





ARTICLE



<https://doi.org/10.1057/s41599-024-03417-3>

OPEN

Co-designing inclusive excellence in higher education: Students' and teachers' perspectives on the ideal online learning environment using the I-TPACK model

Liesbet Saenen ¹, Katrien Hermans¹, Maristela Do Nascimento Rocha¹, Katrien Struyven ¹ & Elke Emmers¹

Online education remains challenging for many institutions of higher education (HE). COVID-19 lockdowns have demonstrated inequalities, underlining the need for more study on its effects on access and engagement. The recent I-TPACK model enables teachers to utilize technological resources to meet diverse learning needs, improve accessibility, and create engaging learning experiences for all students. Online inclusive learning environments (LEs) necessitate a comprehensive understanding of teacher and student needs and perspectives within HE, a level of education that is currently understudied. Moreover, in inclusive and online education, their voices are underrepresented in research and policy discussions, despite their importance. This study aims to investigate how teachers and students in HE articulate their preferred inclusive online LE and therefore adopted a qualitative research approach including homogeneous focus groups, directed by the I-TPACK model. Results present students' and teachers' key elements and conditions of an inclusive online LE. However, there is little preparation and common language on how to implement them. Online LEs' inclusion potential is still underappreciated. This research provides policy suggestions closely aligned with practical application and highlights the necessity of venturing beyond the comfort zone exploring inclusive online practices, as presented by the I-TPACK model.

¹U-RISE Hasselt University Research on Innovative and Society-engaged Education Hasselt University - Martelarenlaan 42, 3500 Hasselt, Belgium.
email: liesbet.saenen@uhasselt.be

Introduction

An inclusive society relies on inclusive education to promote acceptance and equal opportunities for all students, including those with disabilities (Yongo, 2023). Education promotes development, reduces economic inequality, and fosters societal inclusivity (OECD, 2017). As people seek better jobs, mental health, and economic success, the global higher education (HE) student population is growing and diversifying (de Vries, 2014; OECD, 2017).

The aspirations of inclusive education have been the focus of significant policy efforts, however, a persistent gap exists between these ideals and their actual implementation (Amor et al. 2019; EACEA, 2022; Emmers et al. 2023; Florian, 2008; Haug, 2017). European legislation related to inclusion and diversity policies in universities and colleges, are often inadequately implemented as noted by Emmers et al. (2023) and the Eurydice report, emphasizing the necessity for enhanced equality and inclusion in HE institutions in Flanders, the focus region of the present study (EACEA, 2022). The issue permeates educational practice, making it challenging to find suitable tools (Magnússon, 2019; Nilholm, 2006). Teachers struggle to define inclusive education and find a common language, highlighting the need for more culture-specific research on inclusion to assist teachers in defining and implementing inclusive practices that are effective and contextually relevant (Emmers et al. 2023; Krischler et al. 2019). This makes inclusive HE guidelines hard to develop and policymaking uncertain. Moreover, HE has been less studied compared to other educational levels, and inclusive online learning is no exception to that (Beaton et al. 2021; Nørgård, 2021).

Research on the development of inclusive LEs e.g., based on frameworks such as Universal Design (UD), remains scarce in HE setting, but it does demonstrate potential in addressing the needs of all students, including improved academic outcomes and social integration (Boothe et al. 2018; Espada-Chavarria et al. 2023). However, numerous challenges hinder their effective implementation, especially in the context of online education (Castaño et al. 2018; Doeven-Eggens et al. 2008; Hilbert et al. 2010; Marinoni et al. 2020; OECD, 2021; Woodley and Simpson, 2014). These challenges include technological barriers, varying levels of digital literacy among students and teachers, and the lack of appropriate pedagogical strategies tailored for diverse online classrooms. Despite the introduction of frameworks like the I-TPACK model, which aims to integrate inclusive practices within technological and pedagogical approaches, substantial barriers to creating truly inclusive online learning environments (LEs) remain (de Vries, 2014; Dursun et al. 2021; Hassanein, 2015; Mishra and Koehler, 2006; Slooman et al. 2023).

The gap between the theoretical ideals of inclusive education and its practical implementation is exacerbated by the lack of empirical data on the perspectives of teachers and students in HE (Beaton et al. 2021; EACEA, 2022; Fullan, 2015; Nørgård, 2021), which are critical for designing and implementing effective inclusive online strategies. Without a comprehensive understanding of these perspectives, efforts to enhance inclusivity in online LEs may remain ineffective. This study addresses the urgent need to understand teachers' and students' perceptions of the ideal online LE, encompassing both academic and social aspects, as well as their aspirations and goals for achieving inclusivity. By exploring these comprehensive perspectives, the present study aims to guide future policies and practices in HE.

Theoretical framework

Dynamics of inclusive education in Higher Education. Understanding the complexity of inclusive education is enhanced by Göransson and Nilholm's (2014) model, which shows how

different implementation levels significantly impact its outcomes. The definition of an inclusive LE as presented by Göransson and Nilholm (2014), an environment where accommodations and support are available to meet the diverse social and academic needs of ALL learners, without requiring specific identification or labelling of students, also forms the basis for the inclusive LE pursued by the present study, which they refer to as the 'General Individualized Definition'. Inclusion in the online LE is the act of ensuring that education, with the help of digital resources, is accessible to all individuals (Slooman et al. 2023). Molina Roldán et al. (2021) found that inclusive LEs benefit all students, regardless of educational needs. Therefore, in the present study, inclusive education refers to providing high-quality education to all students, regardless of whether they are (temporarily) underserved or not. This definition encompasses diversity in factors such as gender, sexual orientation, identity, learning ability, age, family status, disability, culture, religion, skin colour, origin, and socio-economic background. Inclusive education constantly addresses barriers to all students' presence, participation, and success (Ainscow et al. 2006; Barton, 1997; UNICEF, 2014). Teacher skills and attitudes, infrastructure, pedagogical strategies, and the curriculum can help or hinder inclusive LE practises (UNESCO, 2017). According to Hassanein (2015), these barriers fall into three categories: teacher-related (e.g. negative attitudes and beliefs), institutional (e.g. resource availability), and societal (e.g. culture).

Barriers and challenges of inclusive online learning environments. Due to new technology and tools, LE boundaries are blurring. Pathak and Palvia (2021) show that learning in offline and online settings ranges from fully offline classrooms to fully online education and everything in between. They divide HE delivery modes into four quadrants: face-to-face (in-class or online synchronous), hybrid (in-class and online asynchronous, online synchronous and online asynchronous), online traditional (MOOCs, self-paced), and HyFlex. Each has different cost and time efficiency for different student populations, learning styles, curriculum needs, and teaching pedagogies. The present study uses the term 'online LE' to encompass the diversity of learning modalities, technological proficiency, and digital resource access among participants.

COVID-19 prompted research on the impact of online LE on HE students' (Ali, 2020; Aristovnik et al. 2020; Barrot et al. 2021; Neuwirth et al. 2021; Pokhrel and Chhetri, 2021; Rashid and Yadav, 2020). Pathak and Palvia's (2021) research highlights a digital divide in both fully and partially online learning, particularly in addressing diverse learning needs. Despite advances in information and communication technology (ICT), several studies argue that students with disabilities, older students, and socioeconomic and cultural factors affect access to technology, widening the gap between users and causing students to miss out on potential benefits (Hilbert et al. 2010; Marinoni et al. 2020; OECD, 2021; Ragnedda et al. 2018).

Online LEs provide access, flexibility, and autonomy for underserved students, but may also decrease social support, interaction, and well-being (Castaño et al. 2018; Doeven-Eggens et al. 2008; Kohnke and Moorhouse, 2021; Meydanlioglu and Arikani, 2014). Online students have lower completion rates due to time management issues, unrealistic expectations, and a belief that their value is being diminished by the institution (Brown et al. 2015; Mallman and Lee, 2016). According to Farrell and Brunton (2020), online learners therefore need engaging teachers to rethink their teaching (Kohnke and Moorhouse, 2021). LEs require instructional designs that emphasize community,

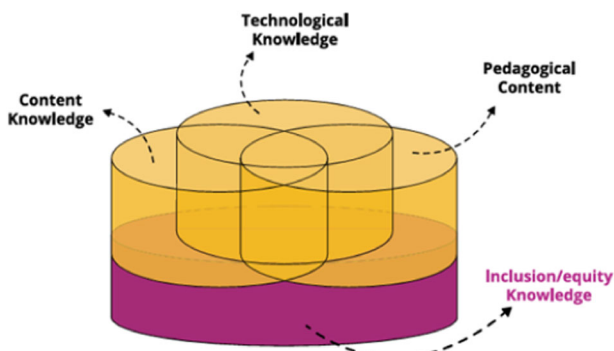


Fig. 1 Schematic representation of the I-TPACK model in the context of inclusive online LEs. Reproduced from A handbook of e-inclusion: Building capacity for inclusive higher education in digital environments, by Slooman et al. 2023, p.28.

participation, and social presence (Farrell and Brunton, 2020; Peacock et al. 2020; Thomas et al. 2014) and unique pedagogy and didactical approaches (Aristovnik et al. 2020; Graffy, 2021). Non-digital-native teachers may find this challenging and Barrot et al. (2021) show that teachers and students struggle with course flexibility. According to Damşa et al. (2021), Meydanlioglu and Arikani (2014), and Wiesenbergl and Stacey (2008) many teachers anticipate increased online flexibility and try to bring their traditional methods online to save time, energy, and workload.

The lack of competence among teachers to meet the needs of increasingly diverse and growing student populations worldwide (de Vries, 2014; OECD, 2017) within evolving online educational modalities exacerbates the challenges associated with diverse LEs. This contributes to teachers' reluctance to take proactive measures, as shown in studies by Dursun et al. (2021) and Pulinx et al. (2021). Moreover, Prinsloo and Van Deventer (2017) found that HE institutions are slow to adopt new technologies, including online platforms, even years after the internet's inception. These tendencies, coupled with the potential absence of urgency conveyed by institutional policies, contribute to the current challenge of implementing an inclusive online LE.

Designing and implementing inclusive online learning environments in Higher Education. To tackle digital inequality, research has delved into optimizing the online LE. Various models, such as the TPACK model (Mishra and Koehler, 2006), Universal Design for Learning (UDL) (Rose and Meyer, 2002), and Community of Inquiry Framework (CoI) (Garrison et al. 2010), offer insights for shaping inclusive online LEs. While the TPACK model guides the integration of technological, pedagogical, and content knowledge into learning, UDL focuses on accessibility and differentiation, and the CoI framework emphasizes meaningful online interaction. These models provide complementary perspectives and approaches alongside the recent I-TPACK model, which provides a framework for establishing effective online LE's, ensuring each student has the opportunity to engage and learn, irrespective of their background or needs (Slooman et al. 2023).

The I-TPACK model adds an 'I' dimension to the original TPACK model (Mishra and Koehler, 2006) and integrates technology, pedagogy, content, and inclusion. The I-TPACK model's inclusion domain emphasizes the importance of understanding inclusion and exclusion in shaping LE and student outcomes (Slooman et al. 2023). The inclusion dimension includes teachers' awareness of inclusion and exclusion criteria, their position, student barriers, collaboration,

and learning content diversity. Recognizing that teachers and educational systems' values, attitudes, and societal norms affect teaching is crucial. Thus, inclusive education requires self-reflection, openness to learning, and awareness of how practices can perpetuate or challenge inequalities (Nilholm, 2006; Slooman et al. 2023). According to the I-TPACK model, curriculum design and instructional delivery must be inclusive to ensure equitable access to education and meaningful learning experiences for all students. This integrated approach provides a holistic framework for designing inclusive online LEs in HE presented in Fig. 1.

The I-TPACK model identifies six interrelated guidelines for inclusive online LEs based on literature and empirical research (Slooman et al. 2023). First, teachers should (1) 'Develop awareness and practice self-reflection' to improve understanding of inclusive digital education and their own positionality, fostering openness, curiosity, and vulnerability. Second, teachers should (2) 'Get to know and adapt to the needs of students' by identifying their aspirations, talents, and digital barriers, learning about diverse backgrounds and needs, and adapting their teaching methods to ensure inclusivity and engagement for all students. Third, teachers should (3) 'Diversify pedagogical practices and ensure accessibility' by providing perceivable, operable, understandable, and robust materials and assignments, lowering digital barriers, offering flexible learning activities and assessment methods, and setting holistic learning goals to accommodate diverse student needs and Fourth, teachers should (4) 'Diversify content' by using the internet and digital tools to access diverse knowledge sources, including multiple perspectives, personal experiences, and inclusive resources that are relevant and accessible to all students. Fifth, teachers should (5) 'Create an inclusive digital learning climate' that promotes student agency, active participation, diverse engagement, and inclusive communication while embracing discomfort and vulnerability as learning opportunities. Finally, teachers should (6) 'Collaborate with organizational allies' to promote personal development, shared goals, and inclusive practices by seeking support from colleagues and HE institutions. The six interrelated guidelines provide teachers with a roadmap for inclusive online LE.

Research objectives and questions. There is limited research on inclusive practices in HE, including online components, despite their importance (Beaton et al. 2021; Nørgård, 2021). The relatively new introduction of online education in many HE institutions emphasizes the need for further research into how online LEs affect HE accessibility and engagement (Slooman et al. 2023). The latest Eurydice report urges policymakers to address this issue immediately (EACEA, 2022).

Curriculum changes put teachers under pressure (Jonker et al. 2020). Despite their limited space, they are often held accountable for curricular innovations. Multiple studies (Ainscow and Sandill, 2010; EACEA, 2022; Krischler et al. 2019; UNESCO, 2005, 2017) show that inclusive online LE and a comprehensive understanding of inclusion require teachers and students' voices. Students' and teachers' perspectives are often ignored in educational research and policy (EACEA, 2022; Fullan, 2015). Limited information exists on their understanding of inclusion and how they characterize inclusive online LEs.

This study aims to capture the valuable experiences and insights of these key stakeholders, namely students and teachers, with the primary objective of informing future policies in their pursuit of fostering more inclusive online HE. The following research question was addressed: How do university students and teachers characterize their ideal, inclusive online LE?

Table 1 Participant characteristics and numbers in the overall sample and the focus group sample.

Characteristics	Stratified Probability sample		FG sample		Stratified probability sample		FG sample	
	N	%	n	%	N	%	n	%
	Teachers				Students			
Gender								
Male	30	50	8	32	30	50	4	33.3
Female	30	50	17	68	30	50	8	66.7
Faculty								
Architecture and Arts (+educational studies ^a)	6	10	4	16	6	10	1	8.3
Medicine and life sciences (+educational studies ^a)	6	10	3	12	6	10	3	25
Industrial Engineering Sciences	6	10	7	28	6	10	1	8.3
Rehabilitation Sciences	6	10	7	28	6	10	0	0
Educational Studies	6	10	2	8	6	10	0 ^a	0 ^a
Social Sciences	6	10	1	4	6	10	0	0
Law	6	10	0	0	6	10	1	8.3
Mobility Sciences	6	10	0	0	6	10	1	8.3
Business Economics (+educational studies ^a)	6	10	0	0	6	10	3	25
Sciences (+educational studies ^a)	6	10	1	4	6	10	2	16.6
Total	60	50	25	67.6	60	50	12	32.4

This table provides an overview of participant demographics, including numerical representations and percentages in both the stratified sample in the focus group sample.
^a Students ($n = 6$) from the educational master program were counted within the faculty corresponding to their major specialization.

Methodology

Homogeneous focus groups (FGs) with HE teachers and students were used to conduct a qualitative, exploratory study to better understand participants' experiences and expectations of an inclusive online LE.

FGs help co-construct knowledge, evaluate opinions, interpret culture, and change perspectives (Coe et al. 2021; Halcomb et al. 2007). They help explain contradictions between stated intentions and actions (Coe et al. 2021). In this study, FGs allow participants to share their online LE inclusivity experiences, concerns, and beliefs, providing valuable insights. Discussions about online learning, diversity, equality, and accessibility can help participants understand inclusivity and identify essential elements of an inclusive online LE.

The 32-item Consolidated Criteria for Reporting Qualitative Research checklist was used to report the study to ensure transparency, reliability, and reproducibility (Tong et al. 2007).

Participants. A balanced representation through stratified sampling was ensured, considering gender balance and the inclusion of participants from all 10 university faculties: Architecture and Arts, Medicine and Life Sciences, Industrial Engineering Sciences, Rehabilitation Sciences, Educational Studies, Social Sciences, Law, Sciences, Mobility Sciences, and the Faculty of Business Economics. Including all faculties aimed to provide diversity in the sample enhancing the transferability of the results across various academic disciplines. A staff member facilitated a random selection procedure to generate a comprehensive mailing list comprising 60 teachers and 60 students from both undergraduate and graduate years. A total of 29 teachers and 18 students expressed interest in participating. Eventually, 25 teachers and 12 students were successfully scheduled for predetermined dates.

Focus groups and instruments. The co-creative FGs took place from March to May 2023. Three homogeneous FGs involving teachers were held in addition to two FGs with students at the university campus. The groups consisted of 6 to 8 participants. Participant characteristics are detailed in Table 1.

The FGs used mind mapping as a systematic data collection technique to promote creative thinking and collaboration, while information could be displayed graphically and clearly, incorporating multiple points of view and creating a comprehensive picture (Gouwens and Dols, 2018). As shown in Fig. 2 participants were provided with a mind map structure to support their discussions but were encouraged to make adjustments and engage flexibly with the structure.

The I-TPACK model mainly guided the mind map on inclusive online education at micro and meso levels in HE (Slootman et al. 2023). Influential themes and variables were also drawn from studies such as Schneider and Preckel (2017) on HE achievement, Tinto and Engle's (2008) strategies for overcoming barriers and improving degree attainment, and the identity-affirming and social fair strategies from Tuitt et al. (2018). The focus of the mind map on teaching practices, curriculum, and community building was established through these studies. The why question is essential because fundamentally effective change and dialogue depend on understanding each other's perspectives and concerns, as repeatedly stated in the literature (Ainscow and Sandill, 2010; European Agency for Special Needs and Inclusive Education, 2022; Krischler et al. 2019; UNESCO, 2005; UNIA, 2019). An in-depth analysis of who is being talked about and the roles and responsibilities of both teachers and students was included to better understand similar expectations and insights. This analysis aimed to explore the conditions and concerns necessary for creating an inclusive LE, as recommended by several studies (Danowitz and Tuitt, 2011; Fullan, 2015; Sahli Lozano et al. 2022; Tuitt et al. 2018; UNIA, 2019).

Prior to the FGs, the methodology was validated and adjusted through a pilot study. During this pilot study, the mind map was refined and tested, assessing the relevance and clarity of specific themes and categories. The spatial requirements and optimization of audio equipment were determined to ensure an optimal environment for the FGs. Based on feedback from the pilot study, the FG guideline was modified to encourage idea sharing. This included adjustments in questioning and moderation techniques to facilitate more open and in-depth discussions. To conclude the FGs, a question was added about the key take-away messages.

The first author facilitated the FG ensuring everyone had the opportunity to speak freely, and managed time and infrastructure.

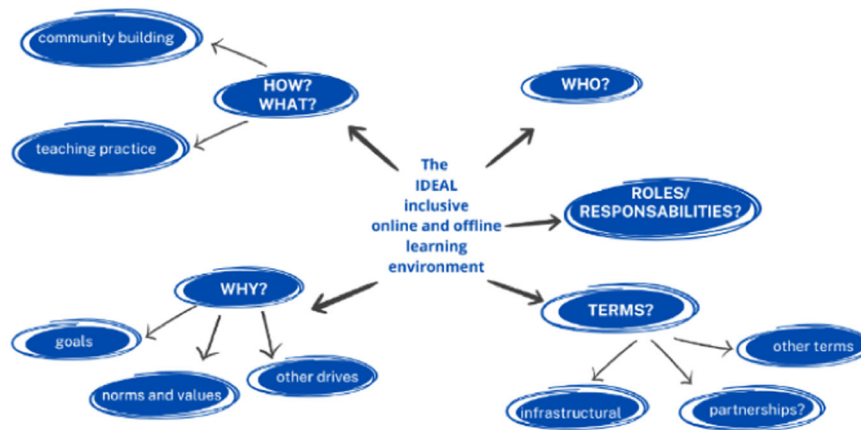


Fig. 2 Mind map designed and used as an FG instrument to facilitate discussions on co-creating the ideal inclusive online LE in HE.

The concept of Appreciative Inquiry was respected, and thus, open questions were posed to emphasize positive thoughts and possibilities rather than shortcomings. The semi-structured FG guideline included stimulating introductory exercises aimed at prompting participants to reflect on their personal experiences with recognition and invisibility and to draw parallels between their own experiences and those of others. Participants were then asked, in pairs, to design an ideal, inclusive LE, encouraging them to think outside the box and explore their deepest desires and aspirations for the future state of education. This exercise was followed by a plenary session where the designs were discussed and integrated into a collective model. A challenging round ensued, presenting realistic scenarios to test the feasibility and universality of the design, with particular attention to the inclusion of diverse student populations. This round aimed to explore how well the design would work for different students, including those with specific needs and backgrounds. Finally, the FGs concluded with a reflective exercise where participants could share and discuss their experiences and ideas from the session. Through this structured approach, valuable insights were gathered on the expectations, challenges, and needs regarding online/offline inclusive LEs in HE, providing a solid foundation for further analysis and policy development.

Each focus group session lasted three hours until data saturation was reached. The recorded focus group discussions were transcribed verbatim. Selected quotes from the Dutch transcripts were translated into English using DeepL to ensure linguistic accuracy and fidelity to participants' expressions. This translation process was carefully monitored to capture the essence and nuances of their original statements accurately.

Data analysis. Thematic data analysis, as proposed by Braun and Clarke (2022), was chosen for its suitability in combining deductive and inductive approaches in qualitative research. Using a reflexive thematic analysis approach guided by the I-TPACK framework, the study aimed to uncover the diverse realities within inclusive online LEs as perceived by teachers and students. This approach focuses on exploring multiple meanings while emphasizing subjectivity and reflexivity, as advocated by Braun and Clarke (2022).

Thematic data analysis using NVIVO14 was performed for data analysis on the transcriptions and notes made by the participants. FG data informed the thematic analysis and through iterative coding, data were organized and subsequently presented reflecting the different guidelines of the I-TPACK framework. This flexible analytic process consisted of six phases: (1) dataset familiarization, (2) data coding guided by the 6 principles of the I-TPACK model, (3) initial theme generation, (4) theme

development and review, (5) theme defining and naming, and (6) writing up (Braun and Clarke, 2022).

Results

This study examined how teachers and students applied the I-TPACK guidelines in answering the research question 'How do university students and teachers characterize their ideal, inclusive online LE?'. The qualitative results showed their perspectives, expectations, and challenges in providing an inclusive online LE. The findings follow I-TPACK guidelines and show how each component affects online LE inclusivity.

Awareness and self-reflection

Uncertainty regarding inclusive measures. Almost three-quarters of all teachers expressed tension and confusion about workload and top-down diversity initiatives, feeling uneasy and indecisive about inclusive concepts like Universal Design, fair academic performance assessment, and reasonable accommodations. For instance, while noise-canceling earplugs are often seen as logical, there is uncertainty about the benefit of additional exam time. The following quote shows reluctance and mixed feelings about exam duration accommodations:

"Facilitating reasonable accommodation is required, but I'm not sure if it's good or bad. Sometimes it makes sense, sometimes not. Noise-cancelling earplugs are reasonable, but extra exam time is uncertain. I hadn't considered this perspective or its universal applicability. Let's continue discussing because I need more information to decide." (teacher_FG3)

Lack of knowledge and adaptability. Over three quarters of participants lacked cultural knowledge and adaptability to diverse needs and communication styles. As the following quote shows, these gaps hinder effective interaction with introverted, learning-disabled, autistic, and Islamic students:

"I think cultural knowledge should be emphasized. What is culturally healthy and how can I communicate? How do I teach introverted or learning-disordered students? We're starting to consider how to achieve it, but nobody is experienced. We must do more than change case study names or offer teachers a few workshops on intercultural communication or evaluation modifications to meet it. This must be longer, more detailed, and more penetrating for coworkers. How? I don't know, but it's important because many people are unaware." (teacher_FG3)

Need for extensive training. Almost all teachers advocated for longer and more intensive cultural awareness and inclusive communication training. A few hours of intercultural communication or evaluation modifications were deemed insufficient. A teachers' quote highlights the lack of training in diverse communication and learning styles and the need for greater awareness:

"I think we all struggle with autistic communication, introversion, and fair appraisal. We know it exists, but I'm not sure what to do with it. We only know that such students get extra time on multiple-choice exams. We are terribly coached and informed." (teacher_FG1)

Unconscious biases. Three-quarters of participants acknowledged language biases and stressed unconscious bias awareness. It was agreed that language-delayed or native-speaker students are often unfairly assessed and evaluated. The following quote emphasizes how unconscious biases against native speakers lead to unfair evaluations and the importance of language skills in assessment:

"I believe unconscious biases matter. Medical diagnostic facilities are obvious. But e.g. native speakers in international masters can work less hard and sell, describe, and package their work better than someone who works harder but has less language knowledge, comes across as less confident, and gets a worse result, which is sad. Collectively, we must be more vigilant. Though never addressed, I think it's worse than a dyslexia certificate." (teacher_FG2)

Know and adapt to the needs of students

Challenges in addressing complex academic needs and online teaching. More than half of teachers and students recognized students' complex academic needs and online education's challenges, such as unequal technology access and inconsistent internet connections. More study spaces with reliable internet, library laptops, recording studios, and ICT training for students and teachers to use were agreed upon. This quote shows the logistical challenges of online evaluation and the need for 24/7 IT support for international and evening classes:

"Online grading doesn't work with so many students. You need the right equipment and software. If you want students to learn when and where they want, you can't simply get IT support between 9 am and 6 pm. International colleagues and evening classes with time differences without any support, isn't that unbelievable?" (teacher_FG2)

Need for enhanced feedback and diverse evaluation formats. Three-quarters of students and no teachers supported clear and accessible feedback and diverse evaluation formats like debates to improve learning. Insufficient and sporadic feedback hurt academic performance and enthusiasm for future assignments, emphasizing the need to continuously engage with course materials throughout the semester. One student highlighted that limited feedback hinders students' academic progress and that timely and ongoing feedback is crucial, which was echoed by several others:

"We just have one exam at the end, so you don't know your progress during the semester. It's awful that points are only released after exams. How well or poorly you're doing is completely unknown, which is discouraging." (student_FG1)

Flexibility in scheduling and curriculum. More students than teachers urged curriculum flexibility and choice due to exam and class scheduling issues. For interdisciplinary learning and faculty

collaboration to broaden perspectives and accommodate diverse learning preferences, a flexible curriculum was needed. To meet the changing needs of students and society, cross-faculty courses and flexible curriculum options allow students to engage in interdisciplinary learning and broaden their educational experiences:

"Inclusive learning includes cross-faculty courses. [...] Society's demand for flexibility may require more diverse profiles in the future. I find it restrictive that students must take the same courses. Give them more options. [...] allowing students to think creatively and make connections, getting to know each other better and meeting more diverse people with diverse experiences and knowledge." (teacher_FG2)

Diversify pedagogical practices

Flexible, self-directed learning. Over half of students preferred self-directed study at flexible times to fit their personal/work schedules. Online classes were especially convenient for students who study in the evening. The following quote confirm that students value the flexibility and convenience of recorded lectures for personalizing their study schedules:

"I'm very detailed, so I write down every word of a recording. That's my style. If 8:30 am class isn't required, I won't be here. I work on school in the evening because it's my least stressful time and I want to do it my way. I study late at night or after work, whichever works for me. Class attendance is optional, and I paid for them [...]" (student_FG1)

Debate over online vs. offline classes. Every teacher and student debated whether they preferred online or offline classes. Over three quarters of teachers and a minority of students worry that recorded lectures may cause procrastination and increase study load. However, both groups understood the importance of balancing theoretical online elements with practical campus training for effective learning. Especially teachers worry about students overusing recorded lectures, leading to procrastination and disengagement:

"How is that beneficial evolution? Students are helpless and take class whenever they desire because "it's recorded anyway." After sleeping in until 10 a.m., they watch it three or four times [...]. They spend three hours instead of one and say 'the study load is too high'. We don't see them or control it anymore." (teacher_FG2)

Challenges of diversifying online teaching. Recording or flipping classes online presented ethical and practical challenges for the vast majority of teachers. They experienced trouble meeting student needs without compromising course feasibility and time management. "Only teachers were concerned about how diversifying pedagogy affected their well-being and autonomy. This quote shows the difficulty of meeting diverse student needs while respecting course requirements and instructor freedom.

"I want to point out that for the first student, you already have recorded a course; for this one, you have a postponed online meeting; a third and fourth will follow soon.... This might sound irreverent, but when does that pendulum swing?" (teacher_FG3)

"Providing flexibility, like multiple valid exams, is challenging, staff welfare must be considered. Because where does it end? Can we say 'no'? Who decides when enough is enough?" (teacher_FG2)

“The online course has many benefits, including time efficiency, flexibility, and pace. But how must I manage this? It’s still MY course, right?” (teacher_FG1)

Concerns about fairness and reasonable accommodations. Approximately three-quarters of teachers and students worried about fairness if all students received reasonable accommodations. The discussions showed the need to support special needs students while maintaining academic standards, workfield expectations, fair competition, and degree value. They talked about ‘entitlement’, learning disabilities, and elite status. The following quotes demonstrate these tensions and question universal reasonable accommodations’ fairness and impact on those with genuine needs:

“Is it fair if everyone gets extra time? Does that mean there’s no longer additional time for those entitled to accommodation? You can’t take away their rights and shortage them. If you give it to everyone, they get nothing extra?” (student_FG2)

You can’t always say a student meets all qualifications, which is problematic. [...] I think teachers should know their course’s end goals and what to test. Don’t change or grant such flexibility because it weakens exam and workfield requirements. At university, we must follow academic standards.” (teacher_FG1)

Balanced, inclusive pedagogy. All participants stressed that inclusive pedagogy must be moderate, realistic, affordable, and feasible within reasonable and legal boundaries. These practices must not disadvantage students without disabilities.

“The problem is that you have those freeloaders. Those who really need it, you might really want to help academically, but not those freeloaders. A doctor’s certificate or other documentation is needed or they abuse it otherwise.” (teacher_FG2)

“That all-inclusive stuff must be moderate, realistic, affordable and feasible within reasonable and legal boundaries. It should be designed to not disadvantage students without limitations or disabilities.” (student_FG2)

Diversify content

Debate over the need for content diversity. Course material diversity was extensively discussed. Less than half of the participants wanted more diverse content voices and perspectives. Minor changes like diverse names, images, and genders to reflect cultures were suggested. The following quote suggests reflecting cultural backgrounds to make course content more inclusive.

“We never considered this. But this could be more highlighted in our education. We could honour foreign students through simple alterations like using other names than Sofie and Marleen in our courses.” (teacher_FG1)

More than half of the participants opposed changing content, stating science is universal and culturally neutral. They claimed that cultural context does not affect chemistry, math, and physics fundamentals. Participants questioned the need for cultural adaptations in scientific education and stressed content quality. The following teacher agrees that culturally neutral scientific content should remain unchanged:

“Gee, it’s basic, I certainly wouldn’t change the content because science is culturally agnostic (a few laughs).”

Seriously, what is cultural in chemics, math or physics? What does academia actually think about that, I wonder?” (teacher_FG2)

Cultural integration in HE. Approximately half of the participants agreed that separating education from culture is impractical suggesting that while cultural dominance should be questioned, students should also adapt to the host culture. This quote emphasizes the expectation that LEs will reflect their cultural roots and that students from different cultures should understand and participate in these dynamics:

“Our roots are Flemish. A student that comes to study here is now part of this culture. He cannot expect that a culture in which he participates makes an abstraction of the culture that it is not. There are reasons why it is the way it is, and perhaps there are points for improvement, and perhaps things are sometimes too dominant, or we have blinders on, and we should do things differently... So let’s talk about that.” (teacher_FG2)

Science education and cultural background. Over half of the participants stressed science education shouldn’t focus on culture. Equal competencies and knowledge acquisition prepare students for social and professional integration. This quote shows the focus on maintaining the same academic standards and competencies for all students, regardless of culture:

“Why diversify content? At the end of the ride, I don’t care if you’re African or not [...]. But assume the student highlights lacking or offensive content. They are now in our society and must be able to accomplish the same things at the same time, pace, knowledge, and competencies. This society can’t use them otherwise. I think they’ll struggle if you don’t teach them that.” (student_FG2)

Hands-on learning and varied examples. All student discussions revolved around more hands-on teaching. They suggested enriching LEs with business speakers, internships, and certified teachers. To gain a broader understanding, students suggested using more examples and explanations beyond their professors’ research. This student’s quote emphasizes the need for more practical teaching experiences and external perspectives to broaden students’ professional worldviews:

“We should invite speakers and teachers who really taught at schools or have real contact with the business world. They have a better idea of what the world actually needs once we have graduated. Our professors can get tunnel vision.” (student_FG1)

Belonging and agency

Need for a vibrant campus life. All participants agreed that a lively campus with communal areas like sports centers, coffee spots, and cafes, as well as events like cultural nights and athletic meets, is key to socialization and community, vital for both students and teachers, including those with disabilities. A vibrant, green, and safe campus fosters inclusivity. This student quote reflects the collective wish for a well-equipped campus:

“I did an Erasmus stay with rooms on campus. The wide domain had a cinema, stores, and coffee shops where students could also work. That’s where a society comes together, creating a small civilization. [...] It must be available to all students, I think of wheelchair-bound or

blind students, or those who struggle with independence or learning. We can help each other in a safe environment.” (student_FG1)

Enhanced online engagement. Online accessibility and integration mattered. Over three-quarters of participants wanted a single, uniform electronic platform for social engagement, accessibility, and practical information sharing. Less than half suggested using social media and other digital tools to build community and improve student-faculty communication. This teacher emphasizes the need for a unified and effective online platform to improve online learning and socialization:

“We battle between electronic learning platforms. [...] Despite institutional ambitions there’s always a ‘yeah but’ and a technical explanation, which is sad. Your online comfort zone should match your physical comfort zone. They should integrate systems into one stable homepage-like personal zone. Through technology you should be able to easily contact teachers and students, speak with them, and check who has read my message and who is online. Maybe even WhatsApp?” (teacher_FG1)

Importance of physical presence. Teachers and students alike stressed the importance of physical presence, especially at the start of programs, to promote meaningful social interactions and reduce isolation, prompting an upscaling of traditional on-campus formats. Participants stressed the importance of balancing online and offline formats, especially face-to-face interactions to strengthen social bonds. The following quote emphasizes the importance of in-person interactions and the difficulties of maintaining social connections online:

“We sometimes use a blended or hybrid strategy. However, we also discussed social connectedness’s effects. Group formation and social contacts are threatened by online courses. I know many students are already feeling lonely.” (teacher_FG2)

Call for engaging offline experiences. Over three-quarters of students wanted more offline interactivity. Traditional lectures were criticized, and dynamic and interactive teaching methods were promoted to boost class attendance. These students’ quotes suggest more engaging and interactive offline learning experiences to improve student engagement and learning:

“The empty lecture halls due to the online videos and lessons? Well duh, it might be linked to the quality of physical classes?” (student_FG2)

“We must promote physical presence. Stop giving traditional lectures, present it differently, interact. Assign group tasks, but make them complex enough to make it worthwhile. In class you can work together, discuss, and announce: ‘I’m here if you have questions.’” (student_FG1)

Approachability and authenticity of teachers. About half of the participants agreed teachers should be approachable and authentic. Open communication and student concerns require humble and equal relationships. Using first names and transparency helps teachers build trust and intimacy with students. This quote shows the benefits of teacher approachability and open communication through humility and equality:

“I notice that with those kinds of students, that if I put myself submissively, modestly, invitingly, more as equals, that they do start talking about their problems.” (teacher_FG1)

Semester-long initiatives for social integration. Almost all participants emphasized welcoming events, mentoring programs, and study tours for semester-long campus social integration. To avoid overwhelming students in the first days of HE, continuous communication and support service reminders were advised. This teacher emphasizes social integration’s benefits to students:

“We used to do a study tour in the beginning of the academic year which was fantastic. Second year students took care of new students organically. We noticed that, while students were moving on, there were really nice dynamics among them. But budget-wise we had to abolish it. Giving space for that social factor on campus is something fundamental.” (teacher_FG1)

Build organizational alliances

Emphasis on collaboration and shared responsibility. Collaboration and teamwork were crucial to inclusive online LEs, according to all teachers and students. Providing comprehensive student support required a cohesive team. Study counsellors, senior students, and diverse teacher profiles were suggested by more teachers than students to provide holistic support and guidance. This quote emphasizes teamwork and diversity in student support:

“We share a responsibility to students. I propose crediting older students for supervising younger students. Insufficient interaction also exists between study counsellors and teachers. Their feedback could help us support that student as a team. I also think teachers should have diverse personalities and approaches to people. Your team should have a variety of people making decisions, offering training, and we should get to know each other better because connecting to others is important.” (teacher_FG2).

Need for institutional support and clarity. Almost all participants were unfamiliar with the institution’s practices, resources, and regulations, highlighting the need for clearer policies and better information dissemination. Teachers and students agreed that inclusive education needs digital resources, expert advice, and adequate funding. This teacher’s quote shows that students and teachers need clearer institutional support and resources to address practical challenges:

“We notice that students with older laptops sometimes drop out because of the packages they have to run. I think there are possibilities for this at our university, but I wouldn’t know who is responsible...” (teacher_FG2)

Call for active institutional involvement. Nearly three-quarters of teachers and students wanted the institution to invest in online flexible learning, professional development, and student challenges to promote inclusive education. The following quotes demonstrate the importance of institutional commitment and recognition in fostering an inclusive LE:

“After saying ‘we want this as a university’, support and money are needed. Please provide time for its developers. We have said: We need more support; ‘ah, there’s no money’; we need to teach online; ‘ah, no money’; so we must say it

louder: ‘you can’t achieve anything if it’s not linked to it.’” (teacher_FG1)

“The policy should invest in mandatory professionalisation to be able to carry those things together. Because... what works in education? Unbelievably, but we no longer need an educational master’s degree. Only interested teachers will take courses, but you’ll hardly progress. (teacher_FG1)

Importance of clear policies. Clear policies and institutional support were essential for all teachers and nearly all students to create inclusive LEs:

“The appreciation policy is not aimed at it yet: inclusive teaching is nice to have, but how many million have you raised with projects? That’s what counts when it comes to promotions and assessment.” (teacher_FG1).

Who chooses our path is unclear. Should working, ill, or fragile students have one path or different paths? Should teachers be open to all questions, or is ‘the path’ set? We want a structure or overarching idea of the best approach.” (teacher_FG3)

Challenges in institutional feedback mechanisms. All participants criticized institutional feedback mechanisms and urged better institutional communication and responsiveness. This student’s quote highlights institutional feedback mechanism shortcomings:

“The institute must respond to student and teacher feedback more openly. We felt completely demolished after meetings and felt unheard, so we decided to stop talking because it wasn’t working.” (student_FG2)

Discussion

This study addressed the lack of authentic teacher and student experiences in online inclusivity literature in HE. To answer the research question, it identified the essential elements and conditions for inclusive online LE through FGs. After analyzing the six I-TPACK model guidelines, six corresponding key elements emerged, each contributing to an inclusive online LE.

Inclusive teaching support. According to numerous studies, including (Aristovnik et al. 2020; Graffy, 2021; Hassanein, 2015; Kohnke and Moorhouse, 2021; Van Mieghem et al. 2020), inclusive online LEs enable teachers to continue learning. Participants stress the importance of self-reflection by teachers on inclusive teaching principles and themselves point to a lack of confidence and knowledge.

Teachers request institutional support for ongoing training and reflective practices to develop their inclusivity skills around accommodations, comprehensive care, inclusive skills in online methodology, incorporating feedback mechanisms or fair evaluation formats.

Participants often propose accommodations for inclusive online LEs to better serve specific groups, but they fail to recognize that these accommodations can benefit all students, which is crucial to achieving more ambitious inclusion goals. Inclusion, as defined by Göransson and Nilholm (2014), is confused with placement or integration, indicating a lack of uniform and comprehensive understanding among participants. Working more inclusively is desired, but a shared vision and language are lacking (Emmers et al. 2023). Therefore, inclusion efforts are hesitant, fragmented, and guided by intuition rather than knowledge and skills.

Flexible infrastructure and technology. The findings suggest a holistic approach to inclusive online LEs that addresses infrastructural and pedagogical aspects. Students and teachers stress the importance of providing accessible study spaces, reliable internet, and digital tools to meet their needs. Students and teachers believe inclusive online LEs should balance and integrate online and offline teaching modalities while addressing practical, logistical, and administrative issues like infrastructure, unequal technological access and use, lesson content, teacher workload, procrastination, increased study load, and soft skills learning. Previous studies have raised similar concerns (Caeiro-Rodríguez et al. 2022; Chen et al. 2022; Damşa et al. 2021; Meydanlioglu and Arıkan, 2014).

Balanced and adaptive pedagogy. Teachers and students assert that an inclusive online LE fosters student autonomy through diverse communication and assessment methods, flexible curricula, and interdisciplinary collaboration. Personalized support, including clear and consistent feedback mechanisms, diverse assessment formats, and flexible scheduling, is deemed essential for promoting various learning styles and needs within the online LE. Recent literature also underscores the significance of these elements in crafting an inclusive online LE (Chen et al. 2022; Jonker et al. 2020; Kohnke and Moorhouse, 2021; Miller et al. 2021).

The flexibility of inclusive online LEs is threatened by teachers and students’ lack of preparation or disagreement on how and to what extent to achieve this (Barrot et al. 2021; Kohnke and Moorhouse, 2021; Pathak and Palvia, 2021). The debate on autonomy and online/offline lessons emphasize the need for inclusive pedagogy balance. Flexible, online learning can lead to procrastination and increased study load if not managed properly. On-campus learning is believed to be best for practical and soft skills development, highlighting the need for blended learning. Teacher experimentation with debates, interactive lessons, flipped classrooms, and recorded lectures to improve offline interaction and active engagement is especially encouraged by students. Teachers believe clear guidelines for integrating these methods into the curriculum can help create a balanced and adaptive pedagogical approach.

Participants strongly support academic standards and boundaries, especially in a flexible, inclusive online setting, to ensure quality education and degrees that meet field expectations. In order to be inclusive, abuse must be addressed, and ‘traditional’ students not neglected. Therefore, reasonable accommodations must be justified, fair, and easy to implement to avoid giving disadvantaged students unnecessary benefits (Ristad et al. 2023). The latter doubts a broader primary care strategy that accommodates all students.

Diverse course content. Teachers and students agree an inclusive online LE makes minor changes to instructional materials and visual aids to support diversity. Language awareness and cultural awareness of students with different language skills, international origins, learning disabilities, autism, and introversion were promoted. However, most participants oppose content changes emphasizing universal scientific bases over cultural influences, supporting content quality, and questioning cultural adaptations. Participants generally accept that LEs cannot fit all student cultures. The idea that diversity is based on skin color, clothing, and diet can hinder inclusion. (Abrica et al. 2023).

Social integration and community building. Student-teacher connection is emphasized by a vibrant campus, suggesting that online inclusive LEs should reflect this informality. Participants claim accessible, dynamic campus facilities and a unified, user-

friendly digital platform improve the experience for all. According to Farrell and Brunton (2020) and Kintu et al. (2017), informal social interactions are most important for student satisfaction intrinsic motivation, and academic success (Schneider and Preckel, 2017).

Students prefer online, deferred, flexible learning through knowledge clips and various (evaluation) methods to meet their diverse learning needs while emphasizing that community building is mostly offline. Some teachers support online learning, but most prefer on-campus learning because, despite the benefits of online technology, they prefer classroom interaction. Reduced online interaction can lead to loneliness, procrastination, and academic pressure in students (Sahli Lozano et al. 2022). Zulfiqar et al. (2020) found a preference for face-to-face interaction in rural contexts, but Mgutshini (2013) found that online learning was valued and beneficial for student performance in urban contexts. This again shows that context affects educational preferences and experiences.

Collaborative efforts and institutional support. Effective implementation of an inclusive online LE requires close collaboration among teachers with diverse profiles, study counselors, older students, and institutional leaders, as well as clear policy measures and adequate institutional support. This collaboration is crucial for developing and communicating inclusive policies and for providing the necessary resources to achieve an LE (Pulinx et al. 2021; Tuitt et al. 2018). Regular feedback and open communication can align institutional goals with teachers' and students' practical needs, creating a more cohesive and supportive LE.

Conclusion and recommendations. This study explores what the essential elements are for an inclusive online LE according to teachers and students. A balance is needed between flexibility in online learning and offline community building. Although the I-TPACK model promotes inclusive online LEs, the study shows that participants feel more comfortable creating an inclusive offline LE. There is no clear consensus on how online learning can meet academic and social needs. Interactive and inclusive online LEs are mainly supported offline, with minor content adjustments that emphasize the need for practical inclusion frameworks such as the I-TPACK model in online HE (Slootman et al. 2023). Professional development programs for inclusive online education should emphasize theory but also provide practical strategies and tools to help teachers improve, feel equipped, and gain confidence in implementing inclusive online practices.

These findings suggest policy recommendations to support inclusive online LE's. To effectively implement online learning by engaging teachers by adopting the right tools, institutions could provide sufficient time for teachers to shift and train. The policy could consider longitudinal team professionalization on inclusive concepts such as Universal Design, (cultural) awareness, unconscious biases, diversifying teaching methods, unequal ICT usage, and implementing a balanced mix of online and offline teaching modalities.

The semantic disagreement among participants about 'science', 'inclusion', and 'culture' highlights the need for institutional efforts to create a common language and understanding and to adapt diversity and inclusion policies across faculties. Institutional guidelines for fair and diversely responsive teaching without compromising science and academics seem important. Ambitious, appreciative guidelines that validate inclusive teaching practices can help urgently normalize inclusive education as excellent education for all students. The I-TPACK model could serve as a framework for improvement.

Collaboration and knowledge-sharing initiatives at the institutional level could further promote the dissemination of best practices and the advancement of inclusive HE. It seems imperative to introduce regular input opportunities aimed at enhancing teacher and student engagement. Encouraging institutional research into the effectiveness of inclusive practices might help to identify evidence-based approaches. Providing flexibility in the curriculum through elective courses and promoting collaboration between faculties could contribute to a more inclusive online LE. Institutions could encourage the inclusion of varied cultural, social, and global perspectives in course materials where relevant and not limit themselves to adapting, for example, names, pictures in brochures, or diverse genders (Tuitt et al. 2018). This can be achieved by including examples, case studies, and readings that reflect a wider range of voices and experiences, thereby increasing the inclusivity of educational content. Finally, improved technological access, infrastructure and support, and user-friendly online platforms seem to be crucial to addressing the 'online teaching lethargy' that was noted.

Limitations and future research. This study explored human experience and engaged in meaning-making, where each person's expertise and subjectivity are strengths rather than biases. To gather diverse experiences, open-ended questions were asked and participants were encouraged to freely share their views. Teacher-student and FG quotes were balanced in reporting. Stratified sampling and random selection were used to balance gender and faculty representation in teachers and students to promote transferability. However, the study did not specify the inclusion of specific student groups, such as students with visual impairments, students from socially vulnerable groups, or international students. This lack of specificity may introduce a potential bias, leading to one-sided perspectives. Given the limited sample size of students, further disaggregation into specific subgroups could compromise the integrity of the data and the ability to reliably attribute perspectives to particular demographics. Saturation occurred during FGs. Teacher participation is higher than student participation, possibly due to time constraints, lack of interest, or research inexperience, which may bias student perspectives. Consider these factors when interpreting results because they may affect representativeness.

Future inclusive HE research can take many interesting paths to improve knowledge and practice. The sample can be expanded including student advisors, diverse age groups, cultural backgrounds, and educational experience to better understand multiple perspectives.

A comparative study across institutions and programs can also reveal findings' generalizability and contextual factors. Additionally, in-depth qualitative interviews and observations can reveal more individual experiences and perspectives that illuminate inclusive online HE's complexity and education effects.

Data availability

Personal data was collected and analysed in this study. The consent form states that all participants agreed to data confidentiality. The datasets are therefore private to protect participant privacy.

Received: 26 March 2024; Accepted: 27 June 2024;

Published online: 06 July 2024

References

Abrica EJ, Hatch-Tocaimaza D, Rios-Aguilar C (2023) On the impossibilities of advancing racial justice in higher education research through reliance on the

- campus climate heuristic. *J. Diversity High. Educ.* 16(2):144–156. <https://doi.org/10.1037/dhe0000323>
- Ainscow M, Booth T, Dyson A (2006) *Improving Schools, Developing Inclusion*. Routledge
- Ainscow M, Sandill A (2010) Developing inclusive education systems: The role of organisational cultures and leadership. *Int. J. Incl. Educ.* 14(4):401–416. <https://doi.org/10.1080/13603110802504903>
- Ali W (2020) Online and remote learning in higher education institutes: a necessity in light of COVID-19 pandemic. *High. Educ. Stud.* 10:16. <https://doi.org/10.5539/hes.v10n3p16>
- Amor AM, Hagiwara M, Shogren KA, Thompson JR, Verdugo MÁ, Burke KM, Aguayo V (2019) International perspectives and trends in research on inclusive education: A systematic review. *Int. J. Incl. Educ.* 23(12):1277–1295. <https://doi.org/10.1080/13603116.2018.1445304>
- Aristovnik A, Keržič D, Ravšelj D, Tomažević N, Umek L (2020) Impacts of the COVID-19 pandemic on life of higher education students: a global perspective. *Sustainability* 12(20):20. <https://doi.org/10.3390/su12208438>
- Barrot JS, Llenares II, del Rosario LS (2021) Students' online learning challenges during the pandemic and how they cope with them: The case of the Philippines. *Educ. Inf. Technol.* 26(6):7321–7338. <https://doi.org/10.1007/s10639-021-10589-x>
- Barton L (1997) Inclusive education: Romantic, subversive or realistic. *Int. J. Incl. Educ.* 1(3):231–242. <https://doi.org/10.1080/1360311970010301>
- Beaton M, Thomson S, Cornelius S, Lofthouse R, Kools Q, Huber S (2021) Conceptualising teacher education for inclusion: lessons for the professional learning of educators from transnational and cross-sector perspectives. *Sustainability* 13(4):2167. <https://doi.org/10.3390/su13042167>
- Boothe KA, Lohmann MJ, Donnell KA, Hall DD (2018) Applying the principles of Universal Design for Learning (UDL) in the college classroom. *J. Spec. Educ. Apprenticesh.* 7(3):13
- Braun V, Clarke V (2022) *Thematic Analysis: A Practical Guide*. Sage Publications
- Brown M, Hughes H, Keppell M, Hard N, Smith L (2015) Stories from students in their first semester of distance learning. *Int. Rev. Res. Open Distrib. Learn.* 16(4). <https://doi.org/10.19173/irrodl.v16i4.1647>
- Caeiro-Rodríguez M, Manso-Vázquez M, Jesmin T, Terasmaa J, Tsalapata H, Heidmann O, Okkonen J, White E, de Carvalho CV, Stefan I-A (2022) Students and teachers' need for sustainable education: lessons from the pandemic. *Computers* 11(11):11. <https://doi.org/10.3390/computers11110157>
- Castaño MJ, Colucci E, Smidt H (2018). *Free Digital Learning for Inclusion of Migrants and Refugees in Europe: A Qualitative Analysis of Three Types of Learning Purposes*. JRC Publications Repository. <https://doi.org/10.19173/irrodl.v19i2.3382>
- Chen V, Sandford A, LaGrone M, Charbonneau K, Kong J, Ragavalo S (2022) An exploration of instructors' and students' perspectives on remote delivery of courses during the COVID-19 pandemic. *Br. J. Educ. Technol.* 53(3):512–533. <https://doi.org/10.1111/bjet.13205>
- Coe R, Waring M, Hedges LV, Ashley LD (2021) *Research Methods and Methodologies in Education* (3rd ed.). Sage
- Damşa C, Langford M, Uehara D, Scherer R (2021) Teachers' agency and online education in times of crisis. *Comput. Hum. Behav.* 121:106793. <https://doi.org/10.1016/j.chb.2021.106793>
- Danowitz MA, Tuit F (2011) Enacting inclusivity through engaged pedagogy: a higher education perspective. *Equity Excell. Educ.* 44(1):40–56. <https://doi.org/10.1080/10665684.2011.539474>
- de Vries R (2014) *Earning by Degrees: Differences in the career outcomes of UK graduates*. The Sutton Trust: Improving social mobility through education. <https://www.suttontrust.com/wp-content/uploads/2019/12/Earnings-by-Degrees-REPORT-1.pdf>
- Doeven-Eggens L, van der Werf MPC, Bosker RJ (2008) Sociale steun, persoonlijk netwerk en studiesucces in het hoger onderwijs. *Pedagogische Stud.* 85:17
- Dursun H, Claes E, Agirdag O (2021) Diversity pedagogical content knowledge: A new conceptual framework and assessment across different teacher education programmes. *Multicult. Educ. Rev.* 13:303–322. <https://doi.org/10.1080/2005615X.2021.2006118>
- EACEA. (2022). *Towards equity and inclusion in higher education in Europe—Eurydice Report* (p. 118). European Education and Culture Executive Agency
- Emmers E, Stevens R, Doumen S, Everaert L, Decabooter I, Engelen I, Jansen D, Pulinx R (2023) Lessen uit het Eurydice-rapport: Een Vlaamse reflectie over kansengelijkheid en inclusie in het hoger onderwijs. *Tijdschr. Voor Hoger Onderwijs* 41:362–380. <https://doi.org/10.59532/tvho.v41i4.18319>
- Espada-Chavarría R, González-Montesino RH, López-Bastias JL, Díaz-Vega M (2023) Universal design for learning and instruction: effective strategies for inclusive higher education. *Educ. Sci.* 13(6):6. <https://doi.org/10.3390/educsci13060620>
- European Agency for Special Needs and Inclusive Education. (2022). *Inclusief digitaal onderwijs – Beleidsbrief* (p. 4). European Agency for Special Needs and Inclusive Education. <https://www.european-agency.org/sites/default/files/IDE-PolicyBrief-NL.pdf>
- Farrell O, Brunton J (2020) A balancing act: A window into online student engagement experiences. *Int. J. Educ. Technol. High. Educ.* 17. <https://doi.org/10.1186/s41239-020-00199-x>
- Florian L (2008) Special or inclusive education: Future trends. *Br. J. Spec. Educ.* 35(4):202–208. <https://doi.org/10.1111/j.1467-8578.2008.00402.x>
- Fullan M (2015) *The New Meaning of Educational Change* (5th edition). Teachers College Press
- Garrison DR, Anderson T, Archer W (2010) The first decade of the community of inquiry framework: A retrospective. *Internet High. Educ.* 13(1–2):5–9. <https://doi.org/10.1016/j.iheduc.2009.10.003>
- Göransson K, Nilholm C (2014) Conceptual diversities and empirical shortcomings – a critical analysis of research on inclusive education. *Eur. J. Spec. Needs Educ.* 29(3):265–280. <https://doi.org/10.1080/08856257.2014.933545>
- Gouwens J, Dols R (2018) *75 werkvormen voor creatieve sessies* (1st ed.). van Duuren Management
- Graffy CP (2021) Pandemic pedagogy and its applications for international legal education and the Hyflex classroom of the future. *South. Ill. Univ. Law J.* 46:29
- Halcomb E, Gholizadeh L, Digiacomio M, Phillips J, Davidson P (2007) Literature review: Considerations in undertaking focus group research with culturally and linguistically diverse groups. *J. Clin. Nurs.* 16:1000–1011. <https://doi.org/10.1111/j.1365-2702.2006.01760.x>
- Hassanein EEA (2015) Studies in inclusive education—Inclusion, disability and culture. In *Inclusion, Disability and Culture*. Sense Publishers. <https://doi.org/10.1007/978-94-6209-923-4>
- Haug P (2017) Understanding inclusive education: Ideals and reality. *Scand. J. Disabil. Res.* 19(3):3. <https://doi.org/10.1080/15017419.2016.1224778>
- Hilbert M, López P, Vázquez C (2010) Information societies or “ICT Equipment Societies?” measuring the digital information-processing capacity of a society in bits and bytes. *Inf. Soc.* 26:157–178. <https://doi.org/10.1080/01972241003712199>
- Jonker H, März V, Voogt J (2020) Curriculum flexibility in a blended curriculum. *Australas. J. Educ. Technol.* 36(1):1. <https://doi.org/10.14742/ajet.4926>
- Kintu MJ, Zhu C, Kagambe E (2017) Blended learning effectiveness: The relationship between student characteristics, design features and outcomes. *Int. J. Educ. Technol. High. Educ.* 14(1):7. <https://doi.org/10.1186/s41239-017-0043-4>
- Kohnke L, Moorhouse BL (2021) Adopting HyFlex in higher education in response to COVID-19: Students' perspectives. *Open Learn.: J. Open, Distance e-Learn.* 36(3):231–244. <https://doi.org/10.1080/02680513.2021.1906641>
- Krischler M, Powell JJW, Pit-Ten Cate IM (2019) What is meant by inclusion? On the effects of different definitions on attitudes toward inclusive education. *Eur. J. Spec. Needs Educ.* 34(5):632–648. <https://doi.org/10.1080/08856257.2019.1580837>
- Magnússon G (2019) An amalgam of ideals – images of inclusion in the Salamanca Statement. *Int. J. Incl. Educ.* 23(7–8):677–690. <https://doi.org/10.1080/13603116.2019.1622805>
- Mallman M, Lee H (2016) Stigmatised learners: Mature-age students negotiating university culture. *Br. J. Sociol. Educ.* 37(5):684–701. <https://doi.org/10.1080/01425692.2014.973017>
- Marinoni G, van't Land H, Jensen, T (2020) *The Impact of COVID-19 on Higher Education around the World* (IAU Global Survey Report 978-92-9002-212-1; p. 50). International Association of Universities (IAU)
- Meydanlioglu A, Arikani F (2014) Effect of hybrid learning in higher education. *Int. J. Educ. Pedagog. Sci.* 8(5):4
- Mgutshini T (2013) Online or not? A comparison of students' experiences of an online and an on-campus class. *Curatorship* 36:E1–E7. <https://doi.org/10.4102/curationis.v36i1.73>
- Miller AN, Sellnow DD, Strawser MG (2021) Pandemic pedagogy challenges and opportunities: Instruction communication in remote, HyFlex, and BlendFlex courses. *Commun. Educ.* 70(2):202–204. <https://doi.org/10.1080/03634523.2020.1857418>
- Mishra P, Koehler MJ (2006) Technological pedagogical content knowledge: a framework for teacher knowledge. *Teach. Coll. Rec.* 108(6):1017–1054
- Molina Roldán S, Maraure J, Aubert A, Flecha R (2021) How Inclusive Interactive Learning Environments Benefit Students Without Special Needs. *Front. Psychol.* 12. <https://www.frontiersin.org/articles/10.3389/fpsyg.2021.661427>
- Neuwirth LS, Jović S, Mukherji BR (2021) Reimagining higher education during and post-COVID-19: Challenges and opportunities. *J. Adult Contin. Educ.* 27(2):141–156. <https://doi.org/10.1177/1477971420947738>
- Nilholm C (2006) Special education, inclusion and democracy. *Eur. J. Spec. Needs Educ.* 21(4):431–445. <https://doi.org/10.1080/08856250600957905>
- Nørgård RT (2021) Theorising hybrid lifelong learning. *Br. J. Educ. Technol.* 52(4):1709–1723. <https://doi.org/10.1111/bjet.13121>
- OECD. (2017). *Education at a Glance 2017: OECD Indicators*. Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/education/education-at-a-glance-2017_eag-2017-en
- OECD. (2021). *21st-Century Readers: Developing Literacy Skills in a Digital World*. OECD. <https://doi.org/10.1787/a83d84cb-en>
- Pathak BK, Palvia SC (2021) Taxonomy of higher education delivery modes: A conceptual framework. *J. Inf. Technol. Case Appl. Res.* 23(1):36–45. <https://doi.org/10.1080/15228053.2021.1901351>

- Peacock S, Cowan J, Irvine L, Williams J (2020) An exploration into the importance of a sense of belonging for online learners. *Int. Rev. Res. Open Distrib. Learn.* 21(2):18–35. <https://doi.org/10.19173/irrodl.v20i5.4539>
- Pokhrel S, Chhetri R (2021) A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning. *High. Educ. Future* 8(1):133–141. <https://doi.org/10.1177/2347631120983481>
- Prinsloo T, Van Deventer JP (2017) Using the Gartner Hype Cycle to Evaluate the Adoption of Emerging Technology Trends in Higher Education – 2013 to 2016. In T-C Huang, R Lau, Y-M Huang, M Spaniol, & C-H Yuen, *Emerging Technologies for Education: Second International Symposium* (pp. 49–57). Springer International Publishing
- Pulinx R, Schrooten M, Emmers E (2021) *Diversiteit in het hoger onderwijs: Van theoretisch kader naar praktijkgerichte verandering* (1st ed.). ASP Editions - Academic and Scientific Publishers. <https://www.aspeditions.be/nl-be/book/diversiteit-in-het-hoger-onderwijs/18279.htm>
- Ragnedda M, Jin J, Mutsvauro B, Goggin G, Abdollahyan H, Ansari MS, Ben-Harush O, Chen A, Dalvit L, Hammond C (2018) *Digital Inclusion: An International Comparative Analysis*. Lexington Books. <http://ebookcentral.proquest.com/lib/ubhasselt/detail.action?docID=5492319>
- Rashid S, Yadav SS (2020) Impact of Covid-19 Pandemic on Higher Education and Research. *Indian J. Hum. Dev.* 14(2):340–343. <https://doi.org/10.1177/0973703020946700>
- Ristad T, Østvik J, Horghagen S, Kvam L, Witsø AE (2023) A multi-stakeholder perspective on inclusion in higher education: Ruling on fragile ground. *International Journal of Educational Research Open*, 1–10. <https://doi.org/10.1016/j.ijedro.2023.100311>
- Rose D, Meyer A (2002) Teaching Every Student in the Digital Age: Universal Design For Learning. In *Alexandria, VA, ASCD*
- Sahli Lozano C, Wüthrich S, Büchi JS, Sharma U (2022) The concerns about inclusive education scale: Dimensionality, factor structure, and development of a short-form version (CIES-SF). *Int. J. Educ. Res.* 111:101913. <https://doi.org/10.1016/j.ijer.2021.101913>
- Schneider M, Preckel F (2017) Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychol. Bull.* 143(6):565–600. <https://doi.org/10.1037/bul0000098>
- Slootman M, Altes TK, Domagała-Zysk E, Rodríguez-Ardura I, Stanojev I (2023) *A Handbook of e-Inclusion: Building capacity for inclusive higher education in digital environments*. Knowledge Innovation Centre
- Thomas L, Herbert J, Teräs M (2014) A sense of belonging to enhance participation, success and retention in online programs. *Int. J. First Year High. Educ.* 5(2):69–80. <https://doi.org/10.5204/intjfyhe.v5i2.233>
- Tinto V, Engle J (2008) *Moving Beyond Access: College Success for Low-Income, First-Generation Students* (p. 38). Pell Institute for the Study of Opportunity in Higher Education
- Tong A, Sainsbury P, Craig J (2007) Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *Int. J. Qual. Health Care* 19(6):349–357. <https://doi.org/10.1093/intqhc/mzm042>
- Tuitt F, Haynes C, Stewart S (2018) Transforming the classroom at traditionally white institutions to make black lives matter: Black lives matter. *Improv. Acad.* 37(1):63–76. <https://doi.org/10.1002/tia.2.20071>
- UNESCO (2005) *Guidelines for inclusion: Ensuring access to education for all* (ED-2004/WS/39). https://unesdoc.unesco.org/in/documentViewer.xhtml?v=2.1.196&id=p::usmarcdef_0000140224&file=/in/rest/annotationSVC/DownloadWatermarkedAttachment/attach_import_ca3f4c77-cddb-4f8f-81c3-4ff1c0e848d3%3F_%3D140224eng.pdf&locale=en&multi=true&ark=/ark:/48223/pf0000140224/PDF/140224eng.pdf#%5B%7B%22num%22%3A75%2C%22gen%22%3A0%7D%2C%7B%22name%22%3A%22XYZ%22%7D%2Cnull%2Cnull%2C0%5D
- UNESCO (2017) *A Guide for ensuring inclusion and equity in education*. United Nations Educational, Scientific and Cultural Organisation. <https://unesdoc.unesco.org/ark:/48223/pf0000248254>
- UNIA (2019) *Richtlijnen voor artikel 24: Het recht op inclusief onderwijs*. https://www.unia.be/files/Documenten/Wetgeving/General_Comment_No4_Klare_Taal.pdf
- UNICEF (2014) *Conceptualizing Inclusive Education and Contextualizing it within the UNICEF Mission*. https://www.unicef.org/eca/sites/unicef.org/eca/files/IE_Webinar_Booklet_1_0.pdf
- Van Mieghem A, Verschuere K, Petry K, Struyf E (2020) An analysis of research on inclusive education: A systematic search and meta review. *Int. J. Incl. Educ.* 24(6):675–689. <https://doi.org/10.1080/13603116.2018.1482012>
- Wiesenber FP, Stacey E (2008) Teaching philosophy: moving from face-to-face to online classrooms. *Can. J. Univ. Contin. Educ.* 34(1):1. <https://doi.org/10.21225/D5JP4G>
- Woodley A, Simpson O (2014) Student Dropout: The Elephant in the Room. In *Online Distance Education: Towards a Research Agenda* (p. 23)
- Yongo CW (2023) Perspectives on diversity and inclusion in education. In J Keengwe, *Handbook of Research on Race, Culture, and Student Achievement* (pp. 340–358). IGI Global. <https://doi.org/10.4018/978-1-6684-5705-4.ch017>
- Zulfikar MS, Siddiqui GK, Mahmood S (2020) A comparison between online and on-campus classes: taking university students'. *Perspect. Rev. Educ., Adm. Law* 3(2):2. <https://doi.org/10.47067/real.v3i2.48>

Acknowledgements

Special thanks to Prof. Dr. Miguel Augusto Meneses da Silva Santos, from the Polytechnic of Porto School of Education, for his insightful comments throughout this study and to Lindsay Everaert from Hasselt University for her proofreading. This research was supported by the Special Research Fund of Hasselt University (BOF22OWB23).

Author contributions

LS, EE, and KS designed the study and methodology. After collecting and analysing data, LS and EE discussed and interpreted it. The manuscript was written by LS and edited by LS and EE. LS, EE, MNR, and KS revised the manuscript critically. LS, EE, and KH approved the final manuscript. EE oversaw the research project.

Competing interests

The authors declare no competing interests.

Ethics

This study received an ethical approval from the UHasselt Social Ethics Committee. All procedures were meticulously executed in accordance with the committee's recommendations.

Informed consent

Prior to their involvement, all participants provided written informed consent.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1057/s41599-024-03417-3>.

Correspondence and requests for materials should be addressed to Liesbet Saenen.

Reprints and permission information is available at <http://www.nature.com/reprints>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

© The Author(s) 2024