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# Organization and planning of university faculty training in virtual classrooms for the inclusion of people with disabilities

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Despite the proliferation of conventions, declarations, and recommendations for inclusive education, many students with disabilities do not complete their university studies. To overcome this situation, university faculty must have skills in inclusion and motivation, but the training of teachers in these subjects is still limited. For all these reasons, this work conveys a basic training proposal -adjusted to the teacher's reality- to improve the organization and planning of this training. With this training proposal, this study aims to answer how training can facilitate online university teachers to acquire knowledge to improve their skills and motivation in students with disabilities inclusion. For this purpose, qualitative research has been carried out based on the responses to an open-ended questionnaire by 20 expert teachers in online university training who have received and evaluated this training. Although the results have shown that the proposed online training of university teachers may be effective in improving their competencies and motivation in the inclusion of students with disabilities, they still need some improvement -according to the suggestions made by the teachers participating in the study-. Most of these suggestions made by high-level teachers especially recommended the ones related to conceptual clarification, presentation of case studies or examples, and description of actions in the didactic field.

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## Introduction

Since the Convention against Discrimination in Education (United Nations Educational, Scientific and Cultural Organization, UNESCO, 1960) or the International Covenant on Economic, Social and Cultural Rights (1966) (United Nations, UN, 1966), conventions, declarations, and recommendations on inclusive education have been multiplying worldwide. In the case of persons with disabilities, the Convention on the Rights of Persons with Disabilities (UN, 2006) has reinforced this trend, additionally transferred to scientific production that has increased considerably in this field related to the education of persons with disabilities (Martínez-Medina et al., 2022).

This whole movement has reached the present day with the 2030 Agenda for Sustainable Development (UN, 2015), whose Goal 4 sets the goal of ensuring equal access to all levels of education, including higher education, with emphasis on the most disadvantaged groups, such as people with disabilities, as highlighted by different authors (Collins et al., 2018; MacLeod et al., 2018; Sandoval, et al., 2019; González-Castellano et al., 2021), who consider the need for this inclusive dimension of the university.

Despite this favorable trend, many students with disabilities do not complete their university studies (De Los Santos et al., 2019). To achieve success with these students, the role of faculty is essential (Veitch et al., 2018; Zhang et al., 2018), but papers abound showing the reduced training of university faculty in these tasks (Moriña-Diez et al., 2013; Gezer and Aksoy, 2019; Mejía, 2019; Jiménez et al., 2019; Moriña et al., 2019; Hernández et al., 2020; Jiménez and Mesa, 2020; Cabero-Almenara et al., 2022; Sánchez and Morgado, 2022).

However, in response to these problems, some educational institutions and universities have designed and developed training programs. For example, in the United States, Utah State University has developed curricula that include training teachers on people with disabilities inclusion. Teachers themselves highly valued this training (Debrand and Salzberg, 2005). Similarly, the Scottish Higher Education Funding Council (SHEFC) Teachability project aims to make the higher education curriculum accessible to students with disabilities and contains specific training for teachers in these subjects (Simpson, 2002). In addition, guides to help teachers make higher education inclusive (Thomas and May, 2010; Disabled Student Sector Leadership Group-United Kingdom Department for Education, 2017), online training materials for teachers (Hockings et al., 2012), teacher training programs (Cunningham, 2013; Moriña, 2018) have developed. Some of these initiatives, after evaluation, have also shown a good assessment by students (Davies et al., 2013) and teachers (Dotras et al., 2008; Carballo et al., 2019). Teachers must participate in these pieces of training, but they show their limited availability (Bunbury, 2018).

Indeed, time is a problem since teachers are under high pressure with their multiple teaching, research, and management tasks; so educational institutions and universities must take this cost into account when making critical decisions in the organization and planning of this training to try to make it as effective as possible (Laso et al., 2022). In this sense, Davies et al. (2013) have already tried to provide solutions with 5-hour training courses, carrying out an experiment that, as mentioned above, was well evaluated.

In any case, this training for teachers should provide theoretical and practical knowledge about disability, experience in curricular adaptations, and practice in new methodologies (Martínez, 2011; Sánchez-Palomino, 2011; Moriña-Diez et al., 2013; Ponce et al., 2021). It is also interesting how the received training improves teaching attitudes toward students with

disabilities (Davies et al., 2013). To this end, authors such as Moriña et al. (2019) highlight the importance of training on classroom management strategies such as communication skills or motivation. These strategies are fundamental to reinforcing teachers' moral and innovation capacity (González, 2003)—essential to continue reimagining the university teaching of these people with disabilities (Edwards et al., 2022).

These experiences have occurred in face-to-face university training, but the high degree of development of the Internet has allowed people with disabilities to also become university students through online training, avoiding the waste of their talent. In this sense, experiences have been very scarce. Some took place during the COVID-19 pandemic and have highlighted the advantages of this type of university training for people with disabilities (Mohammed, 2021), such as improvement of learning processes, progress in social and communication skills, and time savings for these students.

In addition to these advantages, online training has those of this type of education, such as facilitating the reconciliation of personal and professional life, familiarity with the use of the Internet, and some economic savings such as accommodation, transportation, or time flexibility, among others. Moreover, in the specific case of people with disabilities, physical or time barriers are practically non-existent, and many of the devices that favor study can be implemented precisely through the Internet. For all these reasons, technology—together with adequate organization and planning of teacher training—can help this type of online education to reach these people with disabilities.

In this last aspect, teacher training programs in this modality have focused mainly on solving aspects of accessibility to these Internet media for students (Fichten et al., 2009), and these training programs are currently recommended to take into account the acquisition of techno-pedagogical skills by teachers and the design of courses based on the principles of Universal Design for Learning (UDL, Perera et al., 2021).

For all the above reasons and given the scarcity of studies in this area of the organization and planning of teacher training in virtual classrooms for the inclusion of people with disabilities and the significant advantages for this group, this work aims to expand the research by delving into how to make this type of teacher training effective, making it one of the first works in this area. In particular, this paper aims to answer the following question: How can training facilitate online university teachers to acquire knowledge to improve their skills and motivation in the inclusion of students with disabilities?

## Methods

**Methodological approach and formative proposal.** To answer this question requires a qualitative approach, which is oriented to answer the how and why of a process, in contrast to a quantitative approach, which answers questions about what, who, where, and how much (Yin, 2014). A qualitative approach does not seek to quantify but to understand a phenomenon and establish how one aspect is related to another (Del Cid et al., 2007). In this work, the criteria for this type of qualitative research follow those of COREQ (Tong et al., 2007) and RATS (BioMed Central, 2017). In this case, we evaluate a proposal for the training of online university faculty for the inclusion of students with disabilities through an open-ended questionnaire (Table 1), which took into account the knowledge presented in the introduction.

To formulate the questionnaire, we consider that “special educational needs” is not synonymous with disability. In general terms, we acknowledge that a student presents this type of need

**Table 1 Questionnaire.****a) Profile of participants:**

- Sex: Female/Male.
- Work experience in the field of education: More than 20 years/11-20 years/5-10 years/0-4 years.
- Formative skill (prior to training).

**b) Conceptual skills:**

- (b.1) Prior to training, did you consider students with disabilities and students with special educational needs as synonymous? what did you understand by special educational needs?
- b.1) After the training, to what extent have you changed your perception of the concept of students with special educational needs?
- b.2) Prior to the training, what was your level of knowledge of the principles of UDL as applied to university education?
- b.2) After the training, how has your knowledge of the principles of UDL as applied to college teaching changed?

**c) Curricular adaptation skills:**

- Have you ever had to apply curricular support adaptations in the classroom for students with special educational needs?, have you had difficulties in making these curricular support adaptations?, what kind of difficulties, have you needed help in making these adaptations?, have you needed help in making these adaptations?
- In what way has the training received helped you to better develop the curricular adaptations of support in the classroom? in what aspect or aspects?

**d) Curricular adaptation skills in the evaluation:**

- Have you ever had to apply curricular adaptations in assessment tests for students with special educational needs?, have you had difficulties in making these curricular adaptations in assessment tests?, what kind of difficulties?, have you needed help to make these adaptations?
- After the training, how do you consider that your skill in curricular adaptation of assessment for students with disabilities has changed?

**e) Social-relational skills:**

- e.1) Before the training, what was your attitude towards having students with special educational needs in the classroom?, did you prefer not to have such students?, did you consider that they hindered your work?, did they generate uneasiness or stress?, did you feel pity or compassion for these students?, and did you tend to help them excessively?
- e.1) After the training, to what extent has your attitude towards having students with special educational needs in the classroom changed?
- e.2) Before receiving the training, had you analyzed the presence of students with special educational needs as a generalized enrichment of the whole educational community and not only the group of people targeted by the actions implemented for their inclusion?
- e.2) After the training, have you changed your perception of the presence of students with special educational needs as a generalized enrichment of the whole educational community and not only the group of people targeted by the actions implemented for their inclusion? in what aspect(s)?

**f) Communication skills:**

- When you have had students with special educational needs in the classroom, have you had difficulties in communicating with them?
- In what way has the training you have received allowed you to improve your communication skills in the relationship with students with special educational needs?

**g) Digital skills:**

- Until receiving the training, what was your level to select specific ICT resources according to the physical, sensory and cognitive abilities of different students? What were your motivations in learning/using ICT resources to facilitate the inclusion of students with special educational needs?
- How has the training received helped you to find new motivations in the use of ICT resources in the inclusion of students with special educational needs?

**h) Motivations for the inclusion of students with special educational needs:**

- When you have had students with special educational needs in the classroom, have you had enough motivation for personalized attention?
- Has the training received served you as motivation for the inclusion of students with special educational needs? in what aspect or aspects?

**i) Suggestions:**

- Could you indicate any recommendations to improve the training received?

when, for various reasons, they show more access difficulties than the rest of their classmates to the learning that corresponds to them by age or course and needs extraordinary and specialized support to overcome them, so that their learning and development opportunities are not limited (López and Valenzuela, 2015). Following this concept, this paper has only referred to disabilities with special educational needs.

To provide greater flexibility to teachers, the proposal has been contained in a video. Given the limited availability of teachers' time previously exposed (Bunbury, 2018), this proposal has been very synthetic (20 min and 46 s) and very focused on the acquisition of skills and motivation on the part of teachers to attend to this type of student. The training exposed in the video contained the following aspects:

- Presentation of notions on inclusive education and its relevance within the Sustainable Development Goals of the 2030 Agenda (UN, 2015).
- Description of important concepts in inclusive settings such as disability, impairment, and disorder.
- Explanation of different types of disabilities as visual, hearing, intellectual, or motor disabilities for which we showed

definitions, difficulties, and adaptations in the classroom to overcome possible barriers to learning and participation.

- Presentation of the most frequent learning difficulties and their possible forms of educational intervention (dyslexia, dysgraphia, dyscalculia, dysphemia, among others).
- Explanation of methods for better inclusive coordination of teacher and student.
- Presentation on various curricular adaptations to be made by university faculty in online classrooms.
- In the face of different situations with students, indications have been provided to adopt the precise attitude of the teaching staff in the development of inclusive models.
- Presentation of actions to face the difficulties or deficiencies shown by students of this type.
- Indications to improve communication in online classrooms for people with disabilities.
- Explanation of digital resources to facilitate the training of people with disabilities in virtual classrooms.
- Description of various factors to create a motivational environment in online university education and resources available for teachers and students to progress in this type of university education.

**Selection and recruitment of participants.** To obtain a wealth of information, a sample of participants was selected according to the following three criteria: (1) Participation in the course by watching the training video; (2) Being an expert in online university training; (3) Having a minimum of 5–10 years of work experience in the field of education. These participants belonged to an online university (Madrid Open University, MOU), which has a Special Needs Unit, which works to ensure that the entire university community has the same opportunities and develops in an inclusive and non-discriminatory environment, providing students with general and individualized measures to ensure success in their training programs, as well as to enhance their incorporation into the labor market.

This university must be Spanish since, according to the *Comité Español de Representantes de Personas con Discapacidad* (CERMI, 2020), one of the main reasons for the low number of university students entering the university is the lack of faculty trained in disability inclusion. This shortage is confirmed by the latest data available for the 2019–2020 academic year, as there were only 19,919 university students with some degree of disability, which means a reduced 1.5% of the total number of students enrolled (Fundación Universia, 2021). All this is reflected in the fact that even the percentage of employed people with secondary education studies and training and job placement programs is practically double that of those with university studies for these people with disabilities (60.9% compared to 30.6%) (Instituto Nacional de Estadística, 2022).

The recruited teachers were volunteers selected by convenience sampling (Martín-Crespo and Salamanca, 2007). The sampling strategy has prioritized feasibility since the participants had limited time availability (Bunbury, 2018). For all this and also to ensure diversity, a list of 24 teachers who met the three criteria set out above and who belonged in a balanced way to all levels of training (8 high levels, 8 medium level, and 8 low levels) was drawn up. Response to questionnaire Number 20 reached data saturation since new answers would unlikely influence the results obtained. The main reason for this data saturation is that when teachers receive flexible training adjusted in time and on such a supportive subject, they acquire knowledge and are motivated to apply it, so this number of cases obtained is adapted to the research objectives. In addition, it is necessary to consider the difficulties getting higher numbers of key participants, due to time shortage, as exposed above (Bunbury, 2018). Therefore, the sample was composed of 20 university teacher experts in virtual classrooms (12 women—HL1, HL2, HL6, MHL1, ML1, ML2, ML 4, ML6, LL1, LL4, LL5, and LL6—and 8 men—HL3, HL4, HL5, MHL2, ML3, ML5, LL2, and LL3-) with a work experience of more than 5–10 years in the field of education. The course and questionnaire responses occurred between February and May 2022.

**Procedure.** By the criteria of this work, we invited potential participants to collaborate in the study. We informed them about the research objectives, the content of the open-ended questionnaire and its sending by e-mail, the anonymization of their data, and the usage of the study results for scientific publications. Volunteers who showed interest in participating provided their responses to the e-mail address established by the research team. It was not necessary to provide them with further information or request clarification. This entire process ensured neutrality, preventing the researchers from influencing the responses, which could affect the results.

In this study, three researchers coded the responses for characteristics (b)–(h), one of them being the coding coordinator. The fourth scientist did not participate in this coding, acting as a

reviewer of the data and the interpretations made by the other three investigators. We use no computer program for coding but the following patterns:

- Response with positive effect: The teacher has acquired knowledge to increase their capacity for inclusion of people with disabilities.
- Response with neutral effect: The training has not provided sufficient knowledge to change the teacher's capacity for the inclusion of people with disabilities.
- Response with negative affect: The teacher's acquired knowledge reduces their capacity for persons with disabilities inclusion.

After coding, the results of the 20 participants were analyzed by groups of teacher training level and by characteristics to establish patterns and draw conclusions capable of helping to understand the phenomenon of the effectiveness of online university faculty training for the inclusion of students with disabilities.

## Results

To help better visualize these results, we will first present the effects obtained by each group of teachers in each characteristic. In addition and following this exposition, the most outstanding percentages effects per characteristic, according to Table 2.

Concerning *Conceptual skills*, the first question asked about the knowledge of the concept of students with special educational needs: Most high-level teachers have not changed their perception of this concept due to the training offered (5 neutral effects: HL1, HL2, HL3, HL4, and HL5). Only one teacher reached 3 positive effects (HL6 with the acquisition of knowledge of special educational needs situations, types of students, and measures to apply in these cases). In the case of medium-level teachers, 3 had neutral effects (MHL1, MHL2, and ML6), while the other 5 had the following positive effects: ML1 (1 for clarification of the difference between disability, disorder, and impairment), ML2 (2 for deepening the concept and types), ML 3 (1 with knowledge of the types of learning difficulties), ML 4 (1 for broadening the concept by updating the training) and ML 5 (1 for the interest stimulated in the needs of these students). In the low-level teachers, only one teacher has presented neutral effects (LL6) and the rest show 7 positive effects: LL1, LL3, and LL4 (1 in each teacher for knowledge of casuistry of students with these needs), LL2 and LL5 (2 in each teacher for the nuance of the concepts related to students with disabilities and with special educational needs and their different methodological treatment in the classroom). Table 2 shows the positive effects stand out for low-level teachers, with 43.75% of the total positive for all teachers (7 positive out of the 16 presented for all teachers). This effect also stands out for medium-level teachers (37.5%, 6/16), although with a lower percentage. Finally, and in line with higher knowledge of these subjects, neutral effects stand out for high-level teachers (55.56%, 5/9).

In the second question of the *Conceptual skills* related to the knowledge of the principles of UDL applied to university teaching, again high-level teachers have shown mostly neutral effects, with 4 effects of this type: HL1, HL2, HL4, and HL5. In addition, 2 teachers have shown 2 positive effects (HL3 with broadening and sedimentation of the knowledge of these principles and HL6 with knowledge of the nomenclature of teaching initiatives related to these principles to initiate a search for documentation related to the subject). The medium-level teachers have shown 3 neutral effects (MHL1, MHL2, and ML2), and the other 5 have presented the following 5 positive effects: ML1 (1 for the impulse to seek more information), ML3, ML4, and ML 5 (1 in each teacher for

**Table 2 Effects obtained by the teachers in all the characteristics (%).**

Characteristics	High level teachers (HL)			Medium and medium-high level teachers (ML and MHL)			Low level teachers (LL)		
	Positive (%)	Neutral (%)	Negative (%)	Positive (%)	Neutral (%)	Negative (%)	Positive (%)	Neutral (%)	Negative (%)
Conceptual skills (Concept of students with special educational needs)	18.75%	55.56%		37.5%	33.33%		43.75%	11.11%	
Conceptual skills (UDL applied to university education)	16.67%	50%		41.67%	37.5%		41.67%	12.5%	
Curricular adaptation skills	22.22%	36.36%		44.44%	36.36%		33.33%	27.27%	
Curricular adaptation skills in the evaluation	33.33%	33.33%			40%		66.67%	26.67%	
Social-relational skills (attitude towards having students with special educational needs)	25%	33.33%		25%	46.67%		50%	20%	100%
Social-relational skills (enrichment for all students)	25%	31.25%		25%	43.75%		50%	25%	
Communication skills	25%	30.77%		37.5%	38.46%		37.5%	30.77%	
Digital skills	25%	37.5%		41.67%	37.5%		33.33%	25%	
Motivations for the inclusion of students with special educational needs	35.71%	44.44%		35.71%	33.33%		28.57%	22.22%	

the knowledge of these principles) and ML4 (1 with the deepening of the universal approach to these principles). Only in the case of low-level teachers, one teacher has shown 1 neutral effect (LL5), while the rest have experienced 5 positive effects: LL3, LL4, and LL6 (1 in each teacher for knowledge of these principles), LL1 (1 for awareness of the connection between the use of some technological tools and the incorporation of these principles), and LL2 (1 for the impulse to seek more information). In this characteristic, the positive effects are the most for both low and medium-level teachers (41.67%, 5/12, see Table 2). Similarly to what occurred in the previous characteristic, neutral effects stand out among high-level teachers (50%, 4/8).

Regarding the *Curricular Adaptation skills*, again 4 high-level teachers have shown neutral effects (HL1, HL2, HL4, and HL5), and two teachers of this level have shown 2 positive effects (HL3 with the acquisition of knowledge to make adaptations of individual character and HL6 with the provision of a general vision on how to make curricular adaptations in different situations). In the case of intermediate-level teachers, 4 neutral effects were observed (MHL1, ML1, ML4, and ML6), and the others showed the following 4 positive effects: MHL2 (1 for knowledge of technological tools that can facilitate these adaptations), ML2 (1 for contribution to reflect on didactic procedures), ML3 (1 for techniques learned to carry out these adaptations) and ML5 (1 for a contribution to a current and scientific vision on these adaptations). In this skill, low-level teachers have shown both neutral (3 for LL4, LL5, and LL6) and positive effects (1 for LL1 and LL2 for knowledge of technological tools that can facilitate these adaptations; 1 for LL3 for a contribution of knowledge to feel more confident in making decisions about these adaptations). Given Table 2, positive effects in this characteristic predominate in medium-level teachers (44.44%, 4/9), followed by low-level teachers (33.33%, 3/9, see Table 2). In this characteristic, neutral effects stand out in both high-level and medium-level teachers (36.36%, 4/11).

Concerning the *Curricular Adaptation skills in the evaluation*, the majority of high-level teachers have presented neutral effects (HL1, HL2, HL3, HL4, and HL5) again, and only one teacher of this level (HL6) has shown 1 positive effect -due to the knowledge and awareness of certain situations of students with disabilities that need to be made more flexible in these evaluative aspects. Likewise, medium-level teachers have all shown a neutral effect on this characteristic. In the case of low-level teachers, 4 have presented neutral effects (LL1, LL4, LL5, and LL6), and only two

have experienced 2 positive effects (LL2 by knowledge and awareness of certain situations of students with disabilities that need to adapt in these evaluative aspects; LL3 by providing knowledge to feel more confident in making decisions about these curricular adaptations). As in Table 2, the positive effects of this characteristic predominate in low-level teachers, with (66.67%, 2/3). Also, in this characteristic, it stands out that there is no positive effect for medium-level teachers. In contrast, neutral effects stand out in this group (40%, 6/15), followed by those in high-level teachers (33.33%, 5/15).

Regarding *Social-relational skills*, the first question referred to the teacher's attitude toward having students with special educational needs. Most high-level teachers have not presented modifications in this characteristic (5 neutral effects for HL1, HL2, HL3, HL4, and HL5). Only one teacher at this level (HL6) presented 1 positive effect -on the improvement of her attitude towards these people with disabilities- due to the knowledge provided about the situation and the profile of this type of students with which to better cope with their learning. Most of the teachers at the intermediate level also showed no change in this characteristic (seven neutral effects for MHL1, MHL2, ML2, ML3, ML4, ML5, and ML6). Only one teacher at this level (HL6) showed one positive effect due to the increased interest in learning that the training has given her. Among low-level teachers, the responses were neutral for three teachers (LL1, LL3, and ML6), and two teachers showed positive effects (LL2 and LL4) since the training allowed both to learn about the characteristics of the students and to be able to better cope with their teaching. Finally, there is a negative effect on the LL5 teacher at this level, because the training has made her aware of the lack of time and resources available to integrate this type of student in the classroom. In this characteristic, the positive effects occur mostly in low-level teachers (50%, 2/4, see Table 2). As in the previous characteristic, neutral effects again stand out in the group of medium-level teachers (46.67%, 7/15), followed by those produced in high-level teachers (33.33%, 5/15). Likewise, it should be noted that the only negative effect occurred in low-level teachers.

The second question for the *Social-relational skills* is related to the enrichment for all students that the presence of students with special educational needs in virtual classrooms may entail. Again, high-level teachers have presented mostly neutral effects with the five effects HL1, HL2, HL3, HL4, and HL5. In addition, one teacher has shown 1 positive effect (HL6 due to the deepening of

these enriching effects provided with the training). Similarly, medium-level teachers have presented a majority of neutral effects, with the seven effects MHL1, MHL2, ML1, ML2, ML3, ML4, and ML5, and a single positive effect (ML6 for the knowledge provided for the settlement of the enriching vision of diversity). Also, low-level teachers have shown a majority of neutral effects with four effects of this type (LL1, LL3, LL4, and LL6) and 2 of positive type (LL2 and LL5, with 1 effect on each teacher for knowledge of the joint enrichment of sharing experiences). Given Table 2, the positive effects of this characteristic stand out in medium-level teachers (50%, 4/2, see Table 2). In this characteristic, neutral effects stand out in medium-level teachers (43.75%, 7/16) and high-level teachers (31.25%, 5/16).

Regarding *Communication skills*, the majority of high-level teachers show neutral effects again (HL1, HL2, HL3, and HL4), and only two teachers of this level present two positive effects (HL5 for the knowledge about digital applications to improve this communicative process and HL6 for the contribution about the identification of problems and solutions to attend these people that facilitates communication). Also, medium-level teachers have presented a majority of neutral effects in this characteristic with five neutral effects (MHL1, MHL2, ML1, ML3, and ML4) and three positive effects concerning their previous knowledge (ML2 for provoking reflection on these communicative subjects; ML5 for updating on these processes; ML6 for the knowledge contributed on the three phases of communication). Similarly, in the case of low-level teachers, four have shown neutral effects (LL1, LL4, LL5, and LL6) and only two have experienced three positive effects (LL2 with two such effects for the knowledge obtained to take into account aspects such as voice, personality, and language in the communicative process and the contribution to foster an atmosphere of trust in the generation of good communication; LL3 for the knowledge provided on possible resources to improve communication). In this characteristic, positive effects are predominant for low-level and medium-level teachers (37.50%, 3/8, see Table 2). Likewise, neutral effects stand out for medium-level teachers (38.46%, 5/13).

As for *Digital skills*, high-level teachers have shown both neutral effects (HL1, HL2, and HL4) and positive effects (HL3, HL5, and HL6 with one effect on each teacher concerning the motivation obtained to search for the digital resource most adaptable to the learner's needs). For the case of medium-level teachers, a majority of 5 positive effects (MHL2 and ML5 with 1 effect on each teacher for the motivation obtained with the updating of knowledge; ML2 and ML6 with one effect on each teacher for the motivation achieved to reflect on the adaptation of these digital resources; ML4 with one effect concerning the motivation to locate the digital resource most adaptable to the learner's needs) was observed concerning the neutral ones (MHL1, ML1, and ML3). Similarly, a majority of 4 low-level teachers have shown positive effects on their motivation (LL1 to write a document on good practices in these subjects; LL2 and LL3 to search for the digital resource that best suits the learner's needs; LL5 to reflect on the adaptation of these digital resources) relative to the two teachers who have shown neutral effects (LL4 and LL6). Table 2 shows that the positive effects of this characteristic stand out in medium-level teachers, with 41.67% (12/5). Likewise, neutral effects also stand out in this group, with the same percentage of high-level teachers (37.50%, 3/8).

Concerning the *Motivation for the inclusion of students with special educational needs*, again the majority of high-level teachers presented neutral effects (HL1, HL2, HL3, and HL4), HL3 and HL4) and only two teachers of this level have shown positive effects on their motivation (one effect for HL5 for the knowledge about the support service of the university to teachers to attend these students

and four effects for HL6 for the contribution in terms of tools to use, relationship with these students and the rest of students, experience of the rest of students and the climate generated in the classroom). On the other hand, medium-level teachers presented a majority of five positive effects on their motivation (MHL2 for remembering and taking into account these essential motivational aspects; ML2 for reflecting on how to implement new procedures; ML4 for improving classroom resources; ML5 for the motivation obtained by updating knowledge; ML6 for creating this own motivational environment in the classroom) for the three neutral effects on this characteristic (MHL1, ML1, and ML3). Similarly, in the case of low-level teachers, a majority of 4 positive effects were shown (LL1 for formulating new activities for these students; LL2 for creating inclusive classrooms; LL3 for knowledge about the university's support service for teachers to cater to these students; LL6 for the general knowledge provided by the training) compared to the 2 neutral effects for this type of teachers (LL4 and LL5). Regarding this characteristic, positive effects stand out in both medium and high-level teachers (35.71%, 5/14, see Table 2). Likewise, neutral effects also stand out in this group of high-level teachers (44.44%, 4/9).

As far as *Suggestions* are concerned, the high-level teachers have submitted the following 19:

\* HL1(6): conceptual clarification (integration and inclusion; alternative and augmentative systems; significant and non-significant adaptations; presentation of a classification of the different types of Specific Educational Support Needs; deepening on the topic of multiple intelligences) and introduction of practical cases or examples (on some materials such as hand magnifiers, peripheral vision glasses, microscopes, among others).

\* HL2 (2): conceptual clarification (deepening in the universal design of learning) and description of actions in the didactic field (management of the critical sources of diversity).

\* HL3 (2): conceptual clarification (insertion of further references to reference organizations in the world of disability and their conceptualization of disability).

\* HL4 (3): Highlighting the crucial role of psycho-pedagogical counseling in adaptation processes, conceptual clarification to show the normality of diversity and description of actions in the didactic field (management of the critical sources of diversity).

\* HL5 (3): description of actions in the didactic field (for each of the disabilities and their different adaptations) and deepening in the selection of technological applications for each special need.

\* HL6 (3): presentation of practical cases or examples (understanding of some concepts; adaptation of ICT; concrete application of the DUI to special educational needs and in a specific classroom).

The medium and medium-high-level teachers have shown a lower number of suggestions with the following 13 recommendations:

\* MHL1 (1): presentation of case studies or examples.

\* ML3 (1): presentation of case studies or examples.

\* ML4 (2): deepening the variety of resources for virtual classrooms and mandatory training for all teachers.

\* ML5 (1): conceptual clarification (more knowledge about the physical and psychological student characteristics).

\* ML6 (8): mandatory training for all teachers, presentation of case studies or examples (curricular adaptations; assessment adaptations; technological tools and their adaptations), description of actions in the didactic field, conceptual clarification (multiple intelligences), deepening of a vision more adapted to distance higher education and inclusion of references to organizations that can support the teaching work in the face of diversity.

Finally, low-level teachers have submitted only three suggestions:

**Table 3 Summary of effects and teachers' suggestions on all characteristics.**

Characteristics	High level teachers (HL)			Medium and medium-high level teachers (ML and MHL)			Low level teachers (LL)			TOTAL		
	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
Conceptual skills (Concept of students with special educational needs)	3	5		6	3		7	1		16	9	
Conceptual skills (UDL applied to university education)	2	4		5	3		5	1		12	8	
Curricular adaptation skills	2	4		4	4		3	3		9	11	
Curricular adaptation skills in the evaluation	1	5		0	6		2	4		3	15	
Social-relational skills (attitude towards having students with special educational needs)	1	5		1	7		2	3	1	4	15	1
Social-relational skills (enrichment for all students)	1	5		1	7		2	4		4	16	
Communication skills	2	4		3	5		3	4		8	13	
Digital skills	3	3		5	3		4	2		12	8	
Motivations for the inclusion of students with special educational needs	5	4		5	3		4	2		14	9	
<b>TOTAL</b>	<b>20</b>	<b>39</b>		<b>30</b>	<b>41</b>		<b>32</b>	<b>24</b>	<b>1</b>	<b>82</b>	<b>104</b>	<b>1</b>
Suggestions	19			13			3			35		

- \* LL1: training adjusted to the needs of the students.
- \* LL2: conceptual clarification on UDL.
- \* LL4: mandatory training for all teachers.

Once presented with the effects and suggestions, Table 3 shows the summary of the obtained results. It shows that the total neutral effects (104) outnumber the positive ones (82) and the only negative ones. By groups, the highest difference is in the high-level teachers (39 neutral effects compared to 20 positive ones), followed by the medium-level teachers (41 compared to 30). In contrast, low-level teachers offer a difference in favor of positive effects (32 vs. 24 neutral and 1 negative). In terms of characteristics, neutral effects also outnumber positive effects on a higher number of occasions (5 vs. 4). These differences in favor of neutral effects are significant for *Curricular adaptation skills in the evaluation* (15 neutral effects over 3 positives), *Social-relational skills (enrichment for all students)* (16 neutral effects over 4 positives), *Social-relational skills (attitude towards having students with special educational needs)* (15 neutral effects over 4 positive and 1 negative), followed at a greater distance by *Communication skills* (13 neutral effects over 8 positive) and *Curricular adaptation skills* (11 neutral effects over 9 positives). The differences in favor of positive effects are somewhat lower and are observed in *Conceptual skills (concept of students with special educational needs)* (16 positive effects out of 9 neutral), followed by *Motivations for the inclusion of students with special educational needs* (14 positive effects out of 9 neutral) and finally, *Conceptual skills (UDL applied to university education)* and *Digital skills*, both with 12 positive effects out of 8 neutral. Likewise, the *Suggestions* shown reach the

figure of 35, being the group of high-level teachers the one who recommends the most (19), followed by medium-level teachers (13), and finally, the group of low-level teachers (3).

**Discussion and conclusion**

The obtained results allow us to answer the research question by affirming that the training offered has had positive effects and has facilitated the online university teachers participating in the study to acquire knowledge to improve their skills and motivation for students with disabilities inclusion. This effectiveness has mainly occurred in teachers with a low level of expertise in this area, which affects a large part of the teaching staff at present, as shown by many previously exposed works (Moriña-Diez et al., 2013; Gezer and Aksoy, 2019; Mejía, 2019; Jiménez et al., 2019; Hernández et al., 2020; Jiménez and Mesa, 2020; Moriña et al., 2019; Cabero-Almenara et al., 2022; Sánchez and Morgado, 2022). Even teachers with more knowledge also experienced positive effects, although these effects were outweighed by neutral effects, given that it was a brief and introductory training, which has to be improved, given the observed effect on skills and the suggestions shown by the teachers.

By characteristics, the training has had positive effects on all of them, with a predominance over neutral effects highlighted in *Conceptual skills (concept of students with special educational needs)*, so that teachers have acquired the theoretical knowledge exposed by Martínez (2011), Sánchez-Palomino (2011), Moriña-Diez et al. (2013) and Ponce et al. (2021). Likewise, the positive effects of *Motivations for the inclusion of students with special educational needs* have predominated, following Moriña et al. (2019), which is

very relevant to provide teachers with morale and greater capacity for innovation (González, 2003) and to continue reimagining university learning for these people with disabilities (Edwards et al. 2022). Finally, these positive effects have been dominant in the *Conceptual skills (UDL applied to university education)* and in the *Digital skills*, consistent with the provided training, as presented by Perera et al. (2021).

Likewise, the neutral effects have significantly outweighed the positive ones in characteristics such as *Curricular adaptation skills in the evaluation* since the teachers have had the support of the Special Needs Unit of the University and have been simple adaptations -although it is necessary to go deeper with examples of specific adaptations in training to follow what has been exposed in this sense by Martínez, (2011), Sánchez-Palomino (2011), Moriña-Diez et al. (2013) and Ponce et al. (2021). Also, these neutral effects have prevailed in *Social-relational skills (enrichment for all students)* and in *Social-relational skills (attitude towards having students with special educational needs)* since the teachers have very much assumed this enrichment and good attitudes but, in the last characteristic, there has been a negative effect, which implies that the training has to be improved so that it contributes to teaching attitudes towards students with disabilities (Davies et al. 2013), exposing possible solutions to the lack of time and resources shown by the teacher. Equally, in a reduced way, there is also a majority of neutral effects in *Communication skills*, which shows the need for training to deepen in more concrete cases, which facilitates following what is exposed by Moriña et al. (2019) in this area. Finally, there is also little difference in favor of neutral effects in *Curricular adaptation skills*, explained by the same considerations exposed with the *Curricular adaptation skills in the evaluation*.

Among the suggestions put forward by the high-level teachers in these subjects, the most recommended were those related to conceptual clarification, presentation of case studies or examples, and description of actions in the didactic field. These suggestions would imply that the training would increase its duration and the participant's group splitting to offer a specific response to the training demands of the teaching staff. It would make it possible to direct it effectively towards the right path, which could be a valuable contribution to this work for improving the organization and planning of this training.

Although the results on which these conclusions rest are solid to the understanding of the phenomenon of the effectiveness of online university faculty training for the inclusion of students with disabilities, the use of qualitative methodology, although justified to achieve this compression, contains the limitation of the non-generalization of the results obtained. Therefore, to make these results generalizable, future research will be necessary to complement this type of work with other quantitative studies, allowing us to quantify these relationships between training and knowledge acquisition to improve the skills and motivation of university faculty.

For all of the above, although the teachers participating in the study suggest further research, this study's conclusions show that the proposed online university faculty training may improve the competencies and motivation of students with disabilities' inclusion.

### Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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## Author contributions

Conceptualization: PA-A; Funding: PA-A, PM-B, SV-L; Literature review: PA-A, PM-B, SV-L; AG-B; Methodology: PA-A, PM-B, SV-L; Data analysis: PA-A, PM-B, SV-L. Results: PA-A, PM-B, SV-L; Discussion and conclusions: PA-A, PM-B, SV-L; AG-B; Writing (original draft), PA-A, PM-B, SV-L; AG-B. All authors have read and approved the final version of the paper.

## Competing interests

The authors declare no competing interests.

## Ethical approval

All procedures performed in this study were in accordance with the ethical standards of the university. Ethical clearance and approval were granted by Madrid Open University (Number: UDIMA/PID: 0112/2022, 9 December 2022).

## Informed consent

Informed consent was obtained from all participants.

## Additional information

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