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Identification and Analysis of Factors Impacting e-Inclusion in Higher Education

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Abstract. In this chapter, we investigate the complex process of analyzing and understanding the factors that influence individuals' access to and participation in digital education within the Higher Education context. While the digital transformation in Higher Education Institutions (HEI) has produced numerous benefits for both students and educators, it has also brought forth challenges, particularly for students with special educational needs and disabilities (SEND). A literature review was conducted, to gain insight into the specific requirements of this student demographic. This review aimed to identify the multifaceted factors that impact e-inclusion within Higher Education. Our research resulted in the identification of 24 different factors that should be considered when evaluating e-inclusion within HEI. These factors serve as essential indicators in the assessment of the accessibility and inclusivity of digital education, allowing for a more multifaceted understanding of the dynamics in the Higher Education landscape.

Keywords. Inclusion, Higher Education, accessibility, SEND students

1. Introduction

E-inclusion, or digital inclusion, addresses the challenge of ensuring all individuals have equal opportunities to access and benefit from digital technologies and online resources. When studying the factors impacting e-inclusion in Higher Education Institutions (HEI), researchers and practitioners analyze a range of elements that can either enable or hinder the participation of diverse individuals in digital learning environments. With the introduction of changes in HEI new challenges emerged, especially in the COVID time when the teaching environment moved online. The transformation included adapting both learning materials and teaching methods to the demands of online teaching and learning. During this time, it was crucial to emphasize the importance of including all students, regardless of their obstacles, and creating an environment where all participants had an equal opportunity for success and development in HEI. In many cases this involved adaptations and innovations in the educational process, to enable individuals with different needs to reach their full potential. Although the included changes improved the students' experience and enriched the educational community, and

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contributed to better preparedness for the contemporary world, several issues were raised regarding the inclusion of different students.

One of the goals of this research is to understand and contribute to creating an inclusive digital learning environment that provides equal opportunities for all students to succeed in their educational pursuits, focusing on equality versus equity. Although digitalization in HEI has many positive effects, such as saving time, money, energy, increasing safety and a flexible environment, there are several negative impacts of digitalization, which present obstacles for some students, especially students with different disabilities or special needs. In this research, we have focused mainly on digital accessibility and researched factors, classified in one of the following categories, influencing e-inclusion: Infrastructure and Access, Digital Skills and Literacy, Socioeconomic Factors, Inclusive Pedagogical Approaches, Institutional Policies and Support, Cultural and Social Factors, Student Engagement and Motivation. The infrastructure and access present the availability and quality of technological infrastructure, such as internet connectivity and computing devices, and played a significant role in e-inclusion. Factors like broadband availability, affordability, and reliable access to devices can influence a student's ability to engage in online learning. Digital skills, literacy and proficiency in using digital technologies are also crucial for effective participation in e-learning. Assessing the digital skills and literacy levels of students and understanding gaps or barriers they face can help identify strategies to enhance their competence and confidence in using digital tools. Socioeconomic factors are also important in impacting e-inclusion. Students from low-income backgrounds face financial constraints in accessing the necessary technology and Internet services, and understanding those factors can guide the development of targeted support programs. Inclusive pedagogical approaches influence the design and delivery of online courses, which play a role in promoting e-inclusion. Pedagogical strategies that consider diverse learning styles, accessibility requirements, and multiple modes of engagement, can contribute to a more inclusive online learning environment. Institutional policies, practices, and support mechanisms also influence e-inclusion significantly. This includes policies related to digital accessibility, student support services, training programs for HEI, and the delivery of assistive technologies for students with disabilities. Cultural and social factors, such as cultural norms, social expectations, and individual attitudes toward technology, also impact e-inclusion. It is essential to consider cultural diversity and social dynamics within HEI to ensure access and participation in digital learning. Student engagement and motivation affects student success crucially in online learning. Identifying strategies to enhance students' interest, interaction, and sense of belonging in digital learning environments can contribute to their e-inclusion. By analyzing these factors and their interactions, policymakers, educators, and institutions can develop strategies and interventions to promote e-inclusion in Higher Education.

The main aim of the research is to understand which factors influence inclusive digital capabilities in HEI, to enable equal educational opportunities for all students, especially students with special needs (SEND). The foundation of this study is built upon the Technological Pedagogical Content Knowledge (TPACK) framework, a framework for teachers to effectively integrate technology into their teaching, combining knowledge of technology, pedagogy (teaching methods), and subject matter expertise (content knowledge). Therefore our research is based on three essential domains [11]: Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). TK refers to an understanding of the various digital tools, technologies, and resources available for educational purposes. PK includes the understanding of effective

teaching methods, strategies, and approaches. It encompasses the knowledge of instructional techniques, classroom management, assessment practices, and student engagement strategies. CK relates to a deep understanding of the subject matter being taught. It involves expertise in the specific content area, including key concepts, theories, principles, and methodologies [11]. By integrating the domains TK, PK, and CK, educators can design and deliver instruction effectively that optimizes the use of technology to support learning objectives. Through the TPACK framework, this study explores and identifies factors, good practices, and challenges that contribute to successful digital inclusion in Higher Education, ultimately promoting effective and inclusive integration of technology in teaching and learning processes.

2. Method

This research employed a systematic approach to identify relevant factors for digital inclusion in HEI, focusing on accessible education for students, including SEND students. 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 was considered, published from 2017 onwards.

A total of 133 papers were identified through this process. From the identified papers, 206 factors were recognized as contributing to digital inclusion in Higher Education, although 24 distinct factors were extracted after analysis and classification. The screening of the literature, which involved the efforts of all the authors, led to the identification of 87 good practices that have shown positive outcomes in promoting digital inclusion. Additionally, 63 challenges were extracted from the literature, representing the obstacles and barriers that need to be addressed to enhance digital inclusion. By employing this methodology and considering a wide range of sources, this research provides a foundation for understanding the factors, good practices, and challenges related to digital inclusion in Higher Education.

3. Identification of good practices and challenges

A total of 87 good practices were identified throughout the research process. In the first cycle 30 best practices were extracted, based on their recurring mentions in the literature. Each of these practices was highlighted at least once in the reviewed sources, indicating their presence in the context of digital inclusion. Subsequently, in the second cycle, a more rigorous criterion, excluding papers, which did not address e-inclusion within their contents, was applied, to narrow down the selection further. Out of the 30 identified best practices, 16 practices stood out as particularly impactful, as they were identified consistently 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, providing a basis for the identified factors: Variety in Content Presentation, Modern Teaching Methods, Structured Lectures, Practical Examples, Extended Time, Assistive Technologies, Small Groups, Self-Monitoring, Low Physical Effort, Positive Personal

Relationships, Positive Group Relationships, Peer Integration, Structured Feedback, University Regulations, Shared Responsibility and Adapted Learning. However, from the same identified body of research, we also identified 63 challenges for SEND students, from which 6 groups of challenges were extracted, as presented in **Table 1**.

Table 1. Challenges

Challenge	Description
One solution does not fit all	An individual problem needs an individual solution, and there is no one general solution (Blind learners, Deaf learners, Autism, Dyslexia, Muscular dystrophy, Chronic fatigue all have different needs).
Some solutions just do not work	Researchers advise to repeat the content, however, sometimes the content is being repeated too often and it causes dullness. It is also advised to provide everything online (in advance even). However, that can cause dependence on the online platform, and have a negative influence.
Professors mean well but overdo it	Combining several sensory inputs to make the class more diverse and interesting can be discomforting. PowerPoint is often used inefficiently, accessible word processing and presentation styles are not always included, in addition to unreadable graphs, drawings and non-structured Word documents. Also, if HEI provides too much help it has a negative impact, as students may feel their disability was more prominent, and they perceived a strong emphasis on their weaknesses rather than on their strengths.
Social environment	An unfriendly atmosphere, compulsory class attendance, crowded classrooms, and large lecture halls can have a negative effect. In many cases, peers don't know how to communicate with SEND students, increasing the negative environment.
Physical environment	Not adapted infrastructure and existing facilities which have difficulties in accommodating SEND students using a wheelchair, in addition to impracticalities such as cables on the floor and ergonomic barriers (acoustics, furniture, etc.).
Personal issues of students	Loneliness and fear of not knowing how to act in classrooms, hesitation when asking questions in class or conversing with other students. Poor concentration and organizational skills, and becoming overwhelmed by the volume of work also contributes to barriers in HEI, causing SEND students to be segregated from "regular school classes" and "mainstream school programs".

4. Identification of factors

The primary outcome of this study is the development of a list of the factors influencing inclusive digital education. This list incorporates extended essential elements from the TPACK framework [11]. As part of the research process, analysis resulted in the identification of 24 factors that influence digital inclusion in education. To enhance the clarity and positive direction 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 understanding, similar factors were categorized together, based on their common characteristics: student's perspective, teacher's perspective, school`s perspective, pedagogic approach, external environment and tools and technology. By integrating these components a general perspective on the effective

integration of technology in educational settings is provided, while promoting inclusivity. This categorization also allows a clearer overview of the factors influencing digital inclusion. Additionally, the identified best practices and barriers were integrated into the definition and description of the identified factors, presented in the following sections. This integration ensures that the list of factors not only acknowledges the existing barriers, but also offers practical guidance and strategies to overcome them.

4.1. Student's perspective

In the student's perspective category, two main factors were identified, F1 and F2, presented in the **Table 2**.

Table 2. Factors in a student's perspective

Factor	Points in this category
F1 Digital literacy	Student learning in digital education, including digital skills and literacy training, access to devices and software, students' tech proficiency, and device reliability. Infrastructure challenges like limited network access and assistive technology also play a role. Students with disabilities face specific challenges, such as the absence of sign language interpreters and difficulties with screen readers. These limitations can hinder student participation in the curriculum and limit access to the necessary support [1][2][12].
F2 Student's motivation	Emphasizes educational strategies to boost learner motivation and engagement. It also highlights the significance of communication skills, organization, and self-awareness, particularly in terms of seeking support from Disability Team staff. The participants' mind-set is identified as a crucial factor [3][4][5][9].

4.2. Teacher's perspective

In the teacher's perspective category, three main factors were identified, F3, F4 and F5, presented in **Table 3**.

Table 3. Factors in a teacher's perspective

Factor	Points in this category
F3 Teacher's ethics	Addresses critical aspects of teachers' attitudes in education, including their ethical compass concerning a rigid curriculum and the impact of teacher attitudes on teaching, the importance of positive attitudes towards inclusive education and high expectations for SEND students, which correlate with teachers' readiness to provide appropriate support [2][4][13].
F4 Teacher's motivation	Explores teacher development, focusing on their motivation and self-regulation in teaching, highlighting the positive impact of the participants' awareness of SEND students, which increased their motivation for teaching and emphasized the need for training in disability and inclusive education [5][6].
F5 Teacher's knowledge	Provides key insights into effective teaching practices and teacher attitudes. Teachers with high self-efficacy employ student-centered strategies that prioritize flexibility, responsiveness, and student success, fostering self-regulation. It also highlights a lack of awareness and skills in assistive technology (AT) among educators. Additionally, it underscores the role of continuous learning in teaching [2][7][8][14].

4.3. School's perspective

In the teacher's perspective category, five main factors were identified, F6, F7, F8, F9 and F10, as presented in **Table 4**.

Table 4. Factors in a school's perspective

Factor	Points in this category
F6 Collaboration and communication encouragement	Emphasizes the importance of collaboration between teachers and schools, highlighting its essential role in education. It also stresses the need for increased collaboration between schools, parents, and vulnerable learners to protect SEND students from violence. These points revolve around schools' efforts to promote collaboration, engage parents and caregivers, and ensure all voices, including students, teachers, parents, and school administration [15][16].
F7 Curriculum flexibility	Discusses essential supports and instructional strategies for SEND students. These include curriculum modifications, structural adjustments, assessment accommodations, and instructional methods like cooperative learning and universal design for learning. The school plays a vital role in providing these supports, such as offering flexible curriculum options, adapting settings, and granting extra time for students with extensive needs [2].
F8 Training and education on inclusiveness	Highlights the impact of training on instructors' willingness to support SEND students. Teaching methodology and awareness-raising training are linked to higher willingness. Specialized courses boost instructors' willingness to provide accommodations. It stresses the importance of school-based personnel having the skills to offer individualized support, and emphasizes the need for ongoing skill development. Additionally, it highlights desirable instructor attitudes, such as receptiveness to feedback, being firm, fair, and motivating [2][8].
F9 Leadership and support	Emphasizes the critical role of school leadership in shaping the perception of digital accessibility within an organization. It highlights the leadership's attitude toward interactions with students, the institution's desired image, and the importance of school support in staff education [16].
F10 Clear policy	Addresses the necessity of a well-defined university-level policy to accommodate students with disabilities effectively by addressing digital technologies, support services, and resource allocation. It also emphasizes the importance of a school's inclusion policy focused on accommodating students with special needs and the commitment to creating an unbiased, diverse, and inclusive environment, along with the corresponding actions to achieve this goal [12].

4.4. Pedagogic approach

In the pedagogic approach perspective category, six main factors were identified, F11, F12, F13, F14, F15 and F16, as presented in **Table 5**.

Table 5. Factors in a pedagogic approach perspective

Factor	Points in this category
F11 Flexibility	Addresses the value of flexible strategies for SEND students, and highlights the benefits of flexible grouping and cooperative peer learning to provide necessary support and foster collaboration among students. Furthermore, implementing diverse instructional and assessment options through Universal Design for Learning (UDL) ensures curriculum access for all students, accommodating various learning styles [9][10][5].

F12 Personalization	Highlights the use of individual educational plans for students with special needs, addressing various learning backgrounds, prerequisites, and adaptive instructions. It also emphasizes the importance of understanding students' diverse needs, the flexibility of creating individual plans at the beginning of the academic year, and the possibility of making accommodations as the year progresses. Additionally, the factor underscores the significance of involving students in the planning process, considering their feedback for a tailored approach [17][18].
F13 Modern pedagogical approaches	Discusses various pedagogical approaches and practices for delivering study content, including peer tutoring, cooperative teaching, video instruction, lecture methods, online and hybrid instruction. It also mentions strategies like providing lecture outlines and notes, engaging students visually, using teaching aids and technology, and enhancing lectures with appealing study extensions. Additionally, it acknowledges the effectiveness of Social Stories as a learning tool [19].
F14 Feedback	Addresses various aspects of feedback in education, including self-testing, progress checkers, and the importance of the student voice. It also highlights different feedback channels, such as professor-to-student feedback, student-to-student feedback, and feedback from students to professors. Additionally, it emphasizes the mechanisms that enable anonymous feedback from students [20][21].
F15 Consistency	Emphasizes the significance of consistency in various aspects of education, including lecture structure, school organization and feedback provision, access to student work, and clear, written expectations from students [22].
F16 Motivation	Emphasizes the importance of consistency and coherence in education, while advocating for clear accessibility processes to enhance product development efficiency. It also recognizes that inconsistent support can limit curriculum access. Furthermore, it discusses the value of motivational techniques, such as gamification in engaging students based on their interests and needs [3][16][22][23].

4.5. External environment

In the external environment category, three main factors were identified, F17, F18 and F19, as presented in **Table 6**.

Table 6. Factors in an external environment

Factor	Points in this category
F17 Government	Highlights the absence of governmental support, effective legislation, and educational policies, as well as the lack of interventions to promote inclusive practices in education [27].
F18 Peers	Discusses the importance of fostering welcoming environments through strategies like peer support. It also highlights the significance of student-student interactions for socialization and learning purposes, emphasizing the integration of students with special needs into working groups without making it mandatory [23][21].
F19 Caregivers and parents support	Recognizes caregivers as crucial in planning for the successful inclusion of students with extensive support needs, as per IDEIA. It emphasizes the importance of providing a platform to encourage family and caregiver support in students' educational activities [2].

4.6. Tools and technology

In the tools and technology category, five main factors were identified, F20, F21, F22, F23 and F24, as presented in **Table 7**.

Table 7. Tools and technology domain

Factor	Points in this category
F20 Assistive Technology access	Identifies access to assistive technology (AT) as crucial for the full participation of individuals with disabilities in various educational and community settings. This category addresses the importance of adapted and accessible equipment, the lack of such equipment, and the various types of AT that can enhance the learning experience for individuals with disabilities [2][23].
F21 Infrastructure and physical environment	Identifies the need for various accessibility tools, such as sign language interpreters and hearing aid-compatible systems. It also highlights issues related to improper facilities, classroom size, and unwelcoming environments, emphasizing the importance of appropriate classroom conditions for inclusive education [19][23][25][26].
F22 Developing new ICT tools and new ways of using them	Addresses the importance of research and development in the field of ICT, emphasizing the need for exploring new ways of using ICT and developing new tools. It highlights the involvement of various stakeholders, including people with disabilities, and the significance of partnerships and collaboration to support innovative practices in education and technology [27].
F23 Inclusion assessment	Addresses the lack of agreed-upon criteria and tools to measure the efficiency of inclusion in education. It emphasizes the need for criteria and tools for evaluating inclusion at both the teacher and school levels [24].
F24 Periodical assessment	Highlights the importance of establishing a schedule for inclusion assessment, defining key performance indicators, and creating an inclusion index to monitor progress and effectiveness in inclusion efforts [23].

5. Conclusion

The research focuses on identifying factors, good practices, and challenges related to digital inclusion in HEI. The main research method was a literature review, where the key emphasis was to identify factors influencing the creation of an inclusive digital education environment, including accessible digital content and the availability of inclusive technologies. The literature review was performed by several researchers on different digital libraries. The research activities resulted in 16 good practices, 6 main barriers and 24 factors, which were categorized based on their characteristics: Student's perspective, Teacher's perspective, School`s perspective, Pedagogic approach, External environment and Tools and technology.

To provide a more complete framework for advancing digital inclusion in educational settings, it is crucial to refine and expand the identified factors further. The future research will focus on selecting and validating the most impactful factors using methods such as surveys and workshops. This selection process will involve a thorough analysis of factors and a comprehensive exploration of their impact on e-inclusion in HEI. In addition to incorporating insights from TPACK [11], which is a framework used in the field of education to describe the knowledge and skills that teachers need to effectively integrate technology into their teaching practices, other existing frameworks

will also be used, such as SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies) [28][29] and the Index for inclusion [30][31]. The final objective is establishing a set of comprehensive factors that can be utilized to evaluate inclusion in different Higher Education Institutions.

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