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DESIGN AND VALIDATION OF QUESTIONNAIRE ON INCLUSIVE PRACTICES WITH TECHNOLOGICAL RESOURCES AT UNIVERSITY

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ABSTRACT

The main objective of this study is to design and validate a quantitative questionnaire. The instrument aims to obtain information, from the perspective of university students with disabilities, on the impact of technological resources on educational inclusion in Higher Education. The methodology is descriptive and correlational. Based on an initial design of the questionnaire, a content validation was carried out by means of expert judgement, improvements were applied and it was distributed to a sample of 110 university students with disabilities from six Andalusian public universities. After this, statistical validation tests of internal consistency and construct validity were carried out. As general conclusions, the expert judgement provided a positive evaluation of the content, highlighting its overall appropriateness and relevance to the research setting.

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1. Introduction

The creation of inclusive learning environments for vulnerable students, such as students with disabilities, is a central issue in current discourses and debates (Perelmutter et al., 2017). Currently, universities globally face the challenge of ensuring educational inclusion in Higher Education (HE) by providing the necessary resources for students with disabilities to access and fully participate in their studies (Perera et al., 2023).

The percentage of enrolment of this group has increased in recent years (Majoko, 2018). According to the latest report by the Universia Foundation (2023), in the academic year 2021/2022, Spanish universities had a total of 22,156 students with disabilities, representing 1.6% of the total student population (1,386,981). However, despite numerous legal, academic and institutional efforts aimed at guaranteeing access, permanence and completion of studies by these students, the reality does not always reflect these advances (Perera et al., 2023).

Students with disabilities attending HE institutions face situations of greater vulnerability in their academic performance compared to their non-disabled peers (Orozco et al., 2024). This situation is due to the barriers they encounter in their educational environment, which hinder their academic trajectory and even lead to academic dropout (Majoko, 2018). These barriers include negative attitudes, social challenges and environmental constraints, which are a result of the social structure and not the students' disabilities (Zaks, 2023). From this perspective, the social model of disability is accepted, which argues that disability is a consequence of the social context rather than personal limitations (Barton, 2018). This approach highlights the importance of addressing social and environmental barriers to facilitate effective inclusion and enhance the educational experience of students with disabilities (Majoko, 2018).

Research has identified factors that contribute to the success of students with disabilities in staying in school and completing their studies (Moriña & Biagiotti, 2022; Moriña & Martins, 2024; Orozco *et al.*, 2024). Issues such as accessible spaces, diversity-trained teachers, adjusted assessments and diverse methodologies are essential factors that influence academic success (Bjørnerås et al., 2023*;* Moriña & Orozco, 2022). In this line, several studies (Perera & Moriña, 2019) highlight the use of emerging technologies as a key element for the academic performance of university students with disabilities (Cotán et al., 2024).

In recent years, the use of emerging technologies in university classrooms has grown considerably and institutions are investing more resources to improve the accessibility of their digital content (Belenkova et al., 2022). Educational technology has transformed the way students learn and interact in the classroom (Dalsen, 2017). Online learning modalities, such as e-learning and m-learning, facilitate overcoming barriers and provide opportunities for more inclusive and equitable education (Perera et al., 2023).

Numerous studies have shown that the development of inclusive practices based on principles of accessibility and digital design facilitate inclusion, participation and access to content through diverse knowledge pathways for all learners, especially those with disabilities (Perera & Moriña, 2019). When technology resources are used effectively, and are flexible and compatible with assistive technologies, students with disabilities can experience many benefits (Sánchez Díaz et al., 2022).

Increasingly, students with disabilities are choosing online or technology-supported education, considering it more flexible, accessible and favourable to their psychoemotional well-being (Reyes et al., 2023). In this sense, face-to-face HE institutions cannot remain on the sidelines of this fact and must incorporate these resources into their academic and training programmes and plans (Singh *et al.*, 2024). In fact, previous research (Perera-Rodríguez & Moriña, 2019; Perera et al., 2023) indicates that an increasing number of universities are integrating technologies into their teaching modalities, both face-to-face and virtual.

The use of emerging technologies allows the recreation of learning scenarios that remove physical barriers and expand opportunities for academic and social participation (Chambers, 2020; Ibáñez-López et al., 2022; Perera & Moriña, 2019). In addition, it promotes active learning, autonomy, self-determination and motivation, which contributes to improving the process of educational inclusion (Mwantimwa, 2021), removing barriers and opening new opportunities for access to knowledge, thereby improving students' academic outcomes (Cotán et al., 2024). This learning environment enables non-traditional learners, such as students with disabilities, to personalise their educational process. It also allows their equal participation in all learning spaces, ensuring a quality educational experience

(Perera & Moriña, 2019). Thus, the digital context not only welcomes the diversity of students and their needs, but also fosters a sense of belonging, enhancing their overall learning experience (Perera & Moriña, 2019). From this reality, some questions arise such as: Could the use of technological media be a key to implementing inclusive pedagogy? How do teachers use new technologies in their classrooms to foster inclusive learning? Not many research instruments have been created to collect this information (García and López, 2012; Medina-García *et al.*, 2021; Pegalajar Palomino, 2015; Valenzuela *et al.*, 2020) and, specifically, in students with disabilities in HE. Thus, in order to answer these questions, this study addresses the validation of a questionnaire focused on analysing, from the perspective of university students with disabilities, the impact of technological resources on their learning and, furthermore, how these resources allow the design of inclusive educational practices to be promoted and implemented.

2. Methodology

The methodology selected for this study is descriptive and correlational, based on the quantitative method. The aim is to design and validate a quantitative questionnaire, called "EvalTech-Visión" (with registration number 04/2024/4913 in the intellectual property of the Ministry of Culture of the Government of Spain and in the Andalusian Government), which aims to obtain information, from the perspective of university students with disabilities, about the impact of technological resources on educational inclusion in the field of HE. The instrument addresses the extent to which technological resources facilitate the learning of students with disabilities. It also explores the role of teachers in the design and development of inclusive educational practices through the use of technological resources. These questionnaires (extended version and abridged version) are attached in the annexes to this article.

The questionnaire consists of five different blocks of questions. The first block collects information on *"Socio-demographic data"*.

The second block is called *"Characteristics of the inclusive teacher"*, and is composed of 11 questions that collect information on the qualities of the inclusive teacher, as considered by university students with disabilities. This block combines multiple choice questions, yes/no questions and some short answer questions.

The third block of the questionnaire is *"Technological resources and inclusive learning at university"*. It consists of 16 Likert-type questions, with a scale from 1 to 4, where 1 is "do not agree at all" and 4 is "strongly agree". It includes a final open-ended question in case you would like to add any additional information of interest. The questions in this section focus on how technological resources for inclusion are incorporated into university practices and on assessing the accessibility and impact of these technological resources used at the university.

The fourth section, entitled "*Methodologies and technological resources for inclusion"*, examines in more detail the use of technological resources (tools and software) at the university to improve the teaching-learning processes of students with disabilities. It is made up of 11 Likert-type questions, with a scale from 1 to 4, 1 being "do not agree at all" and 4 being "strongly agree", and four short answer questions.

The fifth and last block, *"The university and inclusion based on technologies"*, includes 13 Likert-type questions, with a scale from 1 to 4, with 1 being "do not agree at all" and 4 "totally agree", a Yes/No question and some short answer questions. This section explores in depth the technological resources offered by the university to promote inclusive education.

2.1. Initial Design of the Questionnaire

In the phase prior to the construction of the first model of the questionnaire, an exhaustive review of the scientific literature on the subject addressed in this research was carried out, selecting especially research works that had used instruments for collecting information of high interest to find out the impact of technological resources on the educational inclusion of people with disabilities at the University.

The previous reference studies consulted were the following: Alonso *et al.* (2020), Fernández & Bermejo (2013), Fernández de la Iglesia et al. (2016), García & López (2012), Ibáñez-López et al. (2022), Pegalajar Palomino (2015), Prestridge (2012), Roig-Vila et al. (2015), Sáez (2010), Sánchez et al. (2012),

Suriá (2011), Tejedor et al. (2009) and Valenzuela et al. (2020). Based on these documents that served as inspiration, the research team designed their initial proposal for a questionnaire, which would subsequently be submitted to an expert judgement to validate its content.

2.2. Expert Judgement

An evaluation of the content of the instrument was carried out by means of expert judgement (Cabero-Almenara & Llorente, 2013), seeking reliability and validity. For this purpose, seven professionals with PhDs/experts in diversity, disability and HE were selected. In addition, the selected evaluators are university lecturers (University of Seville, University of Cadiz, University of Almeria and University of Malaga) and have extensive experience in the design of instruments for educational research.

Regarding the sending procedure, each expert evaluator was sent the questionnaire (via e-mail), together with an evaluation rubric for the instrument. The objectives of the study were explained and the necessary instructions for the validation process were provided. Subsequently, responses were obtained from the experts with various aspects for improvement relating to:

- Questionnaire instructions: clarity, appropriateness, length and comprehension.
- Adequacy of the thematic blocks or dimensions of analysis that make up the questionnaire: excellent, good, fair, poor.
- Appropriateness of each question in the questionnaire: excellent, good, fair, poor.
- General comments on the instrument.

The experts returned the evaluation and the research team applied the suggestions for improvement to the questionnaire that were considered appropriate and pertinent, obtaining an improved version of the research instrument.

2.3. Analysis of Internal Consistency and Construct Validity

After the content assessment procedure by expert judgement, the questionnaire was designed and distributed in online format to a sample of 110 university students with disabilities from six Andalusian universities.

The results obtained were subjected to internal consistency and construct validity analyses. In this sense, it should be noted that the statistical tests were only applied to the Likert-type scale responses, due to their exclusively quantitative nature. In total, the results of 40 items divided into three domains or dimensions of analysis were analysed:

- Technological resources and inclusive learning at university (16 questions).
- Methodologies and technological resources for inclusion (11 questions)
- The university and inclusion through technology (13 questions).

Supported by the SPSS statistical data analysis software, internal consistency tests were carried out to measure the degree of homogeneity of the items that form part of the same dimension or construct, and construct validity tests were carried out to assess the degree to which the questionnaire measures the different domains or subscales. A principal component analysis is also carried out, with the intention of identifying sets of variables that correlate with each other and share variability, and the total variance of the set of items is analysed, locating the components that explain the greatest percentage of variance. In this sense, the factor analysis, the correlation matrix between items (including an analysis of the correlation matrix of the rotated components detected with the VARIMAX method) is assessed; the KMO (Kaiser-Meyer-Olkin sampling adequacy) and Barlett's sphericity tests are also carried out.

3. Results

3.1. Expert Validation Data

The seven experts who evaluated the content of the proposed initial questionnaire completed a rubric in which they rated (Excellent, Good, Fair or Poor) aspects related to:

- Questionnaire instructions: clarity, appropriateness, length and comprehension.
- Adequacy of the dimensions analysed.
- Questions in the questionnaire: logical order of presentation of the questions, clarity and level of comprehension in the wording, number of questions, appropriateness of the response options, size of the font used, use of the items to find out the dimensions proposed, appropriateness for the respondents.

- General observations of the questionnaire: relevance of the contents of the questionnaire, effectiveness in providing the required data, achievement of the research objectives.

Table 1. Response rates of the expert judgement (N=7)

		Excellent	Good	Fair	Poor
Questionnaire instructions	Clarity	71%	29%		
	Adequacy	72%	14%	14%	
	Extension	71%	29%		
	Comprehension	57%	43%		
Adequacy of the dimensions analysed	Block 1	57%	43%		
	Block 2	57%	43%		
	Block 3	43%	43%	14%	
	Block 4	71%	29%		
	Block 5	71%	29%		
Questions in the questionnaire	Logical order	29%	71%		
	Clarity and level of understanding	57%	43%		
	Number of questions	43%	57%		
	Adequacy of response options	43%	57%		
	Font size	72%	14%	14%	
	Use of the items to understand the dimensions proposed	57%	29%	14%	
	Appropriateness to the target group	100%			
General comments on the questionnaire	Relevance of content	57%	43%		
	Effectiveness in providing the required data	57%	43%		
	Achievement of objectives	71%	29%		

Source(s): Own elaboration, 2025.

In addition, they made recommendations and suggestions for improvement, such as revising the inclusive language, modifying the wording of some questions, suggesting a change in the order of the questions, including some specific questions, as well as other noteworthy aspects of the instrument as a whole that were evaluated positively.

3.2. Internal Consistency Data

Firstly, the results characterising the sample of participants who answered the questionnaire are presented. A total of 110 university students took part, 54.4% of whom were female and 45.6% male. 5.2% were between 18 and 24 years old, 12.6% between 25 and 34 years old, 15% between 35 and 44 years old, 35.6% between 45 and 54 years old and 31.6% 55 years old or over. The participants in the study have Physical, Mental, Hearing, Visual, a combination of the above or another type of disability or Special Educational Needs. The majority have a Mild disability (55.7%), followed by Moderate (25.9%) and Severe (18.4%). 71.3% have an acquired disability and 28.7% have a congenital disability.

Table 2. Descriptive statistics of the sample (N=110)

Item	Mean	Median	Mode	Standard deviation	Variance
Block 1. Technological resources and inclusive learning in universities					
1	3,05	3	4	1,039	1,080
2	2,64	3	3	1,147	1,316
3	3,04	3	4	1,040	1,081
4	3,43	4	4	,784	,614
5	3,32	3	4	,812	,659
6	3,32	4	4	,877	,769
7	3,22	3	4	,871	,759
8	3,27	4	4	,947	,897
9	3,12	3	4	,984	,968
10	2,71	3	4	1,078	1,162
11	2,52	3	4	1,139	1,298

12	3,55	4	4	,698	,488
13	2,52	2,5	2	1,098	1,206
14	3,43	4	4	,872	,761
15	2,81	3	4	1,161	1,349
16	3,56	4	4	,784	,615
Block 2. Methodologies and technological resources for inclusion					
17	3,47	4	4	,798	,637
18	3,48	4	4	,810	,656
19	3,43	4	4	,735	,541
20	3,33	4	4	,858	,736
21	3,04	3	4	,957	,916
22	3,07	3	4	,993	,985
23	3,15	3	4	,940	,884
24	3,55	4	4	,737	,543
25	3,05	3	4	1,003	1,006
26	3,21	3,5	4	,949	,901
27	1,98	2	1	1,141	1,302
Block 3. The university and inclusion based on technologies					
28	2,68	3	2	1,075	1,155
29	2,80	3	3	1,039	1,079
30	1,72	1	1	,978	,957
31	2,45	2	1	1,201	1,443
32	1,95	1	1	1,214	1,475
33	1,85	1	1	1,148	1,318
34	2,64	3	4	1,239	1,536
35	2,66	3	4	1,273	1,620
36	2,21	2	1	1,150	1,323
37	2,53	2,5	4	1,171	1,371
38	2,58	3	4	1,128	1,273
39	2,71	3	4	1,136	1,291
40	2,92	3	4	1,150	1,324

Source(s): Own elaboration, 2025.

The Cronbach's Alpha coefficient test was then carried out in order to measure the reliability of the different dimensions or blocks of the questionnaire.

Table 3. Descriptive statistics of the sample (N=110)

Domain or subscale	Cronbach's alpha	Mean score	No. of questions
Technological resources and inclusive learning in universities	.845	49,5	16
Methodologies and technological resources for inclusion	.871	34,77	11
The university and inclusion based on technology	.855	31,71	13
Complete questionnaire	.925	115,98	40

Source(s): Own elaboration, 2025.

Specifically, the correlations of the items in each block or domain of the questionnaire were analysed, with the intention of identifying, in each case, which items correlate less with the domain analysed.

Table 4. Correlations by item and subscale "Technological resources and inclusive learning at university"

Item	Scale mean if the item has been deleted	Scale variance if the item has been deleted	Total correlation of corrected items	Cronbach's alpha if the item has been deleted
13	46.98	70.146	.047	.860
15	46.69	72,784	-,097	.870
16	45.94	69,968	.124	.851

Source(s): Own elaboration, 2025.

In Table 4, items 13, 15 and 16 correlate to a lesser extent with the whole of the block "Technological resources and inclusive learning at university". In this sense, it can be seen how, if these items were removed from the questionnaire, Cronbach's alpha result for this domain would increase slightly.

Table 5. Correlations by item and subscale "Methodologies and technological resources for inclusion".

Item	Scale mean if the item has been deleted	Scale variance if the item has been deleted	Total correlation of corrected items	Cronbach's alpha if the item has been deleted
27	32,79	45,635	-,203	.921

Source(s): Own elaboration, 2025.

In Table 5, only item 27 correlates to a lesser extent with the whole block "Methodologies and technological resources for inclusion". In this sense, it can be seen how, if this item were eliminated from the questionnaire, the Cronbach's alpha score for this domain would increase.

Table 6. Correlations by item and subscale "The university and inclusion based on technologies".

Item	Scale mean if the item has been deleted	Scale variance if the item has been deleted	Total correlation of corrected items	Cronbach's alpha if the item has been deleted
34	29,07	87,004	-,307	.895
35	29,05	89,548	-,404	.902

Source(s): Own elaboration, 2025.

In Table 6, items 34 and 35 are the items that correlate to a lesser extent with the whole of the block "The university and inclusion based on technologies ". In this sense, it can be seen how, if these items were eliminated from the questionnaire, the Cronbach's alpha score for this domain would increase slightly.

Finally, if we apply the correlation analysis to the complete questionnaire (40 items), we obtain the following results (Table 7).

Table 7. Correlations by item and complete questionnaire

	Scale mean if the item has been deleted	Scale variance if the item has been deleted	Total correlation of corrected items	Cronbach's alpha if the item has been deleted
13	113,46	421,058	,000	.929
14	112,55	414,690	,192	.926
15	113,17	427,300	-,133	.930
16	112,42	420,979	,021	.927

Source(s): Own elaboration, 2025.

Items 13, 14, 15 and 16 are the items that correlate the least with the questionnaire as a whole. In this sense, it can be observed how, if these items were eliminated from the questionnaire, Cronbach's Alpha score would increase slightly.

3.2. Construct Validity Data

This section of the results analyses the degree to which the questionnaire measures the different domains or dimensions that make up the research instrument. A principal component analysis is carried out, seeking to identify sets of variables that correlate with each other and share variability in order to be grouped together. To do this, the total variance of the set of items is analysed and the components

that explain the greatest percentage of variance are located. In addition, after performing the KMO test (result: .888) and Barlett's sphericity test (result: <.001), a factor analysis is performed, the main components of the questionnaire are detected and the correlation matrix of the rotated components detected with the VARIMAX method is analysed (see Appendix 1).

Table 8. KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy		,888
Bartlett's test of sphericity	Approx. Chi-square	3524,346
	gl	780
	Sig.	<,001

Source(s): Own elaboration, 2025.

Table 9. Analysis of the extraction or principal component analysis

	Initial eigenvalues			**Sums of squared loadings of the extraction**			**Sums of squared rotation loadings**		
Component	**Total**	**% of variance**	**Cumulative %**	**Total**	**Variance %**	**Cumulative %**	**Total**	**Variance %**	**Cumulative %**
1	14,820	37,049	37,049	14,820	37,049	37,049	8,568	21,421	21,421
2	5,500	13,749	50,799	5,500	13,749	50,799	6,111	15,277	36,697
3	2,427	6,068	56,867	2,427	6,068	56,867	4,444	11,110	47,807

Source(s): Own elaboration, 2025.

As we can see, component 1 explains 37% of the variance, component 2 explains 13.7% of the variance and component 3 explains 6% of the variance. These three principal components explain 56.8% of the variance.

There are three principal components, i.e. three groupings of variables. To find out which items belong to these three components we go to the rotated component matrix. Next, we locate the items of the questionnaire that belong to each detected principal component (Table 10).

Table 10. Rotated component matrix

		Component		
	Questionnaire item	**1**	**2**	**3**
Block 1. Technological resources and inclusive learning in universities	**1**	,591	,382	,126
	2	,777	,227	,149
	3	,346	,520	,181
	4	,304	,761	,029
	5	,173	,625	,346
	6	,219	,767	,181
	7	,338	,673	,338
	8	,354	,665	,224
	9	,430	,670	,249
	10	,785	,290	,054
	11	,882	,175	,127
	12	,163	,386	,102
	13	-,157	-,025	,030
	14	-,061	,160	,118
	15	-,300	-,173	,096
	16	-,161	,058	,038
Block 2. Methodologies and technological resources for inclusion	**17**	,179	,338	,131
	18	,207	,512	,276
	19	-,039	,589	,495
	20	,024	,607	,577
	21	,076	,406	,550
	22	,238	,275	,780
	23	,252	,080	,827
	24	,074	,667	,475
	25	,180	,322	,786

	26	,149	,245	,770
	27	-,175	-,465	,077
Block 3. The university and inclusion based on technologies	**28**	,815	,189	,079
	29	,797	,233	,041
	30	,358	,133	,153
	31	,612	,013	,123
	32	,295	,163	,125
	33	,297	,058	,130
	34	-,201	-,086	,013
	35	-,365	,011	-,046
	36	,649	,081	,072
	37	,808	,106	,174
	38	,800	,157	,112
	39	,780	,124	,234
	40	,756	,222	,218

Source(s): Own elaboration, 2025.

4. Discussion

4.1. Expert Judgement

The validation of the information collection instrument by means of expert judgement is a fundamental process to guarantee the reliability and validity of the questionnaire developed for the research (Cabero-Almenara & Llorente, 2013). The results obtained from the evaluation carried out by the seven selected experts offer a valuable contribution both in terms of content validation and qualitative improvement of the instrument in question.

In this sense, the results of the expert judgement reflect a generally positive assessment. Most of the aspects evaluated received "Excellent" or "Good" ratings, indicating a high degree of acceptance of the instrument by the experts. However, some areas were also pointed out as requiring adjustments, which allowed the research team to make relevant modifications to strengthen the questionnaire.

Regarding the questionnaire instructions, the results show that the categories of clarity, appropriateness, length and comprehension were mostly rated as "Excellent" or "Good". In particular, clarity (71% "Excellent" and 29% "Good") and length (71% "Excellent" and 29% "Good") received very positive evaluations, suggesting that the experts consider the instructions to be well formulated and easily understood by the recipients of the questionnaire. However, comprehension of the content received 57% "Excellent" and 43% "Good" ratings, implying a slight variability in the experts' perception of how easily the instructions could be correctly interpreted by the respondents.

The adequacy of the instructions, on the other hand, received 72% "Excellent" ratings, but also 14% "Fair", indicating that while the majority of experts perceived the instructions as adequate, there is a minority who felt that there was still room for improvement. This finding is particularly relevant as it points to the need for specific adjustments to make the instructions more suitable for a diverse audience, which implied modifications in the wording or focus of some parts of the instructions.

In relation to the appropriateness of the dimensions analysed, the ratings reflect a positive consensus, with predominantly "Excellent" or "Good" ratings. Blocks 1, 2, 4 and 5 received 57% or more "Excellent" evaluations, while Block 3 shows a slight decrease with 43% "Excellent", 43% "Good" and 14% "Fair". This implied that, although the general structure of the questionnaire was considered adequate, there was one specific dimension (Block 3) that required further revision. The "Fair" rating in this block indicates that some experts found areas for improvement in the topics covered or in the way they are organised and presented. These observations reinforced the need to consider the suggestions received in terms of reorganisation of the thematic blocks or a better contextualisation of the contents to ensure greater internal coherence of the questionnaire.

With regard to the questions in the questionnaire, aspects such as the logical order of presentation, clarity and level of comprehension in the wording, the number of questions, the appropriateness of the response options, the font size, the use of the items in order to understand the dimensions proposed and the appropriateness for the respondents were addressed.

The most highly rated aspect was the appropriateness to the target group, with a 100% rating of "Excellent", indicating that the questionnaire is clearly aligned with the profile of the target group for which it is intended. This assessment confirms that the instrument is designed in such a way that participants can easily relate to the content, which increases the likelihood of obtaining valid and reliable responses.

However, the logical order of the questions received a more moderate rating, with 29% "Excellent" and 71% "Good", suggesting that, although the order is mostly adequate, it could benefit from reorganisation to further improve the logical sequence of the questions. This assessment is in line with the experts' suggestions for changes in the order of some questions to facilitate greater coherence and flow in the questionnaire response.

In addition, the ratings for "Clarity and level of understanding" (57% "Excellent" and 43% "Good") and "Adequacy of response options" (43% "Excellent" and 57% "Good") are high, although not without room for improvement. In terms of clarity, the experts identified that while the questions are written in an understandable way, some could benefit from more precise or inclusive wording. Similarly, the adequacy of the response options, while well rated, was subject to further review to ensure that all possible responses were adequately covered and relevant to all participants.

The "Use of the items to meet the stated dimensions" scored 57% "Excellent", 29% "Good" and 14% "Fair", suggesting room for improvement in aligning the questions with the specific dimensions they were intended to assess. This result highlighted the importance of reviewing and adjusting the items to ensure that each question was effectively designed to collect relevant information with respect to each dimension of the study.

Overall comments on the questionnaire, including relevance of content, effectiveness in providing the required data and achievement of the research objectives, reflect an overall positive assessment, with ratings of "Excellent" and "Good". These results indicate that the experts consider that the questionnaire effectively meets the research objectives and that its content is relevant and adequate to obtain the required data.

However, specific areas for improvement were identified. The experts' recommendations included revising the inclusive language, which is crucial to ensure that the questionnaire is accessible and respectful of all participants, regardless of their gender or identity. In addition, modifications to the wording of some questions were suggested to improve clarity and accuracy, as well as adjustments to the order of questions to optimise the flow of the questionnaire and the logic of participants' responses.

In summary, the suggestions and comments provided by the experts have been of great value in improving the quality of the instrument. The revision of inclusive language, for example, not only has significant ethical and social implications, but also improves the clarity and acceptability of the questionnaire among participants, promoting more honest and accurate responses. Recommendations on modifying the wording and order of questions were also crucial to ensure that the questionnaire is easy to understand and follow, which can reduce the risk of response bias or confusion.

The expert evaluation has provided a robust validation of the questionnaire, confirming its overall appropriateness while highlighting specific areas for improvement that have already been addressed by the research team. The experts' input has enabled the instrument to be optimised to make it more effective and aligned with the research objectives, thus improving its ability to collect valid and reliable data in the context of HE and attention to diversity and disability. This validation process has strengthened the quality of the instrument and ensured that it is fit for purpose, which is a fundamental step for the success of the study.

4.2. Internal Consistency of the Instrument and Construct Validity

With regard to the descriptive statistics of the sample that answered the questionnaire, it should be noted that both the results obtained for the standard deviation and the variance of the items presented in the instrument are considered sufficient to explain the dispersion of the data. In this sense, understanding that the greater the dispersion, the greater the standard deviation or the variance, it can be seen that the results are not excessively far from the mean scores of each item. This data confirms that there is no significant dispersion around the arithmetic mean.

The Cronbach's alpha test by domains or subscales of the questionnaire were also positive, taking into consideration the scales provided by Cronbach (1951) and Cronbach and Shavelson (2004), where

values between .70 and .90 justify a good internal consistency. The results of our study exceed .845 in all its dimensions or scales, being .925 the result of the test applied to the general questionnaire.

We also analysed the correlations of the items in each block or scale of the questionnaire and, despite having located some items that correlate less with the scale to which they belong in the questionnaire (items 13, 15 and 16 of scale 1; item 27 of scale 2; and items 34 and 35 of scale 3), the statistical results obtained if these items are eliminated are not really relevant.

In this sense, the elimination of these items would mean a minimal increase in the Cronbach's Alpha test results: scale 1 would go from .845 to .86 if item 13 were eliminated; to .87 if item 15 were eliminated; and to .851 if item 16 were eliminated. Considering scale 2, if item 27 were eliminated it would go from .871 to .921. The Cronbach's alpha results for scale 3 show that if item 34 were removed it would increase minimally from .855 to .895 and if item 35 were removed it would increase to .902. This same analysis was applied to the results of the general questionnaire, where it was found that items 13, 14, 15 and 16 correlate the least with the whole. Considering the elimination of these items, the Cronbach's Alpha of the questionnaire would go from .925 to .929; .926; .930; and .927, respectively.

Therefore, after the results obtained in the factor analysis and analysing the correlation matrix, it was decided not to eliminate the proposed items because, according to the minimal increase that would mean dispensing with these questions and taking into account that the initial results are positive Cronbach (1951), it was considered preferable to keep them because of their usefulness in providing relevant information about the impact of technological resources on the educational inclusion of students with disabilities in the field of HE.

Continuing with the in-depth analysis of construct validity, the KMO test and Bartlett's test were carried out, and subsequently the main components of the questionnaire were detected (finding that there are three components that explain 56.8% of the variance, which is sufficient to consider the construct validity acceptable). In this sense, these three differentiated components (one for each block of questions that make up the questionnaire) should present item scores above .05, depending on the block of the instrument to which they belong.

In this case, it became clear that there are relevant aspects for improvement in this sense, since, according to the statistics, there are some items that should belong to other blocks of the instrument. This is a clear indication that the questionnaire can be improved by modifying the inclusion and reorganisation of these items among the three components detected. At this point, and despite having passed previous statistical tests successfully, the changes suggested by the data obtained were applied and a second version of the instrument was generated, consisting of 28 items divided into the three initial blocks of the original questionnaire. The Cronbach's Alpha test was then carried out again, obtaining a certain improvement in the results: scale or block 1 (.959); scale or block 2 (.930); scale or block 3 (.892); and the complete questionnaire (.958).

Both the original questionnaire (40 items) and its reduced version (28 items) can be consulted as complementary material for our work.

5. Conclusions

The aim of this study was to design and validate a quantitative questionnaire in order to obtain information from the perspective of university students with disabilities on the impact of technological resources on their educational inclusion in HE. From the validation process carried out, through a rigorous expert judgement and statistical analysis of internal consistency and construct validity, important conclusions have been reached that highlight both the relevance of the instrument and its ability to meet the proposed research objectives.

The expert judgement provided a positive evaluation of the content of the "EvalTech-Vision" questionnaire, underlining its overall appropriateness and relevance in the research context. The statistical analyses conducted provided robust evidence of the internal consistency of the instrument. The reorganisation of some items, based on the results of the factor analysis, has allowed the creation of a revised version of the questionnaire with 28 items, improving its construct validity and optimising the internal structure of the instrument. This reduced version was also subjected to internal consistency tests, obtaining positive results that validate its use for data collection in future studies.

The development and validation of the EvalTech-Vision questionnaire represents a significant contribution to the field of inclusive education in HE. The instrument allows for a systematic exploration

of how technological resources facilitate the learning of students with disabilities and the role of teachers in designing inclusive educational practices; it is an accessible and effective tool for collecting valid and reliable data in diverse contexts.

The study highlights the importance of rigorous and context-specific tools to address the complex interrelationship between technology, disability, educational inclusion and HE. This work represents an important step forward in promoting inclusive educational practices and contributes significantly to the understanding of the role of technology for people with disabilities in HE.

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Annexes

Annex I

Table 1. Factor analysis. Correlation matrix

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	1																																							
2	,571	1																																						
3	,499	,457	1																																					
4	,456	,440	,566	1																																				
5	,469	,332	,388	,577	1																																			
6	,353	,417	,450	,601	,578	1																																		
7	,544	,456	,497	,561	,666	,581	1																																	
8	,395	,388	,483	,657	,471	,634	,594	1																																
9	,541	,559	,471	,589	,573	,637	,783	,615	1																															
10	,522	,685	,451	,409	,274	,400	,449	,474	,526	1																														
11	,526	,784	,402	,428	,286	,384	,421	,471	,534	,766	1																													
12	,312	,174	,199	,351	,446	,398	,357	,324	,318	,180	,131	1																												

13	-,113	-,184	-,065	-,121	-,053	-,001	-,129	,048	-,100	-,081	-,165	,148	1																											
14	,136	-,109	,074	,133	,273	,120	,166	,124	,101	-,062	-,133	,571	,399	1																										
15	-,204	-,294	-,184	-,222	-,032	-,165	-,167	-,077	-,237	-,257	-,382	,211	,625	,398	1																									
16	-,027	-,137	-,025	,067	,119	,044	,114	-,024	,056	-,151	-,207	,278	,244	,584	,311	1																								
17	,323	,320	,421	,422	,375	,386	,457	,301	,396	,247	,243	,332	-,115	,261	-,070	,201	1																							
18	,361	,408	,437	,540	,532	,493	,630	,461	,515	,320	,324	,351	-,118	,238	-,077	,190	,808	1																						
19	,281	,197	,424	,476	,615	,541	,569	,411	,488	,181	,128	,374	-,004	,342	-,076	,199	,419	,545	1																					
20	,381	,281	,408	,500	,653	,531	,640	,431	,552	,213	,172	,383	-,006	,302	-,056	,201	,415	,616	,794	1																				
21	,339	,330	,450	,444	,469	,423	,551	,303	,444	,233	,243	,217	,026	,157	-,018	,095	,386	,557	,604	,689	1																			
22	,352	,338	,424	,302	,495	,426	,544	,476	,442	,303	,340	,259	,150	,176	,060	,076	,269	,435	,498	,629	,567	1																		
23	,282	,316	,341	,208	,356	,318	,406	,375	,387	,271	,336	,259	,028	,098	,036	,030	,244	,299	,395	,426	,463	,745	1																	
24	,404	,338	,488	,571	,576	,562	,639	,531	,529	,263	,267	,288	,016	,242	-,090	,121	,408	,671	,693	,770	,596	,559	,418	1																

25	,323	,400	,403	,367	,553	,460	,553	,486	,486	,295	,328	,297	-,018	,225	,009	,066	,369	,521	,603	,672	,638	,696	,691	,641	1															
26	,295	,315	,327	,286	,508	,349	,455	,405	,445	,239	,289	,225	,018	,179	,012	,013	,256	,369	,568	,603	,486	,568	,621	,515	,740	1														
27	-,278	-,257	-,378	-,361	-,212	-,361	-,273	-,241	-,390	-,273	-,240	-,114	,205	,045	,364	,094	-,192	-,258	-,111	-,219	-,134	-,072	-,074	-,293	-,143	-,115	1													
28	,525	,694	,495	,446	,359	,332	,418	,419	,435	,680	,750	,152	-,154	-,040	-,336	-,177	,230	,294	,197	,214	,279	,314	,258	,248	,331	,219	-,259	1												
29	,571	,778	,474	,444	,337	,383	,414	,392	,445	,669	,802	,192	-,158	-,138	-,306	-,232	,292	,377	,137	,229	,247	,281	,210	,314	,336	,248	-,313	,756	1											
30	,313	,407	,272	,266	,310	,223	,267	,321	,331	,357	,412	,083	,163	-,019	,065	-,090	,137	,196	,271	,297	,305	,267	,277	,219	,324	,291	,036	,420	,432	1										
31	,414	,587	,369	,269	,198	,227	,237	,366	,358	,507	,631	,036	,035	-,082	-,194	-,235	,224	,235	,090	,121	,233	,257	,287	,189	,291	,294	-,175	,589	,588	,586	1									
32	,300	,396	,321	,262	,294	,272	,313	,282	,250	,375	,342	,052	,052	-,085	-,084	-,194	,155	,181	,238	,208	,349	,261	,231	,223	,341	,263	-,073	,375	,415	,592	,543	1								
33	,237	,391	,304	,202	,276	,192	,270	,180	,259	,277	,367	,067	-,027	-,139	-,110	-,092	,166	,175	,237	,170	,322	,235	,216	,150	,342	,247	-,065	,408	,368	,543	,501	,535	1							
34	-,155	-,262	-,168	-,169	-,103	-,213	-,070	-,266	-,138	-,197	-,288	,066	,146	,213	,200	,194	-,038	-,061	,071	,035	-,004	-,083	-,038	-,048	-,124	-,021	,248	-,287	-,349	-,123	-,356	-,206	-,102	1						
35	-,257	-,355	-,192	-,223	-,100	-,142	-,041	-,182	-,224	-,266	-,385	,036	,126	,197	,316	,182	-,041	-,019	,018	,018	,010	-,089	-,155	-,024	-,079	-,139	,305	-,421	-,398	-,165	-,517	-,200	-,147	,561	1					
36	,420	,600	,354	,307	,292	,288	,339	,393	,359	,538	,659	,083	-,123	-,108	-,286	-,264	,211	,245	,154	,116	,243	,260	,267	,187	,300	,220	-,256	,641	,642	,534	,747	,618	,586	-,397	-,440	1				

37	,474	,725	,399	,412	,353	,344	,435	,448	,455	,646	,763	,077	-,193	-,115	-,323	-,217	,290	,359	,184	,201	,261	,377	,367	,232	,358	,304	-,226	,747	,706	,483	,683	,533	,481	-,297	-,403	,796	1			
38	,474	,640	,381	,412	,277	,377	,420	,442	,483	,600	,777	,041	-,090	-,115	-,363	-,177	,160	,253	,195	,219	,235	,322	,260	,226	,280	,288	-,220	,759	,703	,482	,670	,421	,455	-,274	-,431	,690	,828	1		
39	,519	,657	,405	,399	,360	,388	,380	,441	,483	,619	,777	,170	-,143	-,049	-,279	-,154	,244	,333	,205	,277	,314	,401	,395	,271	,409	,329	-,315	,728	,704	,454	,676	,469	,424	-,408	-,481	,749	,806	,799	1	
40	,572	,617	,455	,456	,372	,372	,476	,492	,503	,617	,670	,194	-,228	,017	-,252	-,101	,262	,378	,259	,343	,303	,375	,326	,357	,401	,352	-,288	,721	,685	,371	,532	,398	,276	-,362	-,389	,609	,761	,744	,824	1

Source(s): Own preparation.

Annex II

QUESTIONNAIRE EvalTech-Vision (v.01)

(Extended version)

Socio-demographic data

University to which you belong: _____

Reasons why you decided to study at this university: _____

Degree you are studying: _____

Year in which you are enrolled:

- ☐ 1º
- ☐ 2º
- ☐ 3º
- ☐ 4º

Age:

- ☐ Under 18 years old
- ☐ 18-24 years old
- ☐ 25-34 years old
- ☐ 35-44 years old
- ☐ 45-54 years old
- ☐ 55 years old and over

Gender:

- ☐ Female
- ☐ Male
- ☐ Other
- ☐ I prefer not to say

University entrance exam:

- ☐ Entrance exam for secondary school graduates.
- ☐ Access to university from higher education studies.
- ☐ Access to university for people over 25 years of age

Other: _____

Type of disability:

- ☐ Physical
- ☐ Visual
- ☐ Hearing
- ☐ Mental

Other: _____

Disability:

- ☐ Congenital
- ☐ Acquired

Degree of disability:

- ☐ Mild Disability (between 33% and 49%)

- ☐ Moderate disability (between 50% and 70%)
- ☐ Severe disability (more than 70%)

Do you use any assistive device?

- ☐ Yes
- ☐ No

If you use any assistive device, please indicate which one: _____

Level of education of parent/guardian 1:

- ☐ No education
- ☐ Primary education
- ☐ Compulsory Secondary Education
- ☐ A levels/Higher Education diplomas
- ☐ University
- ☐ Doctorate
- ☐ NS/NC

Mother's or guardian's level of studies 2:

- ☐ No studies
- ☐ Primary education
- ☐ Compulsory Secondary Education
- ☐ A levels/Higher Education diplomas
- ☐ University
- ☐ Doctorate
- ☐ NS/NC

Number of siblings: _____

Share a home (you can select several options):

- ☐ With friends
- ☐ With flatmates
- ☐ With my family (father, mother, grandfather/grandmother, etc.)
- ☐ With my partner
- ☐ I live alone
- ☐ Other

Family socio-economic level

- ☐ Low
- ☐ Medium
- ☐ High

Do you have children?

- ☐ Yes
- ☐ No

If yes, how many children? _____

Are you a member of an association for people with disabilities?

- ☐ Yes

☐ No

If yes, what is the name of the association? _____

Do you work?

☐ Yes

☐ No

If yes, how long have you been in this profession? _____

Have you received specific support for your disability at university?

☐ Yes

☐ No

If you have received support, please indicate which: _____

Have you experienced discrimination or stigma related to the use of assistive technologies in the university environment?

☐ Yes

☐ No

Below are a series of statements to be answered by selecting from 1 to 4:
1 = DO NOT AGREE AT ALL
2= SLIGHTLY AGREE
3= SOMEWHAT AGREE
4= STRONGLY AGREE

Block 1. Technological resources and inclusive learning in universities				
	1	**2**	**3**	**4**
1. I evaluate positively the accessibility of the technological resources used at the university for my disability.				
2. The syllabuses of the subjects I am taking reflect the use of technological resources as an element favouring inclusion.				
3. I feel good in the classroom working with didactic methodologies that use technological resources in an active way.				
4. The inclusion of computer resources in the classroom favours the teaching-learning process.				
5. Teaching practices improve when technological tools are introduced.				
6. Technological resources allow learning to be more individualised and personalised.				
7. The use of new tools by my teachers really contributes to my learning.				
8. The use of technological resources favours the design and adjustment of activities for students with SEN (specific educational support needs).				
9. In my experience as a student I have noticed that the use of technological tools by my teachers has improved my learning experience.				

10. In general, the teachers who have taught me have been concerned (and are concerned) in their subjects to make their virtual environments accessible and easy to use.				
11. The teaching staff at my university work with inclusive methodologies, which cater for diversity.				
12. I believe that teaching staff should use technological resources to facilitate learning.				
13. I think that, in general, teaching staff find it difficult to teach students with disabilities through the use and implementation of technological resources.				
14. Teachers should receive more training in the use of technological resources in order to teach more effectively.				
15. I think that teachers are poorly prepared to help students with disabilities in the use of technical aids and the use of technological resources,				
16. It is necessary for teachers to be trained in technological resources in order to apply them in the classroom because they favour students' learning.				

Block 2. Methodologies and technological resources for inclusion				
	1	**2**	**3**	**4**
17. I use technological resources to access more easily the contents of the subjects in which I am enrolled.				
18. I use technological resources to facilitate my learning process at university.				
19. Students learn more easily when they use technological resources.				
20. I feel more motivated when I use technological resources in the subject.				
21. The use of technological resources in the classroom allows me to be creative.				
22. Using technological resources in the subject helps me to learn in a collaborative way with my classmates.				
23. Using technological resources in the subject helps me to communicate better with my classmates.				
24. The use of technological tools makes me much more autonomous in my university studies.				
25. I feel that using technological resources in my university environment makes me much more participative.				
26. The use of technological resources boosts the feedback between teaching staff and students.				
27. I think that I have many limitations when using technological resources.				

Block 3. The university and inclusion based on technologies				
	1	**2**	**3**	**4**
28. I believe that the university provides the necessary technological resources to make teaching inclusive.				

29. On a scale of 1 to 4, how satisfied are you with the availability and effectiveness of the technological resources provided by the university for your learning?				
30. The university provides financial aid for the acquisition of technological resources that facilitate the correct following of the subjects.				
31. The university provides me with free training on how to use the technological resources to facilitate the correct monitoring of the subjects I am taking.				
32. I have been consulted about which assistive technologies or technological resources would be most useful for my learning.				
33. I have received specific training on how to use assistive technologies or technological resources to support my learning.				
34. I have had to be trained, outside the university, on how to use technological resources to facilitate the correct follow-up of the subjects I am enrolled in.				
35. I have had to search independently for technology to help me to follow the subjects I am taking.				
36. The university provides sufficient training for students in the use of technological resources to support the inclusion of students with disabilities.				
37. The university fosters an inclusive culture through the accessible and equitable use of technologies in the learning process.				
38. The university develops inclusive practices.				
39. My university is inclusive and caters for the diversity and variability of all its students, without exception.				
40. I feel supported by my university on equal terms with the rest of my classmates.				

Annex III

QUESTIONNAIRE EvalTech-Vision (v.02)

(Short version)

Socio-demographic data

University to which you belong: _____

Reasons why you decided to study at this university: _____

Degree you are studying: _____

Year in which you are enrolled:

- ☐ 1º
- ☐ 2º
- ☐ 3º
- ☐ 4º

Age:

- ☐ Under 18 years
- ☐ 18-24 years old
- ☐ 25-34 years old
- ☐ 35-44 years old
- ☐ 45-54 years old
- ☐ 55 years old and over

Gender:

- ☐ Female
- ☐ Male
- ☐ Other
- ☐ I prefer not to say

University entrance examination:

- ☐ Entrance exam for secondary school graduates.
- ☐ Access to university from higher education courses.
- ☐ Access to university for people over 25 years of age

Other: _____

Type of disability:

- ☐ Physical
- ☐ Visual
- ☐ Hearing
- ☐ Mental

Other: _____

Disability:

- ☐ Congenital
- ☐ Acquired

Degree of disability:

- ☐ Mild Disability (between 33% and 49%)

- ☐ Moderate disability (between 50% and 70%)
- ☐ Severe disability (more than 70%)

Do you use any assistive device?

- ☐ Yes
- ☐ No

If you use an assistive device, please indicate which one: _____

Level of education of parent/guardian 1:

- ☐ No education
- ☐ Primary education
- ☐ Compulsory Secondary Education
- ☐ A levels/Higher Education diplomas
- ☐ University
- ☐ Doctorate
- ☐ NS/NC

Mother's or guardian's level of studies 2:

- ☐ No studies
- ☐ Primary education
- ☐ Compulsory Secondary Education
- ☐ A levels/Higher Education diplomas
- ☐ University
- ☐ Doctorate
- ☐ NS/NC

Number of siblings: _____

Share a home (you can select several options):

- ☐ With friends
- ☐ With flatmates
- ☐ With my family (father, mother, grandfather/grandmother, etc.)
- ☐ With my partner
- ☐ I live alone
- ☐ Others

Family socio-economic level:

- ☐ Low
- ☐ Medium
- ☐ High

Do you have children?

- ☐ Yes
- ☐ No

If yes, how many children? _____

Are you a member of an association for people with disabilities?

- ☐ Yes
- ☐ No

If yes, what is the name of the association? _____
Do you work?

☐ Yes
☐ No

If yes, how long have you been in this profession? _____
Have you received specific support for your disability at university?

☐ Yes
☐ No

If yes, please indicate which: _____
Have you experienced discrimination or stigma related to the use of assistive technologies in the university environment?

☐ Yes
☐ No

Below are a series of statements to be answered by selecting from 1 to 4:
1 = DO NOT AGREE AT ALL
2= SLIGHTLY AGREE
3= SOMEWHAT AGREE
4= STRONGLY AGREE

Block 1. Technological resources and inclusive learning in universities				
	1	**2**	**3**	**4**
1. I evaluate positively the accessibility of the technological resources used at the university for my disability.				
2. The syllabuses of the subjects I am taking reflect the use of technological resources as an element favouring inclusion.				
3. In general, the lecturers who have taught me have been concerned (and are concerned) in their subjects to make their virtual environments accessible and easy to use.				
4. The teaching staff at my university work with inclusive methodologies, which cater for diversity.				
5. I believe that the university provides the necessary technological resources to make inclusive teaching possible.				
6. On a scale of 1 to 4, how satisfied are you with the availability and effectiveness of the technological resources provided by the university for your learning?				
7. The university provides me with free training on how to use the technological resources to facilitate the correct monitoring of the subjects I am taking.				
8. The university provides sufficient training for students on the use of technological resources to support the inclusion of students with disabilities.				

9. The university fosters an inclusive culture through the accessible and equitable use of technology in the learning process.				
10. The university develops inclusive practices.				
11. My university is inclusive and caters for the diversity and variability of all its students, without exception.				
12. I feel supported by my university on equal terms with the rest of my classmates.				

Block 2. Methodologies and technological resources for inclusion				
	1	**2**	**3**	**4**
13. I feel good in the classroom working with didactic methodologies that use technological resources in an active way.				
14. The inclusion of computer resources in the classroom favours the teaching-learning process.				
15. Teaching practices improve when technological tools are introduced.				
16. Technological resources allow learning to be more individualised and personalised.				
17. The use of new tools by my teachers really contributes to my learning.				
18. The use of technological resources favours the design and adjustment of activities for students with SEN (specific educational support needs).				
19. In my experience as a student, I have noticed that the use of technological tools by my teachers has improved my learning experience.				
20. I use technological resources to facilitate my learning process at university.				
21. Students learn more easily when they use technological resources.				
22. I feel more motivated when I use technological resources in the subject.				
23. The use of technological tools makes me much more autonomous in my university studies.				

Block 3. The university and inclusion based on technologies				
	1	**2**	**3**	**4**
24. The use of technological resources in the classroom allows me to be creative.				
25. Using technological resources in the subject helps me to learn in a collaborative way with my classmates.				
26. Using technological resources in the subject helps me to communicate better with my classmates.				
27. I feel that by using technological resources in my university environment I am much more participative.				
28. The use of technological resources boosts feedback between teaching staff and students.				