the area of emotions in a suitable way [Trabajar el ámbito de las emociones de forma adecuada]						
X.23.	V23.	107.	Work on the area of oral language in a suitable way [Trabajar el ámbito del lenguaje oral de forma adecuada]						
X.24.	V24.	108.	Work on the area of communication in a suitable way [Trabajar el ámbito comunicativo de forma adecuada]						
X.25.	V25.	109.	Work on the area of leisure and entertainment in a suitable way [Trabajar el ámbito del ocio y entretenimiento de forma adecuada]						
X.26.	V26.	110.	Work on autonomy in a suitable way [Trabajar la autonomía de forma adecuada]						
X.27.	V27.	111.	Work on time management in a suitable way [Trabajar la gestión del tiempo de forma adecuada]						
X.28.	V28.	112.	Work on cognitive stimulation in a suitable way [Trabajar la estimulación cognitiva de forma adecuada]						
X.29.	V29.	113.	Work on planning in a suitable way [Trabajar la planificación de forma adecuada]						
X.30.	V30.	114.	Work on organization in a suitable way [Trabajar la organización de forma adecuada]						
X.31.	V31.	115.	Work on self-regulation in a suitable way [Trabajar la autorregulación de forma adecuada]						

X.32.	V32.	116.	Work on memory development in a suitable way [Trabajar el desarrollo de la memoria de forma adecuada]						
X.33.	V33.	117.	Work on learning how to read in a suitable way [Trabajar el aprendizaje de la lectura de forma adecuada]						
X.34.	V34.	118.	Work on learning how to write in a suitable way [Trabajar el aprendizaje de la escritura de forma adecuada]						
X.35.	V35.	119.	Work on learning arithmetic in a suitable way [Trabajar el aprendizaje del cálculo de forma adecuada]						

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