HIGHER EDUCATION PROFESSORS' AND STUDENTS' PERSPECTIVES AND EXPERIENCES CONCERNING THE USE OF UNIVERSAL DESIGN FOR LEARNING: A SCOPING REVIEW

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Abstract

After the profound challenges that European countries faced during the COVID-19 pandemic, characterized by a widespread shift to remote teaching, there is a widely held belief that the higher education landscape has undergone a significant transformation. This transformation necessitates higher education institutions (HEIs) to adopt a more adaptable approach, offering a blend of synchronous, asynchronous, and face-to-face instruction. This flexibility is seen as crucial to enabling students to seamlessly transition between various delivery modes. Project SOULSS (Scaffolding Online University Learning: Support Systems, 2022-1-IT02-KA220-HED-000090206) is an Erasmus+ initiative designed to enhance the capacity of HEI teachers. The project's focus is on applying Universal Learning Design (UDL) principles to implement inclusive instruction, instituting early interventions to prevent dropout, and crafting and delivering optimal hybrid instruction that strikes a flexible balance by leveraging the strengths of different delivery modes.

Among the initial tasks of the project was the completion of a comprehensive literature survey on the State of the Art of UDL implementation at the tertiary level in online and hybrid delivery modes. The chosen methodology for this literature survey was the scoping review, considered appropriate for assessing emerging evidence and constituting an initial step in research development. The process adhered to the PRISMA Extension for Scoping Reviews [1] and aimed to address three key research questions:

1. What are the perspectives and practices of higher education professors regarding the use of UDL in online or hybrid classes?
2. What are the perspectives and experiences of higher education students concerning the use of UDL in online or hybrid classes?
3. What are considered good practices in the implementation of UDL in online and hybrid classes in higher education? What factors facilitate its implementation, and what barriers exist?

This presentation provides a detailed account of the entire scoping review process, offering a synthesis of the collected data and analysing it to provide insights into the research questions. The findings lead to recommendations for practice, along with implications for the implementation of the SOULSS project.

Keywords: *Universal Design for Learning, Higher Education, Online and Hybrid Education, Inclusive Education*

1 INTRODUCTION

This presentation delineates the preliminary outcomes of the ERASMUS+ Project SOULSS (Scaffolding Online University Learning: Support Systems). This project endeavours to bridge two pivotal challenges confronting Higher Education Institutions (HEIs): firstly, the imperative to augment conventional face-to-face pedagogy with various modalities of synchronous and asynchronous distance learning; and secondly, the exigency to accommodate the burgeoning diversity within the student populace in higher education. Consequently, the primary objective of this initiative is the formulation and refinement of resources and methodologies conducive to assisting higher education faculty in the application of Universal Learning Design (UDL) principles. This initiative aims to foster inclusive education by developing and implementing optimally designed hybrid instructional strategies, tailored to meet the diverse characteristics and requisites of the contemporary student body.

The SOULSS project began by leading a thorough analysis of the current situation lived in the countries of the partner institutions, conducting an extensive survey addressed to faculty members and higher

education students about their experiences and practices during COVID-19 lockdowns; and a comprehensive literature survey on the State of the Art of UDL implementation at the tertiary level in online and hybrid delivery modes.

This exposition is centred on an analytical exploration of preliminary data related to three cardinal research questions within the ambit of the ERASMUS+ Project SOULSS. These questions are:

1) What are the perspectives and practices of higher education professors in relation to the adoption of Universal Design for Learning (UDL) in online or hybrid instructional contexts;

2) How do higher education students perceive and experience the application of UDL within these digital learning environments; and

3) What are identified as effective practices in the implementation of UDL in online and hybrid educational formats in higher education settings, including an examination of factors that facilitate this implementation and the barriers encountered therein.

The investigation aims to elucidate the multifaceted dimensions of UDL application from both instructional and learner perspectives, contributing to a nuanced understanding of its efficacy and challenges in contemporary higher education landscapes.

2   METHODOLOGY

The selected methodology was a scoping review since our goal was to "summarize findings from a body of knowledge that is diverse in methods or discipline" [1]. Additionally, it was deemed suitable for evaluating emerging evidence and serving as an initial step in research development. Following the PRISMA Extension for Scoping Reviews [1][i], we sought to address the three essential research questions mentioned previously.

The research was conducted in May 2023, by the Portuguese team in project SOULSS. The collection of papers was made using two databases, the EBSCO Host (including 11 sources: Complementary Index; Directory of Open Access Journals; ERIC; Academic Search Complete; MEDLINE; Supplemental Index; Library, Information Science & Technology Abstracts; IEEE Xplore Digital Library; Science Direct; Business Source Complete; Gale in Context) and the Web of Science Core Collection.

The queries searched the Abstract fields including the keywords: "Universal Design for Learning" OR "UDL" AND "Higher Education" OR "University", and the publication period limited to the years of the pandemic and immediately after (2020-2023). The search was limited to peer-reviewed journals, published in English language**.**

Both authors screened the titles and abstracts of the selected studies according to the inclusion and exclusion criteria defined initially. Consensus was achieved whenever any disagreements occurred. The inclusion criteria included: a) Studies that addressed online or hybrid instruction in higher education; b) Studies that included a dimension of empirical research (qualitative or quantitative). The exclusion criteria were: a) papers limited to theoretical explorations of the themes; b) papers that did not address online or hybrid education; c) papers focused on populations other that higher education; d) papers with an unclear or unfocused research topic.

The full text was downloaded for all selected abstracts and were analysed by the researchers. A data-charting form was developed to extract data from the selected full texts. It contained:

1) general information about the study, including the identification of the author(s), year of publication, and location of the study;

2) specific information, including the type of study, the aims/purpose of the study, the study population, the type of intervention (if applicable), and the data collection instruments;

3) results, including data and conclusions that address faculty members' perspectives and practices concerning the use of UDL in online or hybrid instruction, students' perspectives and experiences concerning the use of UDL in online or hybrid instruction, and practices and factors that appear to be facilitators or barriers to the implementation of UDL in online or hybrid instruction.

3   RESULTS

The initial search in the two selected databases, EBSCO and Web of Science (WoS) produced 399 references. An initial analysis removed 108 duplicate references, leaving 291 references to be screened.

After reviewing the titles and abstracts of those references, 263 articles were rejected because they failed to match the inclusion or exclusion criteria, and 8 papers were not retrievable. The final set to be analysed in search of contributions to the research questions included 20 studies.

3.1 Overview of the examined literature

The selected studies were originated from several continents, including Africa (South Africa, Jordan), America (Canada, United States of America), Asia (Sri Lanka, Philippines, Japan), Europe (Italy, Spain, Ireland, Finland, Norway, Sweden, United Kingdom), and Oceania (Australia).

Most of the studies presented case studies (n=13), six studies were based on survey studies (qualitative or quantitative questionnaires and interviews) and two presented the results of quasi-experimental studies (table 1).

Table 1. Description of the selected studies.

Author, year	Country	Sample (N by groups)	Aim of the study and design
Altowairiki, 2023 [2]	Canada	Nine academics (including instructors, program coordinators and school leaders)	To understand: 1) the roles of academic leaders in supporting UDL incorporation into online learning; 2) how do instructors develop their teaching practices to implement UDL in the design and facilitation of online learning
Awajan, 2022 [3]	Jordan	90 students of English literature	Study the effect of using ADDIE (Analysis, Design, Development, Implementation and Evaluation) model with UDL in English Literature online courses from the perspective of students, and the challenges faced by students in the online courses designed.
Baroni & Lazzari, 2022 [4]	Italy	163 students of Education Sciences	Study the students' perceptions about the blended learning and teaching approach implemented.
Carballo, et al., 2021 [5]	Spain	20 faculty members	Analyse the evolution of faculty conceptions of disability and inclusive education after participating in a b-learning program.
Cloonan, 2022 [6]	Ireland	56 students of Business	Study the students' perspectives about the integration of UDL approach in a learning module using an ePortfolio.
Cosier, et al., 2022 [7]	USA	248 students (preservice teachers)	Study the students' perceptions about the impact and usefulness of the remote learning practices implemented.
Dyjur, et al., 2021 [8]	Canada	Students of Nursing Education	Describe the implementation of an assignment following the UDL framework.
Eftring, et al., 2021 [9]	Finland, Norway, Sweden,	Teaching staff (19, divided in two groups, 9 persons face to face, 10 groups online)	Describe the implementation of online training using the UDL principles.

	United Kingdom		
Fedeli, 2021 [10]	Italy	100 students (preservice teachers)	Analyse the use of technology with inclusive perspectives, their decision-making process, in the direction of the UDL principles.
Garrad & Nolan, 2023 [11]	Australia	107 students of Education	Study the effect of the UDL principles in student engagement and attrition.
Gunawardena & Dhanapala, 2023 [12]	Australia, Sri Lanka	Two teachers (one from each participating country)	Compare the experiences of higher education professors implementing UDL online teaching strategies in developed in developing countries.
Hussain & Sanderson, 2022 [13]	Norway	12 faculty members	Study the implementation of UDL among HE teachers, the challenges they experience, and the support offered by the institutions.
Iniesto, et al., 2023 [14]	Spain	23 students of Computer Science	Analyse the perceptions of students about the usefulness of UDL as an evaluation framework to identify accessibility barriers.
Ismailov & Chiu, 2022 [15]	Japan	225 students of English for Academic Purposes	Study UDL-based asynchronous university courses from the need's satisfaction perspective in self-determination theory.
Ives, 2021 [16]	USA	1731 students of different programs and higher education levels (bachelor to doctorate programs)	Compare students' experiences before and after the transition to online instruction, including the implementation of UDL practices.
Marghalani & York, 2021 [17]	USA	3 students with low-vision	Describe the experiences of low-vision students in online courses, in terms of accessibility and UDL.
Pennazio & Bochicchio, 2022 [18]	Italy	96 students in a e-learning specialization course (in service teachers)	Study the inclusive use of technologies in teaching.
Reyes, et al., 2022 [19]	Australia, Philippines	Students	Analyse the design of online instructional resources for topics in first-year chemistry courses from a UDL perspective
Tunjera & Chigona, 2022 [20]	South Africa	165 students (pre-service teachers) answered the survey 20 students participated in the focus group discussion	Describes the use of multiple platforms and devices during the COVID-19 lockdowns to accommodate diversity.
Wells, 2022 [21]	USA	57 undergraduate programs	Explore the students' perceptions and impact of UDL in virtual learning modalities.

3.2 Perspectives and practices of higher education professors

Six studies provided insights from faculty members perspectives and practices. One essential aspect found in several studies is the need for teacher training in HEI, and it should begin at the administration

and leadership level. Altowairiki [2] concluded that effective leadership at multiple levels is crucial for UDL adoption, starting at the institutional level with a clear vision, policy, resources, and rewards for scholars. Faculty-level support involves hosting open educational dialogue, building networks, and ensuring technical and pedagogical support [2]. Training is a fundamental aspect to promote UDL adoption. In fact, faculty without training may lack general knowledge of inclusive education and UDL, leading to a lack of confidence in certain situations [5]. Lack of training, insufficient time, and absence of practical support from HEI contribute to the challenges in making Digital Learning Materials universally designed [13]. Therefore, training is essential for acquiring practical knowledge about adjustments in educational methods and designing accessible educational resources. Altowairiki [2] proposed that the organization of Communities of Practice (CoP) would be an appropriate way to develop teaching capacity.

Reports about practices implemented by faculty members demonstrate their positive outlook on the implementation of UDL in online or hybrid learning. For, instance, Cloonan [6], while studying the implementation of ePortfolios, concluded that the integration of the UDL approach has proved beneficial for students, providing opportunities for choosing learning paths and connecting with course contents. Thus, ePortfolios were an instrument to engage students, offering various options for expression and to develop personal learning paths. On another study, Cosier et al. [18] also concluded that positive responses to active webinar series suggest that format and design have a direct relationship with participant engagement, and aligning the webinars with specific population needs contributes to high levels of participation satisfaction. In fact, design is a fundamental element in inclusive didactic, supporting the implementation of effective technological paths for diverse students [18]. These authors include, in the concept of inclusive didactics, the teaching strategies and methodologies, participation and involvement, accessibility, motivational/relational aspects, and the use of tools (including digital tools). Cloonan [6] also verified that technology and digital tools engage students, offering various options for expression and engagement.

3.3 Perspectives and experiences of higher education students

Nine studies analysed students' perspectives and experiences of higher education students concerning the implementation of UDL in online and hybrid classes, and most of them present a positive outlook on the potential of that approach. It was also possible to verify that students report a decrease in overall instructional quality after the transition to online learning, with engagement showing the largest drop [16]. Baroni and Lazzari [4] verified that students positively evaluate active teaching methods, valuing active participation, peer confrontation, and freedom to choose topics. In the same line, Garrad and Nolan [11] concluded that multiple means of representation, self-paced learning, and accessibility through technology positively impact students experience, thus increasing student engagement, satisfaction, and decreasing attrition. In general, students value variation over standardization in UDL principles [10], emphasizing a holistic vision, technology support for all, awareness of technology applications, and collaborative strategies. Wells [21] underlines the importance of clear feedback and instructions, real-life connections, collaboration, and time management skills as crucial for student success.

Studies focusing in more specific areas also present positive contributes to the value of UDL in online or hybrid instruction. Marghalani and York [17], studying students with low vision, concluded that several aspects are fundamental to achieve success, as alternative formats for materials, accessible PDF files, headings, and colour contrasting, which are essential for increasing accessibility. Other features, such as audio response and instructor video are also identified as beneficial. Reyes and colleagues [19] concluded that applying the UDL framework in chemistry learning environments has substantial potential for designing a more accessible online learning environment. Awajan [3] also found positive impacts on student performance when online courses use both ADDIE (Analysis, Design, Development, Implementation and Evaluation) and UDL models.

In conclusion, from students' perspective, inclusiveness and equity based on UDL approach positively impact learning outcomes.

3.4 Good practices, barriers and facilitators in the implementation of UDL in online and hybrid classes in higher education

Facilitator's collectively underscore the multifaceted approach required for successful implementation of UDL in online and hybrid learning environments. From educational development opportunities to the

effective use of technology and inclusive teaching practices, these strategies aim to create more accessible, engaging, and effective learning experiences for students in higher education. Nine studies presented good practices or facilitators in the implementation of UDL in online and hybrid classes in higher education, and eight listed some challenges or barriers.

3.4.1 Good practices and facilitators

Educational development opportunities are pivotal in cultivating online teaching capacity for UDL adoption. Altowairiki [2] highlights the significance of providing diverse educational development opportunities, ranging from brief, informal sessions to formal, comprehensive programs. These opportunities are designed to be flexible and customizable, catering to the unique needs of individual instructors. This approach includes offering short one-hour sessions, extensive four-week programs, and various support formats from group sessions to one-on-one coaching, thereby ensuring that educators at all levels have access to the necessary resources to effectively implement UDL in their teaching practices.

Guided practice and application play a crucial role in the facilitation of UDL, as outlined by Cosier et al [7]. The integration of resources like checklists, organizers, handbooks, and step-by-step instructions into webinar formats has been effective in guiding educators through the application of UDL principles. Furthermore, extension activities provide opportunities for participants to engage with and practice the content beyond the confines of the initial training sessions, reinforcing their learning and application of UDL principles. Cosier et al [7]. also emphasize the importance of considerations for formatting and *design in online learning* platforms. This includes ensuring ease of use, providing accessible links to presentation slides and materials, and careful agenda planning. The use of interactive tools is encouraged to support content processing, facilitate formative feedback, and enable participant-to-participant interactions. Additionally, post-session activities are suggested to gather further input from participants and share additional resources.

Dyjur et al. [8] recommend the utilization of free online resources and materials available through online library systems to enhance the learning experience. Instructors are advised to incorporate various forms of multimedia, such as text, videos, recorded lectures, and graphs, to engage learners effectively. Moreover, the authors advocate for assignment flexibility and student choice in online learning environments. They suggest that instructors should allow students to select their topics or assignment formats, providing a list of potential topics to keep students focused and pedagogically on track.

The role of Learning Management Systems (LMS) as facilitators in the application of UDL is underscored by Gunawardena & Dhanapala [12]. A well-equipped LMS is identified as a strong supporter of UDL, offering a centralized and accessible platform for online learning. This includes key institutional responsibilities such as supporting teachers to utilize equitable approaches in their pedagogy and providing professional development opportunities for online teaching. Additionally, motivation among teachers and learners is identified as crucial for effective teaching and learning in online environments. Creating an environment conducive to online learning involves supporting students' autonomy, fostering a sense of relatedness, and ensuring the relevance of material to enhance students' motivation and engagement.

The incorporation of inclusive technologies and teacher training is also essential in the context of UDL. Teachers in training are encouraged to view inclusive technologies not just as tools dedicated to students with disabilities, but as part of a broader spectrum of technologies associated with active teaching methodologies. This includes a range of hardware, software, audio and video resources, applications, sharing tools, and virtual reality, as outlined by Pennazio & Bochicchio [18]. These technologies, when used effectively, can significantly enhance the inclusivity and effectiveness of teaching methodologies.

Reyes et al. [19] demonstrate how UDL principles can be integrated into the design of online learning materials, such as in chemistry courses. This approach allows for multiple means of presentation, interactive elements, and alternative means of assessment, thus catering to diverse learning needs and styles. Tunjera & Chigona [20] highlight the benefits of using multiple platforms synchronously to overcome barriers to accessibility, particularly in resource-constrained environments. This method, guided by the UDL framework, illustrates how educators can optimize access and engagement for all students.

Lastly, Ismailov & Chiu [15] emphasize the need for customization of UDL principles. They advocate for an adaptable approach to UDL, suggesting that it should not be seen as a "one-size-fits-all" framework. Instead, it should be tailored to specific course requirements, optimizing the level of social interaction,

and including a mix of asynchronous and synchronous elements to enhance the overall learning experience.

We can, then, conclude that these facilitators collectively underscore the multifaceted approach required for successful implementation of UDL in online and hybrid learning environments. From educational development opportunities to the effective use of technology and inclusive teaching practices, these strategies aim to create more accessible, engaging, and effective learning experiences for students in higher education.

3.4.2 Barriers and challenges

Challenges and barriers to the implementation of Universal Design for Learning (UDL) in online and hybrid classes in higher education, as highlighted in various studies, reflect a range of issues spanning from institutional constraints to individual resistance.

One significant barrier to the effective implementation of UDL identified by Altowairiki [2] is the lack of sufficient knowledge about UDL among faculty members and students. This gap in understanding hinders the ability to effectively implement and leverage UDL principles in educational settings. Additionally, Altowairiki [2] points out the resistance to changing mindset and tradition in higher education, where shifting away from traditional teaching and learning approaches requires a significant change in mindset and established practices. This resistance can be a formidable obstacle in integrating innovative educational strategies like UDL.

Furthermore, Altowairiki [2] highlights time constraints as a critical challenge for instructors. The time required for increasing teaching capacity and redesigning courses to align with UDL principles is often limited, posing a challenge for educators who wish to incorporate UDL into their teaching. Compounding this issue is the insufficient empirical research on the effectiveness of UDL in higher education, which Altowairiki [2] identifies as another barrier, indicating a need for more comprehensive studies to validate and guide UDL implementation.

Baroni & Lazzari [4] report a specific barrier related to active learning - students find the time allocated for group activities to be insufficient, impacting the overall active learning experience. This reflects a broader challenge in curriculum design where balancing content delivery with engaging, interactive learning experiences is often difficult within constrained time frames.

Technological infrastructure barriers are a key obstacle identified by Gunawardena & Dhanapala [12]. Poor infrastructure affects the effectiveness of online learning, with issues ranging from inadequate internet connectivity to lack of access to necessary digital tools. Personal barriers, such as low motivation, absenteeism, personal issues, and online learning fatigue, further contribute to the challenges in online learning environments. Economic and geographical constraints, including students' low economic status and remote locations, coupled with suboptimal household conditions, also present significant challenges in creating an effective online learning environment. Moreover, Gunawardena & Dhanapala [12] note issues of dishonesty and lack of active participation among some students in synchronous sessions, which undermines the efficacy of online learning.

Iniesto et al. [14] draw attention to the variable needs of students, emphasizing that the diversity in viewpoints and criticism of course design suggests that UDL cannot be applied as a one-size-fits-all checklist. This highlights the necessity for flexible and adaptable course designs that cater to a wide range of student needs. Similarly, Reyes et al. [19] point out that the UDL framework may present an obstacle in learning design, particularly in balancing the provision of multiple options with optimizing online learning resources within the constraints of students' time.

Awajan [3] addresses challenges specific to regions where distance and online learning are relatively new, including a lack of necessary infrastructure like decent internet networks. Furthermore, the shift from traditional assessment strategies to rubrics-based and project/task-based assessments is met with criticism from students who may not be accustomed to these methods. Additionally, students express concerns about the demotivating aspects of online learning, particularly in the absence of audiovisual elements or open video cameras.

Lastly, Hussain & Sanderson [13] highlight an institutional-level challenge: the lack of internal policy on Universal Design. While higher education institutions may express a willingness to support the implementation of Universal Design of Information and Communication Technology (UD of ICT), the absence of a robust internal policy framework on UD poses a significant barrier.

In conclusion, these challenges and barriers seem to underscore the complexity of implementing UDL in online and hybrid learning environments. Addressing these issues requires a multifaceted approach, involving institutional support, faculty training, technological infrastructure improvement, and adaptability in course design and assessment strategies.

4 CONCLUSIONS

This scoping review conducted by the authors under the ERASMUS+ Project SOULSS presents an insightful examination of Universal Design for Learning (UDL) in higher education, particularly in the context of online and hybrid classes. This review, adhering to the PRISMA Extension for Scoping Reviews, aimed to gather a comprehensive understanding of the perspectives and practices of higher education professors, the experiences of students, and to identify the effective practices, facilitators, and barriers in implementing UDL.

4.1 Key Findings

In what concerns faculty perspectives and practices, the study highlighted a significant need for comprehensive teacher training in higher education institutions, emphasizing the role of leadership in promoting UDL adoption. This encompasses not only providing resources and policies but also creating a supportive environment through open dialogue and networking. A notable gap in faculty knowledge about inclusive education and UDL principles was identified, leading to challenges in effectively integrating UDL into digital learning materials. Regarding the student experiences, ww can state that students generally perceived UDL positively, particularly valuing active teaching methods and the variation in learning approaches. However, the transition to online learning was marked by a reported decline in instructional quality and student engagement. The study underscored students' preference for a holistic approach to education that includes technological support and collaborative learning opportunities. On the other hand, concerning facilitators and barriers to UDL implementation, the review identified several facilitators, including the provision of diverse educational development opportunities, guided practice, and the effective use of technology and learning management systems. Despite these facilitators, the implementation of UDL faced barriers such as limited faculty understanding of UDL, resistance to changing traditional teaching methods, technological challenges, and personal barriers like online learning fatigue.

4.2 Final Conclusions

The findings from the scoping review underscore the transformative potential of UDL in enhancing inclusivity and engagement in online and hybrid learning environments. The study calls for robust institutional support and faculty training as key elements in the successful implementation of UDL. It also highlights the necessity of addressing the identified barriers, including bridging knowledge gaps, overcoming resistance to change, and addressing technological and personal challenges. These review's outcomes are instrumental in informing the ongoing efforts of the SOULSS project, aiming to cultivate a more inclusive and effective higher education landscape. The recommendations emphasize a comprehensive approach that integrates policy and practical strategies to effectively implement UDL. This involves a multifaceted effort from educators, institutions, and policymakers to ensure the full realization of UDL's potential in catering to the diverse needs of students in higher education.

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