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Self-Evaluation Tools for e-Inclusion in HEI

Theoretical framework of inclusive digital education development

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1 Introduction

Inclusive digital education refers to an approach to education that leverages digital technologies to provide equitable access to education and ensure that learners with diverse needs and backgrounds can participate fully and benefit from educational opportunities.

During the recent COVID-19 pandemic when the schools closed practically overnight, and the teaching/learning has moved to distance learning, teachers and students were faced with many challenges. From this experience, we learned that not all students equally benefited from remote education. Various studies showed that this "experiment" aggregated existing inequalities, especially for SEND students. The SEND students are especially at risk to fall behind in digital education if the diverse learning needs of students are not considered. Rigid teaching methods, inaccessible learning resources and tools without additional support are a recipe for their failure. And this happened in many classes during the last school closure.

The COVID-19 pandemic and the resulting accelerated digitalization of teaching and learning processes in HE has put some students, especially SEND students, in an unequal position when trying to participate in digital education. After realizing that there are many students faced with problems while following educational content and performing their duties online (at least 10 - 16% of students by estimates of the partners HEI), HEI partners want to do something about this problem. At the same time, the HEI partners believe that addressing this issue is actually the part answer to a HE questions from years ago; why several students are underperforming, why are the published contents so poorly understood, why so many students fail to finish their obligation and more.

The need for building more inclusive digital education systems for all students, but especially for various SEND students, which emerged from the experience of the COVID-19 pandemic, is common to all levels and fields of education. Addressing inclusiveness is believed to be one of the answers/solutions. And in the upcoming even more challenging times, HEI partners do not want to ignore the potential of such a large percentage of populations (people with one or several forms of disability) and want to work on building an inclusive digital education environment to provide support in as early as possible stages of education to fully shape student's potentials. Digital education can be a great advantage for SEND students (and for teachers), as the technology makes it possible for teachers to meet all the different needs of students in the classes. The rapidly evolving technology can also make the teaching and learning experience more interesting, fun, and engaging which leads to better learning outcomes and general educational success of the students.

Inclusive digital education emphasizes the use of technology to overcome barriers to learning, such as geographical distance, physical disabilities, economic constraints, and social and cultural factors. It seeks to provide learners with flexible, personalized, and accessible learning experiences that can be adapted to their individual needs and preferences. Inclusive digital education can involve a variety of technologies and tools, such as online learning platforms, multimedia content, adaptive learning systems, assistive technologies, and mobile devices. It can be used to support a wide range of educational contexts, from formal classroom-based instruction to informal and lifelong learning.

Inclusive digital education also encompasses the creation and use of learning resources that reflect diverse cultural, linguistic, and gender perspectives, and that promote equity, inclusion, and social justice. It recognizes that digital education has the potential to be a powerful force for promoting equality and addressing the learning needs of marginalized and underserved populations. Overall, inclusive digital education seeks to use technology to expand access to education, promote diversity and inclusion, and foster the development of a more equitable and just society.

2 Backgrounds

2.1 Inclusive digital education - definitions & existing frameworks

Digital inclusion „consists in giving students with disabilities the possibility to study with other, non-disabled student“ (Guillemot, Lacroix, & Nocus, 2022). The main step forward was the adoption of the Convention on the Rights of Persons with Disabilities by the General Assembly of the United Nations (United Nations, 2006). The states that ratified that convention commit themselves to ensure that “Persons with disabilities can access an inclusive, quality and free primary education and secondary education on an equal basis with others in the communities in which they live”. (Guillemot et al., 2022)

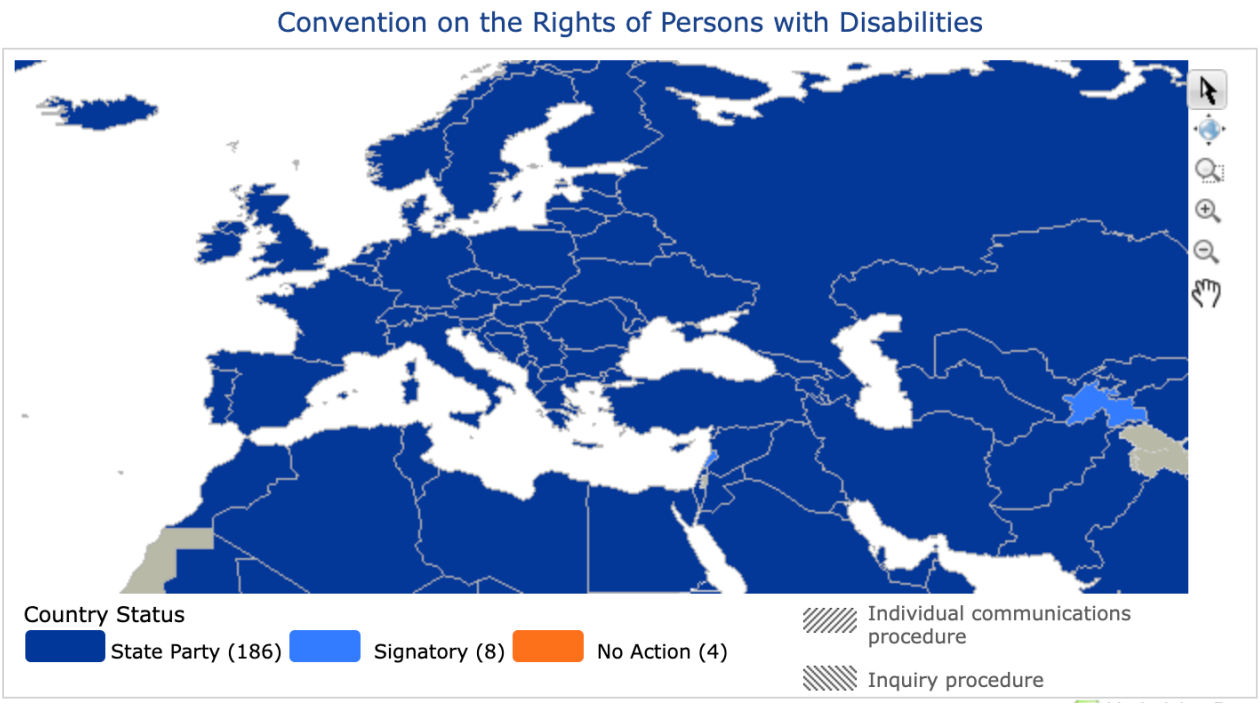

Figure 1. Status of ratification of Convention on the Rights of Persons with Disabilities in Europe (The Office of the High Commissioner for Human Rights, 2014)

Many countries have legislation or policies that support inclusion of students with special needs (Sahli Lozano, Wüthrich, Büchi, & Sharma, 2022). Inclusive education has been defined by United Nations Educational, Scientific and Cultural Organization (UNESCO) as “a process of addressing and responding to the diversity of needs of all learners through increasing participation in learning, cultures and communities, and reducing exclusion within and from education” (Moriña & Carballo, 2017).

„Inclusive education is when children with and without disabilities are educated within the same classroom, they learn and participate together.“ (Zahid, Jamil, & Nawaz, 2023).

„Inclusive education would greatly benefit students with disabilities by giving them the opportunity to spend most of their time being schooled with their typically developing peers. It would also promote greater social acceptance of difference and impairment.“ (Gulya & Fehérvári, 2023).

Inclusion involves more than placement of students with disabilities in mainstream classes. Efficient inclusion requires structural changes (Slee, 2018):

- organization,

- curriculum and teaching, and
- learning strategies.

Understanding the organizations and cultures of schools are central to the theory and practice of inclusive education. Curriculum, pedagogy, assessment, student classification, and stratification are all at play in determining the quality and inclusiveness of educational experiences (Slee, 2023).

Digital inclusion „is the ability of individuals and groups to access information and communication technologies (ICT). Digital inclusion encompasses not only access to Internet but also the availability of hardware and software; relevant content and services; and training for the digital literacy skills required for effective use of ICT. (Reder, 2015)

Activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use ICT. This includes five elements (Federal Communications Commission, 2017; National Digital Inclusion Alliance, 2021):

- affordable, robust broadband internet service,
- internet-enabled devices that meet the needs of the users,
- access to digital literacy training,
- quality technical support,
- applications and online content designed to enable and encourage self-sufficiency, participation and collaboration.

Digital Inclusion must evolve as technology advances and recognizes that access to and use of ICTs is an essential element for participation in society, democracy, and economy. Digital Equity is the ultimate outcome of full digital inclusion, with focused action and investments to eliminate barriers that perpetuate disadvantaged individuals and communities. (Abah, 2019)

Teaching professionals are looking for new methods to meet the challenges raised by the diversity of contemporary classrooms. Universal Design for Learning (UDL) is a philosophy, framework, and set of principles for designing and delivering flexible approaches to teaching and learning that address student diversity within the classroom context. (Capp, 2017; TEAL Center staff, 2010)

At the core of the European Union's Digital Education Action Plan (2021-2027) policy initiative, which 'offers a long-term strategic vision for high quality, inclusive and accessible European digital education' (European Agency for Special Needs and Inclusive Education, 2022). Digital transformation goes beyond applying suitably designed digital technologies in education. Inclusive digital education involves all education system levels (European Agency for Special Needs and Inclusive Education, 2022):

- Technology Level
- Learners level
- Teachers level
- Educational institution level
- National/regional level

Technology Level - The development of inclusive technology should consider technology-driven approaches and the primacy of pedagogy in a balanced way where

- priority is always given to pedagogy over all other considerations.
- assistive technology (AT) should be used as a compensatory means only where universally designed technology does not (yet) sufficiently satisfy all users' needs. (European Agency for Special Needs and Inclusive Education, 2022)

Learner's level - Inclusion in digital education is a multi-dimensional phenomenon, affected by society, technical equipment, the educational institution, the learning situation, and the individual learners. Learners' digital

competencies play an important role in inclusive digital education communication, collaboration and safety, respectful and appreciative social interaction, the development of a digital person, critical reflection on digital media and self-protection against violence in digital environments, etc.

Teacher's level - Teachers need support in selecting inclusive teaching materials that present no or few barriers and are suitable for all learners. Competencies like media literacy, data literacy and data-based decision-making are important in the context of inclusive digital teaching.

Educational institution level - educational organizations that embrace the digitalization process in terms of content and funding can help to reduce social exclusion. Teacher empowerment is key and must be accompanied by organizational support measures, further training and consideration of teachers' individual needs.

Booth and Ainscow developed Index for Inclusion to assist schools to turn the philosophy of inclusion into inclusive educational actions (Booth & Ainscow, 2011). For some schools, improving inclusivity may require substantial change not only to the teaching practices occurring inside and outside of the classroom, but within staffrooms and the school's relationships with parents, carers and the community (Booth & Ainscow, 2011).

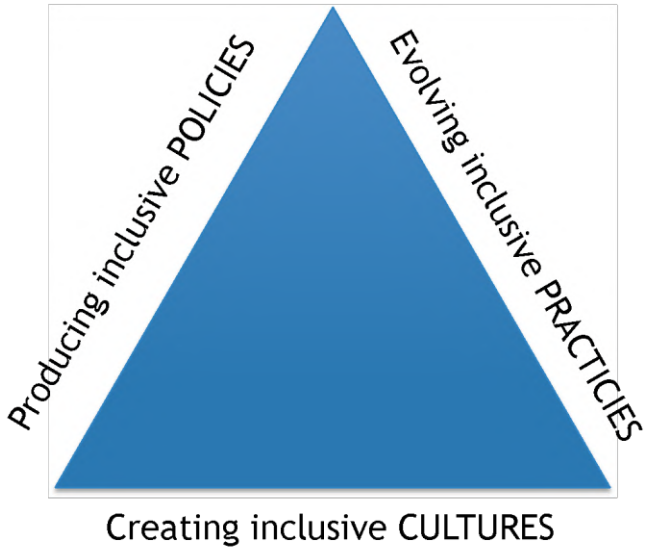

Figure 2. Index for Inclusion – dimensions (Booth & Ainscow, 2011)

Inclusive School Policy provides the foundation for enabling schools to be accessible to all students and staff. An inclusive policy also ensures appropriate resources are in place for students' learning and for staff members' development as inclusive practitioners.

An **Inclusive School Culture** is one in which diversity is embraced, and all members are treated fairly, respectfully, and equitably. An inclusive culture is also one in which teachers recognize their ability to facilitate learning and reduce barriers to learning and participation for all students in their classrooms.

Inclusive practice means that learning and teaching activities are responsive to student diversity. Learning experiences are designed with students' individual strengths and needs in mind, and consideration is given to how all students can actively and meaningfully participate in their learning and be appropriately challenged. Inclusive practice can be supported by approaches such as UDL.

2.2 SEND students - definitions and classifications

2.3 Digital education content accessibility

Digital content accessibility refers to the practice of creating and designing digital content (such as websites, documents, videos, and audio files) in a way that makes them accessible to all individuals, regardless of their abilities or disabilities. In the context of digital education, content accessibility means that all students should have equal access to educational resources and materials, regardless of their physical, cognitive, or sensory abilities.

Content accessibility is crucial for digital education because it ensures that all students, regardless of their abilities or disabilities, can fully participate in online learning. For example, students with visual impairments may use screen readers to access digital content, while students with hearing impairments may rely on captions or transcripts to access audio content. If digital content is not designed with accessibility in mind, students with disabilities may not be able to fully participate in the learning experience, which can lead to unequal educational outcomes.

In addition to ensuring equal access for all students, content accessibility in digital education can also improve the overall quality of education. By creating content that is accessible to all, educators can ensure that their materials are easy to navigate, understand, and interact with, which can benefit all students, not just those with disabilities. Furthermore, creating accessible content can also improve the usability of materials for everyone, including those without disabilities, making it easier for all students to engage with digital content and get the most out of their online learning experience.

Barriers of students with disabilities for accessing digital content

There are 4 main groups of students with disabilities who may face barriers when accessing digital content in the context of digital education. Here are some examples of these groups and the specific barriers they may encounter:

- Visual impairments: Students with visual impairments may have difficulty accessing digital content that is not designed with accessibility in mind. For example, images, videos, and other visual content may not be described in a way that is meaningful to individuals who are blind or have low vision. Additionally, text may be too small or too low contrast to be legible for individuals with certain types of visual impairments.
- Hearing impairments: Students with hearing impairments may face barriers when accessing digital content that includes audio content, such as lectures or videos. Without proper captions or transcripts, students who are deaf or hard of hearing may not be able to fully engage with this content.
- Cognitive disabilities: Students with cognitive disabilities may have difficulty navigating and understanding digital content that is not designed with accessibility in mind. This can include content that is overly complex or difficult to navigate, as well as content that does not provide clear instructions or feedback.
- Motor impairments: Students with motor impairments may have difficulty interacting with digital content that requires precise movements, such as using a mouse or keyboard. This can make it difficult for these students to navigate websites or complete assignments that require specific types of input.

Solutions for ensuring digital content accessibility in education for students with disabilities

There are several solutions that can be implemented to make digital content accessible for each group of students with disabilities. Here are some examples listed by different barriers of students:

- Visual impairments: To make digital content accessible for students with visual impairments, content creators can use alternative text (alt text) to describe images and graphics. This alt text should be detailed enough to convey the meaning of the image or graphic to students who cannot see it. Additionally, designers can use high contrast colors and font sizes that are easy to read for individuals with visual impairments.
- Hearing impairments: To make digital content accessible for students with hearing impairments, content creators can include captions and transcripts for audio content such as videos and lectures. This will allow students who are deaf or hard of hearing to access the audio content and participate fully in the learning experience.
- Cognitive disabilities: To make digital content accessible for students with cognitive disabilities, content creators can use clear and simple language and provide clear instructions and feedback. Additionally, designers can use layout and formatting techniques that make content easy to navigate and understand, such as bullet points and headings.
- Motor impairments: To make digital content accessible for students with motor impairments, content creators can design content that can be accessed using a range of input methods, such as keyboard-only navigation or voice recognition software. Additionally, designers can use a clear and consistent interface design that allows for easy navigation.

Benefits of accessible digital content for all students

Accessible digital content in digital education has many benefits for all students, not just those with disabilities. Here are some of the benefits:

- Improved usability: Accessible digital content is designed to be easy to navigate, which benefits all students. Clear navigation menus and simple language can help students find the information they need quickly and easily.
- Enhanced learning experience: Accessible digital content can help to promote engagement, understanding, and retention for all students. By presenting content in multiple formats and providing clear descriptions, all students can better understand the material.
- Promoting inclusion and diversity: Accessible digital content promotes inclusion and diversity by ensuring that all students, regardless of their backgrounds and abilities have equal access to educational resources and materials. By designing content that is accessible to everyone, educational institutions can create a more inclusive and diverse learning environment for all students.

Overall, creating accessible digital content in digital education benefits all students by improving usability, enhancing the learning experience, promoting inclusion and diversity. By making content accessible to everyone, educators and content creators can help all students reach their full potential and succeed in their education.

2.4 Learning management systems & technology accessibility

Learning management systems (LMS) are online platforms that are used to deliver educational content and facilitate communication between teachers and students (González-Gómez, Guardiola, Martín Rodríguez, & Montero Alonso, 2012). In recent years, there has been growing recognition of the importance of making LMS technology accessible to all users, including those with disabilities.

One of the most important considerations when designing accessible LMS is to ensure that all users can access the content (Burgstahler, 2020). This means that the LMS should be designed in a way that enables keyboard accessibility, as well as providing alternative text descriptions for images and multimedia content. Additionally,

designers should ensure that the LMS is compatible with assistive technologies, such as screen readers and speech recognition software (Burgstahler, 2020).

Another key consideration for making LMS technology accessible is to ensure that the user interface is clear and easy to use (Elfeky & Yakoub Masadeh, 2016; Orhan, 2019). This can be achieved by using direct and consistent navigation and labeling, as well as providing a range of input options for users who may have difficulty using a traditional keyboard and mouse.

Despite the importance of making LMS technology accessible, there are still many challenges that arise when designing accessible LMS (Burgstahler, 2020) For example, there may be conflicts between the needs of users with different disabilities, and designers must strike a balance between meeting the needs of all users and avoiding overloading the interface with too many features.

While LMS have numerous advantages, it is important to consider their potential disadvantages when evaluating their use.

One of the major advantages of LMS, as mentioned in the previous lines, is their accessibility. Learners can access educational content from anywhere with an internet connection, which is especially beneficial for those in remote areas or with limited access to educational resources. Additionally, LMS can save time and money for both teachers and learners, as teachers can easily upload and manage course content while learners can access the content on their own schedule without having to travel to a physical classroom.

Another advantage of LMS is their ability to provide personalized learning experiences. Teachers can customize educational content to meet the specific needs and learning styles of individual learners, track progress, and provide targeted feedback to help learners improve. LMS also provide a platform for learners and teachers to communicate and collaborate, both within and outside of the classroom, which can facilitate discussion, feedback, and the exchange of ideas and information.

However, LMS can also have some disadvantages. Technical issues can arise, such as slow loading times, software glitches, and security concerns, which can impact the learning experience (Elfeky & Yakoub Masadeh, 2016; Orhan, 2019). Additionally, LMS can limit personal interaction between learners and teachers, leading to feelings of isolation that can negatively impact the learning experience (Singh & Reed, 2001). Implementing and maintaining an LMS can also be costly, which can be prohibitive for smaller educational institutions, limiting access to the technology for some learners (Singh & Reed, 2001). Lastly, learners and teachers may need to adapt to the use of LMS, which can be time-consuming and frustrating, and this can impact the initial adoption of the technology (Elfeky & Yakoub Masadeh, 2016; Orhan, 2019).

In addition to the advantages and disadvantages mentioned, there are some other important factors to consider when using LMS.

One such factor is the need for effective training and support for both teachers and learners. Without proper training and support, the use of LMS may be overwhelming or confusing for users, and they may not be able to fully utilize the features and benefits of the technology. Providing ongoing training and support can help to ensure that users are comfortable and proficient in using the LMS, and that they are able to fully engage in the learning process (Burgstahler, 2020).

Another important factor is the need for clear and consistent communication between teachers and learners. While LMS can facilitate communication and collaboration, it is important for teachers to establish clear expectations and guidelines for communication, and to ensure that they are responsive to learners' questions and concerns (González-Gómez et al., 2012). Additionally, it may be necessary to provide alternative forms of communication for learners

who have difficulty using text-based communication, such as voice or video communication (Elfeky & Yakoub Masadeh, 2016; Orhan, 2019).

Finally, it is important to consider the potential impact of LMS on assessment and evaluation. While LMS can provide valuable data and analytics about learners' progress, it may be necessary to consider how this data is used and how it may impact the overall learning experience. For example, relying too heavily on data and analytics may overlook important qualitative aspects of learning, such as creativity, critical thinking, and problem-solving skills(Singh & Reed, 2001).

Overall, while LMS offer many benefits in terms of accessibility, efficiency, personalization, collaboration, and communication, it is important to carefully consider the potential challenges and to provide the necessary training, support, and communication to ensure that learners and teachers are able to fully engage with the technology and to achieve their educational goals (Burgstahler, 2020).

In conclusion, while LMS offers many advantages in terms of accessibility, efficiency, personalization, collaboration, and communication, it is important to consider the potential disadvantages, such as technical issues, lack of personal interaction, cost, and a learning curve. Institutions and educators should carefully evaluate the benefits and challenges of LMS to determine if they are a good fit for their specific educational needs.

2.5 Universal design for learning

Universal design for learning (UDL) is an educational framework based on the idea that all students can benefit from learning when they are provided with choices that are suited to their individual needs. UDL encourages educators to create flexible and adaptable learning environments in which students of all abilities and backgrounds can succeed. (Meyer, Rose, & Gordon, 2014; TEAL Center staff, 2010)

The main goal of UDL is to provide a learning environment that allows students to access the same information and resources regardless of any of their individual limitations or characteristics. Through UDL, educators can provide a range of options for presenting information, engaging with the material, and expressing what they have learned. UDL also encourages the use of technology to create a more inclusive learning environment.

The seven pillars of UDL

The seven pillars of UDL are a set of guidelines created by the Center for Applied Special Technology (CAST). These seven pillars are: (1) Provide multiple means of representation; (2) Provide multiple means of action and expression; (3) Provide multiple means of engagement; (4) Provide flexibility in the use of tools and materials; (5) Provide options for individualizing the pace of learning; (6) Provide options for individualizing content; and (7) Provide options for self-assessment and reflection.

The first pillar, providing multiple means of representation, involves using a variety of visuals, such as diagrams, illustrations, and videos, as well as audio recordings, podcasts, and lectures. It also involves providing textual representation, such as articles, books, and blog posts. UDL focuses on making the material accessible for all students by providing different ways for them to access the information. UDL can be applied in a university setting to create an inclusive learning environment that allows all students to access the same information and resources regardless of any limitations they may have. For example, lectures can be supplemented with visual, auditory, and textual representations of the material to ensure that all students can access the information in the way that is most comfortable for them.

The second pillar, providing multiple means of action and expression, involves offering students the opportunity to demonstrate their understanding of the material in a variety of ways. UDL encourages students to demonstrate their

understanding of the material by making a product and/or providing a response. This could include providing students with the opportunity to create a presentation, a poster, a video, a blog, or a poem.

The third pillar, providing multiple means of engagement, includes giving students the opportunity to interact and engage with the material in ways that are comfortable for them, such as hands-on activities, simulations, and games. UDL encourages students to interact and engage with the material in meaningful ways. This could include providing students with real-world examples, activities, and simulations that can help them to make connections between the material and their own lives. In addition, universities can incorporate activities and simulations into their curriculum to help students make connections between the material and their own lives.

The fourth pillar, providing flexibility in the use of tools and materials, involves providing students with access to a variety of tools and materials, such as computers, tablets, and other assistive technology. Moreover, it also means that the design accommodates a wide range of individual preferences and abilities, like adding captions to the video, which allows the user either to listen or read.

The fifth pillar, providing options for individualizing the pace of learning, involves giving students the freedom to work at their own pace. This includes allowing students to take breaks or pause tasks or giving them the option to work ahead or review previous material. In addition, it means that the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities, like for example Providing alternative text to the images, so that users relying on a screen reader understand the meaning of the picture.

The sixth pillar, providing options for individualizing content, involves providing students with the opportunity to individualize their learning experiences through content customization. This may involve allowing students to choose what topics they want to focus on or providing students with the option to access alternative formats of the same content. It also means to design content that can be used efficiently and comfortably without tiring the user, with low physical effort and simple and intuitive use, meaning that the use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level. An example could be to make your content as easy to digest as possible, e.g., by structuring and organizing information. Divide the long text into smaller paragraphs, use subheadings, and provide progressive disclosure. Using complex layouts can confuse the users as to the contents of a page and hamper the efficiency of their assistive tools.

The seventh and final pillar, providing options for self-assessment and reflection, involves providing students with the opportunity to reflect on their learning and evaluate their progress. This includes providing feedback, encouraging students to set goals, and providing activities that focus on problem-solving. Moreover, it means that the design minimizes risks and conflicts after accidental or unintended actions, like for example Providing a clear and helpful error message in the input form.

UDL and learning styles

UDL considers different learning styles and abilities of students to ensure that all can access the same information and resources. UDL principles recognize that some students may benefit from visual representation of the material, such as diagrams, pictures, and videos. Others may benefit from an auditory representation, such as audio recordings, podcasts, and lectures. And others may benefit from a textual representation, such as an article, a book, or a blog post.

In addition, UDL considers individual preferences for how to engage with the material. For example, some students may benefit from hands-on activities, such as simulations or experiments. Other students may prefer to express themselves through writing or drawing. And some students may benefit from a combination of these approaches.

By recognizing and understanding different learning styles, UDL encourages educators to create a learning environment that is flexible and can be adapted to the needs of all students.

Benefits of UDL

UDL offers many benefits to both students and educators. For educators, UDL helps to create a learning environment that is inclusive, creative, and engaging. This encourages educators to think outside the box and come up with creative solutions to help all students succeed. UDL also encourages collaboration and problem-solving, which helps to foster a sense of community among students. For students, UDL provides access to curriculum materials that are tailored to their individual needs. This ensures that all students can access and understand the material, regardless of their individual limitations. Moreover, some benefits are:

- Allowing students to use their strengths while also working on deficiencies.
- Helping teachers recognize the variability and diversity of individual brains.
- Emphasizing the need to proactively plan for a variety of learning styles, thus reducing barriers to education.
- Fixing the curriculum and not the student.
- Treating each learner as uniquely capable.
- Shaping young students into Expert Learners.
- Including accommodations for students with disabilities and second language to help them fully access the curriculum.
- Relying on a structure designed to reduce barriers to learning.
- Ensuring that students have everything they need to achieve the learning objectives.
- Presenting information in ways that suit the student, rather than asking the student to adapt to the content provided.
- Increasing the involvement of all students.
- Making students more aware and confident.

2.6 Digital inclusion in VR, AR, and MR

Natural disasters such as floods and earthquakes, as well as the COVID-19 pandemic that affected the entire world in 2019, have made it challenging for students to physically attend school. However, students can continue their education through various online platforms. For students with cognitive disabilities, traditional online learning methods may not be easy to follow, as there is no system designed specifically for them. Virtual reality (VR) technology can be highly beneficial for these students in education. VR can help increase their focus and concentration, which is important for those with cognitive disabilities. Additionally, VR can help these students better understand educational material. For instance, by using VR, they can improve their skills, increase their language proficiency, or enhance their math and reading skills. VR can also be used to improve their social skills. By interacting with others in virtual environments, they can develop social skills and learn about different cultures and places, leading to empathy. However, it is crucial to use VR technology under the supervision of a teacher or parent because students with cognitive disabilities may experience physical or emotional discomfort during VR use. Moreover, educational institutions and teachers should possess adequate knowledge and experience to plan and implement VR technology use correctly. Scientific sources, such as journal articles and reports, focus on VR in education and all stakeholders. The starting point of these sources is to highlight the effects of cognitive disabilities on students' education (Helsel, 1992).

Digital inclusion for special educational needs or disabilities in VR, AR, and MR is a critical aspect of ensuring that all students have equal opportunities to learn and grow. These immersive technologies have the potential to revolutionize special education by providing new and engaging ways for cognitive disabilities students to learn and interact with the real world. Digital inclusion for cognitive disabilities students or disabilities in VR, AR, and MR requires a deliberate focus on accessibility and inclusion. This means designing virtual environments and experiences that are accessible to all students, regardless of their abilities. For example, text-to-speech and speech-to-text features can help students with hearing or speech impairments, while haptic feedback and tactile interfaces can provide feedback for students with motor impairments.

Additionally, digital inclusion for cognitive disabilities students in VR, AR, and MR means creating a supportive learning environment that meets the unique needs of each student. Teachers in this field need to be trained in how to use these technologies effectively and inclusively, and they need to be aware of the individualized accommodations that students may require. Through digital inclusion in VR, AR, and MR, students with special educational needs or disabilities can have access to new and engaging learning experiences that can enhance their education and improve their quality of life. By promoting digital inclusion, we can ensure that these technologies are accessible to all students, regardless of their abilities, and that they are truly transformative in the field of special education.

2.7 Best practices in existing self-evaluation tools

SELFIEforTEACHERS involves a self-reflection process and aims to help teachers identify their strengths and gaps in their digital competence (European Commission & Economou, 2023). It complements the SELFIE tool which supports whole school planning for technology use. The tool aims to support teachers in reflecting on and improving their digital competence and integration of technology in their teaching practices. The tool provides a series of questions and prompts that guide teachers in evaluating their use of digital technologies. Based on the European Framework for the Digital Competence of Educators (DigCompEdu), SELFIEforTEACHERS includes 32 self-reflection items on teachers' digital competence. Results are provided on a six-level proficiency scale. A report provides personalised feedback to guide teachers in reaching the next level in their digital competence (European Commission & Economou, 2023). This self-reflection helps identify strengths and areas for improvement. After completing the self-assessment, teachers receive personalized feedback and suggestions for professional development. SELFIE ensures that all data collected is anonymous and securely stored, with results being used solely for the purpose of self-reflection and improvement. The tool can be used individually by teachers or integrated into broader school-wide initiatives to enhance digital education practices across the institution.

3 Factors that impact inclusive digital education

3.1 Literature review

To identify good practices for inclusive digital education, barriers of inclusive digital education and factors that impact inclusive digital education in existing literature, first, a literature review was conducted. The aim of the literature review was to identify the relevant literature (journal papers, articles published in conferences, reports, and other relevant sources.

First, the search string used for searching the literature was set as following:

Factors AND (digital inclusion OR e-inclusion OR einclusion) AND (higher education) AND (accessible education) AND (students OR SEND) AND (pedagogy OR teaching)

The search string was used in different databases and search engines:

- Scientific databases: WoS, ScienceDirect, IEEExplore, ACM, etc.
- Google Schoolar
- Search engines: Google

Inclusion criteria:

- Literature only in English
- Literature only from 2017 or newer

Altogether 131 literature units were identified and recorded. Each unit was recorded with information about the title, source (where the unit was discovered), year of publishing, venue (Journal name, Conference proceedings title, etc.), and a short description or abstract if available.

The literature units that were analyzed for identification of good practices, barriers and factors that impact inclusive digital education were following (ordered in alphabetical order by the authors' names):

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The identified literature was used for extracting information about (1) best practices for inclusive digital education, (2) barriers of inclusive digital education, and (3) factors that impact the level of inclusive digital education. In the subsections that follow, the results of the literature review and analysis of the qualitative data are presented. The results of the literature review were the basis for defining the model for the self-evaluation tool.

3.2 Best practices for inclusive digital education

The literature review employed a systematic approach to identify relevant factors for digital inclusion in higher education, focusing on accessible education for students, including those with special educational needs (SEND). The identification of factors was conducted through a literature search using specific keywords, including "Factors," "Digital Inclusion," "E-inclusion," "Higher Education," "Accessible Education," "Students," and "Pedagogy" or "Teaching." The search was performed across scientific databases including WoS, ScienceDirect, IEEExplore, ACM

and Google Scholar. To ensure the relevance of the findings, only literature in the English language published from 2017 onwards was considered. Through this process, a total of 133 papers were identified.

From screening of the 133 identified papers, which was performed by all partners (each partner had assigned set of papers) 206 distinct factors were recognized as contributing to digital inclusion in higher education. For each identified factor, the following data was recorded:

- Factor name
- A short description
- Impact type (positive, negative or neutral)
- Source of the paper or papers
- Question, how to investigate, whether a factor is addressed in HEI

Since different partners read the papers and identified the factors, the naming of factors was not unified and consequently a same factor in meaning had two or more different names. To classify and unify the factors, partners from MARIBOR summarized all identified factors.

Based on the identified 206 factors, each factor's description, and definition of the impact type, whether it is positive, negative or neutral, several good practices and challenges were recognized and extracted. The screening of the literature and overviewing the defined factors, the partners primarily identified 87 good practices that have shown positive outcomes in promoting digital inclusion, based on research and experience of different authors. Additionally, 63 challenges or barriers were also identified and extracted from the literature, representing the obstacles and barriers that need to be addressed to enhance digital inclusion efforts.

To translate the 87 good practices into a more manageable set of good practices, two extraction cycles were performed. The first cycle was based on their recurring mentions in the literature. Throughout the research process, which identified 87 good practices, only the good practices which were mentioned more than once in literature were used, resulting in 30 most addressed best practices. Each of these practices was highlighted at least twice in the reviewed sources, indicating their significance in the context of digital inclusion. Subsequently, in the second cycle, a more rigorous criterion was applied to narrow down the selection further. Out of the initial 30 best practices, 16 practices stood out as particularly impactful, as they were consistently identified at least three times in the literature. These practices not only addressed digital inclusion but also emphasized a broader sense of inclusion across diverse educational settings. The research resulted in the following good practices, accompanied by short descriptions, taken from the identified literature:

1. **Variety in content presentation** - Different ways of presentations are encouraged, professors not being limited by only PowerPoints but investing effort in enriching the existing material with extensive use of pictures, audio fragments, animations, videos and use of e-books. Keywords definition and synopsis provided before and after every lecture has proven to be useful.
2. **Modern teaching methods** - Effective teaching methods and strategies have great impact on perceived success of students, where no previous knowledge must be assumed. The HEI teachers are encouraged to invite other lecturers, as including different lectures increases diversity. Class notes, lecture slides and materials should be provided ahead of lectures. The literature also mentioned applying Universal Design for Learning (UDL) approach to teaching and learning, which offers flexibility in the ways students access material and show what they know, looking for different ways to keep students motivated, including:
    - Engaged school leader and competent, engaged, supported and accountable teachers.
    - Motivation of teachers to advance their knowledge.
    - Instructional quality (example: Appropriate cues; clear directions; assisting with skills).
    - Teacher attitude (example: Tolerance; positive attitude towards all students; empathy).
    - Activity selection/modification (example: Disability-specific activity modifications; adapting rules).
    - Teacher knowledge/education (example: Knowledge of disabilities; knowing student's abilities).

- Collaboration (example: Co-teaching; collaboration among colleagues).
- Expectations of students (example: Peer acceptance; encouraging classmates).
- Teacher ability (example: Ability to differentiate; creativity).
- Teacher flexibility (example: Flexibility within lessons).
- Teacher/student relationship (example: Relationships with students).

3. **Structured lectures** - Clear expectations, a skeleton of contents with key phrases presented in the beginning of lectures, clearly structured and guided content, focusing on providing the information progressively, so students have enough time to process the content.
4. **Practical examples** - Theory supported with a lot of practical examples, students are shown real outcomes, creating examples in real world environment, making the classes more tangible. Enforcing problem-based learning.
5. **Extended time** - For learning, examinations, finishing seminar work, creating projects or other student related work.
6. **Assistive technologies** - The possibility to use assistive technologies, providing assistive technologies at schools, if possible, use of computers for teaching and examinations
7. **Small groups** – Using a small class format in HEI, allowing max 30 students to listen to lectures together. If this is not possible or in case of larger classroom, dividing students into smaller groups or managing larger groups by task-oriented activities should be performed. The literature uncovered, that in larger groups, typically only the students in the first row actually cooperate (in case of physical attendance) or do not say anything in case of online lectures.
8. **Self-monitoring** – A self-assessment technique provides opportunities for self-testing and anonymous self-monitoring. The possibility to repeat the tests or have several opportunities for assessment, but having only one obligatory test, positively effects students. Since for some too many tests create stress, extra exercise with solutions is also advisable. As there are different forms of assessment, it is advisable to use different methods, create multiple examinations and assignments and use multiple choice in assessments. Written demand tasks as well as oral examinations are advisable. The students benefit from general as well as specific feedback, individualized guidance and freedom in choosing tests (which again should not be obligatory).
9. **Low physical effort** – Inclusive digital education should be designed to accommodate individuals with varying levels of physical ability. Ensuring that low physical effort is required for participation is essential for creating an inclusive learning environment. The classrooms should be simple accessible to students, if lectures are performed physically. In case of digital content, access to materials should require as minimal energy as possible, such as Accessible Content, enabled simple keyboard navigation, responsive design, clear and consistent layout, captioning and transcripts, adjustable text size and font, color contrast etc.
10. **Positive personal relationships** - A supportive and inclusive learning environment, connections between students, instructors, and peers that promote a sense of belonging, trust, and collaboration, based on open and regular communication, collaboration, feedback and support, empathy and flexibility.
11. **Positive group relationships** – A supportive and collaborative connections formed among students within a group or team learning setting based on communication, collaboration, support, shared goals, accountability, feedback, flexibility and effective leadership.
12. **Peer integration** - Ensuring that students of diverse backgrounds, abilities, and experiences are effectively integrated into a supportive and inclusive online learning community, including diversity acknowledgment, collaborative learning, inclusive language, peer support networks, structured group work and a communication platform.
13. **Structured feedback** - providing clear, constructive, and equitable feedback to all students, including those with diverse backgrounds and abilities in a clear, constructive and timely way. Tailored feedback with addressing the individual needs and progress of each student, celebrating students' achievements reinforces their confidence and motivation of students.

14. **University regulations** - policies and guidelines put in place to ensure that online and remote learning environments are accessible and equitable for all students, regardless of their backgrounds, abilities, or circumstances. Regulations can include accessibility standards, instructor training, privacy and data security, anti-discrimination policies and others.
15. **Shared responsibility** - collective effort of various involved—educators, institutions, students, caregivers, and technology providers—to ensure that online learning environments are accessible, reasonable, and inclusive for all.
16. **Adapted learning** - Using different methods in multiple examinations, and assignments, multiple choice in assessments, written demand tasks, oral examinations, general and specific feedback, individualized guidance, freedom in choosing non-obligatory tests.

3.3 Barriers of inclusive digital education

As typically the universities are designed for 20-year-old healthy and high performing kids supported by their parents, listening to lectures in their mother language, we identified 63 challenges for non-typical students, from which 6 groups of challenges were extracted.

1. **One solution does not fit all** - Students have barriers as an individual problem that needed an individual solution (Blind learners, Deaf learners, Autism, Dyslexia, Muscular dystrophy, Chronic fatigue).
2. **Some solutions just do not work** - It is advised to repeat the content, however sometimes the content is being repeated too much and it causes dullness, It is advised to provide everything online (in advance even), however that can cause dependence on the online platform, Students get so dependent on the online platform to provide them with content that some of them don't really take notes during the lesson, AT devices are available but their use is inappropriate.
3. **Professors mean well but overdo it** - Discomfort when instructors combined several sensory inputs to make the class more diverse and interesting; The PowerPoint is used inefficiently, accessible word processing and presentation styles is not always included unreadable graphs, drawings and non-structured Word documents. If university provides too much help, it is an extra handicap than a help; Students felt their disability was more prominent and they perceived a strong emphasis on their weaknesses rather than on their strengths.
4. **Social environment** - Unfriendly atmosphere, Compulsory class attendance (due to general rules), Crowded classrooms, large lecture halls, Students in the back are left alone and only the students in the first two rows were paying attention. Working in groups - When students are in a group, people are counting on them and it is "frustrating" when suddenly students are out of communication for a week due to an illness, Peers don't know how to communicate, how to understand what SEND students are saying and the instructor has to intervene as a mediator.
5. **Physical environment** - Infrastructure/environment, Existing facility has difficulties to accommodate a teacher/student using a wheelchair, Cables on the floor, Ergonomic barriers (acoustics, furniture, etc.). Time - No time to find new ways of teaching, no time to deal with students, who need more time.

Personal issues of students - Loneliness and fear of not knowing how to act Students conveyed difficulty with asking questions in class or conversing with other students; Students struggling to understand abstract or ambiguous concepts, or to express their thoughts in writing; Poor concentration and organizational skills and becoming overwhelmed by the volume of work; Students with similar disabilities study together in classrooms segregated from "regular school classes" and "mainstream school programs".

3.4 Factors that impact inclusive digital education

The primary outcome of this study is the development of a comprehensive theoretical framework for inclusive digital education. This framework incorporates three essential elements from the TPACK framework: technology, pedagogy, and content aspects. By integrating these components, the framework provides a holistic perspective on the effective integration of technology in educational settings while promoting inclusivity. As part of the research process, a thorough analysis resulted in the identification of 206 distinct factors that influence digital inclusion in education. To enhance the clarity and positive orientation of these factors, negative aspects were transformed into positive counterparts. For instance, factors such as "Insufficient or limited teacher training" were reframed as "Informed, trained, aware, and educated staff/university." This reframing aims to emphasize the importance of equipping educators and institutions with the necessary skills and knowledge to foster digital inclusion. To facilitate a more organized and comprehensive understanding, similar factors were categorized and grouped together based on their common themes and characteristics. This categorization process allows for a clearer overview of the factors influencing digital inclusion and facilitates targeted interventions and strategies.

Additionally, the identified best practices (87 in total) and barriers (63 in total) were seamlessly integrated into the definition and description of the identified factors. By doing so, the framework aligns the positive practices that promote digital inclusion with the challenges that need to be addressed. This integration ensures that the framework not only acknowledges the existing barriers but also offers practical guidance and strategies to overcome them.

3.4.1. Leadership/ School's perspective

- Inclusive digital strategy - HEI has an inclusive digital education strategy
- Collaborative digital strategy development - Inclusive digital strategy in HEI is developed together with leaders and teachers
- Contemporary pedagogical approaches - Teachers are supported to try out new ways of teaching with inclusive digital technologies
- Scheduled time to explore digital teaching - In HEI teachers have time to explore how to improve their teaching with inclusive digital technologies in the form of individual learning or organized training courses.
- Efforts to minimize discrimination - HEI strives to minimize all forms of digital (education) discrimination
- Collaboration and communication encouragement between school and teacher - In HEI teachers are supported by their organization and collaboration and communication is performed without difficulties.
- Inclusion policies - HEI uses a Special educational needs policy (or Special digital educational needs) to reduce the barriers to learning and participation of all students.
- Digital literacy - HEI supports teachers in acquiring knowledge and skills in digital literacy for inclusive digital education.

3.4.2. Collaboration and Networking

- Progress review - In HEI, progress in teaching and learning with inclusive digital technologies is reviewed.
- Discussion on the use of technology - In HEI the advantages and disadvantages of inclusive teaching and learning with digital technologies are discussed between HEI staff
- Collaboration of HEI, local communities, caregivers and parents - In HEI inclusive digital technologies in partnerships with other organizations are used
- Synergies for Blended Learning - HEI actively collaborates with other HEIs or organizations to support the use of inclusive digital technologies
- Staff, governors, students and parents/carers share a philosophy of inclusion - In HEI, the main actors promote a common vision of digital inclusion

- Teachers plan, teach and review in partnership - HEI staff meet to plan the inclusive course, review existing inclusive courses, or plan inclusive teaching methods.
- Encouraged collaboration and communication between students and teachers - HEI encourages inclusive digital collaboration and communication between teachers and students

3.4.3. Infrastructure and Equipment/ Tools and Technology

- Accessible infrastructure and tools - HEI's digital infrastructure supports inclusive and accessible teaching and learning with digital technologies
- Digital devices and assistive products for teaching - Are In HEI inclusive digital devices and assistive products provided to use for teaching.
- Internet Access - In HEI, there is access to the Internet for all to enable inclusive digital teaching and learning
- Technical support - In HEI technical support is available in case of problems with digital technologies
- Available digital devices and assistive products for learning - In HEI there are school owned/managed inclusive digital devices and assistive products for students to use when they need them
- Devices and assistive products for students - In HEI there are school-owned and managed portable devices and/or assistive products that students can take home when needed
- Measures to identify digital divide - In HEI there are measures in place to identify challenges that arise with blended learning related to students' learning needs and socio-economic background
- Support to address the digital divide - In HEI there is a plan in place to help teachers deal with challenges that arise with blended learning, related to students' learning needs and socio-economic background
- Bring your own device and assistive products - In HEI students bring and use their own portable devices and assistive products during lessons.
- Reduced physical barriers - In HEI physical spaces support teaching and learning with digital technologies
- Assistive products for students in need of special - In HEI students in need of special support have access to assistive technologies support.
- Online libraries - In HEI there are accessible online libraries or repositories with teaching and learning materials.
- Fairly distributed resources - All students have equal access to digital resources.

3.4.4. Continuing Professional Development/ Teacher's Perspective

- Discussion of CPD needs - HEI leaders to discuss with staff about CPD needs for inclusive teaching with digital technologies.
- Participation in CPD activities - Teachers in HEI have opportunities to participate in CPD for inclusive teaching and learning with digital technologies.
- Face-to-face or online sharing experiences between staff - HEI supports teachers to share experiences within the school community about inclusive teaching with digital technologies.

3.4.5. Pedagogy: Supports and Resources

- Online educational resources - HEI staff search online for inclusive digital educational resources
- Creating digital resources - HEI teachers create inclusive digital resources to support their teaching.
- Using virtual learning environments - In HEI, teachers use virtual learning environments with students in an inclusive way.
- Communicating with the school community - In HEI, teachers use inclusive digital technologies for school-related communication.
- Open educational resources - HEI teachers use inclusive open educational resources

- Staff development activities help staff to respond to student diversity. - Staff development activities help staff to respond to student digital diversity.
- Student difference is used as a resource for teaching and learning - In HEI teachers are trained and instructed on how to address student diversity
- Staff develop resources to support learning and participation. - How often are the resources updated to support inclusive participation?

3.4.6. Pedagogy: Implementation in the classroom/Pedagogic approach

- Personalization according to students' needs - In HEI teachers use digital technologies to tailor their teaching to students' individual needs
- Fostering students' creativity - In HEI teachers use digital learning activities that foster all students' creativity
- Engaging and motivating students - In HEI, teachers set inclusive digital learning activities that actively engage students, increasing their creativity and participation.
- Student collaboration - In HEI teachers use digital technologies to facilitate student collaboration
- Everyone is made to feel welcome and treated with respect - In HEI the classroom environment is made respectful and welcoming through digital technologies
- The partnership between staff and parents/carers - Parents/carers support the use of digital resources in HEI
- Students are equally valued. - Digital tools help students feel equally valued.
- Staff and students treat one another as human beings and discipline is based on mutual respect. - In HEI the use of digital technologies helps create a positive classroom environment based on mutual respect between students and teachers
- The school arranges teaching groups so that all students are valued and differences are understood - In HEI digital technologies facilitate the organization of teaching groups in which students can collaborate by valuing the diversity of each one
- Training and education on inclusiveness - In HEI, the pedagogical staff is trained in inclusiveness

3.4.7. Assessment Practices/ Inclusion Assessment

- Assessing skills - HEI teachers use inclusive and accessible digital technologies to assess students' skills
- Digital assessment - HEI support teachers in using digital technologies for assessment
- Timely feedback - HEI teachers use inclusive digital technologies to provide timely feedback to students
- Self-reflection on learning - HEI teachers use digital technologies to enable students to reflect on their own learning
- Feedback to other students - HEI teachers use digital technologies to enable students to provide feedback on other students' work
- Using data to improve learning - Digital data analysis helps to identify students' needs and improve their digital learning experience
- Evaluation metrics - In HEI, evaluation metrics on inclusiveness are used

3.4.8. Student Digital Competence/ Student's perspective

- Learning to communicate - In HEI students learn to communicate using digital technologies
- Digital skills across subjects - HEI ensures that students develop their digital skills across subjects

4 Teachers' perceptions about inclusive digital education

First survey was conducted to acquire empirical evidence about teachers' perceptions about inclusive digital education. The survey was constructed based on the evidence from the existing literature, where we identified most significant factors that can impact inclusive digital education.

4.1 The results of the survey for HEI staff

Table 1. Answers received per country.

Where was the survey conducted	Counts	% of Total
Spain	22	19.8 %
Italy	20	18.0 %
Portugal	20	18.0 %
Slovenia	29	26.1 %
Turkey	20	18.0 %
Together	**111**	

Table 1 summarizes the distribution of survey responses by country. The highest number of responses came from Slovenia, accounting for 26.1% of the total. Spain contributed 19.8% of the responses, while Italy, Portugal, and Turkey each provided 18.0% of the responses. In total, 111 responses were received across all countries.

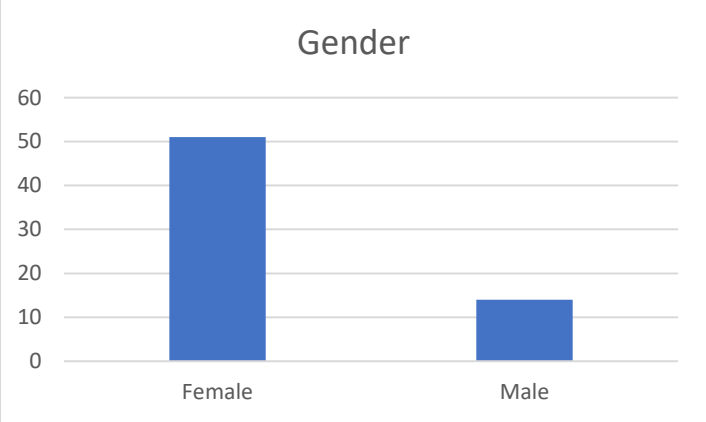

Figure 1: Gender of the respondents

Table 2: Role of respondents in the HEI

Role in the HEI	**Counts**	**% of Total**
Administrator	7	6.3 %
Assistant	16	14.4 %
Director	1	0.9 %
Executive	1	0.9 %
I prefer not to answer	4	3.6 %
Manager	2	1.8 %

President	1	0.9 %
Psychotherapist	1	0.9 %
Researcher	8	7.2 %
Science Manager	1	0.9 %
Teacher/professor/associate professor/assistant professor/instructor/lecturer	62	55.9 %
Technical support	6	5.4 %
Independent professional associate	1	0.9 %

Table 2 provides a breakdown of the roles of respondents in a Higher Education Institution (HEI). The majority of respondents (55.9%) are in teaching roles, including teachers, professors, associate professors, assistant professors, instructors, and lecturers. Assistants make up the next largest group at 14.4%. Other notable roles include researchers (7.2%), administrators (6.3%), and technical support (5.4%). Smaller percentages are seen in roles such as manager (1.8%), and single representatives from positions like director, executive, president, psychotherapist, science manager, and independent professional associate, each constituting 0.9% of the total. A small portion (3.6%) preferred not to disclose their role.

Table 3. Status of the respondents about having a disability (teachers)

Do you have any kind of disability?	**Counts**	**% of Total**
A person who is colour blind	1	1.0 %
A person who is deaf	1	1.0 %
A person who is hard of hearing	1	1.0 %
A person who stutters or has a speech impairment	1	1.0 %
A person with a psycho-social or mental disorder	1	1.0 %
A person with motor impairment (for example spinal cord injury, a lost or damaged limb, cerebral palsy, muscular dystrophy, multiple sclerosis)	1	1.0 %
A person with neurodiversity (for example autism, ADHD, dyslexia, dyspraxia, Tourette Syndrome)	2	1.9 %
A person with neurodiversity (for example autism, ADHD, dyslexia, dyspraxia, Tourette Syndrome), A person with a psycho-social or mental disorder	1	1.0 %
A person with photosensitive seizures (for example epilepsy)	1	1.0 %
I do not have a disability	91	87.5 %
I do not have a disability, I prefer not to answer	1	1.0 %
I prefer not to answer	2	1.9 %

Table 3 details the disability status of respondents who are teachers. The vast majority (87.5%) reported not having any disability. Specific disabilities were reported by small percentages: neurodiversity (1.9%), and various other

disabilities such as color blindness, deafness, hard of hearing, speech impairment, psycho-social or mental disorder, motor impairment, and photosensitive seizures, each at 1.0%. Additionally, 1.0% of respondents reported both neurodiversity and a psycho-social or mental disorder. A small portion of respondents (1.9%) preferred not to disclose their disability status, with 1.0% stating they have no disability but prefer not to answer.

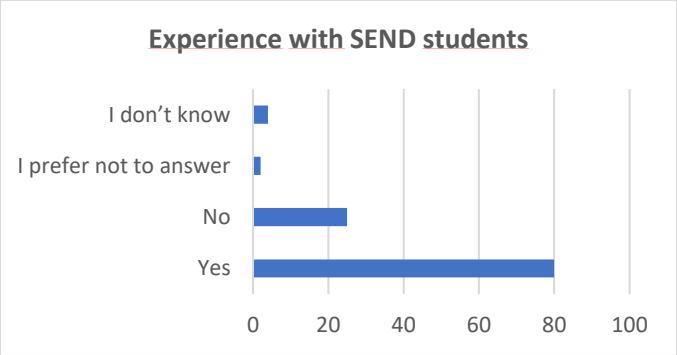

Figure 2. Experience with SEND students (teachers)

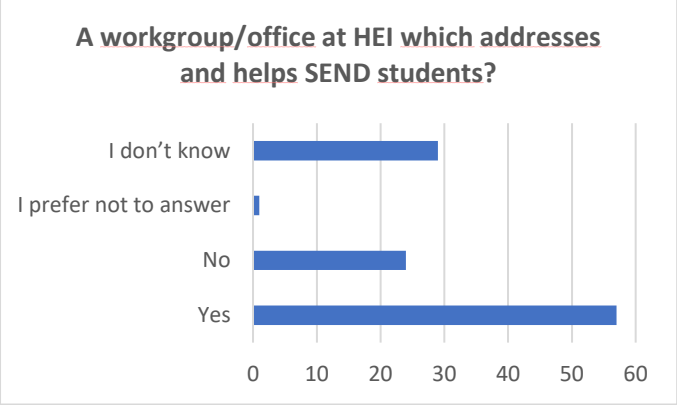

Figure 3. A workgroup/office at HEI which addresses and helps SEND students (teachers)

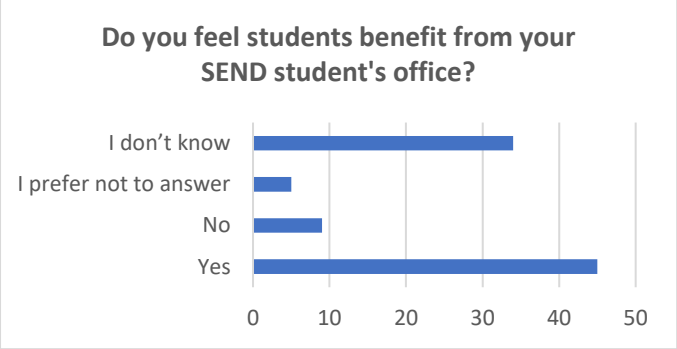

Figure 4. Do you feel students benefit from your SEND student's office? (teachers)

Table 4. Descriptives for Leadership/ School's perspective (LSP)

	LSP1.1	LSP1.2	LSP1.3	LSP1.4	LSP1.5	LSP1.6	LSP1.7	LSP1.8
N	111	111	110	111	111	111	111	111
Mean	4.50	4.54	4.46	4.46	4.40	4.41	4.35	4.58
Median	5	5	5.00	5	5	5	5	5
Standard deviation	1.03	0.912	1.15	1.01	1.16	1.17	1.12	0.940
Variance	1.05	0.832	1.32	1.01	1.35	1.37	1.25	0.883
Minimum	0	0	0	0	0	0	0	0

	LSP1.1	LSP1.2	LSP1.3	LSP1.4	LSP1.5	LSP1.6	LSP1.7	LSP1.8
Maximum	5	5	5	5	5	5	5	5

Cronbach's Alpha for LSP: 0,947

The descriptive statistics for the Leadership/School's Perspective (LSP) indicators reveal high average ratings, with means ranging from 4.35 to 4.58 and medians consistently at 5, indicating that respondents generally rated these indicators very positively (see Table 4). The standard deviations (0.912 to 1.17) and variances (0.832 to 1.37) suggest moderate variability in responses, though the majority rated the indicators at the highest score of 5. Despite some responses at the minimum score of 0, the high means and medians indicate overall favorable perceptions. The Cronbach's Alpha for these indicators is 0.947, demonstrating excellent internal consistency and reliability, suggesting that the LSP indicators are a cohesive and reliable measure of respondents' views on leadership and school perspective.

Table 5. Descriptives for Collaboration and Networking (CAN)

	CAN2.1	CAN2.2	CAN2.3	CAN2.4	CAN2.5	CAN2.6	CAN2.7
N	111	111	111	110	111	111	111
Mean	4.31	4.41	4.18	4.40	4.40	4.43	4.51
Median	5	5	4	5.00	5	5	5
Standard deviation	0.970	0.939	1.06	0.921	0.917	0.901	0.841
Variance	0.942	0.881	1.13	0.848	0.841	0.811	0.707
Minimum	0	0	0	0	1	1	1
Maximum	5	5	5	5	5	5	5

Cronbach's Alpha for CAN: 0,930

Table 5 provides descriptive statistics for the Collaboration and Networking (CAN) indicators that demonstrate generally positive ratings, with mean scores ranging from 4.18 to 4.51 and medians mostly at 5, indicating that respondents frequently gave the highest possible ratings. The standard deviations, between 0.841 and 1.06, and variances, from 0.707 to 1.13, suggest moderate variability in responses. Although the minimum scores include some low ratings of 0 or 1, the high means and medians reflect an overall positive perception of collaboration and networking. The Cronbach's Alpha for these indicators is 0.930, signifying excellent internal consistency and reliability, which means the CAN indicators are a reliable and cohesive measure of respondents' views on collaboration and networking.

Table 6. Descriptives for Infrastructure and Equipment/Tools and Technology (IET)

	IET3.1	IET3.2	IET3.3	IET3.4	IET3.5	IET3.6	IET3.7	IET3.8	IET3.9	IET3.10	IET3.11	IET3.12	IET3.13
N	111	111	111	111	111	91	111	111	111	111	111	111	111
Missing	0	0	0	0	0	20	0	0	0	0	0	0	0
Mean	4.44	4.53	4.49	4.46	4.47	4.12	4.35	4.38	4.41	4.50	4.50	4.45	4.46
Median	5	5	5	5	5	4	5	5	5	5	5	5	5
Mode	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Standard deviation	0.941	0.923	1.01	0.922	0.952	1.13	1.07	1.04	0.958	0.923	0.933	0.941	0.970
Variance	0.885	0.851	1.02	0.851	0.906	1.29	1.14	1.09	0.918	0.852	0.870	0.886	0.942

	IET3.1	IET3.2	IET3.3	IET3.4	IET3.5	IET3.6	IET3.7	IET3.8	IET3.9	IET3.10	IET3.11	IET3.12	IET3.13
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum	5	5	5	5	5	5	5	5	5	5	5	5	5

Cronbach's Alpha for IET: 0,981

The descriptive statistics for the Infrastructure and Equipment/Tools and Technology (IET) indicators presented in Table 6 show high average ratings, with means ranging from 4.12 to 4.53 and medians consistently at 5, indicating that respondents generally rated these indicators very favorably. The standard deviations (0.923 to 1.13) and variances (0.851 to 1.29) suggest some variability in the responses. Notably, IET3.6, which has a slightly lower mean of 4.12, also shows the highest standard deviation and variance, indicating greater variability. Despite the presence of some minimum scores of 0, the high means and medians reflect an overall positive perception of infrastructure and technology. The Cronbach's Alpha for these indicators is 0.981, demonstrating excellent internal consistency and reliability, indicating that the IET indicators are a highly reliable and cohesive measure of respondents' views on infrastructure and technology.

Table 7. Descriptives for Continuing Professional Development (CPD)

	CPD4.1	CPD4.2	CPD4.3
N	111	111	111
Missing	0	0	0
Mean	4.43	4.43	4.41
Median	5	5	5
Mode	5.00	5.00	5.00
Standard deviation	0.987	0.940	0.948
Variance	0.975	0.884	0.898
Minimum	0	0	0
Maximum	5	5	5

Cronbach's Alpha for CPD: 0,955

The descriptive statistics for the Continuing Professional Development (CPD) indicators reveal high average ratings, with mean scores of 4.41 to 4.43, and medians consistently at 5, indicating that respondents generally rated these indicators very positively (see Table 7). The mode for all indicators is 5, suggesting that the most common response was the highest possible rating. The standard deviations (0.940 to 0.987) and variances (0.884 to 0.975) indicate some variability in responses, but overall, responses are clustered around the higher end of the scale. The minimum scores include some low ratings of 0, yet the high means and medians reflect an overall favorable perception of continuing professional development. The Cronbach's Alpha for these indicators is 0.955, indicating excellent internal consistency and reliability, meaning that the CPD indicators are a cohesive and reliable measure of respondents' views on continuing professional development.

Table 8. Descriptives for Pedagogy: Supports and Resources (PSR)

	PSR5.1	PSR5.2	PSR5.3	PSR5.4	PSR5.5	PSR5.6	PSR5.7	PSR5.8
N	111	111	111	111	111	111	111	111
Missing	0	0	0	0	0	0	0	0
Mean	4.22	4.29	4.32	4.36	4.28	4.32	4.35	4.29
Median	4	4	5	5	5	5	5	4
Mode	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Standard deviation	0.985	0.967	0.955	1.03	1.04	1.04	1.03	0.985
Variance	0.971	0.934	0.912	1.05	1.08	1.08	1.07	0.971
Minimum	0	0	0	0	0	0	0	0

	PSR5.1	PSR5.2	PSR5.3	PSR5.4	PSR5.5	PSR5.6	PSR5.7	PSR5.8
Maximum	5	5	5	5	5	5	5	5

Cronbach's Alpha for PSR: 0,963

The descriptive statistics for the Pedagogy: Supports and Resources (PSR) indicators show generally positive ratings, with mean scores ranging from 4.22 to 4.36 (see Table 8). Medians are mostly at 5, indicating that many respondents gave the highest possible ratings, while modes are consistently 5 across all indicators. The standard deviations (0.955 to 1.04) and variances (0.912 to 1.08) suggest moderate variability in responses. Despite some minimum scores of 0, the overall high means and medians reflect favorable perceptions of the support and resources available for pedagogy. The Cronbach's Alpha for these indicators is 0.963, demonstrating excellent internal consistency and reliability, meaning the PSR indicators are a cohesive and reliable measure of respondents' views on pedagogical supports and resources.

Table 9. Descriptives for Pedagogy: Implementation in the classroom (PIC)

	PIC6.1	PIC6.2	PIC6.3	PIC6.4	PIC6.5	PIC6.6	PIC6.7	PIC6.8	PIC6.9	PIC6.10
N	111	111	110	111	111	111	111	110	111	111
Missing	0	0	1	0	0	0	0	1	0	0
Mean	4.41	4.37	4.43	4.44	4.49	4.10	4.52	4.49	4.46	4.58
Median	5	5	5.00	5	5	5	5	5.00	5	5
Mode	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Standard deviation	1.06	1.04	0.962	0.997	1.07	1.30	0.971	1.03	0.998	0.900
Variance	1.12	1.09	0.926	0.994	1.14	1.69	0.943	1.06	0.996	0.810
Minimum	0	0	0	0	0	0	0	0	0	0
Maximum	5	5	5	5	5	5	5	5	5	5

Cronbach's Alpha for PIC: 0,968

The descriptive statistics for the Pedagogy: Implementation in the Classroom (PIC) indicators reveal overall positive ratings, with mean scores ranging from 4.10 to 4.58 and medians consistently at 5, indicating that respondents frequently gave the highest possible ratings (see Table 9). The mode for all indicators is 5, further underscoring this trend. The standard deviations, ranging from 0.900 to 1.30, and variances, ranging from 0.810 to 1.69, suggest moderate to high variability in responses, particularly for PIC6.6, which has the highest standard deviation and variance. Despite the presence of some minimum scores of 0, the high means and medians reflect favorable perceptions of how pedagogy is implemented in the classroom. The Cronbach's Alpha for these indicators is 0.968, indicating excellent internal consistency and reliability, meaning the PIC indicators are a highly reliable and cohesive measure of respondents' views on classroom pedagogy implementation.

Table 10. Descriptives for Assessment Practices/ Inclusion Assessment (AIA)

	AIA7.1	AIA7.2	AIA7.3	AIA7.4	AIA7.5	AIA7.6	AIA7.7
N	111	111	111	111	111	111	111
Missing	0	0	0	0	0	0	0
Mean	4.22	4.23	4.25	4.20	4.05	4.31	4.28
Median	4	5	4	5	4	5	5
Mode	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Standard deviation	1.03	1.08	0.995	1.17	1.20	1.07	1.02
Variance	1.06	1.16	0.990	1.38	1.45	1.14	1.04
Minimum	0	0	0	0	0	0	0
Maximum	5	5	5	5	5	5	5

Cronbach's Alpha for AIA: 0,968

The descriptive statistics for the Assessment Practices/Inclusion Assessment (AIA) indicators show generally positive ratings, with mean scores ranging from 4.05 to 4.31 (see Table 10). Medians vary between 4 and 5, with most indicators having a median of 5, indicating that respondents frequently gave the highest possible ratings. The mode for all indicators is 5, further highlighting the tendency for high ratings. The standard deviations, which range from 0.995 to 1.20, and variances, from 0.990 to 1.45, suggest moderate variability in responses. Despite some minimum scores of 0, the overall high means and medians reflect favorable perceptions of assessment practices and inclusion assessments. The Cronbach's Alpha for these indicators is 0.968, indicating excellent internal consistency and reliability, meaning the AIA indicators are a highly reliable and cohesive measure of respondents' views on assessment practices and inclusion.

Table 11. Descriptives for Student Digital Competence/ Student's Perspective (DCP)

	DCP8.1	DCP8.2
N	111	111
Missing	0	0
Mean	4.29	4.29
Median	5	5
Mode	5.00	5.00
Standard deviation	1.12	1.04
Variance	1.24	1.08
Minimum	0	0
Maximum	5	5

Cronbach’s Alpha for DCP: 0,915

The descriptive statistics for the Student Digital Competence/Student's Perspective (DCP) indicators show positive ratings, with both indicators (DCP8.1 and DCP8.2) having a mean score of 4.29 (see Table 11). The median and mode for both indicators are 5, indicating that many respondents gave the highest possible ratings. The standard deviations are 1.12 and 1.04, respectively, with variances of 1.24 and 1.08, suggesting moderate variability in responses. Despite the presence of some minimum scores of 0, the high means and medians reflect overall favorable perceptions of student digital competence. The Cronbach's Alpha for these indicators is 0.915, indicating excellent internal consistency and reliability, meaning the DCP indicators are a cohesive and reliable measure of respondents' views on student digital competence.

The results of the questionnaires reveal generally positive perceptions across various aspects of educational practice, with high average ratings and medians consistently at or near the highest possible score of 5. This trend is evident in the areas of Leadership/School's Perspective (LSP), Collaboration and Networking (CAN), Infrastructure and Equipment/Tools and Technology (IET), Continuing Professional Development (CPD), Pedagogy: Supports and Resources (PSR), Pedagogy: Implementation in the Classroom (PIC), Assessment Practices/Inclusion Assessment (AIA), and Student Digital Competence/Student's Perspective (DCP). The high means, along with the frequent occurrence of mode and median scores at 5, indicate a strong positive response from participants. Additionally, the Cronbach's Alpha values for all areas are exceptionally high, ranging from 0.915 to 0.981, demonstrating excellent internal consistency and reliability of the indicators used in the questionnaires.

Despite the overall positive ratings, there is moderate variability in responses as indicated by the standard deviations and variances. This suggests that while many respondents rated the indicators highly, there were diverse opinions among the participants, particularly in areas such as Infrastructure and Technology (IET) and Pedagogy: Implementation in the Classroom (PIC), where variability was slightly higher. These findings highlight areas of strength as perceived by respondents, as well as potential areas for further improvement and targeted interventions. The positive feedback on professional development, collaboration, and digital competence underscores the importance of continuing to support and enhance these aspects within educational institutions.

5 Students' perceptions about inclusive digital education

Second survey was conducted to acquire empirical evidence about students' perceptions about inclusive digital education. The survey was constructed based on the evidence from the existing literature, where we identified most significant factors that can impact inclusive digital education.

5.1 The results of the survey for students

Table 12. Number of surveys conducted per country (students)

Where was the survey conducted	Counts	% of Total
Spain	20	15.0 %
Italy	29	21.8 %
Portugal	24	18.0 %
Slovenia	36	27.1 %
Turkey	24	18.0 %
Together	**133**	

Table 12 provides a summary of the number of student surveys conducted in various countries. The highest number of surveys was conducted in Slovenia, accounting for 27.1% of the total responses. Italy followed with 21.8%, while both Portugal and Turkey each contributed 18.0% of the responses. Spain accounted for 15.0% of the surveys. In total, 133 student surveys were conducted across these countries. These distributions highlight Slovenia as the country with the most significant student participation in the survey.

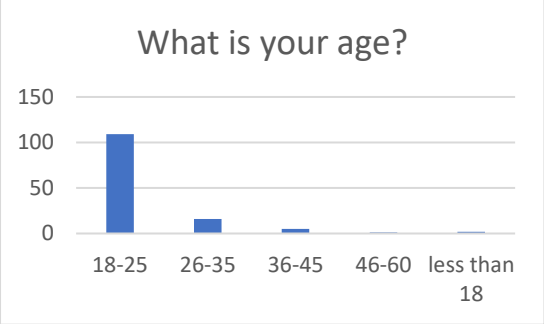

Figure 5. Age of respondents (students)

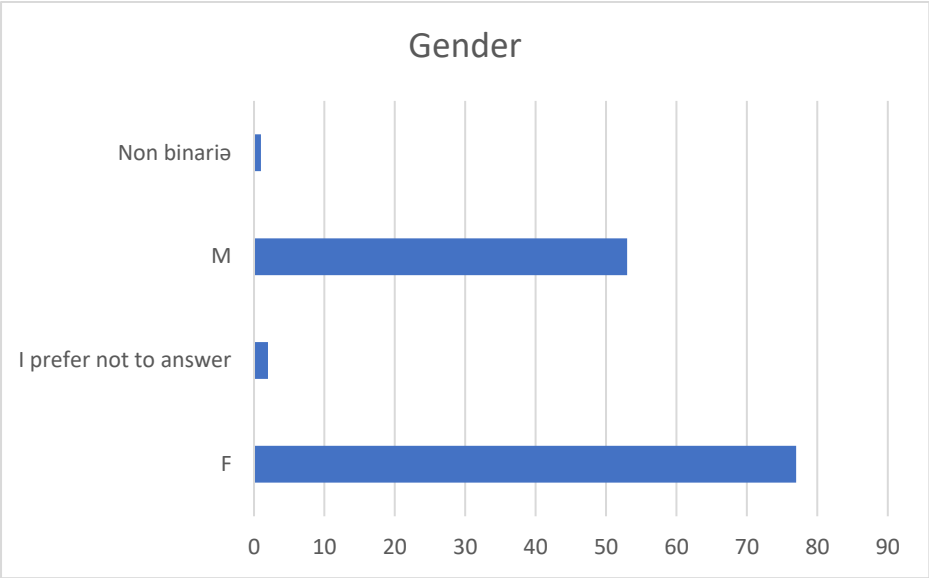

Figure 6. Respondent's gender (students)

Table 13. The degree or level of school completed (students)

The degree or level of school completed	Counts	% of Total
First Cycle Bologna Study Programmes - Professional higher education study programmes	3	2.3 %
First Cycle Bologna Study Programmes - University study programmes	73	55.7 %
High School	3	2.3 %
High school diploma	2	1.5 %
High school diploma, first year university	1	0.8 %
High school graduation	2	1.5 %
I prefer not to answer	10	7.6 %
Scientific high school diploma	1	0.8 %
Second Cycle Bologna Study Programmes	17	13.0 %
Secondary	2	1.5 %
Single cycle master's degree	5	3.8 %
Single-cycle master's degree - I year	1	0.8 %
Third Cycle Bologna Study Programmes- Doctoral study programmes	1	0.8 %
Undergraduate Program	1	0.8 %
bachelor's degree	2	1.5 %

Table 13 provides a breakdown of the educational levels completed by students who participated in the survey. The majority of respondents (55.7%) have completed First Cycle Bologna Study Programmes - University study programmes. Second Cycle Bologna Study Programmes were completed by 13.0% of the respondents. A small percentage (2.3%) have completed First Cycle Bologna Study Programmes - Professional higher education study programmes or high school. Other education levels, such as high school diploma, high school graduation, and bachelor's degree, were each completed by 1.5% of respondents. Additionally, 7.6% of students preferred not to disclose their educational level. Single cycle master's degrees were completed by 3.8%, and several other categories, including first-year university students and doctoral study programmes, each comprised less than 1% of the respondents. These results indicate a significant representation of students who have pursued higher education, particularly within the Bologna study programmes.

Table 14. Status of the respondents about having a disability (students)

Do you have any kind of disability?	Counts	% of Total
A person who is colour blind	1	0.8 %
A person who is deaf	1	0.8 %
A person who is partially sighted	2	1.5 %
A person who is partially sighted, A person with a psycho-social or mental disorder	1	0.8 %
A person who is partially sighted, A person with neurodiversity (for example autism, ADHD, dyslexia, dyspraxia, Tourette Syndrome), A person with a psycho-social or mental disorder	1	0.8 %
A person who stutters or has a speech impairment	1	0.8 %
A person who stutters or has a speech impairment, A person with neurodiversity (for example autism, ADHD, dyslexia, dyspraxia, Tourette Syndrome)	1	0.8 %
A person with a psycho-social or mental disorder	3	2.3 %
A person with motor impairment (for example spinal cord injury, a lost or damaged limb, cerebral palsy, muscular dystrophy, multiple sclerosis)	1	0.8 %
A person with neurodiversity (for example autism, ADHD, dyslexia, dyspraxia, Tourette Syndrome)	5	3.8 %
A person with photosensitive seizures (for example epilepsy)	1	0.8 %
A person with photosensitive seizures (for example epilepsy), epilepy, but not photosensitive	1	0.8 %
I do not have a disability	105	80.8 %
I prefer not to answer	4	3.1 %
Operated bone deficiency (scoliosis)	1	0.8 %
Person with neurodiversity (e.g. autism, ADHD, dyslexia, dyspraxia, Tourette's syndrome), Person with a psychosocial or mental disorder	1	0.8 %

Table 14 details the disability status of student respondents. The vast majority (80.8%) reported not having any disability. Among those who do have a disability, 3.8% indicated having neurodiversity, such as autism, ADHD, dyslexia, dyspraxia, or Tourette Syndrome. A smaller percentage (2.3%) reported having a psycho-social or mental disorder. Other disabilities, each reported by 0.8% to 1.5% of respondents, include color blindness, deafness, partial sight, speech impairments, motor impairments, and photosensitive seizures. Additionally, a small number of respondents (3.1%) preferred not to disclose their disability status. These results suggest that while most students do not report having a disability, there is a diverse range of disabilities among those who do.

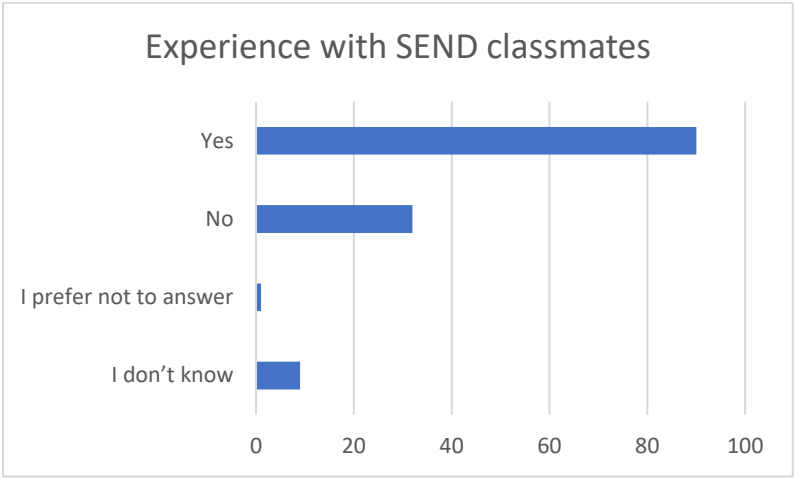

Figure 7. Experience with SEND students (students)

The chart presented in Figure 7 illustrates the distribution of student responses regarding their interaction with classmates who have Special Educational Needs and Disabilities (SEND). The majority of students, approximately 90,

indicated that they have experience with SEND classmates, demonstrating a high level of interaction and awareness. Around 30 students reported not having any such experience. A small number of students, roughly 5-10, were unsure about their experience, and an even smaller number, about 1-2, preferred not to answer. Overall, the data suggests that most students have had interactions with SEND classmates, reflecting a general exposure to inclusive educational environments.

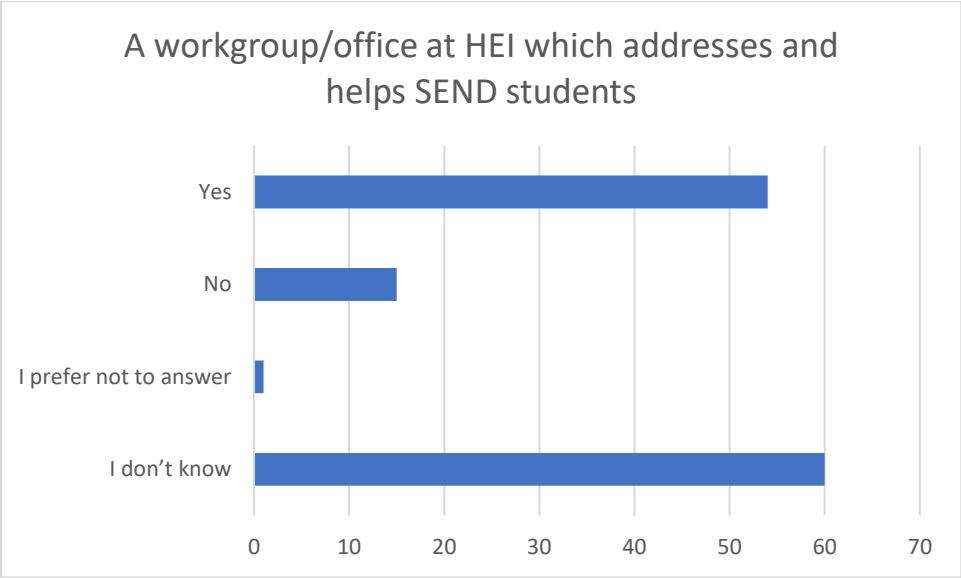

Figure 8. A workgroup/office at HEI which addresses and helps SEND students

The chart presented in Figure 8 reveals that a significant number of students (approximately 50) are aware of the existence of a dedicated workgroup or office at their Higher Education Institution (HEI) to support students with Special Educational Needs and Disabilities (SEND). However, a notable portion of respondents (around 60) indicated that they are unaware of whether such support exists. Additionally, about 15 students reported that their HEI does not have such a workgroup or office, and a very small number, about 1 or 2, preferred not to answer. This suggests that while many institutions have established support systems for SEND students, there is still a considerable lack of awareness among students about these resources, highlighting a need for improved communication and visibility of support services.

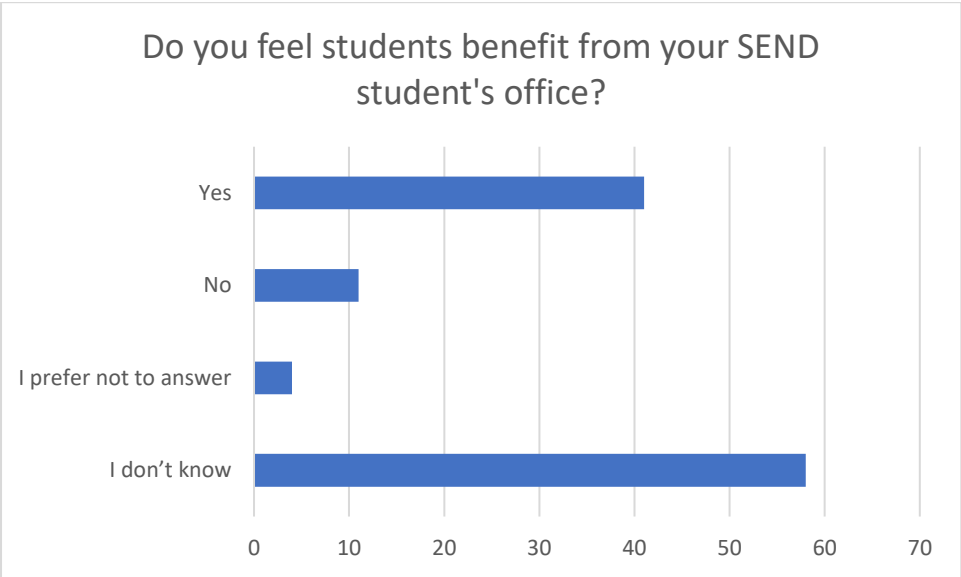

Figure 9. Do you feel students benefit from your SEND student's office?

Figure 9 shows the responses of students regarding the perceived benefits of the SEND office at their institution. A significant number of respondents, approximately 45, believe that students do benefit from the SEND office, indicating a positive impact. Around 15 respondents feel that students do not benefit from it. A small number, about 5, prefer not to answer this question. However, the largest portion, around 60 respondents, are unsure, indicating a lack of awareness or clarity about the benefits provided by the SEND office. This suggests that while there is recognition of the SEND office's benefits among some students, there is also a substantial need for better communication and awareness to ensure more students understand and recognize these benefits.

Table 15. Descriptives for Leadership/ School's perspective (LSP)

	LSP1.1	LSP1.2	LSP1.3
N	133	133	133
Missing	0	0	0
Median	5	5	5
Standard deviation	0.933	0.981	1.16
Minimum	0	0	0
Maximum	5	5	5

Cronbach's Alpha for LSP: 0,863

The descriptive statistics for the Leadership/School's Perspective (LSP) indicators (LSP1.1, LSP1.2, LSP1.3) show highly positive responses, with median scores consistently at 5 across all indicators, indicating that most respondents rated these aspects very favorably (see Table 15). The standard deviations range from 0.933 to 1.16, suggesting some variability in responses but generally high ratings. All indicators have a minimum score of 0 and a maximum score of 5, showing the full range of possible responses. The Cronbach's Alpha for these indicators is 0.863, indicating good internal consistency and reliability, meaning that the LSP indicators are a cohesive and reliable measure of respondents' perceptions of leadership and school perspective.

The descriptive statistics for the Collaboration and Networking (CAN) indicators (CAN2.1 to CAN2.6) show generally high ratings, with median scores predominantly at 5, except for CAN2.1, which has a median of 4 (see Table 16). This indicates that most respondents view collaboration and networking very positively. The standard deviations range from 0.851 to 1.14, indicating moderate variability in responses. All indicators have a minimum score of 0 and a maximum score of 5, reflecting the full spectrum of possible ratings. The Cronbach's Alpha for these indicators is 0.905, suggesting excellent internal consistency and reliability, making the CAN indicators a reliable and cohesive measure of respondents' perceptions of collaboration and networking within their context.

Table 16. Descriptives for Collaboration and Networking

	CAN2.1	CAN2.2	CAN2.3	CAN2.4	CAN2.5	CAN2.6
N	133	133	133	133	133	133
Missing	0	0	0	0	0	0
Median	4	5	5	5	5	5
Standard deviation	0.851	0.922	0.985	0.980	1.14	0.983
Minimum	0	0	0	0	0	0
Maximum	5	5	5	5	5	5

Cronbach's Alpha for CAN: 0,905

Table 17. Descriptives for Infrastructure and Equipment/Tools and Technology (IET)

	IET3.1	IET3.2	IET3.3	IET3.4	IET3.5	IET3.6	IET3.7	IET3.8	IET3.9	IET3.10	IET3.11
N	133	133	133	133	133	133	133	133	133	133	132
Missing	0	0	0	0	0	0	0	0	0	0	1

	IET3.1	IET3.2	IET3.3	IET3.4	IET3.5	IET3.6	IET3.7	IET3.8	IET3.9	IET3.10	IET3.11
Median	5	5	5	5	5	5	5	5	5	5	5.00
Standard deviation	0.830	0.875	0.831	0.866	0.917	0.798	0.831	0.811	0.884	0.883	0.851
Minimum	0	0	0	0	0	0	0	0	0	0	0
Maximum	5	5	5	5	5	5	5	5	5	5	5

Cronbach's Alpha for IET: 0,968

The descriptive statistics for the Infrastructure and Equipment/Tools and Technology (IET) indicators (IET3.1 to IET3.11) reveal highly positive responses, with median scores consistently at 5 across all indicators, indicating that respondents generally rated these aspects very favorably (see Table 17). The standard deviations range from 0.798 to 0.917, showing moderate variability in responses but still reflecting a high level of satisfaction. All indicators have a minimum score of 0 and a maximum score of 5, capturing the entire range of possible responses. The Cronbach's Alpha for these indicators is 0.968, indicating excellent internal consistency and reliability, suggesting that the IET indicators are a reliable and cohesive measure of respondents' perceptions of the infrastructure and technology available to them.

Table 18. Descriptives for Pedagogy: Supports and Resources (PSR)

	PSR4.1	PSR4.2	PSR4.3	PSR4.4	PSR4.5
N	132	132	132	132	132
Missing	1	1	1	1	1
Median	5.00	5.00	5.00	5.00	5.00
Standard deviation	0.897	0.877	0.860	1.06	0.975
Minimum	0	0	0	0	0
Maximum	5	5	5	5	5

Cronbach's Alpha for PSR: 0,942

The descriptive statistics for the Pedagogy: Supports and Resources (PSR) indicators (PSR4.1 to PSR4.5) demonstrate highly positive ratings, with median scores uniformly at 5 across all indicators, suggesting that respondents generally rated the support and resources available for pedagogy very favorably (see Table 18). The standard deviations range from 0.860 to 1.06, indicating moderate variability in responses. Each indicator has a minimum score of 0 and a maximum score of 5, reflecting the entire range of possible ratings. The Cronbach's Alpha for these indicators is 0.942, indicating excellent internal consistency and reliability, confirming that the PSR indicators are a cohesive and reliable measure of respondents' views on the pedagogical support and resources provided.

Table 19. Descriptives for Pedagogy: Implementation in the classroom (PIC)

	PIC5.1	PIC5.2	PIC5.3	PIC5.4	PIC5.5	PIC5.6	PIC5.7	PIC5.8	PIC5.9	PIC5.10
N	132	132	132	132	132	132	132	132	132	132
Missing	1	1	1	1	1	1	1	1	1	1
Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Standard deviation	1.08	1.03	0.926	0.902	0.884	1.07	0.923	0.876	0.936	0.878
Minimum	0	0	0	0	0	0	0	0	0	0
Maximum	5	5	5	5	5	5	5	5	5	5

Cronbach's Alpha for PIC: 0,966

The descriptive statistics for the Pedagogy: Implementation in the Classroom (PIC) indicators (PIC5.1 to PIC5.10) show uniformly high ratings, with median scores consistently at 5 across all indicators, indicating that respondents rated the implementation of pedagogy in the classroom very positively (see Table 19). The standard deviations range from 0.876 to 1.08, reflecting moderate variability in responses but generally high satisfaction. Each indicator has a

minimum score of 0 and a maximum score of 5, encompassing the full range of possible responses. The Cronbach's Alpha for these indicators is 0.966, demonstrating excellent internal consistency and reliability, suggesting that the PIC indicators are a reliable and cohesive measure of respondents' perceptions of how pedagogy is implemented in the classroom.

Table 20. Descriptives for Assessment Practices/ Inclusion Assessment (AIA)

	AIA6.1	AIA6.2	AIA6.3	AIA6.4	AIA6.5	AIA6.6
N	132	132	132	132	132	132
Missing	1	1	1	1	1	1
Median	4.00	5.00	5.00	5.00	4.50	5.00
Standard deviation	0.972	0.933	0.872	0.916	1.05	0.999
Minimum	0	0	0	0	0	0
Maximum	5	5	5	5	5	5

Cronbach's Alpha for AIA: 0,954

The descriptive statistics for the Assessment Practices/Inclusion Assessment (AIA) indicators (AIA6.1 to AIA6.6) show generally positive ratings, with medians predominantly at 5, except for AIA6.1 and AIA6.5, which have medians of 4.00 and 4.50, respectively (see Table 20). This suggests that most respondents rated these assessment practices favorably, with slightly lower ratings for AIA6.1 and AIA6.5. The standard deviations range from 0.872 to 1.05, indicating moderate variability in responses. Each indicator has a minimum score of 0 and a maximum score of 5, showing the full range of possible ratings. The Cronbach's Alpha for these indicators is 0.954, indicating excellent internal consistency and reliability, meaning that the AIA indicators are a cohesive and reliable measure of respondents' views on assessment practices and inclusion.

Table 21. Descriptives for Student Digital Competence/ Student's Perspective (DCP)

	DCP7.1	DCP7.2
N	132	132
Missing	1	1
Median	5.00	5.00
Standard deviation	0.923	0.960
Minimum	0	0
Maximum	5	5

Cronbach's Alpha for DCP: 0,943

The descriptive statistics for the Student Digital Competence/Student's Perspective (DCP) indicators (DCP7.1 and DCP7.2) reveal highly positive responses, with both indicators having a median score of 5.00, indicating that most respondents rated these aspects very favorably (see Table 21). The standard deviations are 0.923 and 0.960, suggesting moderate variability in responses. Both indicators have a minimum score of 0 and a maximum score of 5, reflecting the entire range of possible ratings. The Cronbach's Alpha for these indicators is 0.943, indicating excellent internal consistency and reliability, suggesting that the DCP indicators are a cohesive and reliable measure of respondents' perceptions of student digital competence.

The descriptive statistics for survey for students indicate a generally positive perception across various aspects of educational practice among respondents. For the Leadership/School's Perspective (LSP) indicators, respondents rated these aspects highly, with consistent median scores of 5 and a Cronbach's Alpha of 0.863, reflecting good internal consistency and reliability. Similarly, the Collaboration and Networking (CAN) indicators received predominantly high ratings, with median scores largely at 5 and a Cronbach's Alpha of 0.905, indicating excellent

internal consistency. These findings suggest that respondents have a favorable view of leadership, school perspective, and collaborative efforts within their institutions.

The Infrastructure and Equipment/Tools and Technology (IET) indicators also received high ratings, with median scores consistently at 5 and a Cronbach's Alpha of 0.968, demonstrating exceptional internal consistency. This indicates strong satisfaction with the available infrastructure and technology. The Pedagogy: Supports and Resources (PSR) and Pedagogy: Implementation in the Classroom (PIC) indicators similarly showed high median scores of 5 and Cronbach's Alpha values of 0.942 and 0.966, respectively, reflecting excellent internal consistency and a positive perception of pedagogical support and implementation. Assessment Practices/Inclusion Assessment (AIA) and Student Digital Competence/Student's Perspective (DCP) indicators also garnered high ratings, with Cronbach's Alpha values of 0.954 and 0.943, respectively, indicating reliable measures and favorable views on assessment practices and digital competence.

Overall, the survey results highlight strong satisfaction with various dimensions of educational practice, particularly in leadership, collaboration, infrastructure, pedagogy, assessment practices, and digital competence. The consistently high median scores and excellent internal consistency across indicators suggest that respondents generally perceive these areas positively, reflecting well-implemented practices and supportive educational environments. However, the moderate variability in responses points to areas where individual experiences may differ, indicating opportunities for further improvement and more targeted support.

6 Theoretical model with factors of Inclusive Digital Education Evaluation

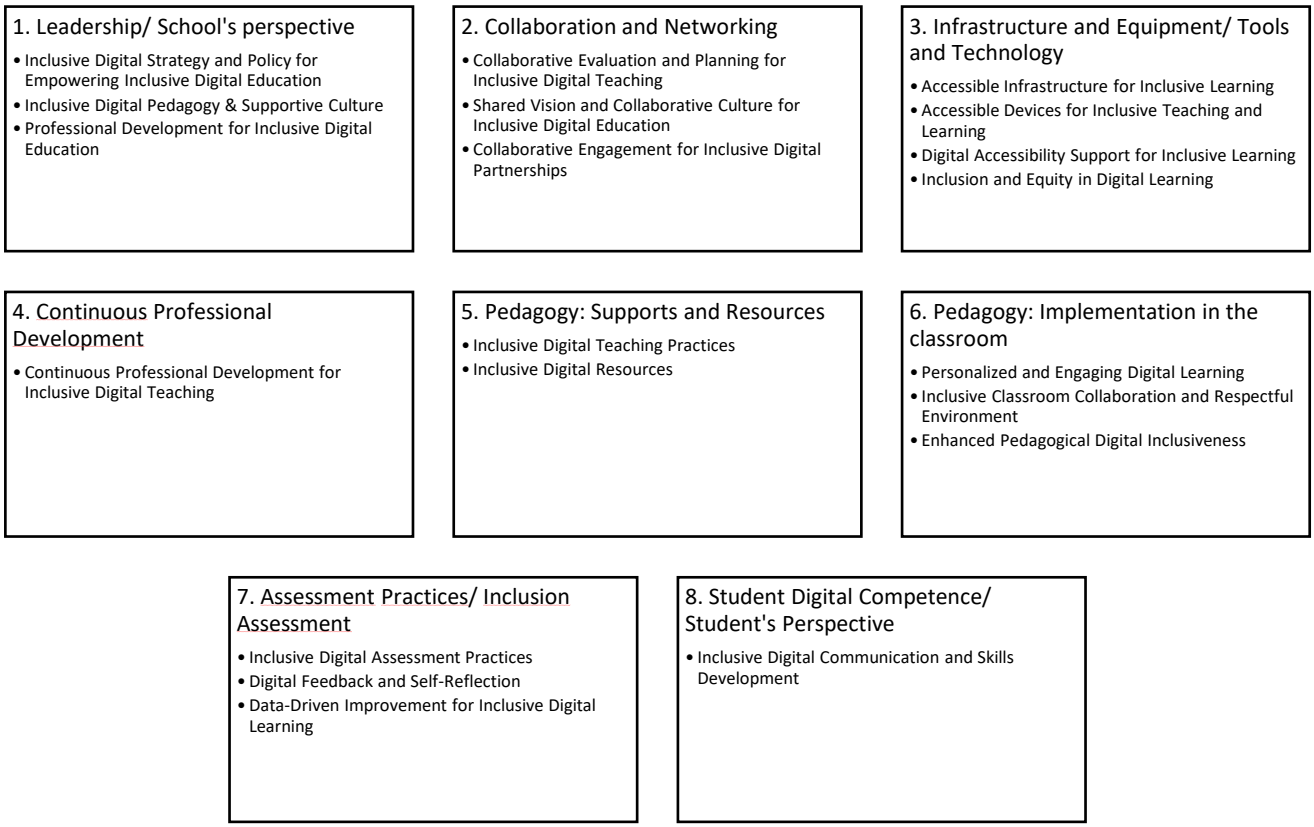

Figure 10. Factors for inclusive digital education

Based on the results from the online survey, the following model (see Figure 10) of factors enabling inclusive digital education was proposed that were categorized into 8 categories:

1. Leadership/ School's perspective
2. Collaboration and Networking
3. Infrastructure and Equipment/ Tools and Technology
4. Continuous Professional Development
5. Pedagogy: Supports and Resources
6. Pedagogy: Implementation in the classroom
7. Assessment Practices/ Inclusion Assessment
8. Student Digital Competence/ Student's Perspective

6.1 Category 1: Leadership/School's perspective

Inclusive Digital Strategy and Policy for Empowering Inclusive Digital Education

This factor reflects the key elements, such as the importance of an inclusive digital strategy, collaboration with leaders and teachers, and the establishment of enabling policies to reduce barriers to learning and participation.

Inclusive Digital Pedagogy & Supportive Culture

This factor encompasses the key elements, such as supporting contemporary pedagogical approaches with inclusive digital technologies, minimizing digital discrimination, and fostering collaboration and communication between HEI staff and the organization. It highlights the importance of both pedagogical strategies and a supportive organizational culture to promote inclusive digital education.

Professional Development for Inclusive Digital Education

This factor emphasizes the importance of providing scheduled time for staff to explore inclusive digital technologies and supporting their acquisition of digital literacy knowledge and skills. It highlights the focus on professional development to enhance the capacity of HEI staff in promoting inclusive digital education.

6.2 Category 2: Collaboration and Networking

Collaborative Evaluation and Planning for Inclusive Digital Teaching

This factor highlights the importance of reviewing progress in teaching and learning with inclusive digital technologies, discussing the advantages and disadvantages of inclusive teaching, and engaging in collaborative planning for inclusive courses and teaching methods. It emphasizes the collaborative and evaluative nature of the factor in promoting inclusive digital teaching practices.

Shared Vision and Collaborative Culture for Inclusive Digital Education

This factor emphasizes the importance of promoting a common vision of digital educational inclusion among the main actors in the institution (management, pedagogical staff, students, and parents), as well as fostering inclusive digital collaboration and communication between staff and students. It highlights the need for a shared vision and a collaborative culture to support inclusive digital education practices.

Collaborative Engagement for Inclusive Digital Partnerships

This factor highlights the importance of enabling inclusive collaboration with local communities, caregivers, and parents through digital technologies, as well as actively collaborating with other HEIs or organizations to support the use of inclusive digital technology. It emphasizes the focus on collaborative engagement and partnerships to promote inclusive digital practices.

6.3 Category 3: Infrastructure and Equipment/ Tools and Technology

Accessible Infrastructure for Inclusive Learning

This factor highlights the importance of both digital and physical infrastructure in creating an inclusive learning environment.

Accessible Devices for Inclusive Teaching and Learning

This factor captures the essence of the indicators, emphasizing the importance of providing accessible digital devices and assistive products for inclusive teaching in HEI. It highlights the focus on ensuring accessibility and availability of such devices for students, both within the school environment and for use at home.

Digital Accessibility Support for Inclusive Learning

This factor emphasizes the importance of HEI providing support for digital accessibility in order to facilitate inclusive learning. It captures the essence of the indicators, highlighting the need for technical support and access to assistive products to ensure an inclusive digital learning environment.

Inclusion and Equity in Digital Learning

This factor emphasizes the importance of HEI's efforts to identify and address the digital divide and challenges related to students' learning needs and socio-economic backgrounds in the context of digital learning. It reflects the focus on promoting inclusion, equity, and equal opportunities for all students in the digital learning environment.

6.4 Category 4: Continuous Professional Development

Continuous Professional Development for Inclusive Digital Teaching

This factor emphasizes the importance of HEI leaders discussing and addressing continuing professional development needs for inclusive teaching with digital technologies. It also highlights the importance of providing staff with opportunities to participate in CPD and fostering the sharing of experiences within the school community.

6.5 Category 5: Pedagogy: Supports and Resources

Inclusive Digital Teaching Practices

This factor emphasizes the importance of HEI teachers using virtual learning environments and digital technologies in an inclusive way, as well as being trained and instructed on how to address student diversity. It highlights the focus on promoting inclusive practices that leverage student differences as a resource for teaching and learning.

Inclusive Digital Resources

This factor emphasizes the importance of HEI staff searching for inclusive digital educational resources, creating digital resources to support inclusive teaching, using inclusive open educational resources, and developing and updating resources that support inclusive learning and participation. It highlights the focus on the development and utilization of digital resources to enhance inclusivity in teaching and learning.

6.6 Category 6: Pedagogy: Implementation in the classroom

Personalized and Engaging Digital Learning

This factor emphasizes the importance of HEI staff using digital technologies to personalize and tailor their teaching to students' individual needs, incorporating digital learning activities that foster creativity, and setting inclusive digital learning activities that actively engage and motivate all students. It highlights the focus on creating a learning environment that is personalized, engaging, and promotes creativity for all students using digital technologies.

Inclusive Classroom Collaboration and Respectful Environment

Factor focuses on promoting inclusive collaboration and creating a respectful classroom environment using digital technologies.

Enhanced Pedagogical Digital Inclusiveness

This factor emphasizes the focus on enhancing digital inclusiveness among pedagogical staff. It acknowledges the importance of teachers using digital technologies to facilitate inclusive collaboration among students and highlights the need for pedagogical staff to receive training in digital inclusiveness. The factor reflects the overarching goal of developing the pedagogical skills and competencies necessary for creating an inclusive digital learning environment.

6.7 Category 7: Assessment Practices/ Inclusion Assessment

Inclusive Digital Assessment Practices

This factor emphasizes the importance of HEI staff using inclusive and accessible digital technologies for assessing students' skills. It also highlights the need for HEI to provide support to staff in utilizing digital technologies for inclusive assessment. The factor reflects the focus on adopting assessment practices that are inclusive, accessible, and leverage digital technologies to ensure fair and equitable assessment for all students.

Digital Feedback and Self-Reflection

This factor emphasizes the importance of HEI staff using inclusive digital technologies to provide timely feedback to students, enable students to self-reflect on their own learning, and facilitate peer feedback on other students' work. The factor reflects the focus on leveraging digital tools and technologies to enhance feedback processes and promote student self-reflection and collaboration.

Data-Driven Improvement for Inclusive Digital Learning

This factor highlights the focus on leveraging digital data analysis and evaluation metrics to identify students' needs and improve their inclusive digital learning experience. It emphasizes the importance of HEI providing tools and resources for data analysis, as well as using evaluation metrics specifically related to inclusiveness. The factor reflects the goal of using data-driven insights to inform decision-making and enhance the inclusivity of digital learning practices in the HEI.

6.8 Category 8: Student Digital Competence/ Student's Perspective

Inclusive Digital Communication and Skills Development

This factor emphasizes the importance of HEI ensuring that students learn to communicate in an inclusive way using digital technologies and that they develop their digital skills and knowledge on inclusiveness across subjects. The factor reflects the focus on promoting inclusive communication practices and fostering the development of digital skills in relation to inclusivity.

7 Operationalization of the theoretical model for inclusive digital education evaluation

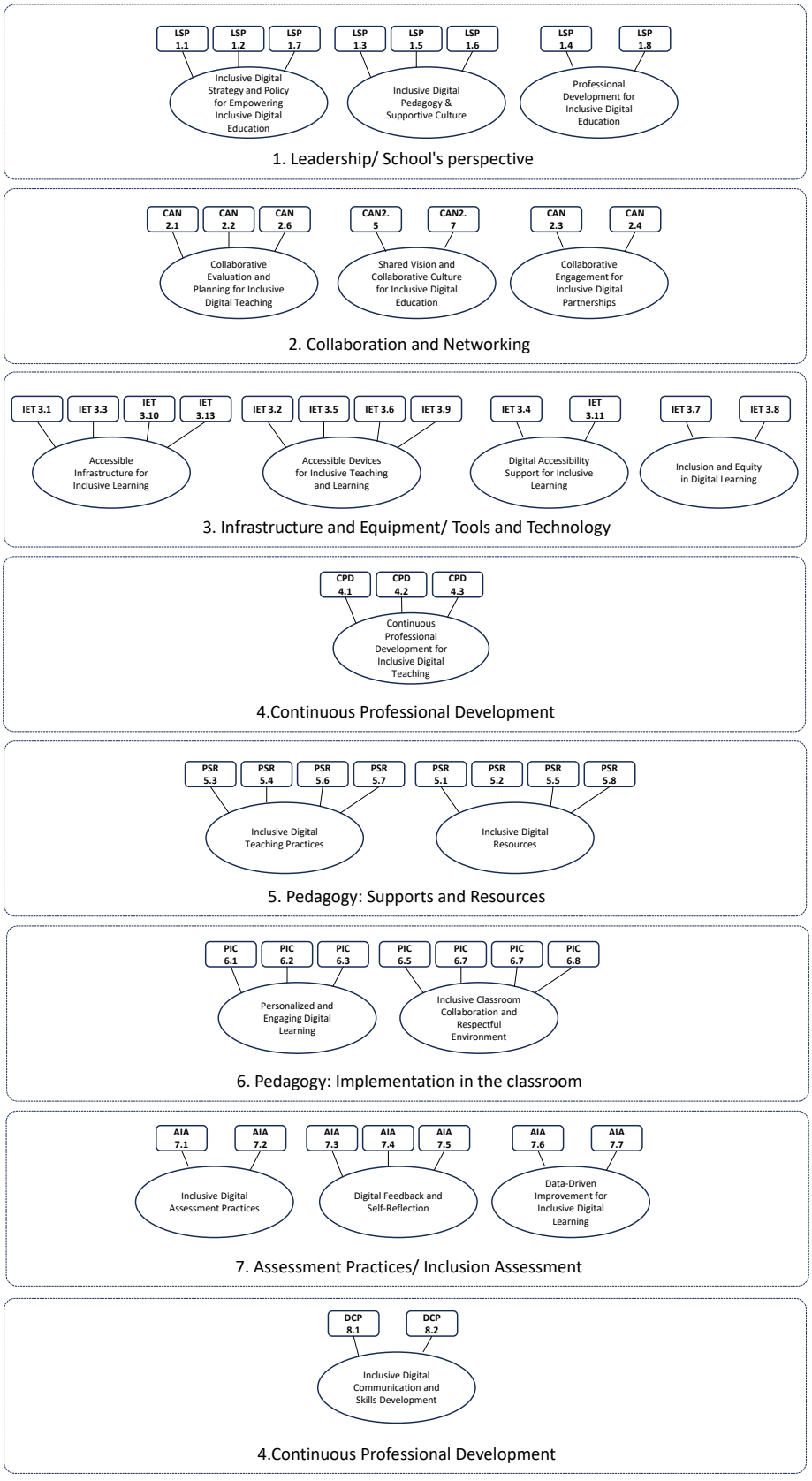

Figure 11. Operationalized model for inclusive digital education

7.1 Proposed indicators for factors in Leadership/ School's perspective

7.1.1 Indicators for Inclusive Digital Strategy and Policy for Empowering Inclusive Digital Education

For the factor “Inclusive Digital Strategy and Policy for Empowering Inclusive Digital Education”, following indicators were proposed:

- **LSP 1.1:** It is important for HEI to have an inclusive digital strategy to enable inclusive digital education.
- **LSP 1.2:** It is important for HEI to develop an inclusive digital strategy in collaboration with leaders and teachers.
- **LSP 1.7:** For empowering inclusive digital education, it is important that HEI establishes enabling policies (Inclusion policy, Special educational needs policy, Special digital educational needs policy…) to reduce the barriers to learning and participation of all students.

7.1.2 Indicators for Inclusive Digital Pedagogy & Supportive Culture

For the factor “Inclusive Digital Pedagogy & Supportive Culture”, the following indicators were proposed:

- **LSP 1.3:** It is important for the HEI to support contemporary pedagogical approaches to teaching with inclusive digital technologies.
- **LSP 1.5:** It is important for HEI to minimize all forms of digital (education) discrimination.
- **LSP 1.6:** It is important that HEI staff are supported by their organization and that there is collaboration and communication encouragement between the school and the teacher.

7.1.3 Indicators for Professional Development for Inclusive Digital Education

For the factor “Professional Development for Inclusive Digital Education”, the following indicators were proposed:

- **LSP 1.4:** It is important for HEI staff to have scheduled time to explore inclusive digital technologies in the form of either individual learning or organized training courses.
- **LSP 1.8:** It is important that HEI supports staff in acquiring knowledge and skills in digital literacy for inclusive digital education.

7.2 Proposed indicators for factors in Collaboration and Networking

7.2.1 Indicators for Collaborative Evaluation and Planning for Inclusive Digital Teaching

For the factor “Collaborative Evaluation and Planning for Inclusive Digital Teaching”, the following indicators were proposed:

- **CAN 2.1:** It is important for HEI to review progress in teaching and learning with inclusive digital technologies (regularly).
- **CAN 2.2:** It is important that staff in HEI discusses the advantages and disadvantages of inclusive teaching and learning with digital technologies.
- **CAN 2.6:** It is important in HEI that staff meet to plan the inclusive course, review existing inclusive courses, or plan inclusive teaching methods together in partnership.

7.2.2 Indicators for Shared Vision and Collaborative Culture for Inclusive Digital Education

For the factor “Shared Vision and Collaborative Culture for Inclusive Digital Education”, the following indicators were proposed:

- **CAN 2.5:** In HEI, it is important that the main actors (management, pedagogical staff, students, and parents) promote a common vision of digital educational inclusion.
- **CAN 2.7**: It is important that HEI encourages inclusive digital collaboration and communication between staff and students.

7.1.3 Indicators for Collaborative Engagement for Inclusive Digital Partnerships

For the factor “Collaborative Engagement for Inclusive Digital Partnerships”, the following indicators were proposed:

- **CAN 2.3**: It is important for HEI to enable inclusive collaboration with local communities, caregivers, and parents through digital technologies.
- **CAN 2.4**: It is important for HEI to actively collaborate with other HEIs or organizations to support the use of inclusive digital technology.

7.3 Proposed indicators for factors in Infrastructure and Equipment/ Tools and Technology

7.3.1 Indicators for Accessible Infrastructure for Inclusive Learning

For the factor “Accessible Infrastructure for Inclusive Learning”, the following indicators were proposed:

- **IET 3.1:** It is important for HEI's digital infrastructure to support inclusive and accessible teaching and learning with digital technologies.
- **IET 3.3:** It is important for HEI to provide free Internet access to enable inclusive digital teaching and learning.
- **IET 3.10:** It is important for HEI to reduce (or minimize or eliminate) physical barriers and create physical spaces to support inclusive teaching and learning with digital technologies.
- **IET 3.12:** It is important for HEI to provide accessible online libraries or repositories with teaching and learning materials.
- **IET 3.13:** It is important for HEI to fairly distribute resources and provide all students equal access to accessible digital resources.

7.3.2 Indicators for Accessible Devices for Inclusive Teaching and Learning

For the factor ”Accessible Devices for Inclusive Teaching and Learning”, the following indicators were proposed:

- **IET 3.2:** It is important that accessible digital devices and assistive products are available for inclusive teaching in HEI.
- **IET 3.5:** It is important for HEI to provide accessible digital devices and assistive products for learning, available for students to use when they need them.
- **IET 3.6:** It is important for HEI to provide school-owned portable devices and/or assistive products that students can take home when needed.
- **IET 3.9:** It is important for HEI to allow students to bring and use their own portable devices and assistive products during lessons.

7.3.3 Indicators for Digital Accessibility Support for Inclusive Learning

For the factor “Digital Accessibility Support for Inclusive Learning”, the following indicators were proposed:

- **IET 3.4:** It is important for HEI to provide technical support for inclusive digital teaching and learning.
- **IET 3.11:** It is important for HEI students that need special support to have access to assistive products.

7.3.4: Indicators for Inclusion and Equity in Digital Learning

For the factor “Inclusion and Equity in Digital Learning”, the following indicators were proposed:

- **IET 3.7:** It is important for HEI to have measures in place to identify the digital divide that arises with inclusive learning related to students' learning needs and socio-economic backgrounds.
- **IET 3.8:** It is important for HEI to have a plan in place to help teachers deal with challenges that arise with inclusive learning, related to students' learning needs and socio-economic background.

7.4 Proposed indicators for factors in Continuing Professional Development

7.4.1 Indicators for Continuous Professional Development for Inclusive Digital Teaching

For the factor “Continuous Professional Development for Inclusive Digital Teaching”, the following indicators were proposed:

- **CPD 4.1:** It is important for HEI leaders to discuss with staff continuing professional development (CPD) needs for inclusive teaching with digital technologies.
- **CPD 4.2:** It is important for staff in HEI to have opportunities to participate in CPD for inclusive teaching and learning with digital technologies.
- **CPD 4.3:** It is important for HEI to support staff to share experiences within the school community about inclusive teaching with digital technologies.

7.5 Proposed indicators for factors in Pedagogy: Supports and Resources

7.5.1 Indicators for Inclusive Digital Teaching Practices

For the factor “Inclusive Digital Teaching Practices”, the following indicators were proposed:

- **PSR 5.3:** It is important for HEI teachers to use virtual learning environments with students in an inclusive way.
- **PSR 5.4:** It is important for HEI teachers to use digital technologies for inclusive school-related communication.
- **PSR 5.6:** It is important for HEI staff’s development activities to help staff to respond to student digital diversity.
- **PSR 5.7:** It is important for HEI teachers to be trained and instructed on how to address student diversity (Student differences are used as a resource for teaching and learning).

7.5.2 Indicators for Inclusive Digital Resources

For the factor ”Inclusive Digital Resources”, the following indicators were proposed:

- **PSR 5.1:** It is important for HEI staff to search online for inclusive digital educational resources.
- **PSR 5.2:** It is important for HEI teachers to create digital resources to support their inclusive teaching.
- **PSR 5.5:** It is important for HEI teachers to use inclusive open educational resources.
- **PSR 5.8:** It is important for HEI staff to develop and regularly update resources that support inclusive learning and participation.

7.6 Proposed indicators for factors in Pedagogy: Implementation in the classroom

7.6.1 Indicators for Personalized and Engaging Digital Learning

For the factor "Personalized and Engaging Digital Learning", the following indicators were proposed:

- **PIC 6.1:** It is important for HEI staff to use digital technologies to personalize and tailor their teaching to students' individual needs.
- **PIC 6.2:** It is important for HEI staff to use digital learning activities that foster all students' creativity.
- **PIC 6.3:** It is important for HEI staff to set inclusive digital learning activities that actively engage and motivate all students, increasing their creativity and participation.

7.6.2 Indicators for Inclusive Classroom Collaboration and Respectful Environment

For the factor "Inclusive Classroom Collaboration and Respectful Environment", the following indicators were proposed:

- **PIC 6.5:** It is important for the HEI classroom environment to be made respectful and welcoming through digital technologies (everyone is made to feel welcome and treated with respect)
- **PIC 6.7:** It is important that digital tools in HEI help students feel equally valued.
- **PIC 6.8:** It is important that the use of digital technologies in HEI helps create a positive classroom environment based on mutual respect between students and teachers (Staff and students treat one another as human beings and discipline is based on mutual respect)
- **PIC 6.9:** It is important that digital technologies in HEI facilitate the organization of teaching groups in which students can collaborate by valuing the diversity of each one (The school arranges teaching groups so that all students are valued, and differences are understood).

7.6.3 Indicators for Enhanced Pedagogical Digital Inclusiveness

For the factor "Enhanced Pedagogical Digital Inclusiveness", the following indicators were proposed:

- **PIC 6.4:** It is important for HEI teachers to use digital technologies to facilitate inclusive collaboration among students.
- **PIC 6.10:** It is important for the HEI pedagogical staff to be trained in digital inclusiveness.

7.7. Proposed indicators for factors in Assessment Practices/ Inclusion Assessment

7.7.1 Indicators for Inclusive Digital Assessment Practices

For the factor "Inclusive Digital Assessment Practices", the following indicators were proposed:

- **AIA 7.1:** It is important for HEI staff to use inclusive and accessible digital technologies to assess students' skills.
- **AIA 7.2**: It is important for HEI to support staff in using digital technologies for inclusive assessment.

7.7.2 Indicators for Digital Feedback and Self-Reflection

For the factor "Digital Feedback and Self-Reflection", the following indicators were proposed:

- **AIA 7.3:** It is important for HEI staff to use inclusive digital technologies to provide timely feedback to students.
- **AIA 7.4:** It is important for HEI staff to use digital technologies to enable students to self-reflect on their own learning.
- **AIA 7.5:** It is important for HEI staff to use digital technologies to enable students to provide feedback on other students' work.

7.7.3 Indicators for Data-Driven Improvement for Inclusive Digital Learning

For the factor "Data-Driven Improvement for Inclusive Digital Learning", the following indicators were proposed:

- **AIA 7.6:** It is important for HEI to provide digital data analysis to help identify students' needs and improve their inclusive digital learning experience.
- **AIA 7.7:** It is important for HEI to use evaluation metrics on inclusiveness.

7.8 Proposed indicators for factors in Student Digital Competence/ Student's Perspective

7.8.1 Indicators for Inclusive Digital Communication and Skills Development

For the factor "Inclusive Digital Communication and Skills Development", the following indicators were proposed:

- **DCP 8.1:** It is important for HEI to ensure students learn to communicate in an inclusive way by using digital technologies.
- **DCP 8.2:** It is important for HEI to ensure that students develop their digital skills and knowledge on inclusiveness across subjects.

8 Refinement and validation of the variables and indicators of the model for inclusive digital education evaluation through online workshops

8.1 Preparation of protocol, materials, and tools for the workshop

The project consortium first developed and agreed on the workshop agenda and presentation in English. The MS PowerPoint presentation was prepared in English with the aim of conducting the workshops in the partner countries in the same way and providing data that we can analyze and compare between different countries. Individual partners were left to translate the contents of the MS PowerPoint presentation into their own language or to use the presentation in English.

All partners have translated the presentation into partners' languages.

The agenda of both workshops included an introduction section and the presentation of all categories of factors. The time for each workshop was estimated at 90 minutes, with the timeline defined as follows:

- Introduction (10 minutes)
- Validation of factors with presentation and discussion of factors (10 minutes for each factor category):
    - Leadership/School's perspective.
    - Collaboration and Networking.
    - Infrastructure and Equipment/Tools and Technology.
    - Continuing Professional Development/Teacher's perspective.
    - Pedagogy: Supports and Resources.
    - Pedagogy: Implementation in the classroom/Pedagogic approach.
    - Assessment Practices/Inclusion Assessment.
    - Student Digital Competence/Student's perspective.
- Conclusion

For the implementation of the workshop, the following materials (prepared in English) and tools were prepared by the project consortium:

1. PowerPoint presentation (MS PowerPoint).
2. Attendance list (Google Form)
3. Workshop Survey, including all categories, factors, and indicators (Google Form).
4. Satisfactory survey (Google Form).
5. Mentimeter word clouds for open discussions.

To engage the participants to actively participate in open discussions during the workshop, the following interactive elements were incorporated into the workshop process:

- Mentimeter to engage participants actively.
- Encouraging participants to share their insights, experiences, and perspectives during the discussion.
- Participants were given opportunities to ask questions and seek clarification during the workshop.

The partners had the choice to use materials prepared in English and approved by the consortium of partners for the workshop, or to translate the prepared material into their native language, if they believed that this would facilitate the workshop.

The implementation of the workshops was planned in the form of an online workshop, where the partners could choose tools for conducting online meetings that they otherwise use in their work and know how to use.

8.2 Workshop protocol

8.2.1 Workshop introduction

The beginning of the workshop included an introductory part, which included the following activities and steps:

- First, the participants were welcomed and provided with a brief overview of the SET4Inclusion project and the workshop's objectives.
- Partners introduced their role in the project and presented other partners, highlighting that similar workshops are being or will be held in other European countries as well.
- The importance of the workshop topic was explained to participants and how it will benefit the participants and their institutions in the future.
- The meaning of inclusive digital education was presented to participant including different definitions and key aspects of inclusive digital education.
- Previous project activities were presented (literature review, surveys among students and STAFF member), which resulted in 8 categories of 20 factors, and 58 indicators to be validated at the workshop.
- Participants were asked to complete an attendance sheet.

Before continuing, the participants were introduced to the validation process itself.

8.2.2 Validation of factors

After the introduction, the main part of the workshop began, which was basically divided into 8 equally implemented steps that included the presentation of the factors, analysis, and discussion of the identified factors for qualitative validation of the factors and conducting online survey for quantitative validation of the indicators of the factors.

Before the presentation of individual categories and associated factors, the validation process was explained to the participants, which included the following four steps (for each category):

1. **Step 1:** Presentation of the category of factors with an explanation of the category and its importance for inclusive digital education.
2. **Step 2:** Presentation of the definition of the factors in the category and the explanation of factors' impact on inclusive digital education.
3. **Step 3:** Open discussion with participants about the presented category and associated factors to obtain qualitative data for the needs of factor validation. The participants were encouraged to comment on the identified factors based on their own experience and knowledge. As part of the open discussion, minutes were kept, which served to analyze the opinions of the participants. For additional encouragement, Mentimeter questionnaires were prepared, which made it possible to obtain additional qualitative data for later analysis of the participants' opinions on individual factors and categories of factors.
4. **Step 4:** After an open discussion of each group of factors, the participants were asked to fill out an online questionnaire with indicators, which enabled additional quantitative validation of the indicators created in the previous activities of the project. Completion of the online questionnaire was carried out after the presentation and discussion of each group of factors, when the participants were mentally focused on the presented factors. Since it was difficult to estimate the needed time for filling out the survey, we the participants were asked to give a sign when they have finished with the specific part. During the survey completing, the importance of honest and thoughtful responses to help improve future workshops were emphasized.

8.2.3 Workshop conclusion

After the validation of all categories and factors was completed, key points were summarized, which were discussed and expressed gratitude to the participants for their active engagement and valuable contributions.

The participants had to fill out the last questionnaire, which was used to obtain the opinion of the participants on the quality of the workshop itself.

The participants were contact information for those who may have further questions and interests for the project results.

8.3 Recruitment

For the implementation and validation of the factors, it was necessary to invite the widest possible group of individuals with different roles at the faculty to participate, namely:

- SEND students,
- students,
- staff from the SEND students' office,
- representatives of SEND students,
- representative of the association/union of students with disabilities (external)
- teachers or professors,
- researchers,
- external experts,
- and others.

The goal was to reach a wide range of people with different experiences and knowledge that could be very valuable in discussing and improving the proposed model.

Although the separation of groups had been premeditated in both workshops, as the work progressed, it was considered more profitable to involve teachers, students, and staff in the same discussion. This would allow a more plural flow of ideas and motivate more "out of the box" discussions.

Thus, the two workshops carried out have the same statistical population and provide some flexibility in the dates proposed to the participants to involve the maximum number of people.

Also, in terms of statistical analysis, the fact that we can join the participants of both workshops allows us to have a larger population for the subsequent statistical analysis.

8.4 Implementation of workshops in partner countries

8.4.1 Implementation of the workshops in Spain

First workshop in Spain was conducted on Tuesday, 27th of June, 11:00 – 13:00 online using the Google Meets tool. Some screenshots taken during the first workshop are presented in Figure 12 and Figure 13. More screenshots from the workshop are available in the pictures folder for the 1st workshop.

The number of participants of the first workshop by different role is presented in the Table 22 in the second column.

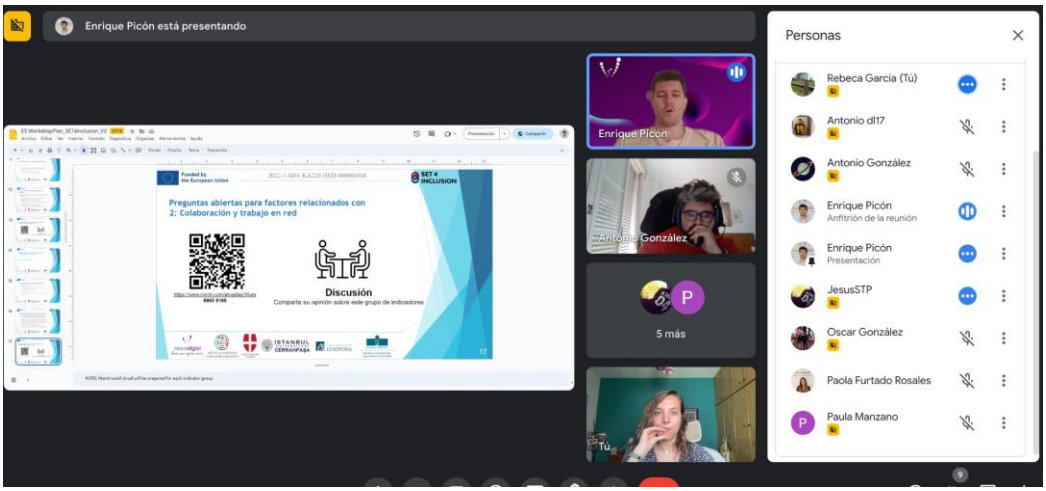

Figure 12. Collecting data through the online survey

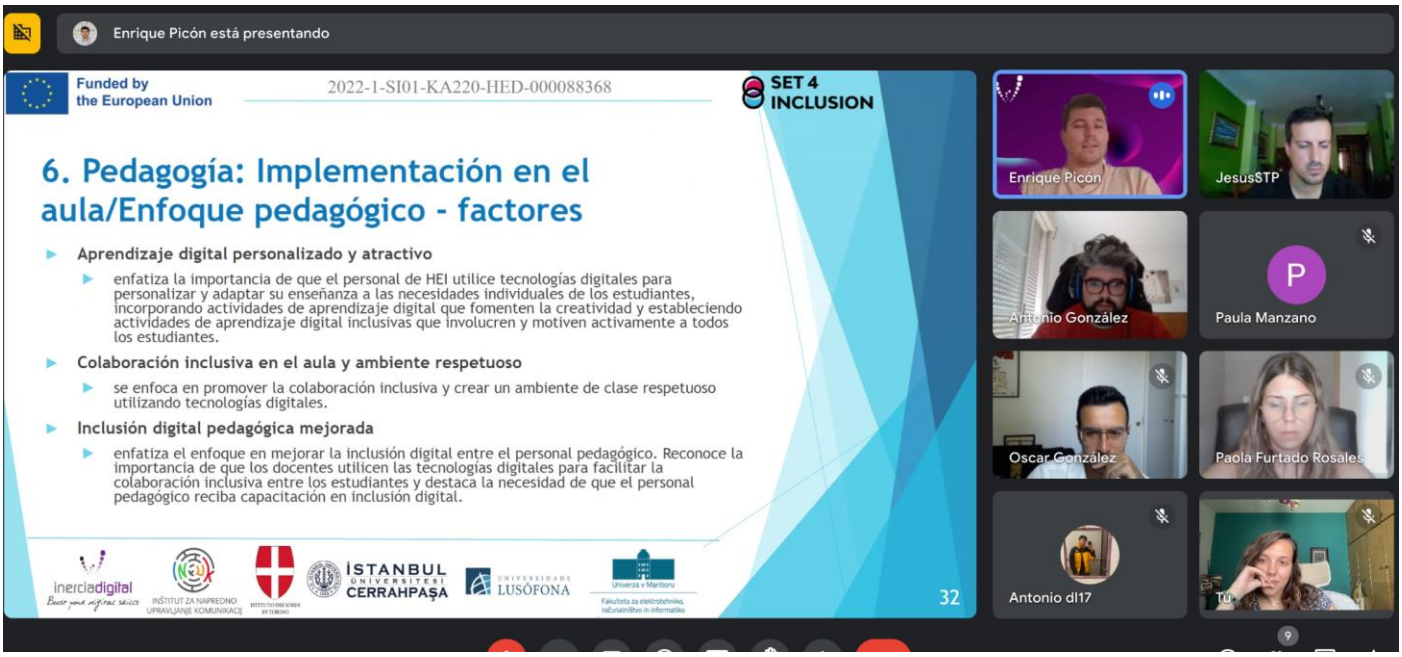

Figure 13. Presentation and discussion of factors in the sixth category

Table 22. Number of workshop participants in Spain by the participant's role

	1st Workshop, 27th of June, 11:00 – 13:00, Google Meets	2nd Workshop, Thursday, 29th of June, 11:00 – 13:00, Google Meets
Role	**N of participants**	**N of participants**
SEND student	3	
Student	2	
Representative of SEND students	2	
SEND students office representative		
Representative of the association/union of students with disabilities (external)		
Teacher/Professor/Associate Professor/Assistant Professor/Lecturer		4
Researcher		1
Assistant		

Management		1
Technical staff		
External expert		
Together	**7**	**6**

In Spain, the second workshop was conducted on Thursday, 29th of June, 11:00 – 13:00 online using the Google Meets tool. Some screenshots taken during the first workshop are presented in Figure 14 and Figure 15. More screenshots from the workshop are available in the pictures folder for the 2nd workshop.

The number of participants of the second workshop by different role is presented in the Table 22 in the third column.

Figure 14. Explaining the participants basic definitions and concepts of the inclusive digital education

Figure 15. Collecting data through the online survey

8.4.2 Implementation of the workshops in Italy

First workshop in Italy was conducted on Tuesday, 28th of June, 10:00 – 12:00 online using Zoom. Some screenshots taken during the first workshop are presented in Figure 16 and Figure 17. More screenshots from the workshop are available in the pictures folder for the 1st workshop.

The number of participants of the first workshop by different role is presented in the Table 23 in the second column.

Figure 16. Presentation of the factors

Figure 17. Collecting data through the online survey

Table 23. Number of workshop participants in Italy by the participant's role

	1st Workshop, 28th of June, 10:00 – 12:00, Zoom	3rd of July, 10:00 – 12:00, in a hybrid form in presence at the Institute for the Deaf in Turin and online using Teams as a tool
Role	**N of participants**	**N of participants**
SEND student		3
Student		5
Representative of SEND students		
SEND students office representative		
Representative of the association/union of students with disabilities (external)		
Teacher/Professor/Associate Professor/Assistant Professor/Lecturer	5	
Researcher	2	
Assistant	1	
Management		
Technical staff	1	
External expert		
Together	**9**	**8**

In Italy, the second workshop was conducted on on Wednesday , 3th of July, 10:00 – 12:00 in a hybrid form in presence at the Institute for the Deaf in Turin and online using Teams as a tool. A photo from the second workshop is presented in Figure 18.

The number of participants of the second workshop by different role is presented in the Table 23 in the third column.

Figure 18. Hybrid implementation of the second workshop in Italy

8.4.3 Implementation of the workshops in Portugal

First workshop in Portugal was conducted on 12th of July 2023, from 10:00 to 12:00 online using the Zoom tool for online remote meetings. Some screenshots taken during the first workshop are presented in Figure 19 and Figure 20. More screenshots from the workshop are available in the pictures folder for the 1st workshop.

The number of participants of the first workshop by different role is presented in the Table 24 in the second column.

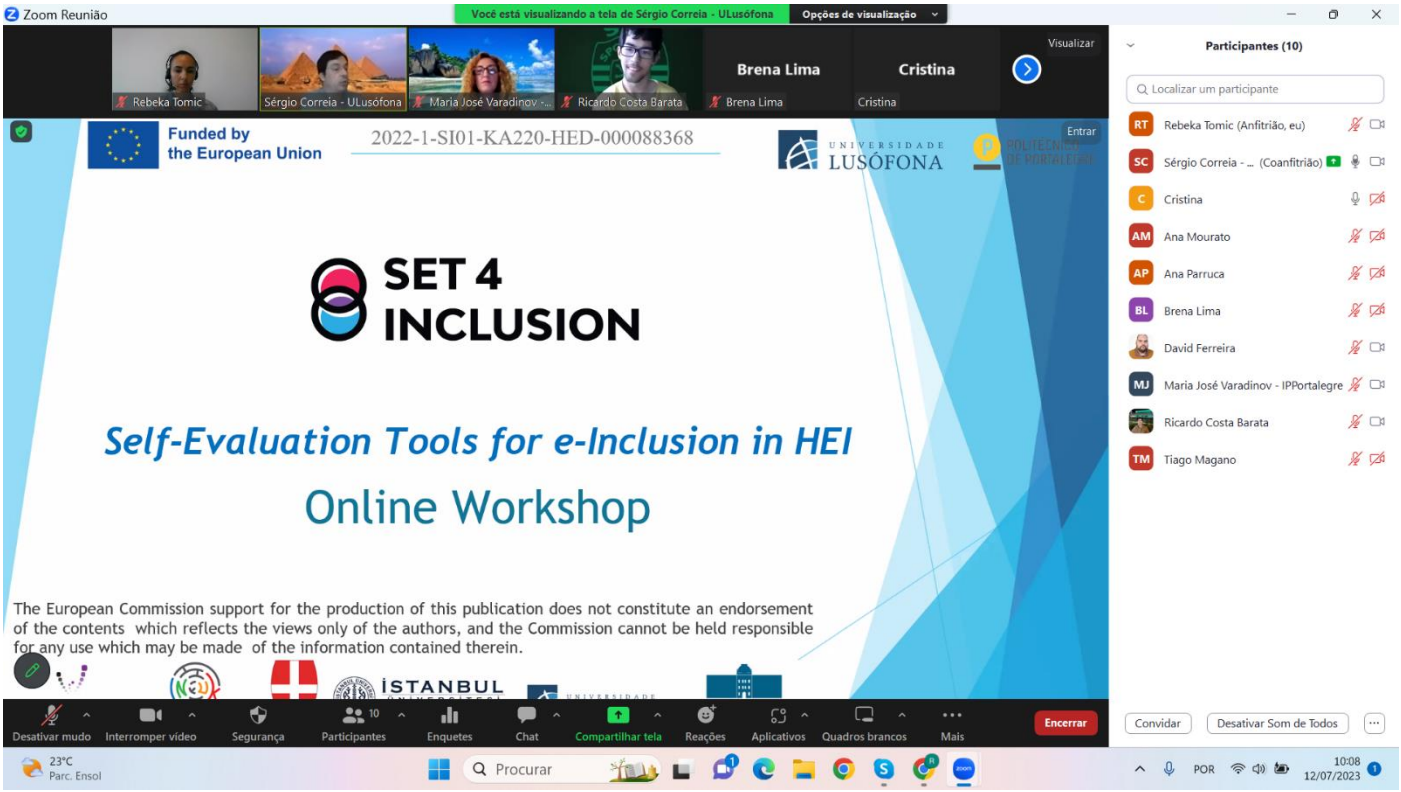

Figure 19. Screenshot of the beginning of the first workshop

Figure 20. Participants during the first workshop

Table 24. Number of workshop participants in Portugal by the participant's role

	1st Workshop, 12th of July 2023, from 10:00 to 12:00, Zoom	2nd Workshop, 14th of July 2023, from 10:00 to 12:00, Zoom

Role	N of participants	N of participants
SEND student	3	
Student	1	3
Representative of SEND students		
SEND students office representative		
Representative of the association/union of students with disabilities (external)		
Teacher/Professor/Associate Professor/Assistant Professor/Lecturer	1	2
Researcher		
Assistant		
Management		
Technical staff	1	2
External expert		
Together	**6**	**7**

In Spain, the second workshop was conducted on Thursday, 29th of June, 11:00 – 13:00 online using the Google Meets tool. Some screenshots taken during the first workshop are presented in Figure 21 and Figure 22. More screenshots from the workshop are available in the pictures folder for the 2nd workshop.

The number of participants of the second workshop by different role is presented in the Table 24 in the third column.

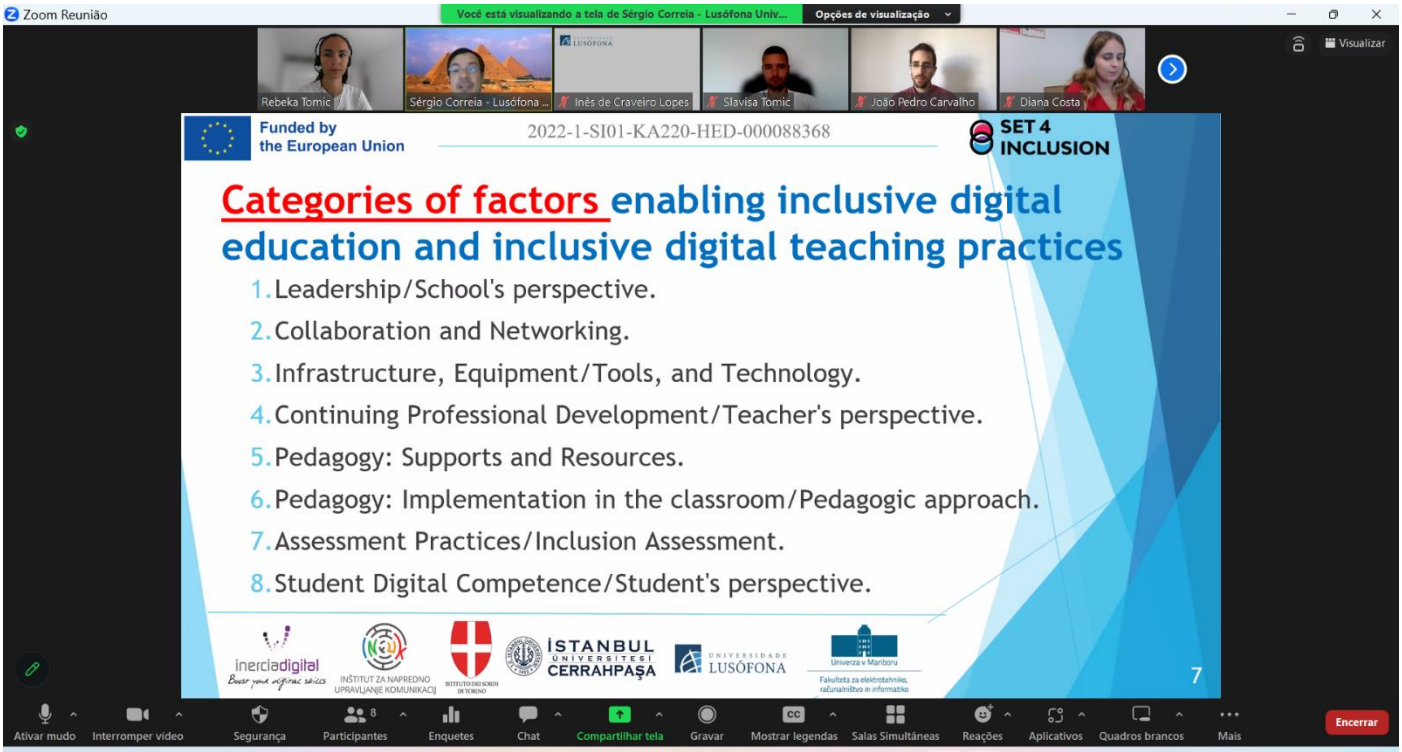

Figure 21. Participants during the second workshop

Figure 22. Second set of participants at the second workshop

8.4.4 Implementation of the workshops in Slovenia

First workshop in Slovenia was conducted on Tuesday, 13th of June, 11:00 – 13:00 online using the MS Teams tool. Some screenshots taken during the first workshop are presented in Figure 23 and Figure 24. More screenshots from the workshop are available in the pictures folder for the 1st workshop.

The number of participants of the first workshop by different role is presented in the Table 25 in the second column.

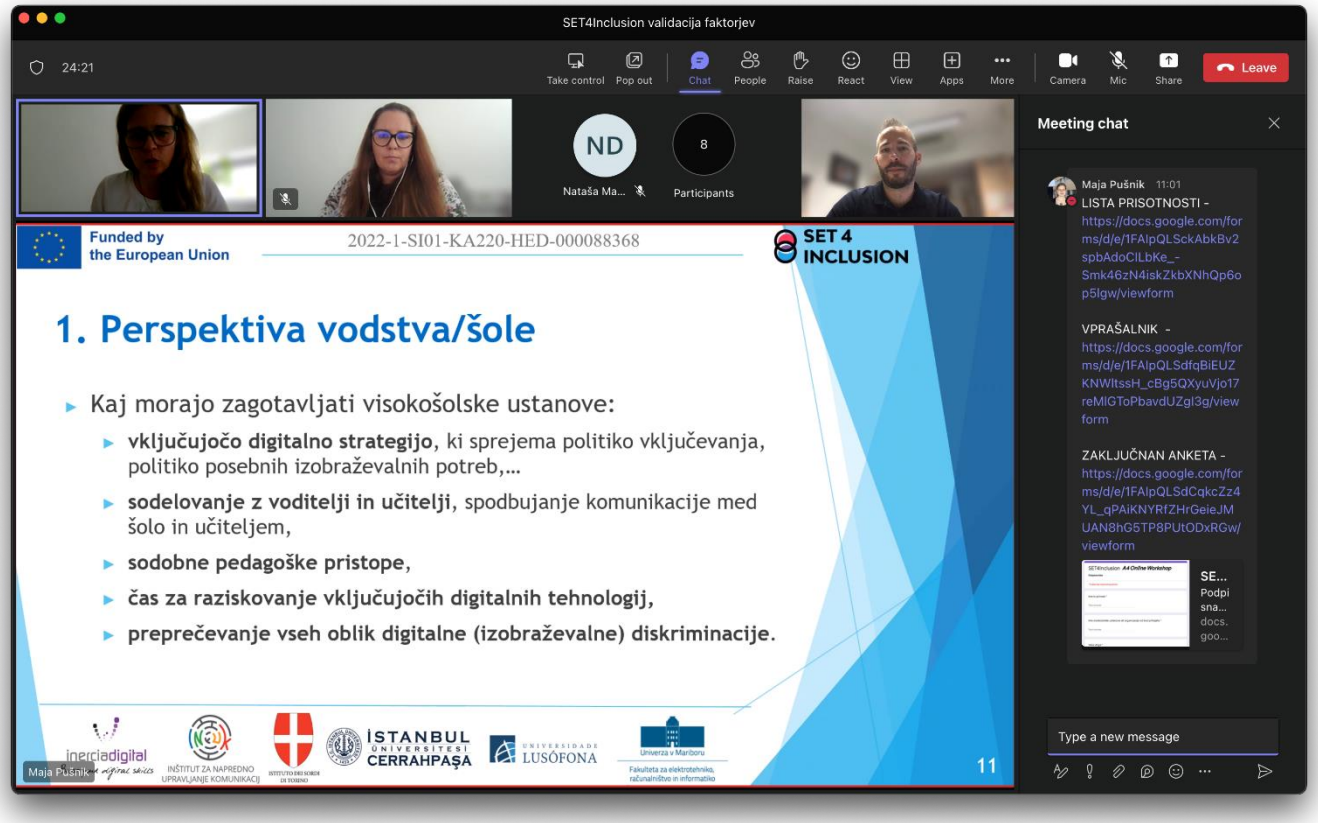

Figure 23. Presentation of the first category of e-inclusion factors

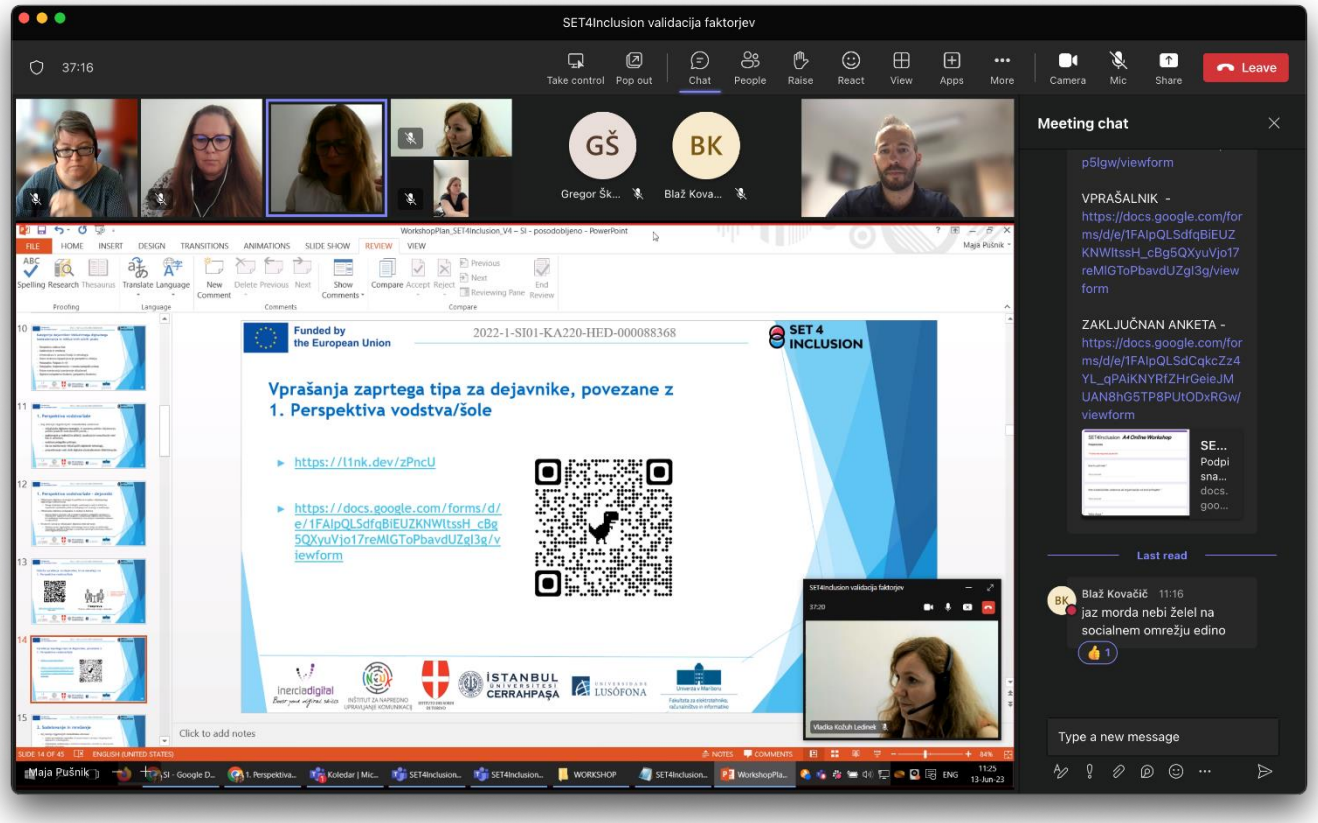

Figure 24. Collecting data through the online survey

Table 25. Number of workshop participants in Slovenia by the participant's role

	1st Workshop, 13th of June, 11:00 – 13:00, MS Teams	2nd Workshop, Thursday, 14th of June, 11:00 – 13:00 MS Teams
Role	**N of participants**	**N of participants**
SEND student	3	
Student	4	
Representative of SEND students	1	
SEND students office representative	1	
Representative of the association/union of students with disabilities (external)	1	
Teacher/Professor/Associate Professor/Assistant Professor/Lecturer	3	7
Researcher		
Assistant		3
Management	1	1
Technical staff		2
External expert		2
Together	**14**	**15**

In Slovenia, the second workshop was conducted on Wednesday, 14th of June, 11:00 – 13:00 online using the MS Teams tool. Some screenshots taken during the first workshop are presented in Figure 25Figure 14 and Figure 26. More screenshots from the workshop are available in the pictures folder for the 2nd workshop.

The number of participants of the second workshop by different role is presented in Table 25 in the third column.

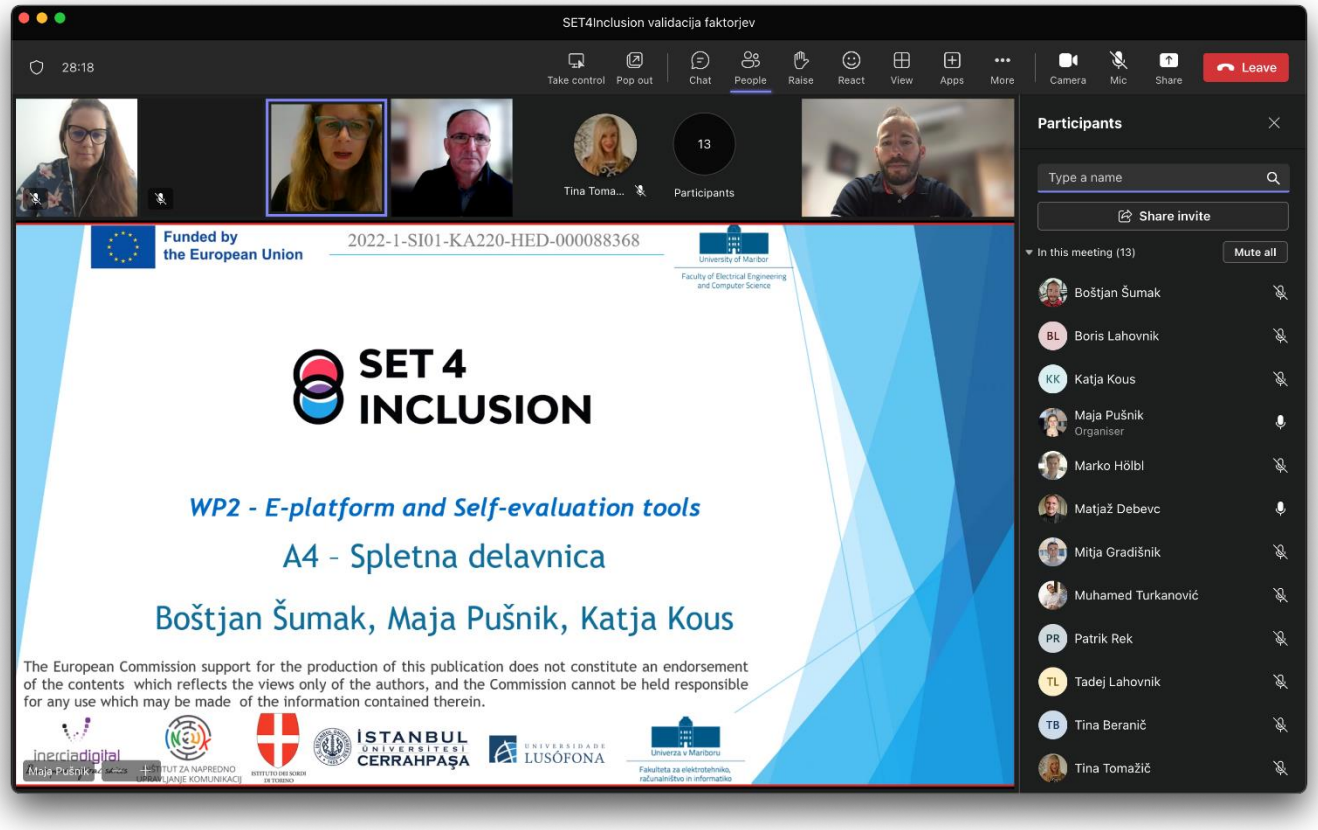

Figure 25. Explaining the participants basic definitions and concepts of the inclusive digital education

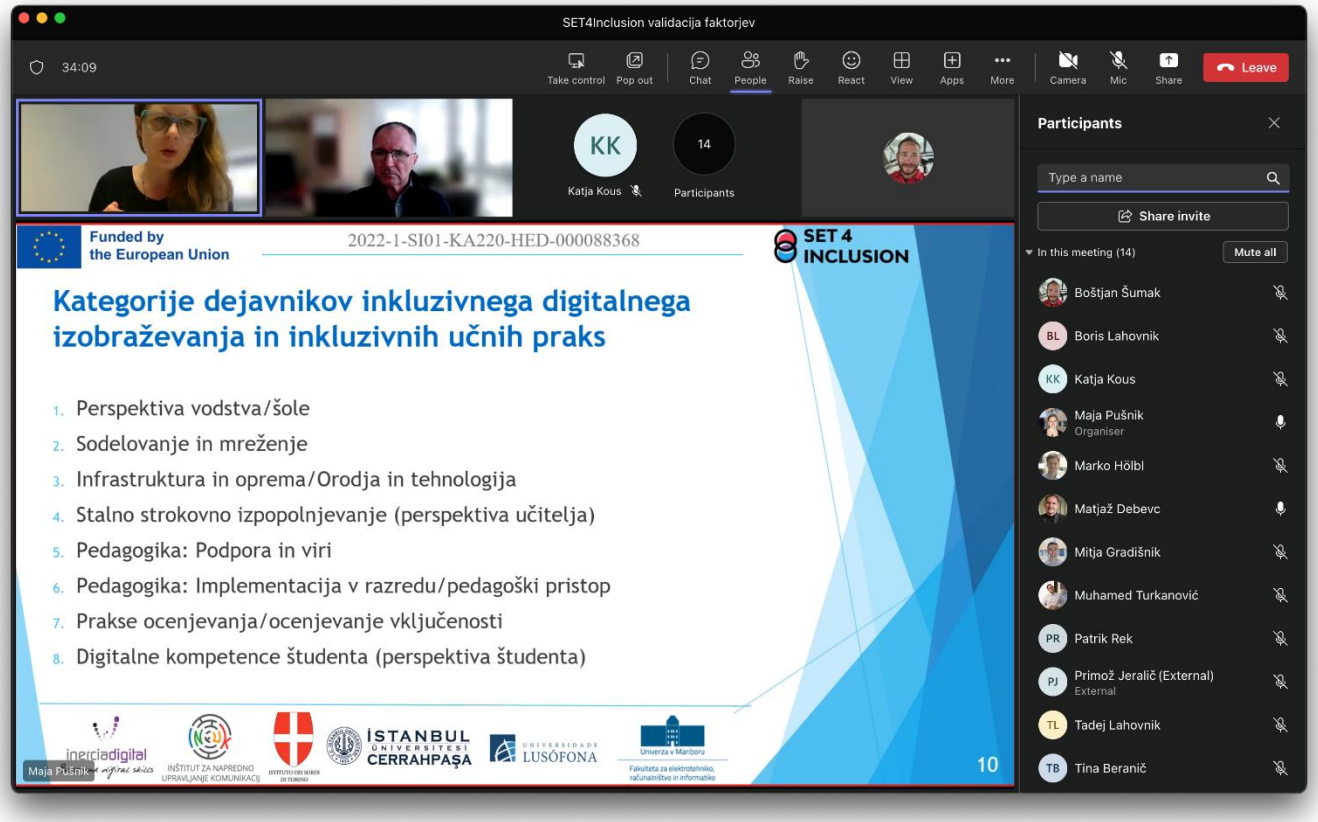

Figure 26. Presentation of the first category of e-inclusion factors

8.4.5 Implementation of the workshops in Turkey

First workshop in Turkey was conducted on on Monday, 24th of July, 14:00 – 15:30 online using the Zoom tool. Some screenshots taken during the first workshop are presented in Figure 27 and Figure 28. More screenshots from the workshop are available in the pictures folder for the 1st workshop.

The number of participants of the first workshop by different role is presented in the Table 26 in the second column.

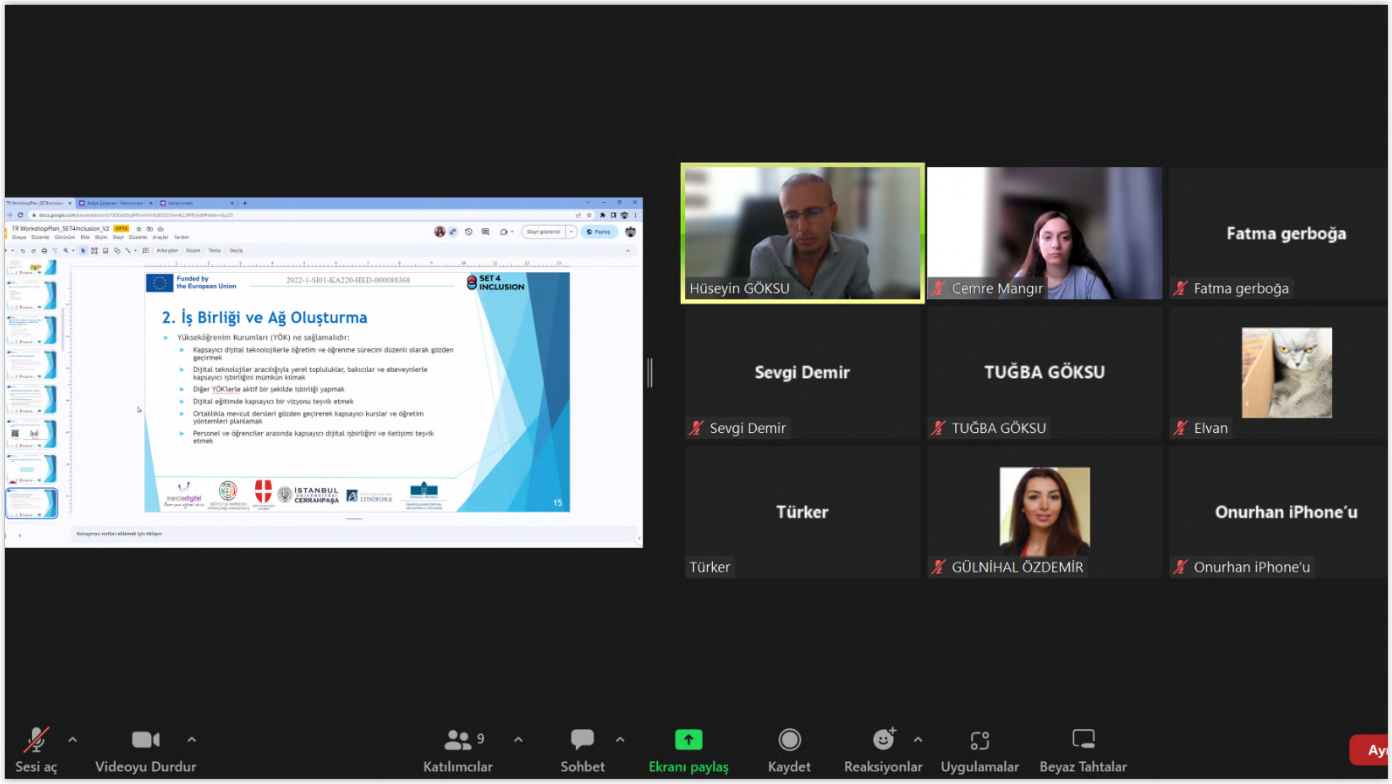

Figure 27. Presentation of the categories of e-inclusion factors

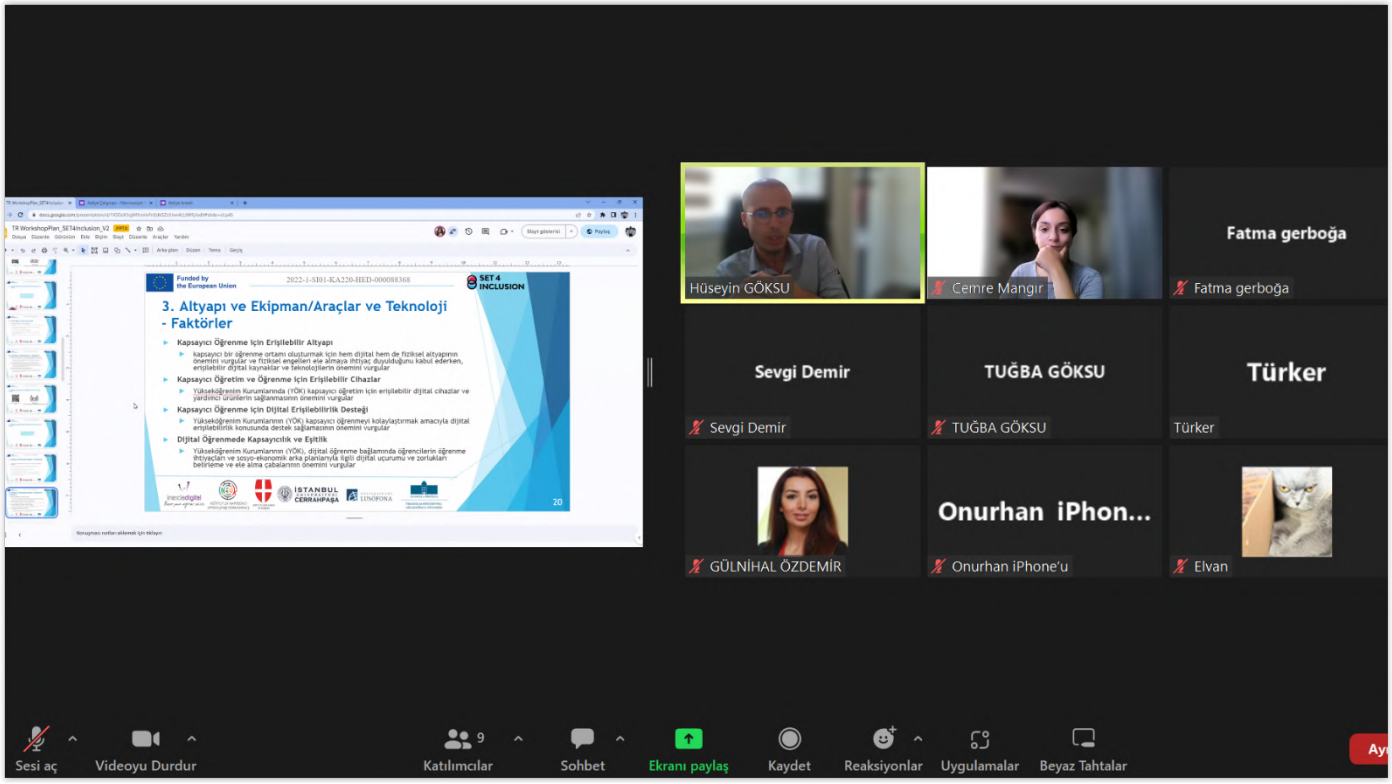

Figure 28. Presentation and discussion of factors in the third category

Table 26. Number of workshop participants in Turkey by the participant's role

	1st Workshop, 24th of July, 14:00 – 15:30, Zoom	2nd Workshop, 24th of July, 16:00 – 17:30, Zoom

Role	N of participants	N of participants
SEND student	1	1
Student		
Representative of SEND students		1
SEND students office representative		
Representative of the association/union of students with disabilities (external)		
Teacher/Professor/Associate Professor/Assistant Professor/Lecturer	5	2
Researcher		
Assistant		
Management	1	2
Technical staff		1
External expert		
Together	**7**	**7**

In Turkey, the second workshop was conducted on Monday, 24th of July, 16:00 – 17:30 online using the Zoom tool. Some screenshots taken during the first workshop are presented in Figure 29 and Figure 30. More screenshots from the workshop are available in the pictures folder for the 2nd workshop.

The number of participants of the second workshop by different role is presented in Table 26 in the third column.

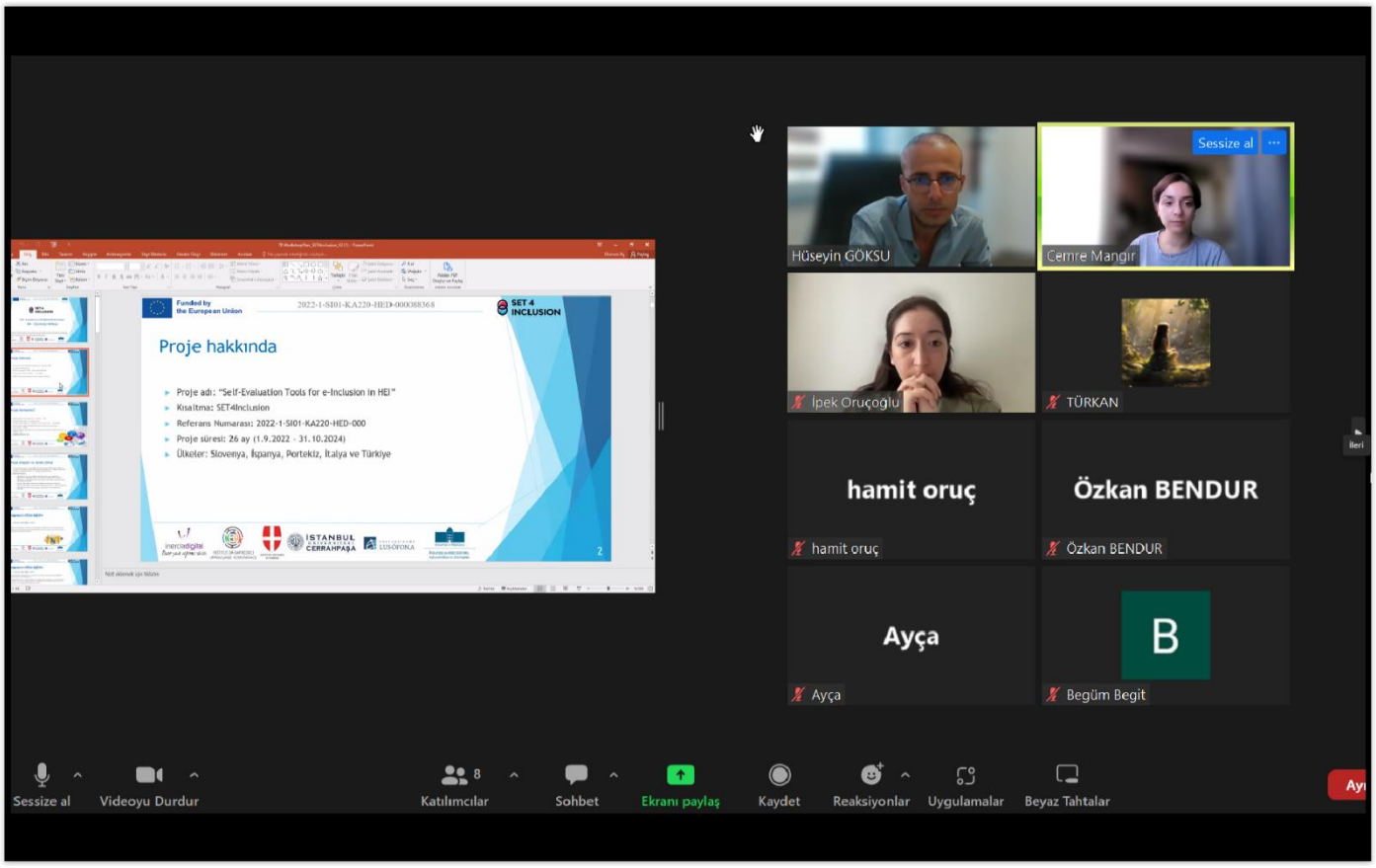

Figure 29. Short presentation of the project's objectives to the participants

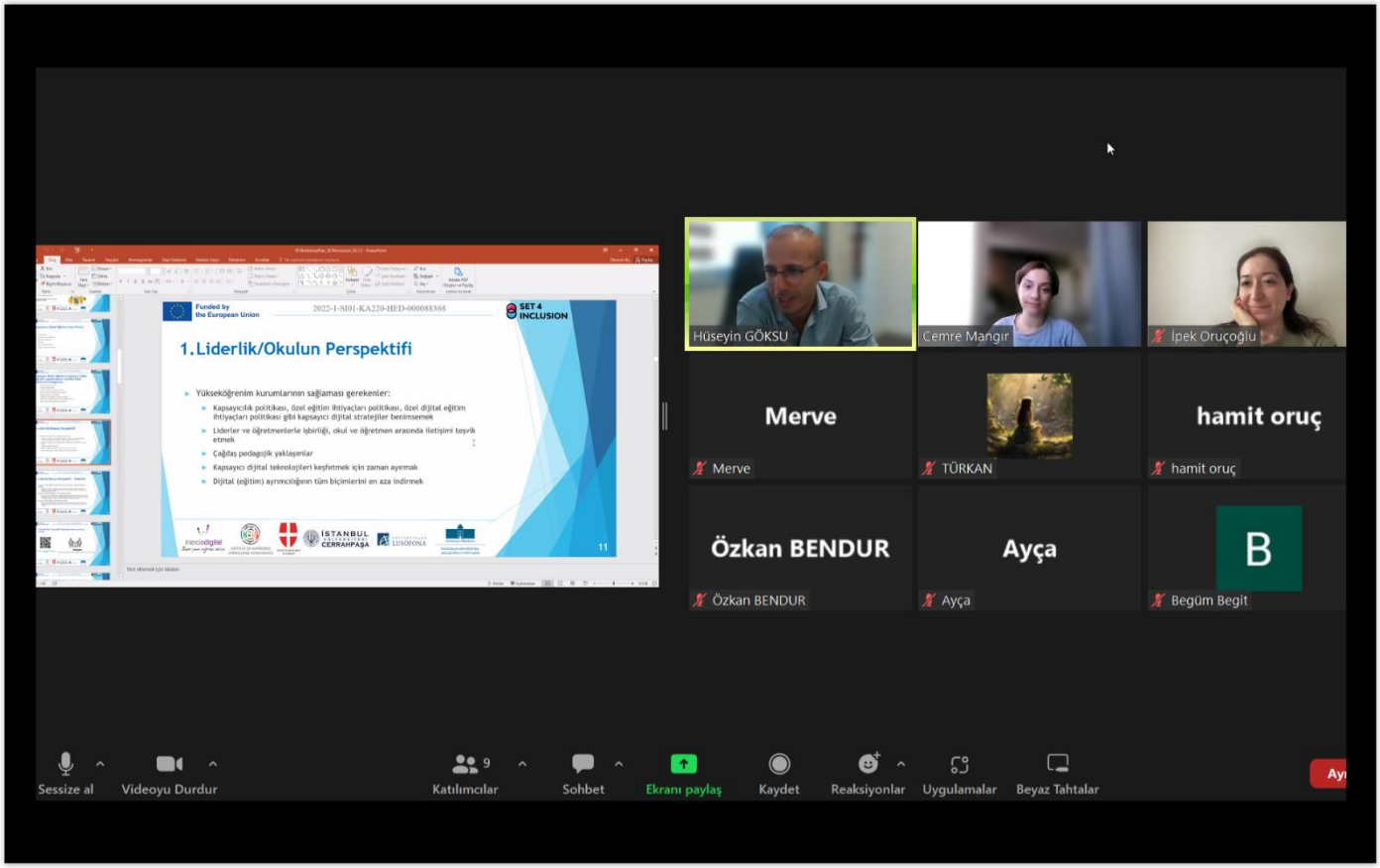

Figure 30. Presentation and discussion of factors in the first category

8.5 Results

8.5.1 Validation of factors for Leadership/ School's perspective

Results from workshops

Table 27. Descriptive statistics for indicators of Leadership/ School's perspective

	N	Minimum	Maximum	Mean	Std. Deviation
LSP1.1	76	3	5	4.68	.496
LSP1.2	76	3	5	4.70	.490
LSP1.3	76	2	5	4.66	.579
LSP1.4	76	3	5	4.67	.500
LSP1.5	76	0	5	4.70	.712
LSP1.6	76	3	5	4.67	.526
LSP1.7	76	1	5	4.46	.720
LSP1.8	76	1	5	4.55	.700
Valid N (listwise)	76				

Cronbach's Alpha: 0.826

The descriptive statistics for the Leadership/School's Perspective (LSP) indicators show consistently high mean scores, ranging from 4.46 to 4.70, across the eight indicators (LSP1.1 to LSP1.8), suggesting a generally positive

perception of leadership and school perspective among the 76 respondents (see Table 27). The standard deviations vary from 0.490 to 0.720, indicating relatively low to moderate variability in responses. The minimum scores range from 0 to 3, and the maximum score for all indicators is 5, indicating that while most ratings are high, there are some lower ratings present. The Cronbach's Alpha for these indicators is 0.826, demonstrating good internal consistency and reliability, confirming that the LSP indicators are a cohesive and reliable measure of respondents' views on leadership and school perspective.

Results from online surveys + workshops

Table 28. Descriptive statistics for indicators of Leadership/ School's perspective

	N	Minimum	Maximum	Mean	Std. Deviation
LSP1.1	187	0	5	4.58	.854
LSP1.2	187	0	5	4.60	.772
LSP1.3	186	0	5	4.54	.959
LSP1.4	187	0	5	4.55	.844
LSP1.5	187	0	5	4.52	1.013
LSP1.6	187	0	5	4.51	.969
LSP1.7	187	0	5	4.40	.975
LSP1.8	187	0	5	4.57	.849
Valid N (listwise)	186				

Cronbach's Alpha: 0.933

Table 28 provides descriptive statistics for the Leadership/School's Perspective (LSP) indicators that reveal generally positive ratings among the 187 respondents, with mean scores ranging from 4.40 to 4.60. The standard deviations range from 0.772 to 1.013, indicating moderate variability in responses. The minimum scores for all indicators are 0, while the maximum score is 5, showing a full range of possible ratings. Despite some low ratings, the overall high mean scores reflect favorable perceptions of leadership and school perspective. The Cronbach's Alpha for these indicators is 0.933, indicating excellent internal consistency and reliability, suggesting that the LSP indicators are a cohesive and reliable measure of respondents' views on leadership and school perspective.

8.5.1.1 Digital Strategy and Policy for Empowering Inclusive Digital Education

Table 29. Descriptive statistics for indicators of Digital Strategy and Policy for Empowering Inclusive Digital Education

Results from workshops

	N	Minimum	Maximum	Mean	Std. Deviation
LSP1.1	76	3	5	4.68	.496
LSP1.2	76	3	5	4.70	.490
LSP1.7	76	1	5	4.46	.720
Valid N (listwise)	76				

Cronbach's Alpha: 0.618
Cronbach's Alpha (if LSP1.7 deleted): 0.741

The descriptive statistics for the indicators of Digital Strategy and Policy for Empowering Inclusive Digital Education, based on results from workshops (see Table 29), indicate high mean scores for LSP1.1 (4.68) and LSP1.2 (4.70), suggesting strong positive perceptions in these areas among the 76 respondents. LSP1.7 has a slightly lower mean

score of 4.46 and a higher standard deviation of 0.720, indicating more variability in responses. All indicators have a minimum score of 1 or 3 and a maximum score of 5, reflecting generally high ratings. The overall Cronbach's Alpha for these indicators is 0.618, indicating moderate internal consistency. However, if LSP1.7 is deleted, the Cronbach's Alpha improves to 0.741, suggesting that the internal consistency and reliability of the measure would be stronger without LSP1.7.

Results from online surveys + workshops

Table 30. Descriptive statistics for indicators of Digital Strategy and Policy for Empowering Inclusive Digital Education

	N	Minimum	Maximum	Mean	Std. Deviation
LSP1.1	187	0	5	4.58	.854
LSP1.2	187	0	5	4.60	.772
LSP1.7	187	0	5	4.40	.975
Valid N (listwise)	186				

Cronbach's Alpha: 0.836

The descriptive statistics for the indicators of Digital Strategy and Policy for Empowering Inclusive Digital Education, combining results from online surveys and workshops (see Table 30), show generally positive perceptions among the 187 respondents. The mean scores for LSP1.1, LSP1.2, and LSP1.7 are 4.58, 4.60, and 4.40, respectively, indicating favorable views on these aspects. The standard deviations range from 0.772 to 0.975, suggesting moderate variability in responses. All indicators have a minimum score of 0 and a maximum score of 5, reflecting a full range of possible ratings. The overall Cronbach's Alpha is 0.836, indicating good internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on digital strategy and policy for empowering inclusive digital education.

8.5.1.2 Inclusive Digital Pedagogy & Supportive Culture

Results from workshops

Table 31. Descriptive statistics for indicators of Inclusive Digital Pedagogy & Supportive Culture

	N	Minimum	Maximum	Mean	Std. Deviation
LSP1.3	76	2	5	4.66	.579
LSP1.5	76	0	5	4.70	.712
LSP1.6	76	3	5	4.67	.526
Valid N (listwise)	76				

Cronbach's Alpha: 0.732

The descriptive statistics for the indicators of Inclusive Digital Pedagogy & Supportive Culture, based on results from workshops, show high mean scores among the 76 respondents (see Table 31). LSP1.3 has a mean of 4.66, LSP1.5 has a mean of 4.70, and LSP1.6 has a mean of 4.67, indicating generally positive perceptions in these areas. The standard deviations range from 0.526 to 0.712, indicating moderate variability in responses. The minimum scores range from 0 to 3, and the maximum score for all indicators is 5, reflecting a broad range of possible ratings. The overall Cronbach's Alpha is 0.732, suggesting good internal consistency and reliability, indicating that these indicators are a cohesive and reliable measure of respondents' views on inclusive digital pedagogy and supportive culture.

Results from online surveys + workshops

Table 32. Descriptive statistics for indicators of Inclusive Digital Pedagogy & Supportive Culture

	N	Minimum	Maximum	Mean	Std. Deviation
LSP1.3	186	0	5	4.54	.959
LSP1.5	187	0	5	4.52	1.013
LSP1.6	187	0	5	4.51	.969
Valid N (listwise)	186				

Cronbach's Alpha: 0.847

The descriptive statistics for the indicators of Inclusive Digital Pedagogy & Supportive Culture, combining results from online surveys and workshops, indicate positive perceptions among the respondents (see Table 32). LSP1.3, LSP1.5, and LSP1.6 have mean scores of 4.54, 4.52, and 4.51, respectively, reflecting favorable views on these aspects from 186-187 respondents. The standard deviations range from 0.959 to 1.013, indicating moderate variability in responses. All indicators have a minimum score of 0 and a maximum score of 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.847, suggesting good internal consistency and reliability, indicating that these indicators are a cohesive and reliable measure of respondents' views on inclusive digital pedagogy and supportive culture.

8.5.1.3 Professional Development for Inclusive Digital Education

Results from workshops

Table 33. Descriptive statistics for indicators of Professional Development for Inclusive Digital Education

	N	Minimum	Maximum	Mean	Std. Deviation
LSP1.4	76	3	5	4.67	.500
LSP1.8	76	1	5	4.55	.700
Valid N (listwise)	76				

Cronbach's Alpha: 0.482

The descriptive statistics for the indicators of Professional Development for Inclusive Digital Education, based on results from workshops, show generally positive responses among the 76 participants (see Table 33). LSP1.4 has a mean score of 4.67 with a standard deviation of 0.500, while LSP1.8 has a mean score of 4.55 with a standard deviation of 0.700. These scores indicate favorable perceptions of professional development for inclusive digital education. The minimum scores are 3 and 1, respectively, and the maximum score for both indicators is 5, showing a range of ratings. However, the overall Cronbach's Alpha is 0.482, indicating low internal consistency and reliability, suggesting that these indicators may not be a cohesive measure of respondents' views on professional development for inclusive digital education.

Results from online surveys + workshops

Table 34. Descriptive statistics for indicators of Professional Development for Inclusive Digital Education

	N	Minimum	Maximum	Mean	Std. Deviation
LSP1.4	187	0	5	4.55	.844
LSP1.8	187	0	5	4.57	.849
Valid N (listwise)	186				

Cronbach's Alpha: 0.834

The descriptive statistics for the indicators of Professional Development for Inclusive Digital Education, combining results from online surveys and workshops, reveal positive perceptions among the 187 respondents (see Table 34). Both LSP1.4 and LSP1.8 have similar mean scores of 4.55 and 4.57, respectively, indicating favorable views on professional development in this area. The standard deviations are 0.844 for LSP1.4 and 0.849 for LSP1.8, suggesting moderate variability in responses. Both indicators have a minimum score of 0 and a maximum score of 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.834, indicating good internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on professional development for inclusive digital education.

The results of the Leasership/School's perspective factors validation indicate generally positive perceptions across various aspects of inclusive digital education among respondents. For the Leadership/School's Perspective (LSP) indicators, both workshop and combined online survey results reveal high mean scores, indicating strong satisfaction with leadership and school policies related to digital inclusion. Cronbach's Alpha values for these indicators suggest good to excellent internal consistency, further validating the reliability of these measures.

In the area of Digital Strategy and Policy for Empowering Inclusive Digital Education, high mean scores were observed from both workshop results and combined online survey data, reflecting favorable views on the institution's digital strategies. However, the Cronbach's Alpha for the workshop-only data was lower, indicating moderate consistency, which improved significantly when certain items were excluded.

The indicators for Inclusive Digital Pedagogy & Supportive Culture also showed high mean scores, indicating positive perceptions among respondents. Both workshops and combined survey results exhibited good internal consistency, suggesting reliability in these measures. This indicates a strong supportive culture for inclusive digital pedagogy within the institutions.

For Professional Development for Inclusive Digital Education, mean scores were similarly high, reflecting favorable views on the professional development opportunities provided. The combined survey and workshop data indicated good internal consistency, although the workshop-only data showed lower reliability, suggesting potential variability in how professional development is perceived solely based on workshop responses.

Overall, the survey results demonstrate a generally positive outlook on various dimensions of inclusive digital education, with strong support for leadership, digital strategy, inclusive pedagogy, and professional development. The findings highlight areas of strength while also pointing to the need for consistent and reliable implementation across different settings to ensure all aspects of inclusive digital education are effectively supported.

8.5.1.4 Results of qualitative data analysis

The need for leaders to adapt and update their strategies in line with new technologies is crucial. Specialized training can help leaders and their teams stay current and effective. Therefore, offering focused training or self-learning resources is essential for both leadership and team success.

Digital policies and guidelines are crucial in promoting digital inclusion in universities. Leaders should develop comprehensive policies that address accessibility, privacy, security, **intellectual property, and ethical considerations** in the digital realm. These policies should be communicated **effectively and regularly** updated to ensure compliance and foster a safe and inclusive digital environment.

Leadership should **prioritize the allocation of funds and resources** specifically dedicated to digital inclusion initiatives. By recognizing the importance of financial support, leaders can ensure that digital accessibility, affordability, and equitable access are addressed effectively. This can involve investing in assistive technologies, providing subsidies for devices or internet access, and offering grants or funding opportunities for innovative digital inclusion projects. Collaboration and partnerships are essential for advancing digital inclusion in universities. **By**

partnering with industry experts, non-profit organizations, and government agencies, universities can leverage resources, expertise, and funding opportunities to enhance their digital infrastructure and support initiatives.

8.5.2 Validation of factors for Collaboration and Networking

Results from workshops

Table 35. Descriptive statistics for indicators of Collaboration and Networking

	N	Minimum	Maximum	Mean	Std. Deviation
CAN2.1	76	3	5	4.54	.552
CAN2.2	76	0	5	4.55	.790
CAN2.3	76	0	5	4.58	.735
CAN2.4	76	3	5	4.66	.505
CAN2.5	76	3	5	4.71	.512
CAN2.6	76	3	5	4.53	.599
CAN2.7	76	3	5	4.59	.546
Valid N (listwise)	76				

Cronbach's Alpha: 0.792

The descriptive statistics for the indicators of Collaboration and Networking (CAN) based on workshop results indicate generally high ratings among the 76 respondents (see Table 35). The mean scores for the indicators range from 4.53 to 4.71, reflecting favorable perceptions of collaboration and networking. The standard deviations vary from 0.505 to 0.790, indicating moderate variability in responses. The minimum scores for most indicators are 3, with some having a minimum of 0, and the maximum score for all indicators is 5, showing a broad range of ratings. The overall Cronbach's Alpha is 0.792, suggesting good internal consistency and reliability, indicating that the CAN indicators are a cohesive and reliable measure of respondents' views on collaboration and networking.

Results from online surveys + workshops

Table 36. Descriptive statistics for indicators of Collaboration and Networking

	N	Minimum	Maximum	Mean	Std. Deviation
CAN2.1	187	0	5	4.40	.833
CAN2.2	187	0	5	4.47	.882
CAN2.3	187	0	5	4.34	.962
CAN2.4	186	0	5	4.51	.787
CAN2.5	187	1	5	4.52	.792
CAN2.6	187	1	5	4.47	.792
CAN2.7	187	1	5	4.55	.735
Valid N (listwise)	186				

Cronbach's Alpha: 0.907

The descriptive statistics for the indicators of Collaboration and Networking (CAN) from combined online surveys and workshops show generally positive perceptions among the 187 respondents (see Table 36). The mean scores range from 4.34 to 4.55, indicating favorable views on collaboration and networking. The standard deviations, ranging from 0.735 to 0.962, suggest moderate variability in responses. The minimum scores vary from 0 to 1, and the maximum score for all indicators is 5, reflecting the full range of possible ratings. The overall Cronbach's Alpha is

0.907, indicating excellent internal consistency and reliability, suggesting that the CAN indicators are a cohesive and reliable measure of respondents' views on collaboration and networking.

8.5.2.1 Collaborative Evaluation and Planning for Inclusive Digital Teaching

Results from workshops

Table 37. Descriptive statistics for indicators of Collaborative Evaluation and Planning for Inclusive Digital Teaching

	N	Minimum	Maximum	Mean	Std. Deviation
CAN2.1	76	3	5	4.54	.552
CAN2.2	76	0	5	4.55	.790
CAN2.6	76	3	5	4.53	.599
Valid N (listwise)	76				

Cronbach's Alpha: 0.695

The descriptive statistics for the indicators of Collaborative Evaluation and Planning for Inclusive Digital Teaching, based on workshop results, show generally positive ratings among the 76 respondents (see Table 37). The mean scores for the indicators (CAN2.1, CAN2.2, and CAN2.6) are 4.54, 4.55, and 4.53, respectively, indicating favorable perceptions of collaborative evaluation and planning. The standard deviations range from 0.552 to 0.790, suggesting moderate variability in responses. The minimum scores for most indicators are 3, with CAN2.2 having a minimum of 0, and the maximum score for all indicators is 5. The overall Cronbach's Alpha is 0.695, indicating moderate internal consistency and reliability, suggesting that while the indicators are somewhat cohesive, there is room for improvement in their consistency as a measure of collaborative evaluation and planning for inclusive digital teaching.

Results from online surveys + workshops

Table 38. Descriptive statistics for indicators of Collaborative Evaluation and Planning for Inclusive Digital Teaching

	N	Minimum	Maximum	Mean	Std. Deviation
CAN2.1	187	0	5	4.40	.833
CAN2.2	187	0	5	4.47	.882
CAN2.6	187	1	5	4.47	.792
Valid N (listwise)	186				

Cronbach's Alpha: 0.829

The descriptive statistics for the indicators of Collaborative Evaluation and Planning for Inclusive Digital Teaching, based on combined results from online surveys and workshops, indicate positive perceptions among the 187 respondents (see Table 38). The mean scores for CAN2.1, CAN2.2, and CAN2.6 are 4.40, 4.47, and 4.47, respectively, reflecting favorable views on these aspects. The standard deviations range from 0.792 to 0.882, suggesting moderate variability in responses. The minimum scores are 0 or 1, and the maximum score for all indicators is 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.829, indicating good internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on collaborative evaluation and planning for inclusive digital teaching.

8.5.2.2 Shared Vision and Collaborative Culture for Inclusive Digital Education

Results from workshops

Table 39. Descriptive statistics for indicators of Shared Vision and Collaborative Culture for Inclusive Digital Education

	N	Minimum	Maximum	Mean	Std. Deviation
CAN2.5	76	3	5	4.71	.512
CAN2.7	76	3	5	4.59	.546
Valid N (listwise)	76				

Cronbach's Alpha: 0.601

The descriptive statistics for the indicators of Shared Vision and Collaborative Culture for Inclusive Digital Education, based on workshop results, show very positive ratings among the 76 respondents (see Table 39). The mean scores for CAN2.5 and CAN2.7 are 4.71 and 4.59, respectively, indicating strong agreement on the shared vision and collaborative culture. The standard deviations are 0.512 for CAN2.5 and 0.546 for CAN2.7, suggesting low variability in responses. Both indicators have a minimum score of 3 and a maximum score of 5. However, the overall Cronbach's Alpha is 0.601, indicating moderate internal consistency and reliability, suggesting that while the indicators are somewhat cohesive, there may be some variability in how respondents perceive the shared vision and collaborative culture for inclusive digital education.

Results from online surveys + workshops

Table 40. Descriptive statistics for indicators of Shared Vision and Collaborative Culture for Inclusive Digital Education

	N	Minimum	Maximum	Mean	Std. Deviation
CAN2.5	187	1	5	4.52	.792
CAN2.7	187	1	5	4.55	.735
Valid N (listwise)	186				

Cronbach's Alpha: 0.808

The descriptive statistics for the indicators of Shared Vision and Collaborative Culture for Inclusive Digital Education, based on combined results from online surveys and workshops, indicate positive perceptions among the 187 respondents (see Table 40). The mean scores for CAN2.5 and CAN2.7 are 4.52 and 4.55, respectively, reflecting strong agreement on these aspects. The standard deviations are 0.792 for CAN2.5 and 0.735 for CAN2.7, indicating moderate variability in responses. Both indicators have a minimum score of 1 and a maximum score of 5, showing a wide range of ratings. The overall Cronbach's Alpha is 0.808, suggesting good internal consistency and reliability, indicating that these indicators are a cohesive and reliable measure of respondents' views on the shared vision and collaborative culture for inclusive digital education.

8.5.2.3 Collaborative Engagement for Inclusive Digital Partnerships

Results from workshops

Table 41. Descriptive statistics for indicators of Collaborative Engagement for Inclusive Digital Partnerships

	N	Minimum	Maximum	Mean	Std. Deviation
CAN2.3	76	0	5	4.58	.735
CAN2.4	76	3	5	4.66	.505
Valid N (listwise)	76				

Cronbach's Alpha: 0.576

The descriptive statistics for the indicators of Collaborative Engagement for Inclusive Digital Partnerships, based on workshop results, show high ratings among the 76 respondents (see Table 41). The mean scores for CAN2.3 and CAN2.4 are 4.58 and 4.66, respectively, indicating positive perceptions of collaborative engagement. The standard deviations are 0.735 for CAN2.3 and 0.505 for CAN2.4, suggesting low to moderate variability in responses. The minimum scores are 0 for CAN2.3 and 3 for CAN2.4, with both indicators having a maximum score of 5. The overall Cronbach's Alpha is 0.576, indicating moderate internal consistency and reliability, suggesting that while the indicators are somewhat cohesive, there may be variability in how respondents perceive collaborative engagement for inclusive digital partnerships.

Results from online surveys + workshops

Table 42. Descriptive statistics for indicators of Collaborative Engagement for Inclusive Digital Partnerships

	N	Minimum	Maximum	Mean	Std. Deviation
CAN2.3	187	0	5	4.34	.962
CAN2.4	186	0	5	4.51	.787
Valid N (listwise)	186				

Cronbach's Alpha: 0.736

The descriptive statistics for the indicators of Collaborative Engagement for Inclusive Digital Partnerships, based on combined results from online surveys and workshops, indicate generally positive perceptions among the 187 respondents (see Table 42). The mean scores for CAN2.3 and CAN2.4 are 4.34 and 4.51, respectively, reflecting favorable views on collaborative engagement. The standard deviations are 0.962 for CAN2.3 and 0.787 for CAN2.4, suggesting moderate variability in responses. The minimum scores are 0 for both indicators, and the maximum score is 5, showing a wide range of ratings. The overall Cronbach's Alpha is 0.736, indicating good internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on collaborative engagement for inclusive digital partnerships.

The validation of factors for Collaboration and Networking highlights overall positive perceptions across various aspects of collaboration and networking for inclusive digital education. The indicators for Collaboration and Networking (CAN) showed high mean scores, both from workshops and combined online surveys, suggesting that respondents generally view collaboration and networking within their institutions favorably. The internal consistency of these indicators was robust, particularly in the combined data with a Cronbach's Alpha of 0.907, indicating that these measures are reliable and cohesive in assessing respondents' views on collaboration and networking.

For Collaborative Evaluation and Planning for Inclusive Digital Teaching, both the workshops and combined survey results revealed positive ratings, with high mean scores indicating favorable perceptions. However, the internal consistency was moderate in the workshop-only data (Cronbach's Alpha of 0.695) but improved significantly in the combined data (Cronbach's Alpha of 0.829), suggesting that the combined approach provides a more reliable measure of these indicators. This highlights the importance of incorporating diverse data sources to enhance the reliability of the evaluation process.

In the areas of Shared Vision and Collaborative Culture and Collaborative Engagement for Inclusive Digital Partnerships, the survey results were similarly positive, with high mean scores across indicators reflecting strong agreement among respondents. The internal consistency for these factors was moderate to good, with Cronbach's Alpha values ranging from 0.576 to 0.808. Notably, the combined survey and workshop data generally showed better internal consistency than the workshop-only data, underscoring the value of integrating multiple data sources for more reliable assessments. Overall, these findings suggest a supportive environment for inclusive digital education

within the institutions, though there is room for improvement in certain areas to ensure even greater consistency and reliability in the measures.

8.5.2.4 Results of qualitative data analysis

The presence of students with disabilities in schools often necessitates parental involvement for accompaniment, as seen in cases like those of blind students. This creates a dependency on parents. The hiring of specialized aides by schools could reduce this dependency and offer greater independence to these students. Additionally, there is a noted gap in the expertise among general educators regarding instructional strategies for students with disabilities. Collaboration between special education experts and general educators could help fill this gap and improve educational outcomes.

Digital inclusion also encompasses bridging the gap between academic and community engagement. Universities should actively collaborate with local communities, organizations, and businesses to extend digital access and skills beyond the campus. **By fostering digital literacy programs**, outreach initiatives, and community partnerships, universities can contribute to the overall digital well-being and empowerment of society as a whole.

Evaluation and continuous improvement are vital aspects of digital inclusion in universities. Leaders should establish mechanisms to assess the effectiveness and impact of digital inclusion initiatives. This can involve collecting and analyzing data, soliciting feedback from stakeholders, and **using evidence-based practices to inform decision-making and drive improvements** in digital inclusion strategies.

The high mean scores and good internal consistency for the Collaboration and Networking (CAN) indicators suggest that respondents perceive strong collaborative efforts within their institutions. The dependency on parental involvement for students with disabilities, particularly blind students, points to a need for specialized aides. This can reduce dependency on parents and foster greater independence for students. The quantitative data supports this by highlighting the importance of effective collaboration, which can be enhanced through the inclusion of specialized aides.

Indicators for Collaborative Evaluation and Planning for Inclusive Digital Teaching also received high ratings, indicating positive perceptions of these efforts. The noted gap in expertise among general educators regarding instructional strategies for students with disabilities suggests a need for more targeted collaboration between special education experts and general educators. The positive ratings in the quantitative data underscore the potential effectiveness of such collaborations in improving educational outcomes for students with disabilities.

The high ratings for Shared Vision and Collaborative Culture, as well as Collaborative Engagement for Inclusive Digital Partnerships, reflect strong institutional support for inclusive practices. Extending digital access and skills beyond the campus through partnerships with local communities, organizations, and businesses can enhance digital inclusion. The quantitative results indicate a solid foundation for these initiatives, suggesting that institutions are well-positioned to expand their impact through community engagement and outreach.
Evaluation and Continuous Improvement:

The high overall Cronbach's Alpha values across various indicators highlight the reliability of current practices in inclusive digital education. Establishing mechanisms for continuous evaluation and improvement is crucial. The quantitative data's reflection of positive perceptions and good internal consistency provides a baseline from which institutions can further refine and enhance their digital inclusion strategies. By incorporating data collection, feedback, and evidence-based practices, institutions can ensure their initiatives remain effective and impactful.

The qualitative insights reinforce and expand upon the positive perceptions captured in the quantitative results, offering specific recommendations for enhancing inclusive digital education. The integration of specialized aides, targeted professional development, community partnerships, and continuous evaluation can address identified gaps and build on the strengths highlighted in the quantitative data, fostering a more inclusive and effective educational environment.

8.5.3 Validation of factors for Infrastructure and Equipment/ Tools and Technology

Results from workshops

Table 43. Descriptive statistics for indicators of Infrastructure and Equipment/ Tools and Technology

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.1	76	3	5	4.75	.465
IET3.2	76	3	5	4.67	.551
IET3.3	76	3	5	4.66	.530
IET3.4	76	0	5	4.58	.753
IET3.5	76	2	5	4.72	.580
IET3.6	76	2	5	4.67	.575
IET3.7	76	3	5	4.75	.465
IET3.8	76	3	5	4.49	.683
IET3.9	76	3	5	4.78	.450
IET3.10	76	3	5	4.72	.506
IET3.11	76	3	5	4.66	.555
IET3.12	76	3	5	4.76	.486
IET3.13	76	3	5	4.64	.534
Valid N (listwise)	76				

Cronbach's Alpha: 0.908

The descriptive statistics for the indicators of Infrastructure and Equipment/Tools and Technology, based on workshop results, reveal highly positive perceptions among the 76 respondents (see Table 43). The mean scores for the indicators range from 4.49 to 4.78, indicating strong satisfaction with the infrastructure and technological tools available. The standard deviations vary from 0.450 to 0.753, suggesting relatively low to moderate variability in responses. The minimum scores for most indicators are 2 or 3, and the maximum score is consistently 5 across all indicators, reflecting high ratings overall. The overall Cronbach's Alpha is 0.908, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on infrastructure and equipment/tools and technology.

Results from online surveys + workshops

Table 44. Descriptive statistics for indicators of Infrastructure and Equipment/ Tools and Technology

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.1	187	0	5	4.57	.796
IET3.2	187	0	5	4.59	.794
IET3.3	187	0	5	4.56	.849

IET3.4	187	0	5	4.51	.857
IET3.5	187	0	5	4.57	.829
IET3.6	167	0	5	4.37	.960
IET3.7	187	0	5	4.51	.894
IET3.8	187	0	5	4.42	.915
IET3.9	187	0	5	4.56	.810
IET3.10	187	0	5	4.59	.787
IET3.11	187	0	5	4.57	.803
IET3.12	187	0	5	4.58	.802
IET3.13	187	0	5	4.53	.825
Valid N (listwise)	167				

Cronbach's Alpha: 0.972

The descriptive statistics for the indicators of Infrastructure and Equipment/Tools and Technology, based on combined results from online surveys and workshops, indicate positive perceptions among the 187 respondents (see Table 44). The mean scores for the indicators range from 4.37 to 4.59, reflecting overall satisfaction with the infrastructure and technological tools available. The standard deviations range from 0.787 to 0.960, suggesting moderate variability in responses. The minimum scores for all indicators are 0, and the maximum score is consistently 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.972, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on infrastructure and equipment/tools and technology.

8.5.3.1 Accessible Infrastructure for Inclusive Learning

Results from workshops

Table 45. Descriptive statistics for indicators of Accessible Infrastructure for Inclusive Learning

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.1	76	3	5	4.75	.465
IET3.3	76	3	5	4.66	.530
IET3.10	76	3	5	4.72	.506
IET3.12	76	3	5	4.76	.486
IET3.13	76	3	5	4.64	.534
Valid N (listwise)	76				

Cronbach's Alpha: 0.830

The descriptive statistics for the indicators of Accessible Infrastructure for Inclusive Learning, based on workshop results, show very positive perceptions among the 76 respondents (see Table 45). The mean scores for the indicators (IET3.1, IET3.3, IET3.10, IET3.12, and IET3.13) range from 4.64 to 4.76, indicating strong satisfaction with the accessibility of infrastructure for inclusive learning. The standard deviations range from 0.465 to 0.534, suggesting low variability in responses. The minimum score for all indicators is 3, and the maximum score is 5, reflecting consistently high ratings. The overall Cronbach's Alpha is 0.830, indicating good internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on accessible infrastructure for inclusive learning.

Results from online surveys + workshops

Table 46. Descriptive statistics for indicators of Accessible Infrastructure for Inclusive Learning

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.1	187	0	5	4.57	.796
IET3.3	187	0	5	4.56	.849
IET3.10	187	0	5	4.59	.787
IET3.12	187	0	5	4.58	.802
IET3.13	187	0	5	4.53	.825
Valid N (listwise)	167				

Cronbach's Alpha: 0.941

The descriptive statistics for the indicators of Accessible Infrastructure for Inclusive Learning, based on combined results from online surveys and workshops, indicate positive perceptions among the 187 respondents (see Table 46). The mean scores for the indicators (IET3.1, IET3.3, IET3.10, IET3.12, and IET3.13) range from 4.53 to 4.59, reflecting overall satisfaction with the accessibility of infrastructure for inclusive learning. The standard deviations range from 0.787 to 0.849, suggesting moderate variability in responses. The minimum score for all indicators is 0, and the maximum score is 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.941, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on accessible infrastructure for inclusive learning.

8.5.3.2 Accessible Devices for Inclusive Teaching and Learning

Results from workshops

Table 47. Descriptive statistics for indicators of Accessible Devices for Inclusive Teaching and Learning

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.2	76	3	5	4.67	.551
IET3.5	76	2	5	4.72	.580
IET3.6	76	2	5	4.67	.575
IET3.9	76	3	5	4.78	.450
Valid N (listwise)	76				

Cronbach's Alpha: 0.735

The descriptive statistics for the indicators of Accessible Devices for Inclusive Teaching and Learning, based on workshop results, show very positive perceptions among the 76 respondents (see Table 47). The mean scores for the indicators (IET3.2, IET3.5, IET3.6, and IET3.9) range from 4.67 to 4.78, indicating strong satisfaction with the accessibility of devices for inclusive teaching and learning. The standard deviations range from 0.450 to 0.580, suggesting low to moderate variability in responses. The minimum scores for most indicators are 2 or 3, and the maximum score for all indicators is 5, reflecting consistently high ratings. The overall Cronbach's Alpha is 0.735, indicating good internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on accessible devices for inclusive teaching and learning.

Results from online surveys + workshops

Table 48. Descriptive statistics for indicators of Accessible Devices for Inclusive Teaching and Learning

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.2	187	0	5	4.59	.794
IET3.5	187	0	5	4.57	.829
IET3.6	167	0	5	4.37	.960
IET3.9	187	0	5	4.56	.810
Valid N (listwise)	167				

Cronbach's Alpha: 0.898

The descriptive statistics for the indicators of Accessible Devices for Inclusive Teaching and Learning, based on combined results from online surveys and workshops, indicate generally positive perceptions among the 187 respondents (see Table 48). The mean scores for the indicators (IET3.2, IET3.5, IET3.6, and IET3.9) range from 4.37 to 4.59, reflecting overall satisfaction with the accessibility of devices for inclusive teaching and learning. The standard deviations range from 0.794 to 0.960, suggesting moderate variability in responses. The minimum scores for all indicators are 0, and the maximum score is 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.898, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on accessible devices for inclusive teaching and learning.

8.5.3.3 Digital Accessibility Support for Inclusive Learning

Results from workshops

Table 49. Descriptive statistics for indicators of Digital Accessibility Support for Inclusive Learning

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.4	76	0	5	4.58	.753
IET3.11	76	3	5	4.66	.555
Valid N (listwise)	76				

Cronbach's Alpha: 0.629

The descriptive statistics for the indicators of Digital Accessibility Support for Inclusive Learning, based on workshop results, show positive perceptions among the 76 respondents (see Table 49). The mean scores for the indicators (IET3.4 and IET3.11) are 4.58 and 4.66, respectively, indicating strong satisfaction with digital accessibility support for inclusive learning. The standard deviations are 0.753 for IET3.4 and 0.555 for IET3.11, suggesting moderate to low variability in responses. The minimum scores are 0 for IET3.4 and 3 for IET3.11, with the maximum score being 5 for both indicators. The overall Cronbach's Alpha is 0.629, indicating moderate internal consistency and reliability, suggesting that while the indicators are somewhat cohesive, there is room for improvement in their consistency as a measure of digital accessibility support for inclusive learning.

Results from online surveys + workshops

Table 50. Descriptive statistics for indicators of Digital Accessibility Support for Inclusive Learning

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.4	187	0	5	4.51	.857
IET3.11	187	0	5	4.57	.803

Valid N (listwise)	167				

Cronbach's Alpha: 0.872

The descriptive statistics for the indicators of Digital Accessibility Support for Inclusive Learning, based on combined results from online surveys and workshops, indicate positive perceptions among the 187 respondents (see Table 50). The mean scores for the indicators (IET3.4 and IET3.11) are 4.51 and 4.57, respectively, reflecting overall satisfaction with digital accessibility support. The standard deviations are 0.857 for IET3.4 and 0.803 for IET3.11, suggesting moderate variability in responses. The minimum scores for both indicators are 0, and the maximum score is 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.872, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on digital accessibility support for inclusive learning.

8.5.3.4: Inclusion and Equity in Digital Learning

Results from workshops

Table 51. Descriptive statistics for indicators of Inclusion and Equity in Digital Learning

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.7	76	3	5	4.75	.465
IET3.8	76	3	5	4.49	.683
Valid N (listwise)	76				

Cronbach's Alpha: 0.487

The descriptive statistics for the indicators of Inclusion and Equity in Digital Learning, based on workshop results, show positive perceptions among the 76 respondents (see Table 51). The mean scores for the indicators (IET3.7 and IET3.8) are 4.75 and 4.49, respectively, indicating strong satisfaction with inclusion and equity in digital learning. The standard deviations are 0.465 for IET3.7 and 0.683 for IET3.8, suggesting low to moderate variability in responses. The minimum score for both indicators is 3, and the maximum score is 5, reflecting consistently high ratings. The overall Cronbach's Alpha is 0.487, indicating low internal consistency and reliability, suggesting that the indicators may not be entirely cohesive as a measure of inclusion and equity in digital learning. There is room for improvement to enhance the consistency and reliability of these measures.

Results from online surveys + workshops

Table 52. Descriptive statistics for indicators of Inclusion and Equity in Digital Learning

	N	Minimum	Maximum	Mean	Std. Deviation
IET3.7	187	0	5	4.51	.894
IET3.8	187	0	5	4.42	.915
Valid N (listwise)	167				

Cronbach's Alpha: 0.875

The descriptive statistics for the indicators of Inclusion and Equity in Digital Learning, based on combined results from online surveys and workshops, indicate generally positive perceptions among the 187 respondents. The mean scores for the indicators (IET3.7 and IET3.8) are 4.51 and 4.42, respectively, reflecting overall satisfaction with inclusion and equity in digital learning. The standard deviations are 0.894 for IET3.7 and 0.915 for IET3.8, suggesting moderate variability in responses. The minimum scores for both indicators are 0, and the maximum score is 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.875, indicating excellent internal

consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on inclusion and equity in digital learning.

The validation results of factors for Infrastructure and Equipment/ Tools and Technology, encompassing Accessible Infrastructure for Inclusive Learning, Accessible Devices for Inclusive Teaching and Learning, Digital Accessibility Support for Inclusive Learning, and Inclusion and Equity in Digital Learning, demonstrate generally positive perceptions and strong internal consistency across various measures. In the workshops, indicators related to Infrastructure and Equipment/Tools and Technology received high mean scores ranging from 4.49 to 4.78, with Cronbach's Alpha values indicating excellent reliability (0.908). Similarly, the combined results from online surveys and workshops maintained high mean scores and even higher internal consistency (Cronbach's Alpha: 0.972), reflecting strong satisfaction with the infrastructure and technological tools available for inclusive learning.

For Accessible Infrastructure for Inclusive Learning, the workshop results showed mean scores from 4.64 to 4.76 and good reliability (Cronbach's Alpha: 0.830). The combined data also indicated high mean scores and excellent internal consistency (Cronbach's Alpha: 0.941). These findings suggest that respondents are very satisfied with the accessibility of the infrastructure provided for inclusive learning. Likewise, the indicators for Accessible Devices for Inclusive Teaching and Learning from workshops had high mean scores ranging from 4.67 to 4.78, with good reliability (Cronbach's Alpha: 0.735). The combined results showed slightly lower mean scores but maintained excellent reliability (Cronbach's Alpha: 0.898), indicating a general satisfaction with the accessibility of devices.

Digital Accessibility Support for Inclusive Learning received positive ratings in both workshop-only and combined results. The workshops' results showed high mean scores but moderate internal consistency (Cronbach's Alpha: 0.629), while the combined results demonstrated improved internal consistency (Cronbach's Alpha: 0.872). Finally, the indicators of Inclusion and Equity in Digital Learning had high mean scores in workshops but low reliability (Cronbach's Alpha: 0.487), which significantly improved in the combined results (Cronbach's Alpha: 0.875). These findings indicate that while perceptions of inclusion and equity are generally positive, there is a notable improvement in consistency when combining data from multiple sources. Overall, the validation results highlight strong satisfaction with various aspects of digital infrastructure and accessibility, underscoring the importance of diverse data sources for reliable evaluation.

8.5.3.5 Results of qualitative data analysis

The absence of technical staff skilled in digital inclusion at special education schools is a significant issue that necessitates the hiring of information technology specialists. Additionally, there is a notable shortage of affordable technical devices, which impedes e-inclusion efforts. Economic factors in Turkey exacerbate this problem, making it increasingly challenging for schools and students to acquire necessary technology. Furthermore, infrastructural limitations in certain regions of Turkey restrict internet access, hampering students' ability to use digital services and resources.

Data privacy and security are important considerations when striving for digital inclusion in universities. Students and faculty must feel confident that their personal information and digital activities are protected. Establishing robust data protection policies, implementing secure technology infrastructure, and providing education on digital safety and privacy can foster trust and enable individuals to fully engage in the digital landscape.

Affordability and accessibility of technology are crucial considerations for digital inclusion in universities. It is important to ensure that students have access to affordable devices, reliable internet connectivity, and necessary software and applications. Implementing initiatives such as device loan programs or providing subsidies for internet expenses can help bridge the digital divide among students.

The analysis of both quantitative and qualitative data reveals a comprehensive understanding of the current state of digital inclusion and accessibility within educational institutions. The quantitative data analysis demonstrates generally positive perceptions of infrastructure, equipment, and support for inclusive digital education, with high mean scores and strong internal consistency across various indicators. However, the qualitative data highlights significant challenges that need to be addressed to enhance these positive perceptions and ensure comprehensive digital inclusion.

One of the key issues identified in the qualitative analysis is the absence of skilled technical staff in special education schools, underscoring the need for hiring information technology specialists to support digital inclusion. This complements the quantitative findings, which reflect satisfaction with existing infrastructure but do not capture the underlying staffing challenges. Additionally, the qualitative data points to a shortage of affordable technical devices and economic constraints in Turkey that hinder e-inclusion efforts. This aligns with the quantitative indicators that show strong satisfaction with available devices but does not fully address affordability issues.

Another crucial insight from the qualitative data is the importance of data privacy and security in fostering digital inclusion. While the quantitative results highlight high satisfaction with digital accessibility support, the qualitative analysis emphasizes the need for robust data protection policies and secure technology infrastructure to build trust among students and faculty. Furthermore, the qualitative data stresses the need for initiatives to improve affordability and accessibility of technology, such as device loan programs and subsidies for internet expenses, to bridge the digital divide. These insights suggest that while the current infrastructure and support are viewed positively, there are critical areas—particularly related to staffing, affordability, and data security—that require targeted interventions to achieve true digital inclusion.

8.5.4 Validation of factors for Continuing Professional Development

8.5.4.1 Continuous Professional Development for Inclusive Digital Teaching

Results from workshops

Table 53. Descriptive statistics for indicators of Continuous Professional Development for Inclusive Digital Teaching

	N	Minimum	Maximum	Mean	Std. Deviation
CPD4.1	76	0	5	4.58	.753
CPD4.2	76	3	5	4.67	.500
CPD4.3	76	3	5	4.66	.555
Valid N (listwise)	76				

Cronbach’s Alpha: 0.700

The descriptive statistics for the indicators of Continuous Professional Development for Inclusive Digital Teaching, based on workshop results, show generally positive perceptions among the 76 respondents (see Table 53). The mean scores for the indicators (CPD4.1, CPD4.2, and CPD4.3) are 4.58, 4.67, and 4.66, respectively, indicating strong satisfaction with the professional development opportunities provided for inclusive digital teaching. The standard deviations range from 0.500 to 0.753, suggesting moderate variability in responses. The minimum scores for the indicators range from 0 to 3, while the maximum score is consistently 5, reflecting high ratings overall. The overall Cronbach's Alpha is 0.700, indicating moderate internal consistency and reliability, suggesting that these indicators are a cohesive and reasonably reliable measure of respondents' views on continuous professional development for inclusive digital teaching.

Results from online surveys + workshops

Table 54. Descriptive statistics for indicators of Continuous Professional Development for Inclusive Digital Teaching

	N	Minimum	Maximum	Mean	Std. Deviation
CPD4.1	187	0	5	4.49	.900
CPD4.2	187	0	5	4.53	.798
CPD4.3	187	0	5	4.51	.819
Valid N (listwise)	187				

Cronbach's Alpha: 0.915

The descriptive statistics for the indicators of Continuous Professional Development for Inclusive Digital Teaching, based on combined results from online surveys and workshops, indicate positive perceptions among the 187 respondents (see Table 54). The mean scores for the indicators (CPD4.1, CPD4.2, and CPD4.3) are 4.49, 4.53, and 4.51, respectively, reflecting strong satisfaction with professional development opportunities. The standard deviations range from 0.798 to 0.900, suggesting moderate variability in responses. The minimum scores for all indicators are 0, and the maximum score is 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.915, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and highly reliable measure of respondents' views on continuous professional development for inclusive digital teaching.

8.5.4.2 Results of qualitative data analysis

Working hours significantly impact experts' motivation to pursue ongoing professional education, particularly when financial support for seminars and events is lacking. This leads to a reliance on free but often limited-content educational resources. Platforms offering lifelong educational support could address this issue.

Geographical disparities also exist, with most training events located in major cities, limiting access for educators in Turkey's eastern regions. Rising living expenses further discourage educators from participating in paid seminars and training. Consequently, there is an increasing dependency on free but potentially less comprehensive educational opportunities.

Digital literacy plays a vital role in promoting digital inclusion in universities. It is important to **equip students and faculty with the necessary skills and knowledge** to effectively navigate and utilize digital tools and technologies. Providing training programs and resources that empower individuals to confidently engage in the digital world can greatly enhance their overall learning experience.

Leadership should prioritize **professional development and training programs** for faculty and staff to enhance their digital skills and fluency. By offering ongoing support and opportunities for upskilling, leaders can empower educators to effectively leverage digital tools and technologies in their teaching and administrative roles, promoting digital inclusion across various aspects of university operations.

The combined analysis of quantitative and qualitative data for the factors and indicators of Continuous Professional Development (CPD) for Inclusive Digital Teaching highlights both the strengths and challenges faced by educators in pursuing ongoing professional education. The quantitative results indicate generally positive perceptions of CPD opportunities, with high mean scores and strong internal consistency across indicators, suggesting that respondents are satisfied with the professional development opportunities provided. Specifically, the workshops and combined survey data show high mean scores (ranging from 4.49 to 4.67) and Cronbach's Alpha values indicating moderate to excellent reliability (0.700 for workshops and 0.915 for combined data).

However, the qualitative data uncovers several critical challenges that impact the effectiveness and accessibility of CPD for educators. One significant issue is the impact of working hours on educators' motivation to engage in ongoing professional development, particularly when financial support for seminars and events is lacking. This often forces educators to rely on free but limited-content educational resources. To address this, platforms offering comprehensive lifelong educational support could provide a viable solution, ensuring that educators have access to high-quality, continuous professional development opportunities regardless of financial constraints.

Geographical disparities also pose a challenge, as most training events are concentrated in major cities, limiting access for educators in Turkey's eastern regions. The rising living expenses further exacerbate this issue, discouraging participation in paid training and seminars. This results in a dependency on free, potentially less comprehensive educational opportunities. To mitigate these barriers, it is crucial to develop and implement training programs that are accessible to educators in all regions, possibly through online platforms and virtual seminars. Additionally, leadership in educational institutions should prioritize digital literacy and professional development, providing ongoing support and opportunities for upskilling. By empowering educators with the necessary digital skills and knowledge, universities can promote digital inclusion and enhance the overall learning experience for both faculty and students.

8.5.5 Validation of factors for Pedagogy: Supports and Resources

Results from workshops

Table 55. Descriptive statistics for indicators of Continuing Professional Development

	N	Minimum	Maximum	Mean	Std. Deviation
PSR5.1	76	3	5	4.64	.509
PSR5.2	76	3	5	4.59	.570
PSR5.3	76	3	5	4.59	.570
PSR5.4	76	3	5	4.67	.526
PSR5.5	76	3	5	4.59	.546
PSR5.6	76	0	5	4.51	.757
PSR5.7	76	0	5	4.58	.771
PSR5.8	76	0	5	4.57	.754
Valid N (listwise)	76				

Cronbach’s Alpha: 0.867

The descriptive statistics for the indicators of Continuing Professional Development (CPD) based on workshop results show generally positive perceptions among the 76 respondents (see Table 55). The mean scores for the indicators (PSR5.1 to PSR5.8) range from 4.51 to 4.67, indicating strong satisfaction with the professional development supports and resources provided. The standard deviations range from 0.509 to 0.771, suggesting low to moderate variability in responses. The minimum scores for most indicators are 3, with a few having minimum scores of 0, and the maximum score is consistently 5 across all indicators, reflecting high ratings overall. The overall Cronbach's Alpha is 0.867, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on continuing professional development.

Results from online surveys + workshops

Table 56. Descriptive statistics for indicators of Continuing Professional Development

	N	Minimum	Maximum	Mean	Std. Deviation
PSR5.1	187	0	5	4.39	.850
PSR5.2	187	0	5	4.41	.840
PSR5.3	187	0	5	4.43	.829
PSR5.4	187	0	5	4.49	.870
PSR5.5	187	0	5	4.41	.883
PSR5.6	187	0	5	4.40	.936
PSR5.7	187	0	5	4.44	.939
PSR5.8	187	0	5	4.40	.907
Valid N (listwise)	187				

Cronbach's Alpha: 0.950

The descriptive statistics for the indicators of Continuing Professional Development (CPD), based on combined results from online surveys and workshops, show positive perceptions among the 187 respondents (see Table 56). The mean scores for the indicators (PSR5.1 to PSR5.8) range from 4.39 to 4.49, indicating overall satisfaction with the professional development supports and resources provided. The standard deviations range from 0.829 to 0.939, suggesting moderate variability in responses. The minimum scores for all indicators are 0, and the maximum score is consistently 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.950, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and highly reliable measure of respondents' views on continuing professional development.

8.5.5.1 Inclusive Digital Teaching Practices

Results from workshops

Table 57. Descriptive statistics for indicators of Inclusive Digital Teaching Practices

	N	Minimum	Maximum	Mean	Std. Deviation
PSR5.3	76	3	5	4.59	.570
PSR5.4	76	3	5	4.67	.526
PSR5.6	76	0	5	4.51	.757
PSR5.7	76	0	5	4.58	.771
Valid N (listwise)	76				

Cronbach's Alpha: 0.830

The descriptive statistics for the indicators of Inclusive Digital Teaching Practices, based on workshop results, show generally positive perceptions among the 76 respondents (see Table 57). The mean scores for the indicators (PSR5.3, PSR5.4, PSR5.6, and PSR5.7) range from 4.51 to 4.67, indicating strong satisfaction with inclusive digital teaching practices. The standard deviations range from 0.526 to 0.771, suggesting moderate variability in responses. The minimum scores for most indicators are 3, with a few having minimum scores of 0, and the maximum score is consistently 5 across all indicators, reflecting high ratings overall. The overall Cronbach's Alpha is 0.830, indicating good internal consistency and reliability, suggesting that these indicators are a cohesive and reliable measure of respondents' views on inclusive digital teaching practices.

Results from online surveys + workshops

Table 58. Descriptive statistics for indicators of Inclusive Digital Teaching Practices

	N	Minimum	Maximum	Mean	Std. Deviation
PSR5.3	187	0	5	4.43	.829
PSR5.4	187	0	5	4.49	.870
PSR5.6	187	0	5	4.40	.936
PSR5.7	187	0	5	4.44	.939
Valid N (listwise)	187				

Cronbach's Alpha: 0.909

The descriptive statistics for the indicators of Inclusive Digital Teaching Practices, based on combined results from online surveys and workshops, indicate positive perceptions among the 187 respondents (see Table 58). The mean scores for the indicators (PSR5.3, PSR5.4, PSR5.6, and PSR5.7) range from 4.40 to 4.49, reflecting overall satisfaction with inclusive digital teaching practices. The standard deviations range from 0.829 to 0.939, suggesting moderate variability in responses. The minimum scores for all indicators are 0, and the maximum score is 5, covering the full range of possible ratings. The overall Cronbach's Alpha is 0.909, indicating excellent internal consistency and reliability, suggesting that these indicators are a cohesive and highly reliable measure of respondents' views on inclusive digital teaching practices.

8.5.5.2 Inclusive Digital Resources

Results from workshops

Table 59. Descriptive statistics for indicators of Inclusive Digital Resources

	N	Minimum	Maximum	Mean	Std. Deviation
PSR5.1	76	3	5	4.64	.509
PSR5.2	76	3	5	4.59	.570
PSR5.5	76	3	5	4.59	.546
PSR5.8	76	0	5	4.57	.754
Valid N (listwise)	76				

Cronbach's Alpha: 0.788

The descriptive statistics for the indicators of Inclusive Digital Resources from the workshops reveal generally high mean scores, indicating positive perceptions (see Table 59). Specifically, PSR5.1 has a mean of 4.64 with a standard deviation of 0.509, PSR5.2 has a mean of 4.59 and a standard deviation of 0.570, PSR5.5 also shows a mean of 4.59 with a standard deviation of 0.546, and PSR5.8, while slightly more variable with a standard deviation of 0.754, has a mean of 4.57. All indicators have minimum scores ranging from 0 to 3 and a maximum of 5, reflecting some variability in responses. The overall Cronbach's Alpha for these indicators is 0.788, indicating a reasonable level of internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 60. Descriptive statistics for indicators of Inclusive Digital Resources

	N	Minimum	Maximum	Mean	Std. Deviation
PSR5.1	187	0	5	4.39	.850

PSR5.2	187	0	5	4.41	.840
PSR5.5	187	0	5	4.41	.883
PSR5.8	187	0	5	4.40	.907
Valid N (listwise)	187				

Cronbach's Alpha: 0.929

The descriptive statistics for the indicators of Inclusive Digital Resources from the combined results of online surveys and workshops show generally high mean scores, indicating favorable perceptions (see Table 60). PSR5.1 has a mean of 4.39 with a standard deviation of 0.850, PSR5.2 has a mean of 4.41 and a standard deviation of 0.840, PSR5.5 shows a mean of 4.41 with a standard deviation of 0.883, and PSR5.8 has a mean of 4.40 with a standard deviation of 0.907. The minimum and maximum scores for all indicators range from 0 to 5, reflecting a wider variability in responses compared to the workshop-only results. The overall Cronbach's Alpha is 0.929, indicating excellent internal consistency and reliability among the indicators.

8.5.5.3 Results of qualitative data analysis

Most schools in Turkey do not have enough number of technical tools to be used in special education. There is huge lack of resources.

To achieve digital inclusion in universities, it is essential to prioritize accessibility. This includes providing equal access to technology and digital resources for all students, regardless of their abilities or disabilities. It is crucial to ensure that **digital platforms, learning materials, and communication channels are designed and developed with accessibility in mind**.

8.5.6 Validation of factors for Pedagogy: Implementation in the classroom

Results from workshops

Table 61. Descriptive statistics for indicators of Pedagogy: Implementation in the classroom

	N	Minimum	Maximum	Mean	Std. Deviation
PIC6.1	76	3	5	4.66	.579
PIC6.2	76	3	5	4.61	.544
PIC6.3	76	3	5	4.68	.496
PIC6.4	76	3	5	4.75	.493
PIC6.5	76	0	5	4.62	.730
PIC6.7	76	0	5	4.68	.716
PIC6.8	76	3	5	4.68	.496
PIC6.9	76	3	5	4.67	.500
PIC6.10	76	3	5	4.59	.546
Valid N (listwise)	76				

Cronbach's Alpha: 0.869

The descriptive statistics for the indicators of Pedagogy: Implementation in the classroom from the workshops demonstrate very high mean scores, reflecting highly favorable perceptions (see Table 61). All indicators, including PIC6.1 through PIC6.10, have mean scores ranging from 4.59 to 4.75, with relatively low standard deviations, indicating a high level of agreement among respondents. The minimum scores range from 0 to 3 and the maximum

score is consistently 5 across all indicators, suggesting some variability but generally positive responses. The overall Cronbach's Alpha is 0.869, indicating a strong level of internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 62. Descriptive statistics for indicators of Pedagogy: Implementation in the classroom

	N	Minimum	Maximum	Mean	Std. Deviation
PIC6.1	187	0	5	4.51	.900
PIC6.2	187	0	5	4.47	.881
PIC6.3	186	0	5	4.53	.813
PIC6.4	187	0	5	4.57	.842
PIC6.5	187	0	5	4.54	.946
PIC6.7	187	0	5	4.59	.878
PIC6.8	186	0	5	4.57	.856
PIC6.9	187	0	5	4.55	.837
PIC6.10	187	0	5	4.58	.774
Valid N (listwise)	185				

Cronbach's Alpha: 0.963

The descriptive statistics for the indicators of Pedagogy: Implementation in the classroom, derived from both online surveys and workshops, show high mean scores, indicating positive perceptions (see Table 62). The mean scores range from 4.47 to 4.59, with standard deviations between 0.774 and 0.946, suggesting a moderate level of variability among responses. Each indicator (PIC6.1 to PIC6.10) has minimum and maximum scores from 0 to 5, reflecting the full range of possible ratings. The overall Cronbach's Alpha is 0.963, demonstrating excellent internal consistency and reliability, indicating that the indicators are a highly reliable measure of respondents' views on classroom pedagogy implementation.

8.5.6.1 Personalized and Engaging Digital Learning

Results from workshops

Table 63. Descriptive statistics for indicators of Personalized and Engaging Digital Learning

	N	Minimum	Maximum	Mean	Std. Deviation
PIC6.1	76	3	5	4.66	.579
PIC6.2	76	3	5	4.61	.544
PIC6.3	76	3	5	4.68	.496
Valid N (listwise)	76				

Cronbach's Alpha: 0.729

The descriptive statistics for the indicators of Personalized and Engaging Digital Learning from the workshops show high mean scores, indicating positive perceptions (see Table 63). The indicators, PIC6.1, PIC6.2, and PIC6.3, have mean scores of 4.66, 4.61, and 4.68 respectively, with standard deviations ranging from 0.496 to 0.579, indicating a relatively low level of variability among responses. The minimum score for all indicators is 3 and the maximum score is 5, showing that responses are clustered towards the higher end of the scale. The overall Cronbach's Alpha is 0.729, suggesting a reasonable level of internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 64. Descriptive statistics for indicators of Personalized and Engaging Digital Learning

	N	Minimum	Maximum	Mean	Std. Deviation
PIC6.1	187	0	5	4.51	.900
PIC6.2	187	0	5	4.47	.881
PIC6.3	186	0	5	4.53	.813
Valid N (listwise)	185				

Cronbach's Alpha: 0.892

The descriptive statistics for the indicators of Personalized and Engaging Digital Learning, derived from both online surveys and workshops, show generally high mean scores, reflecting positive perceptions (see Table 64). Specifically, PIC6.1 has a mean of 4.51 with a standard deviation of 0.900, PIC6.2 has a mean of 4.47 with a standard deviation of 0.881, and PIC6.3 has a mean of 4.53 with a standard deviation of 0.813. The minimum and maximum scores range from 0 to 5 for all indicators, indicating the full spectrum of possible responses. The overall Cronbach's Alpha is 0.892, suggesting a high level of internal consistency and reliability among the indicators.

8.5.6.2 Inclusive Classroom Collaboration and Respectful Environment

Results from workshops

Table 65. Descriptive statistics for indicators of Inclusive Classroom Collaboration and Respectful Environment

	N	Minimum	Maximum	Mean	Std. Deviation
PIC6.5	76	0	5	4.62	.730
PIC6.7	76	0	5	4.68	.716
PIC6.8	76	3	5	4.68	.496
PIC6.9	76	3	5	4.67	.500
Valid N (listwise)	76				

Cronbach's Alpha: 0.781

The descriptive statistics for the indicators of Inclusive Classroom Collaboration and Respectful Environment from the workshops show high mean scores, indicating positive perceptions (see Table 65). The indicators PIC6.5, PIC6.7, PIC6.8, and PIC6.9 have mean scores of 4.62, 4.68, 4.68, and 4.67 respectively, with standard deviations ranging from 0.496 to 0.730, indicating moderate variability among responses. The minimum scores range from 0 to 3 and the maximum score is consistently 5 across all indicators. The overall Cronbach's Alpha is 0.781, indicating a reasonable level of internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 66. Descriptive statistics for indicators of Inclusive Classroom Collaboration and Respectful Environment

	N	Minimum	Maximum	Mean	Std. Deviation
PIC6.5	187	0	5	4.54	.946
PIC6.7	187	0	5	4.59	.878
PIC6.8	186	0	5	4.57	.856
PIC6.9	187	0	5	4.55	.837
Valid N (listwise)	185				

Cronbach's Alpha: 0.936

The descriptive statistics for the indicators of Inclusive Classroom Collaboration and Respectful Environment, derived from both online surveys and workshops, show high mean scores, indicating positive perceptions (see Table 66). Specifically, PIC6.5 has a mean of 4.54 with a standard deviation of 0.946, PIC6.7 has a mean of 4.59 with a standard deviation of 0.878, PIC6.8 has a mean of 4.57 with a standard deviation of 0.856, and PIC6.9 has a mean of 4.55 with a standard deviation of 0.837. The minimum and maximum scores for all indicators range from 0 to 5, reflecting the full range of possible responses. The overall Cronbach's Alpha is 0.936, indicating excellent internal consistency and reliability among the indicators.

8.5.6.3 Enhanced Pedagogical Digital Inclusiveness

Results from workshops

Table 67. Descriptive statistics for indicators of Enhanced Pedagogical Digital Inclusiveness

	N	Minimum	Maximum	Mean	Std. Deviation
PIC6.4	76	3	5	4.75	.493
PIC6.10	76	3	5	4.59	.546
Valid N (listwise)	76				

Cronbach's Alpha: 0.578

The descriptive statistics for the indicators of Enhanced Pedagogical Digital Inclusiveness from the workshops reveal high mean scores, indicating very positive perceptions (see **Table 67**). PIC6.4 has a mean of 4.75 with a standard deviation of 0.493, and PIC6.10 has a mean of 4.59 with a standard deviation of 0.546. Both indicators have minimum scores of 3 and maximum scores of 5, showing responses are concentrated at the higher end. However, the overall Cronbach's Alpha is 0.578, suggesting moderate internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 68. Descriptive statistics for indicators of Enhanced Pedagogical Digital Inclusiveness

	N	Minimum	Maximum	Mean	Std. Deviation
PIC6.4	187	0	5	4.57	.842
PIC6.10	187	0	5	4.58	.774
Valid N (listwise)	185				

Cronbach's Alpha: 0.857

In the combined results from online surveys and workshops, the indicators of Enhanced Pedagogical Digital Inclusiveness maintain high mean scores, reflecting favorable views (see **Table 68**). PIC6.4 has a mean of 4.57 with a standard deviation of 0.842, and PIC6.10 has a mean of 4.58 with a standard deviation of 0.774. The minimum and maximum scores range from 0 to 5, capturing a wider variability in responses. The overall Cronbach's Alpha is 0.857, indicating a high level of internal consistency and reliability among the indicators.

8.5.6.4 Results of qualitative data analysis

Educational approaches for digital inclusion should prioritize a comprehensive view of digital literacy, encompassing not just technical skills but also critical thinking and digital citizenship. However, the current education system inadequately addresses these areas. While there is awareness of the importance of learner-centered teaching, practical implementation is often hindered due to teachers' additional responsibilities.

Inclusive pedagogy and curriculum design are crucial factors in digital inclusion. Faculty members should strive to create **learning experiences** that accommodate **diverse learning styles** and preferences, leveraging digital tools and resources to cater to individual needs. Incorporating **varied multimedia formats, interactive elements**, and opportunities for student engagement can enhance accessibility and promote inclusive learning environments.

Another key factor in achieving digital inclusion is fostering a culture of diversity and inclusivity within the university community. This involves creating an environment where individuals from **different backgrounds, languages, and socio-economic statuses feel welcome** and supported in their digital endeavors. Embracing diversity not only enriches the learning experience but also promotes innovation and collaboration.

8.5.7. Validation of factors for Assessment Practices/ Inclusion Assessment

Results from workshops

Table 69. Descriptive statistics for indicators of Assessment Practices/ Inclusion Assessment

	N	Minimum	Maximum	Mean	Std. Deviation
AIA7.1	76	3	5	4.59	.546
AIA7.2	76	3	5	4.63	.538
AIA7.3	76	3	5	4.68	.522
AIA7.4	76	0	5	4.50	.808
AIA7.5	76	0	5	4.49	.945
AIA7.6	76	0	5	4.61	.732
AIA7.7	76	0	5	4.51	.792
Valid N (listwise)	76				

Cronbach's Alpha: 0.866

The descriptive statistics for the indicators of Assessment Practices/Inclusion Assessment from the workshops show high mean scores, indicating positive perceptions (see Table 69). The mean scores for AIA7.1 to AIA7.7 range from 4.49 to 4.68, with standard deviations between 0.522 and 0.945, reflecting moderate variability in responses. The minimum scores range from 0 to 3, and the maximum score is consistently 5 for all indicators. The overall Cronbach's Alpha is 0.866, indicating a high level of internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 70. Descriptive statistics for indicators of Assessment Practices/ Inclusion Assessment

	N	Minimum	Maximum	Mean	Std. Deviation
AIA7.1	187	0	5	4.37	.885
AIA7.2	187	0	5	4.40	.918
AIA7.3	187	0	5	4.43	.861
AIA7.4	187	0	5	4.32	1.049
AIA7.5	187	0	5	4.23	1.124
AIA7.6	187	0	5	4.43	.955
AIA7.7	187	0	5	4.37	.938
Valid N (listwise)	187				

Cronbach's Alpha: 0.940

For the combined results from online surveys and workshops, the indicators of Assessment Practices/Inclusion Assessment also show high mean scores, though slightly lower than those from the workshops alone (see Table 70). The mean scores for AIA7.1 to AIA7.7 range from 4.23 to 4.43, with standard deviations between 0.861 and 1.124, indicating a wider range of variability in responses. The minimum and maximum scores range from 0 to 5 for all indicators, capturing the full spectrum of possible responses. The overall Cronbach's Alpha is 0.940, indicating excellent internal consistency and reliability among the indicators.

8.5.7.1 Inclusive Digital Assessment Practices

Results from workshops

Table 71. Descriptive statistics for indicators of Inclusive Digital Assessment Practices

	N	Minimum	Maximum	Mean	Std. Deviation
AIA7.1	76	3	5	4.59	.546
AIA7.2	76	3	5	4.63	.538
Valid N (listwise)	76				

Cronbach's Alpha: 0.727

The descriptive statistics for the indicators of Inclusive Digital Assessment Practices from the workshops show high mean scores, indicating positive perceptions (see Table 71). Specifically, AIA7.1 has a mean of 4.59 with a standard deviation of 0.546, and AIA7.2 has a mean of 4.63 with a standard deviation of 0.538. Both indicators have minimum scores of 3 and maximum scores of 5, showing responses are clustered at the higher end. The overall Cronbach's Alpha is 0.727, suggesting moderate internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 72. Descriptive statistics for indicators of Inclusive Digital Assessment Practices

	N	Minimum	Maximum	Mean	Std. Deviation
AIA7.1	187	0	5	4.37	.885
AIA7.2	187	0	5	4.40	.918
Valid N (listwise)	187				

Cronbach's Alpha: 0.888

In the combined results from online surveys and workshops, the indicators of Inclusive Digital Assessment Practices maintain high mean scores, though slightly lower than those from the workshops alone (see Table 72). AIA7.1 has a mean of 4.37 with a standard deviation of 0.885, and AIA7.2 has a mean of 4.40 with a standard deviation of 0.918. The minimum and maximum scores range from 0 to 5 for both indicators, reflecting a wider variability in responses. The overall Cronbach's Alpha is 0.888, indicating a high level of internal consistency and reliability among the indicators.

8.5.7.2 Digital Feedback and Self-Reflection

Results from workshops

Table 73. Descriptive statistics for indicators of Digital Feedback and Self-Reflection

	N	Minimum	Maximum	Mean	Std. Deviation
AIA7.3	76	3	5	4.68	.522

AIA7.4	76	0	5	4.50	.808
AIA7.5	76	0	5	4.49	.945
Valid N (listwise)	76				

Cronbach's Alpha: 0.671
Cronbach's Alpha (if AIA7.3 deleted): 0.759

The descriptive statistics for the indicators of Digital Feedback and Self-Reflection from the workshops indicate high mean scores, suggesting positive perceptions (see Table 73). Specifically, AIA7.3 has a mean of 4.68 with a standard deviation of 0.522, AIA7.4 has a mean of 4.50 with a standard deviation of 0.808, and AIA7.5 has a mean of 4.49 with a standard deviation of 0.945. The minimum scores range from 0 to 3, and the maximum score is consistently 5 across these indicators. The overall Cronbach's Alpha is 0.671, indicating moderate internal consistency, but it would increase to 0.759 if AIA7.3 were deleted, suggesting AIA7.3 might be less consistent with the other indicators.

Results from online surveys + workshops

Table 74. Descriptive statistics for indicators of Digital Feedback and Self-Reflection

	N	Minimum	Maximum	Mean	Std. Deviation
AIA7.3	187	0	5	4.43	.861
AIA7.4	187	0	5	4.32	1.049
AIA7.5	187	0	5	4.23	1.124
Valid N (listwise)	187				

Cronbach's Alpha: 0.838

In the combined results from online surveys and workshops, the indicators of Digital Feedback and Self-Reflection also show high mean scores, though slightly lower than those from the workshops alone (see Table 74). AIA7.3 has a mean of 4.43 with a standard deviation of 0.861, AIA7.4 has a mean of 4.32 with a standard deviation of 1.049, and AIA7.5 has a mean of 4.23 with a standard deviation of 1.124. The minimum and maximum scores range from 0 to 5, reflecting a wider range of responses. The overall Cronbach's Alpha is 0.838, indicating a high level of internal consistency and reliability among the indicators.

8.5.7.3 Data-Driven Improvement for Inclusive Digital Learning

Results from workshops

Table 75. Descriptive statistics for indicators of Data-Driven Improvement for Inclusive Digital Learning

	N	Minimum	Maximum	Mean	Std. Deviation
AIA7.6	76	0	5	4.61	.732
AIA7.7	76	0	5	4.51	.792
Valid N (listwise)	76				

Cronbach's Alpha: 0.853

The descriptive statistics for the indicators of Data-Driven Improvement for Inclusive Digital Learning from the workshops show high mean scores, indicating positive perceptions (see Table 75). Specifically, AIA7.6 has a mean of 4.61 with a standard deviation of 0.732, and AIA7.7 has a mean of 4.51 with a standard deviation of 0.792. The minimum scores for both indicators are 0, and the maximum scores are 5, showing a range of responses. The overall Cronbach's Alpha is 0.853, indicating a high level of internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 76. Descriptive statistics for indicators of Data-Driven Improvement for Inclusive Digital Learning

	N	Minimum	Maximum	Mean	Std. Deviation
AIA7.6	187	0	5	4.43	.955
AIA7.7	187	0	5	4.37	.938
Valid N (listwise)	187				

Cronbach's Alpha: 0.891

In the combined results from online surveys and workshops, the indicators of Data-Driven Improvement for Inclusive Digital Learning also show high mean scores, though slightly lower than those from the workshops alone (see Table 76). AIA7.6 has a mean of 4.43 with a standard deviation of 0.955, and AIA7.7 has a mean of 4.37 with a standard deviation of 0.938. The minimum and maximum scores range from 0 to 5 for both indicators, reflecting a wider range of variability in responses. The overall Cronbach's Alpha is 0.891, indicating a high level of internal consistency and reliability among the indicators.

8.5.7.4 Results of qualitative data analysis

A diversity of assessment methods is needed to accommodate students with disabilities. While extra time is often allotted, the question types and levels remain uniform, which doesn't account for varied learning experiences. Assessment systems should be adaptable, with standardized options determined by educators to suit students' differing abilities.

Deaf often have difficulties regarding digital communication. It is true that nowadays there are some platforms (zoom and similar) that are more accessible and offer more options for subtitling or interpreters, but at the same time regarding the online assessment, especially in university, there are now programs that blocks any other app running on your computer, which makes it harder for deaf people to get support.

8.5.8 Validation of factors for Student Digital Competence/ Student's Perspective

8.5.8.1 Inclusive Digital Communication and Skills Development

Results from workshops

Table 77. Descriptive statistics for indicators of Inclusive Digital Communication and Skills Development

	N	Minimum	Maximum	Mean	Std. Deviation
DCP8.1	76	3	5	4.63	.512
DCP8.2	76	3	5	4.66	.505
Valid N (listwise)	76				

Cronbach's Alpha: 0.741

The descriptive statistics for the indicators of Inclusive Digital Communication and Skills Development from the workshops show high mean scores, indicating very positive perceptions (see Table 77). Specifically, DCP8.1 has a mean of 4.63 with a standard deviation of 0.512, and DCP8.2 has a mean of 4.66 with a standard deviation of 0.505. The minimum scores for both indicators are 3, and the maximum scores are 5, indicating responses are clustered at the higher end. The overall Cronbach's Alpha is 0.741, suggesting a reasonable level of internal consistency and reliability among the indicators.

Results from online surveys + workshops

Table 78. Descriptive statistics for indicators of Inclusive Digital Communication and Skills Development

	N	Minimum	Maximum	Mean	Std. Deviation
DCP8.1	187	0	5	4.43	.933
DCP8.2	187	0	5	4.44	.880
Valid N (listwise)	187				

Cronbach's Alpha: 0.899

In the combined results from online surveys and workshops, the indicators of Inclusive Digital Communication and Skills Development show high mean scores, though slightly lower than those from the workshops alone (see Table 78). DCP8.1 has a mean of 4.43 with a standard deviation of 0.933, and DCP8.2 has a mean of 4.44 with a standard deviation of 0.880. The minimum and maximum scores range from 0 to 5 for both indicators, reflecting a wider range of variability in responses. The overall Cronbach's Alpha is 0.899, indicating a high level of internal consistency and reliability among the indicators.

8.5.8.2 Results of qualitative data analysis

HEIs should not only focus on teaching students how to use digital technologies, but also on how to communicate inclusively through these platforms. This involves integrating digital skills and inclusivity training across various subjects, thereby providing a more holistic educational experience.

9 Proposal of Self-Evaluation tools for assessing the level of Inclusive Digital Education

9.1 Self-Evaluation Tool for HEI Management

Based on the results of the validation by conducting an online questionnaire and based on the feedback obtained in the framework of the conducted workshops, we prepared the final questionnaire proposal for constructing a self-evaluation tool for HEI management. The questionnaire is designed in English and translated into Spanish, Italian, Portuguese, Slovenian and Turkish. The final form of the questionnaire and translations into individual languages are available in the document **WP2 - Appendix 1. Self-evaluation tool - questionnaire for HEI management**.

9.2 Self-Evaluation Tool for HEI Staff

Based on the results of the validation by conducting an online questionnaire and based on the feedback obtained in the framework of the conducted workshops, we prepared the final questionnaire proposal for constructing a self-evaluation tool for HEI teachers as well.

The questionnaire is designed in English and translated into Spanish, Italian, Portuguese, Slovenian and Turkish. The final form of the questionnaire and translations into individual languages are available in the document **WP2 - Appendix 2. Self-evaluation tool - questionnaire for HEI teachers**.

10 Conclusions

10.1 Teacher's and students' perceptions about inclusive digital education

The results from surveys revealed generally positive perceptions of inclusive digital education among both teachers and students. High average ratings across various indicators, such as Leadership/School's Perspective (LSP), Collaboration and Networking (CAN), Infrastructure and Equipment/Tools and Technology (IET), Pedagogy: Supports and Resources (PSR), and Assessment Practices/Inclusion Assessment (AIA), demonstrate a favorable view of these aspects. The consistently high mean scores, often close to the maximum possible rating of 5, reflect a strong endorsement of the current practices and resources in place. Moreover, the reliability of these indicators is underscored by high Cronbach's Alpha values, which range from 0.863 to 0.981, indicating excellent internal consistency.

Despite the overall positive feedback, there is notable variability in responses. This suggests that while many participants rate the indicators highly, opinions vary, particularly in areas such as Infrastructure and Technology (IET) and Pedagogy: Implementation in the Classroom (PIC). This variability highlights the diverse experiences and perceptions among respondents, pointing to areas where individual satisfaction levels differ.

A key finding from the surveys is the difference in perceptions between teachers and students. Teachers generally rate infrastructure and support systems more positively than students. This disparity suggests that while teachers feel well-supported by the existing infrastructure, students may experience these resources differently, potentially pointing to areas for improvement in student engagement and resource accessibility.

Another significant insight is the gap in awareness regarding support services for students with special educational needs and disabilities (SEND). A considerable portion of students (around 45%) are unaware of whether their institution has a dedicated office for SEND support, compared to 26% of teachers. This gap in awareness underscores the need for better communication and visibility of these support services to ensure that all students can benefit from them.

Perceptions of the impact of SEND offices are mixed. While most teachers and a significant portion of students believe that these offices benefit students, many respondents are unsure of their effectiveness. This uncertainty highlights the need for institutions to improve the visibility and communication of the benefits provided by SEND offices to ensure that both teachers and students are fully aware of and can access the available support.

Overall, the findings from online surveys suggested a strong positive perception of inclusive digital education among both teachers and students. The high ratings for leadership, collaboration, infrastructure, and pedagogy indicate that current practices and resources are well-regarded. However, the variability in responses and gaps in awareness, particularly regarding SEND support, point to areas for further improvement. Institutions should focus on enhancing communication about available resources, increasing the visibility of support services, and ensuring that both teachers and students are aware of and can access the benefits provided. Continued professional development and collaboration will be crucial in maintaining and further improving the positive trends observed in these surveys.

10.2 Refined and validated model for evaluating inclusive digital education

The validation study of factors and indicators for inclusive digital education provided comprehensive results from both workshops and combined online surveys. These findings offered insights into various aspects of digital inclusiveness, encompassing pedagogy, resources, assessment practices, and communication skills. The consistency of responses, indicated by Cronbach's Alpha values, further strengthened the reliability of these measures.

The indicators of Inclusive Digital Resources, assessed in both workshops and combined online surveys, consistently showed high mean scores, suggesting a strong positive perception among participants. For instance, the mean scores for indicators PSR5.1 to PSR5.8 ranged from 4.57 to 4.64 in workshops and slightly lower, from 4.39 to 4.41, in the combined surveys. The standard deviations indicated moderate variability, reflecting a range of experiences among respondents. The Cronbach's Alpha values of 0.788 for workshops and 0.929 for combined surveys demonstrated good to excellent internal consistency, confirming the reliability of these indicators.

In evaluating Pedagogy: Implementation in the Classroom, workshop results revealed high mean scores across all indicators, with values ranging from 4.59 to 4.75, indicating positive perceptions of classroom implementation. The combined surveys also showed favorable mean scores, although slightly lower, with values between 4.47 and 4.59. The variability was moderate, and the Cronbach's Alpha values of 0.869 (workshops) and 0.963 (combined surveys) indicated high internal consistency, suggesting that these indicators were robust measures of classroom pedagogy.

The indicators of Personalized and Engaging Digital Learning also received high ratings, with mean scores from 4.61 to 4.68 in workshops and 4.47 to 4.53 in combined surveys. The moderate standard deviations and Cronbach's Alpha values of 0.729 (workshops) and 0.892 (combined surveys) supported the reliability of these indicators.

For Inclusive Classroom Collaboration and Respectful Environment, workshops showed high mean scores (4.62 to 4.68), while combined surveys reflected slightly lower means (4.54 to 4.59). The standard deviations were moderate, and Cronbach's Alpha values of 0.781 (workshops) and 0.936 (combined surveys) indicated good to excellent reliability.

Enhanced Pedagogical Digital Inclusiveness was another area with high mean scores in workshops (4.59 to 4.75) and combined surveys (4.57 to 4.58). The standard deviations were relatively low, indicating consistent positive perceptions. However, the Cronbach's Alpha of 0.578 in workshops suggested moderate reliability, while the combined surveys' value of 0.857 indicated strong internal consistency.

Assessment Practices/Inclusion Assessment showed high mean scores in both workshops (4.49 to 4.68) and combined surveys (4.23 to 4.43), with moderate standard deviations. The Cronbach's Alpha values of 0.866 (workshops) and 0.940 (combined surveys) demonstrated excellent reliability.

Inclusive Digital Assessment Practices were positively perceived, with high mean scores in workshops (4.59 to 4.63) and slightly lower in combined surveys (4.37 to 4.40). The Cronbach's Alpha values of 0.727 (workshops) and 0.888 (combined surveys) confirmed good reliability.

The indicators for Digital Feedback and Self-Reflection also received favorable ratings, with high mean scores in workshops (4.49 to 4.68) and lower means in combined surveys (4.23 to 4.43). The Cronbach's Alpha values reflected moderate to good internal consistency.

Data-Driven Improvement for Inclusive Digital Learning was well-rated, with high mean scores in both workshops (4.51 to 4.61) and combined surveys (4.37 to 4.43). The Cronbach's Alpha values of 0.853 (workshops) and 0.891 (combined surveys) indicated strong reliability.

Inclusive Digital Communication and Skills Development indicators showed high mean scores in workshops (4.63 to 4.66) and slightly lower in combined surveys (4.43 to 4.44). The Cronbach's Alpha values suggested good to excellent reliability.

The qualitative data analysis complemented these quantitative findings, highlighting key areas for improvement in digital inclusion, such as the need for comprehensive digital literacy, inclusive pedagogy, and diverse assessment methods. Practical challenges in implementing learner-centered teaching due to additional responsibilities on teachers were noted.

Possible limitations of the study included the reliance on self-reported data, which might have introduced bias, and the variability in respondents' understanding of the indicators. Additionally, the differences in Cronbach's Alpha

values between workshops and combined surveys suggested variability in internal consistency that warranted further investigation.

To improve the proposed model of factors and indicators, future studies could enhance the clarity and specificity of the indicators, incorporate a broader range of participant demographics, and employ longitudinal designs to assess changes over time. Moreover, integrating more robust qualitative data collection methods could provide deeper insights into the nuances of digital inclusion in education.

Overall, the combined results from online surveys and workshops provided a comprehensive and reliable assessment of factors and indicators for inclusive digital education, offering valuable insights for policymakers, educators, and researchers striving to create more inclusive and effective digital learning environments.

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