Universal design principles for emergency remote teaching: educators' perspective in higher education

Принципи універсального дизайну для дистанційного навчання в надзвичайних ситуаціях: погляд викладачів у вищій освіті

Written by:
Olha Pavlenko[1]
https://orcid.org/0000-0003-3233-6361
Sophiya Nikolaeva[2]
https://orcid.org/0000-0003-2522-2059
Anastasiia Syzenko[3]
https://orcid.org/0000-0001-8443-7813
Yana Diachkova[4]
https://orcid.org/0000-0003-3145-6695

Abstract

The COVID-19 pandemic and the war in Ukraine have forced a shift towards emergency remote teaching (ERT), highlighting the need for inclusive and accessible learning environments. This study explores the application of Universal Design for Learning (UDL) principles in ERT, focusing on educators' perspectives in higher education institutions. A mixed-methods approach was used, involving 129 educators from two major Ukrainian universities. Quantitative data from a 5-point Likert scale questionnaire and qualitative data from open-ended responses were analyzed. Findings indicate a positive perception of UDL principles among educators, particularly in promoting student motivation, engagement, and autonomy. However, challenges remain in providing multiple means of representation and ensuring equitable access to technology. This study provides valuable insights into the potential of UDL to enhance ERT quality, emphasizing the need for ongoing faculty development and support.

Анотація

Пандемія COVID-19 та війна в Україні спричинили перехід до дистанційного навчання в надзвичайних ситуаціях (ДННС), що підкреслило важливість створення інклюзивного та доступного навчального середовища. Це дослідження вивчає застосування принципів універсального дизайну для навчання (УДН) у контексті ДННС, зосереджуючи увагу на перспективах його використання викладачами закладів вищої освіти. У дослідженні використано змішану методологію, яка включала участь 129 викладачів з двох великих українських університетів. Проаналізовано кількісні дані, зібрані за 5-бальною шкалою Лайкерта, а також якісні дані з відкритих відповідей. Результати свідчать про позитивне ставлення викладачів до принципів УДН, особливо в частині сприяння мотивації, залученості та автономії студентів. Водночас залишаються труднощі з наданням різноманітних засобів представлення матеріалу та забезпеченням рівного доступу до технологій. Це дослідження підкреслює

[1] Associate professor, Faculty of Linguistics, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine. WoS Researcher ID: C-2620-2016 - Email: olha.v.pavlenko@gmail.com
[2] Full professor, Faculty of Educational Technologies in Philology, Kyiv National Linguistic University, Kyiv, Ukraine, Ukraine. WoS Researcher ID: O-2261-2019
[3] Associate professor, Faculty of Economics, Taras Shevchenko National University of Kyiv, Ukraine. WoS Researcher ID: L-6172-2019
[4] Associate professor, Faculty of Economics, Taras Shevchenko National University of Kyiv, Ukraine. WoS Researcher ID: N-3120-2019

Introduction

This article provides an overview of the challenges faced in higher education due to the dual pressures of the COVID-19 pandemic and the war in Ukraine. It also introduces the concept of universal design for learning and its relevance in emergency remote teaching. Following this, the methodology section outlines the qualitative and quantitative research methods used to gather data from Ukrainian educators. The findings and discussion sections present the results of the study and analyze the implications of these findings in relation to universal design principles. Finally, the conclusion offers practical recommendations for educators and policymakers, emphasizing the importance of resilient and inclusive educational practices in the context of ongoing crises.

Background

The third decade of the 21st century has been marked by a multitude of unprecedented social, economic, and political challenges that have significantly impacted the education system, particularly higher education. The implications of this impact are evident in the adoption of more innovative and flexible approaches to teaching and learning methods. The COVID-19 pandemic has accelerated the digitalization of higher education and remote teaching. As a result, there has been an increase in the complexity of classroom management, greater flexibility in student-teacher and student-student interactions, and heightened time demands in course and lesson design. However, the majority of countries returned to traditional face-to-face teaching with a wider use of digital technologies. In Ukraine, however, the beginning of the full-scale Russian invasion meant that most learners were once again forced to continue their education online. This dual pressure of pandemic and war drives the need for sustainable, adaptive, and resilient educational practices that can withstand long-lasting effects of such challenges.

Educational Disruptions Amidst War

The onset of military action in Ukraine has brought about a whole new set of educational challenges to address. These challenges included safety concerns. For example, students and educators faced physical safety threats caused by air raid sirens and shellings, making it challenging to focus on learning and teaching. There was limited access to educational resources due to frequent interruptions in internet connectivity and blackouts, making it difficult to access online resources and participate in virtual classes. Additionally, the absence of a structured learning environment oftentimes led to decreased motivation and self-discipline. Those who fled the country experienced issues of limited and/or asynchronous communication due to working across different time zones. Trauma-related issues affected students' and educators' mental health and ability to concentrate and engage in learning effectively. Displacement and increased family responsibilities due to war-related disruptions further compounded the challenges. Lastly, there was a change in students' attitudes towards the value of higher education and their career prospects due to the risk of prolonged conflict.

Research Objectives and Scope

This paper aims to address the pressing issue of how the combination of these challenges has affected teaching and learning in Ukraine, as well as the potential long-term consequences. Drawing on qualitative and quantitative data collected from a sample of educators from higher education institutions in Ukraine, this study aims to achieve the following research objectives: a. explore the ways in which emergency remote teaching has affected teaching and learning practices; b. consider the potential impact of the principles of universal design for learning on the quality of higher education and the educators' perceptions of the value of these principles for emergency remote teaching; and c. provide practical recommendations for educators

and policymakers to enhance the effectiveness and inclusivity of emergency remote teaching, both in Ukraine and beyond. The study aims to achieve these objectives by analyzing the experiences of educators in Ukraine. This analysis will contribute to a deeper understanding of the challenges and opportunities associated with emergency remote teaching in extremely challenging circumstances.

Responding to Educational Challenges with Universal Design

In this new reality, education must adapt and maintain the quality of learning and teaching practices to meet the demands of the emergency remote context. The urgency of new developments highlights the need to research and identify effective strategies for digital learning and teaching. Although individual aspects of this problem require further investigation, we believe that addressing emergency remote teaching in a unified manner deserves immediate attention, given the current circumstances in Ukraine. The rushed transition to emergency remote teaching has led to a perception that online learning is once again considered a subpar choice. However, implementing the use of universal design principles for learning can assist educators in creating more accessible and engaging learning experiences that can benefit all learners, regardless of their abilities or backgrounds.

In this study, universal design for learning is viewed as an approach to teaching and learning that provides all learners with equal opportunities to succeed by utilizing a variety of teaching methods to eliminate any barriers to learning. The paper also focuses on emergency remote teaching, which refers to the temporary shift of instructional delivery to an alternate mode in response to crisis circumstances (Hodges et al., 2020).

Significance and Implications of the Study

The study contributes to the ongoing discussion on how to enhance the quality of higher education and increase its accessibility and inclusivity, particularly in the context of emergency remote teaching. By examining the applicability of universal design principles in this context, the study can help identify ways to enhance teaching and learning for all students, including those with disabilities or diverse learning needs. The findings suggest the importance of implementing universal design for learning in higher education to promote accessibility, flexibility, and inclusivity. By applying the principles of universal design of learning to course design for emergency remote teaching, educators can improve the quality of teaching and learning in various learning environments and address the diverse needs of students in a rapidly evolving educational landscape.

The findings also have implications for policy and practice, as they can inform the development of guidelines for emergency remote teaching and the integration of technology in higher education. Ultimately, the goal of this study is to provide practical recommendations for educators and policymakers to improve the effectiveness and inclusivity of emergency remote teaching, both in Ukraine and globally.

Literature Review

This section highlights the critical role of higher education in ERT, focusing on the need for inclusive and flexible teaching strategies. It emphasizes the importance of UDL principles to address diverse student needs, promote equity, and ensure effective learning outcomes. The review discusses how digitalization has expanded access to education, while also acknowledging the challenges of ERT, such as complex course design and limited student-teacher interaction. It concludes that ERT, when informed by UDL, can foster more adaptable and inclusive educational practices, improving both accessibility and learning quality, especially during emergencies.

Higher education's shifting priorities in response to emergency remote teaching

Higher education must play an essential role in transforming both learning and teaching, requiring professionalism from all stakeholders. Bucklow and Clark (2000) suggest in their work that changes and developments in learning and teaching in higher education must ensure the quality of students' learning experiences. In the situation of emergency remote teaching, it is inevitable that classroom management has become much more complex. The interaction between students and teachers, as well as among students, has become much more flexible. Additionally, course and lesson design have become much more time-consuming. This prompts us to revisit the principles of universal design as a means of removing barriers to learning and ensuring equal opportunities for all students, especially in the context mentioned.

As digitalization continues to provide wider access to higher education, its benefits are not limited to education alone but also extend to employment opportunities, entrepreneurship, and innovation in the labour market. According to UNESCO, increasing access to education is crucial for future prosperity, as the global number of students in tertiary education is projected to surpass 260 million by 2025. The availability of open access to education for all learners maximizes the impact of education on society, making it crucial to ensure its success and sustainability (UNESCO, 2015). In light of this, Ukraine is working diligently to support educational institutions and sustain the teaching and learning process. The country acknowledges the critical role of education in shaping the future of its citizens and society.

Digitalization, access, and inclusion in higher education

Improving the quality of education, especially in higher education, requires a systematic approach that incorporates advancements in digitalization and technology into educational management and teaching. Recent advances in digitalization have made significant contributions to research on online tools, platforms, instruments, and technologies in Ukraine and beyond (Syzenko, 2016; Castañeda & Selwyn, 2018; Bozkurt, 2020; Bilytska et al., 2022; Sulym et al., 2023). As a result of these developments, remote teaching practices have become more complex, online tools have become more widely used, and interactions between educational stakeholders have become more open due to the increasing accessibility of the Internet and smart devices. In view of these advances, the risks and benefits of remote teaching are being actively researched, and many of its aspects have received considerable attention from scholars worldwide. Hodges et al. (2020) and colleagues have explored the differences between emergency remote teaching and online learning (Hodges et al., 2020), while Bond (2021) has identified the specific features of emergency remote education at the secondary school level and mapped the emerging field of research in higher education (Bond et al., 2021). Most recent studies into emergency learning suggest that a variety of learning resources play a crucial role in ensuring higher attainment rates (Castañeda-Trujillo & Jaime-Osorio, 2021; Balderas-Solís et al., 2022) and emphasize the importance of developing educators' digital competencies to enhance the quality of higher education (Santos et al., 2022).

Inclusion is taking on a new perspective, as learners may face exclusion from the learning process due to various issues, including physical displacement, limited internet access caused by Wi-Fi jamming or electricity blackouts, threats to physical health, and emotional traumas. Educational institutions are now exploring the advantages of universal design for learning (UDL) to cater to the diverse educational needs of students. Research is also being conducted to explore the potential for increased successful participation in demanding academic programs and careers, such as those in science, engineering, mathematics, and technology (Burgstahler, 2021). The latest studies on ensuring quality in higher education classes delivered remotely conclude that UDL has the potential to improve online learning efficiency and guarantee a desirable online learning experience and quality (Altameemi & Alomaim, 2022). One of the greatest benefits of UDL is that it helps promote inclusion in online learning (Hu & Huang, 2022).

Universal design principles in emergency remote teaching

The UDL theory draws inspiration from the architectural concept of universal design, which emphasizes the design of products and environments that are accessible to all (The Center for Universal Design, 1997). Grounded in Vygotsky's theory, which emphasizes the role of social interaction in cognition (Vygotsky, 1978), UDL has evolved as a response to research that has revealed the limitations of a 'one-size-fits-all' educational approach, especially in meeting the diverse needs of students (Rose & Meyer, 2002). With the aid of advancements in cognitive science and neuroscience, UDL explores how students learn, including memory, language processing, perception, thinking, and problem-solving (Dalton, 2017). UDL is framed as a flexible framework that addresses the obstacle of rigid curricula hindering learner development (CAST, 2011). It emphasizes inclusivity, suggesting that barriers arise from inflexible teaching methods rather than from student capabilities. UDL's evidence-based approach consists of two layers: the conceptual layer, which includes recognition, strategic, and affective networks. These networks involve categorization, thought organization, and engagement, respectively (Al-Azawei et al., 2016).

Universal design principles for emergency remote teaching in higher education can be examined from various perspectives, taking into consideration the framework provided by the Center for Applied Special Technology (CAST, 2018).

Class climate: This category refers to practices that reflect high values regarding diversity, equity, and inclusion (CAST, 2018). In an emergency remote teaching context, it becomes even more crucial to ensure a positive class climate with a strong commitment to diversity, equity, and inclusion. Beyond physical access to lecture rooms, this also includes ensuring equal access to online platforms and resources. Additionally, offering customizable learning paths and flexible assessment methods respects diverse learning styles and abilities. Facilitating regular virtual office hours and discussions promotes an inclusive environment where students can voice their concerns. In remote settings, fostering a sense of belonging through active participation in online discussions and collaborative projects helps to create an equitable and supportive learning atmosphere. By emphasizing empathy and understanding, instructors can proactively address barriers that students might face, ensuring that every learner feels valued and included in the digital classroom.

Physical environments and products: It ensures that facilities, activities, materials, and equipment are physically accessible and usable by all students. Additionally, safety considerations should take into account the diverse characteristics of potential students (CAST, 2018). In the context of emergency remote teaching, this category assumes new implications. Safety considerations extend beyond physical spaces to encompass the online realm. In situations where internet access is unstable, it is advisable to implement alternative measures, such as offering downloadable content for offline use. Clear communication of safety procedures becomes vital, not only for physical activities but also for navigating the online learning environment. Remote teaching must be flexible to address the diverse potential challenges students may face, such as limited internet access or varying time zones. Offering asynchronous learning options, recording lectures, and providing multiple communication channels helps accommodate different circumstances.

Multiple means of engagement: It implies regular and effective interactions between students, with multiple communication methods accessible to all participants (CAST, 2018). In emergency remote teaching, this category requires adaptable strategies that facilitate diverse interactions through accessible communication methods. An example could be the implementation of group projects that involve a diverse range of skills and roles, promoting engagement. It is important to ensure that all participants can contribute effectively, fostering collaborative learning in the virtual environment.

Multiple means of representation: This mostly refers to a variety of instructional methods that are accessible to all learners (CAST, 2018). In emergency remote teaching, this category requires versatile approaches. This should involve utilizing different modes of content delivery, providing options for learning methods, involving students through lectures, collaboration, hands-on activities, online communication, software, and fieldwork, ensuring that all learners have access to diverse instructional pathways, and enhancing motivation and understanding in the remote learning environment.

Information resources and technology: This category suggests that course materials, notes, and other information resources should be engaging, flexible, and accessible for all students (CAST, 2018). In emergency remote teaching, this category requires adaptable practices. An example could be developing an accessible syllabus in advance, allowing students to prepare and arrange alternative formats. This would also involve student-centered communication and ensuring engaging, flexible course materials and notes that cater to diverse learning needs. It is important to enable equitable access for all learners in a remote environment.

Multiple means of action and expression: This category is centered on the regular assessment of students' progress, providing specific feedback on a consistent basis using various accessible methods and tools, and adjusting instruction accordingly (CAST, 2018). In emergency remote teaching, this category involves continuous assessment, personalized feedback, and adaptable instruction. Since more support might be needed, it is advisable to regularly assess student progress and provide specific feedback using a variety of accessible tools. Adjusting teaching based on feedback is another option for supporting learners. Allowing interim submission of assignments and project parts for guidance before the final deadline will promote more effective learning and achievement in a remote setting.

Accommodations: This category deals with accommodations for students whose needs are not fully met by the instructional content and practices (CAST, 2018). In emergency remote teaching, this category includes students with diverse needs, including those who do not have access to reliable internet. Providing alternative material formats and diverse interaction options is necessary for equitable participation.

Addressing individual requirements is crucial to ensuring that all learners can effectively engage in the remote learning environment, thereby preventing the loss of desired learning outcomes during emergency circumstances.

Universal design principles are highly applicable in emergency remote teaching contexts, where educators and learners are compelled to teach and learn in various physical, economic, geographical, and technological circumstances. In tertiary education, principles such as multiple means of engagement, multiple means of representation, information resources and technologies, and multiple means of action and expression are of immediate and critical importance for course and lesson design.

In this paper, we focus on universal design principles that are primarily implemented by educators. These principles aim to enhance interaction with learners and improve the overall quality of teaching and learning. CAST has formulated three core principles aimed at addressing diverse learning needs (Hall et al., 2003). The principle of multiple means of representation pertains to the "how of learning," utilizing diverse methods to present content and accommodating recognition learning. Multiple means of expression, related to the "what of learning," grant students' diverse ways to showcase knowledge, facilitating strategic learning. The engagement principle, which focuses on the "why of learning," provides various options for engaging in effective learning.

By studying the experiences and perceptions of educators, this study aims to provide guidelines and practical implications for better supporting educators in managing remote teaching. The study also seeks to apply universal design principles and address the personal impact of different emergency situations. As emergency remote teaching requires continuous revision and improvement of instructional practices, educators become primary agents who can introduce systemic changes to evolving educational needs.

Moreover, this study attempts to enhance understanding of the practical impacts of ERT on UDL-informed teaching practices teaching as a certain debate persists among scholars with regard to risks associated with inability to incorporate UDL principles effectively. Additionally, there are concerns that the focus on ERT might divert attention and resources away from sustained UDL efforts in favour of short-term solutions. Conversely, we argue that ERT may provide an opportunity to apply UDL principles more broadly and creatively, leading to more adaptable and inclusive educational practices, however as the findings of this study suggest, to this end a significant commitment is required from educators.

A key debate in the literature on technology use in education during crises revolves around the balance between the urgent adoption of ERT and the long-term application of UDL principles (Hodges et al., 2020; Bond, 2021). While ERT offers immediate solutions, its focus on short-term responses and the rush to implement ERT could detract from sustained efforts to innovate pedagogy, suggesting that a long-term commitment to UDL could be compromised. However, others see the crisis as an opportunity for more sustainable integration of UDL, which is essential for inclusivity and accessibility in education (Markou, & Díaz-Noguera, 2022).

As demonstrated by literature review, there is considerable scholarly interest towards the intersections of universal design and emergency remote learning and teaching, which allows us to seek better understanding of challenges and opportunities in applying both in emergency environments. We conclude that application of UDL principles in higher education may have significant benefits for the quality of learning, particularly in emergencies, and help ensure equitable access to education by addressing issues of inclusivity and adaptability. The key, in our understanding, lies in balancing immediate needs with long-term goals, ensuring equitable access, and fostering innovative pedagogical practices.

In conclusion, UDL offers significant potential in making ERT more inclusive and adaptable, yet debates remain about balancing immediate ERT needs with sustained UDL efforts. In higher education, a strategic approach is necessary to ensure the long-term adoption of UDL principles is essential for transforming education in a way that addresses diverse learner needs.

Methodology

The study is based on qualitative and quantitative data collected from 129 educators representing 16 fields of knowledge. These fields include education, humanities, social and behavioural sciences, economics, international relations, management, public administration, sciences, healthcare, law, construction and

technologies, IT, electrical engineering, electronics and telecommunications, civil defense, and chemical and bioengineering. The data was collected from the two largest higher educational institutions in Ukraine. The purpose of the questionnaire was to analyze the current situation in academia, examine participants' attitudes and beliefs towards applying principles of universal design to course design, and identify how this affects emergency remote teaching in higher education. In this study, our aim was to determine whether applying the principles of universal design for learning, which include providing multiple means of engagement, representation, action, and expression, to emergency remote teaching can assist educators in improving teaching and learning outcomes by addressing the diverse needs of students in various learning environments. As the majority (79%) of the respondents are between the ages of 35 and 54 and have 10 to more than 20 years of working experience, we can conclude that the survey results reflect the perspectives of experienced educators who have worked in higher educational settings for a significant amount of time. To investigate the attitudes and experiences of educators, we developed an anonymous questionnaire consisting of 21 closed-ended statements. The statements were rated on a 5-point Likert scale, and participants were given the option to provide comments for each statement. The questionnaire was distributed online through the internal professional networks of two universities. Thus, the first principle, "Multiple means of engagement," is represented in the first section of the questionnaire by questions 1–9. The second principle, "Multiple means of representation," is covered by questions 10–14. Lastly, the third principle, "Multiple means of action and expression," is highlighted by questions 15–21. The English version of the questionnaire is presented in (Table 1).

Table 1.
Questionnaire: Universal design for learning in emergency remote teaching

Q1	Section 1–Multiple means of engagement Transferring to emergency remote teaching (ERT) had a considerable impact on my learners' motivation.				
	1 – strongly disagree	2 – disagree	3 – not sure	4 – agree	5 – strongly agree
Q2	Transfer to emergency remote teaching (ERT) had considerable impact on my learners' personal coping skills and strategies				
	1	2	3	4	5
Q3	When I invite learners to make their individual choices of learning strategies for remote learning, they become more purposeful.				
	1	2	3	4	5
Q4	When I give learners more autonomy in their remote learning, they feel more committed.				
	1	2	3	4	5
Q5	I feel confident in using a variety of tools and strategies for providing my learners with autonomy in their remote learning.				
	1	2	3	4	5
Q6	I know how to minimize threats and distractions during remote learning to help my learners to stay focused on the task.				
	1	2	3	4	5
Q7	When I show how collaboration can foster their remote learning, learners feel more motivated.				
	1	2	3	4	5
Q8	When I explain the relevance and value of the task, learners demonstrate higher motivation.				
	1	2	3	4	5
Q9	I feel confident in using a variety of tools and strategies for developing learners' self-assessment and reflection when learning remotely.				
	1	2	3	4	5
Q10	Section 2 – multiple means of representation When I transferred to ERT, I had to customize all the materials.				
	1	2	3	4	5
Q11	My lesson materials for remote learning offer ways of customizing the display of information				
	1	2	3	4	5
Q12	I ensure that the tasks in remote learning courses can be Illustrated through multiple media				
	1	2	3	4	5
Q13	I design the tasks so that they activate or supply background knowledge				
	1	2	3	4	5
Q14	My lesson materials are designed so that they guide information processing and visualization in digital environment				
	1	2	3	4	5
Q15	Section 3–Multiple means of action & expression When I transferred to ERT, I had to revisit my approaches to supporting my learners practice and performance				
	1	2	3	4	5
Q16	I know how to optimize access to tools and assistive technologies.				
	1	2	3	4	5
Q17	When I teach remotely it is less challenging to vary the methods for response and navigation				
	1	2	3	4	5
Q18	When I teach remotely it is less challenging to provide options for expression and communication				

	1	2	3	4	5
Q19	I feel confident in providing my learners with the tools and strategies for appropriate goal setting, planning and strategy development, managing information and resources for their remote learning.				
	1	2	3	4	5
Q20	ERT enhances capacity for monitoring my learners' progress				
	1	2	3	4	5
Q21	Applying the principles of multiple means of engagement, representation, action and expression to ERT improves and optimizes teaching and learning.				
	1	2	3	4	5

Results and Discussion

The results obtained in this study highlight significant challenges in emergency remote teaching, particularly in maintaining learner engagement and motivation. Overall, as findings demonstrate while some students adapted well, with increased responsibility and focus, a notable portion of educators encountered difficulties, especially with younger or less experienced learners. Offering autonomy and choices to students, while beneficial for many, also may lead to decreased participation and engagement for others. Furthermore, the transition exposes gaps in educators' skills, particularly in managing distractions, utilising digital tools effectively, and promoting active engagement. These challenges may give a better understanding of practical implications of emergency remote teaching in higher education settings in order to provide more targeted support to both learners and educators. In the section below we are going to look deeper into 'educators' experiences and interpret them from the point of view of UDL.

Multiple means of engagement

The findings suggest that 50% of the educators surveyed strongly agree and agree that the transition to remote teaching had a considerable impact on learners' motivation. They have become more motivated and focused on studying. However, 23% strongly disagree or disagree with this statement. Almost 27% neither agree nor disagree with this statement. Several respondents added additional comments to this statement, starting with the fact that remote teaching has had a positive impact on master students but a negative impact on first- and second-year bachelor students. They also mentioned that students have become more responsible, attendance has increased, and participation has improved. Additionally, they noted that average students have disappeared, and those who are truly motivated have become even more so. Several more mentioned that "the motivation does not depend on the format", "those who were motivated remained so." Another respondent reckoned that "new digital technologies have compensated for the lack of face-to-face contact."

62% of educators acknowledge that emergency remote teaching had a significant impact on learners' personal coping skills and strategies. Interestingly, respondents mentioned the impact of emergency teaching on their own coping strategies, recognizing that it "was an issue" and that "the transfer was not easy for me." Some mentioned that their previous experience with online learning during the COVID-19 pandemic has facilitated the transition, while others noted that "new skills have also brought new challenges."

When it comes to giving learners choices and autonomy in remote learning, the vast majority (over 78%) of respondents agreed or strongly agreed that this increases commitment and purposefulness in learning. Respondents commented that "students learn better when there are no boundaries set by the teacher," "choices help in making realistic decisions," and "everyone has to choose what is most convenient." However, the issue of autonomy raised concerns among 21% of those who disagreed with statement 4.

They commented that there should be no autonomy in selecting methods, syllabuses, or literature. They also mentioned that autonomy must be controlled and that too much autonomy leads to skipping lectures. Despite this, 73% of respondents feel confident in using various tools and strategies to promote learner autonomy in remote learning and believe that these methods "enhance student engagement." Here too, some mention challenges such as "students having very limited access to the Internet" and "the need for a variety of tools." Others mention the lack of their own repertoire of tools, starting with "I am experimenting, and if something works well, I try to use it regularly" and "I am still learning to use the tools."

Similarly, a vast majority of educators (79%) acknowledge the positive impact of collaboration on learners' motivation. They also recognize the importance of demonstrating the relevance and value of the task to promote higher engagement with it. Despite this overall positive attitude, there are those who comment that

"many prefer to work on their own. Learners themselves claim to be asocial and not wanting to work together." Additionally, there is often no time to explain the value of a task.

Interestingly, 44% of educators recognize that they do not know how to minimize threats and distractions during remote learning and help learners stay focused on the task. Only 18% believe they know how to do it. Respondents mention a lack of experience and that they need to "go through trial and error" and "experiment" to achieve this aim. Finally, 64% of respondents feel very or quite confident in using a variety of tools and strategies to develop learners' self-assessment and reflection skills when learning remotely. They comment that "developing learners' skills in giving and receiving feedback promotes the development of their competences" and "allows learners to evaluate their progress." On the other hand, 36% of respondents feel less confident and report limited use of self-assessment and reflection tools and strategies in remote teaching.

Overall, the findings suggest that multiple means of engagement prove to be beneficial for both educators and learners in higher education. These means foster collaboration, individual choice and autonomy, relevance and value of tasks, and authenticity of course materials. Additionally, they minimize threats and distractions in the educational process. Keeping up with this principle in course and lesson design offers opportunities for learners to regulate themselves, thereby increasing their motivation, facilitating the development of personal coping skills and strategies, and fostering self-assessment and reflection.

Multiple means of representation

According to the UDL principles, a variety of means of representation is vital for ensuring equal access to learning and achieving learning outcomes. 48% of all respondents admitted that they had to customize all the materials when they transitioned to emergency remote teaching, while another 48% claimed that only some of the materials had to be customized. In response to this statement, some commenters mentioned that "customization occurs regularly" and is a "dynamic process." Others mentioned that teaching strategies and approaches, rather than materials, required customization.

The vast majority (93%) of respondents agreed and strongly agreed that their lesson materials for remote learning offer ways to customize the display of information. Some respondents even mentioned that "more variety should be offered to learners." However, a slightly lower number of respondents (80%) agreed that they ensure tasks in remote learning can be illustrated through multiple media. Many commented that "more effort could be taken in this respect" and that "more options should be provided."

The statement regarding whether tasks are designed to activate or provide background knowledge received strong agreement from 53% of respondents and agreement from 32%. Comments from respondents emphasized the successful use of "integrated tasks" and combinations of "background knowledge and new knowledge activation." Finally, 84% of respondents agree and strongly agree that their lesson materials are designed to facilitate information processing and visualization in a digital environment. Several respondents commented that "a lot depends on the discipline."

While the findings of the survey suggest that most respondents are confident in their ability to provide various means of engagement in the classroom, it is important to consider that learners' perspectives may differ. Therefore, a thorough study of learners' experiences is necessary to draw any definitive conclusions on this matter.

Multiple means of action and expression

The variety of means of action and expression represents an important factor in the effectiveness of learning. 87% of respondents agree and strongly agree that they had to reassess their approaches to support learners' practice and performance after transitioning to emergency remote teaching, while 18% of respondents admit that they are unsure how to optimize access to tools and assistive technologies. 42% of respondents agree that remote teaching makes it more challenging to vary the methods of response, and 34% admit that remote teaching has made expressions and communication more difficult in the remote environment. Comments suggest that despite the potential of many creative methods, there are often problems with connection, technical glitches, and other issues that can make it impossible at times. 29% of respondents admit that they do not feel confident in providing learners with the tools and strategies for appropriate goal setting, planning, strategy development, and managing information and resources for remote learning. Even a larger

share of respondents (32%) doubt that emergency remote teaching enhances the capacity for monitoring learners' progress. Commenters mention the deficiencies of video-conferencing tools and applications, as well as the lack of live communication with learners. Finally, almost 70% of respondents agree that applying the principles of multiple means of engagement, representation, action, and expression to ERT improves and optimizes teaching and learning.

Overall, the findings suggest that the vast majority of respondents demonstrate awareness of the importance of utilizing various methods of action and expression in remote emergency classrooms and express confidence in their ability to use them effectively. However, comments shed light on the fact that many educators also realize their limitations and acknowledge the need for training in using tools and technologies. They express a desire to develop their skills and competencies.

The data collected from responses to the questionnaire provided insights into educators' attitudes and experiences regarding the application of UDL principles to course design and remote teaching in emergencies.

The questionnaire structured around the three principles of UDL, namely multiple means of engagement, representation, and action and expression was intended to probe the perspectives of educators on the impact of emergency remote teaching on learners' motivation and coping skills, as well as on the effectiveness of strategies such as providing autonomy and multiple choices in learning.

The findings highlight the realization among educators of their limitations in using tools and technologies, and their expressed need for training to develop relevant skills and competencies. This is in line with findings of similar research conducted by Markou & Díaz-Noguera (2022) in secondary education, which highlights the necessity for tailored training and professional development for educators at all levels of education to effectively implement the UDL principles in their teaching practices with a focus on leveraging technology and modern teaching tools in the context of emergency remote teaching.

Effective use of UDL principles can potentially lead to improved engagement among learners, the development of coping skills in crises and emergencies, and autonomy and purposefulness in learning. This requires investing in UDL-based approaches to course design and emergency remote teaching making it a valuable resource for institutions, policymakers, and academic professionals. This study contributes to the need to advocate for the integration of UDL principles into higher education, aligning with the evolving educational landscape and the increasing significance of remote teaching methodologies.

A limitation of this study is the relatively small sample size of respondents, with 129 educators representing just over 3% of the total faculty from two universities. The rationale for the sample size is twofold. First, this study aims to provide an in-depth examination of the experiences and challenges faced by educators during the transition to emergency remote teaching in the specific context of armed conflict in Ukraine. By selecting a smaller, yet diverse, group of participants, we were able to gather qualitative and quantitative data that offer insights into the unique dynamics of this context. Second, the study also serves as an initial exploration of the application of UDL principles in this setting. In future research, we intend to address this limitation by expanding the sample size to include a larger and more diverse representation of educators in Ukraine. Additionally, we will evaluate how their attitudes towards UDL change over time. A comparative study with a larger sample can further validate the effectiveness of implementing UDL on a broader scale, especially in the context of crises and emergency remote teaching.

Recommendations

To enhance the quality of emergency remote teaching, it is crucial to focus on recommendations that prioritize raising awareness and implementing universal design principles. To achieve this, the following recommendations can be made:

1. *More awareness is needed to understand the principles of universal design and how they can improve the quality of remote emergency learning.*

The implementation of universal design principles can greatly enhance the quality of remote emergency learning. These principles encompass a variety of strategies and techniques that can guarantee the accessibility and usability of learning materials for all students, regardless of their backgrounds, abilities,

or learning styles. Educators must be made aware of the importance of these principles and how they can be applied in the context of remote emergency learning. By doing so, educators can ensure that all students have equal access to learning opportunities and can reach their maximum potential.

2. *Educators need training to develop the appropriate skills and master the necessary tools.*

Faculty-wide or university-wide guidelines would benefit both educators and students. To effectively cater to the diverse needs of learners in remote emergency learning, it is crucial that educators utilize multiple methods of presenting information. This can include a combination of text, images, audio, and video. However, educators must be trained to develop the necessary skills and master the appropriate tools in order to effectively utilize these multiple means of presentation. Faculty-wide or university-wide guidelines can ensure that educators are aware of the best practices in this regard and can effectively utilize them to cater to the diverse needs of learners. This would ultimately benefit both teachers and learners by improving the quality of remote emergency learning.

3. *Training is necessary to enhance teachers' skills in classroom management and methods of interaction in remote teaching environments.*

Effective classroom management and modes of interaction are essential for successful remote teaching. However, many educators lack the necessary skills and training in this area. Additional training in the form of webinars, workshops, and other resources can help educators develop these skills and become more effective at managing remote classrooms and interacting with students in virtual settings. Such training can help educators navigate the challenges of remote emergency learning and provide a positive and engaging learning experience for their students.

4. *Self-control and self-assessment should be incorporated into continuing professional development (CPD) programs for educators.*

Continuing professional development courses provide educators with opportunities to enhance their skills and knowledge. However, these courses often overlook issues of self-control and self-assessment, which are crucial for success in remote emergency learning. Educators should receive training in order to develop self-control and self-assessment skills. These skills will enable them to effectively manage their time and workloads, as well as evaluate their own performance in the context of remote emergency learning. By incorporating these issues into CPD courses, educators can enhance their overall effectiveness in remote emergency learning and provide a more enriching learning experience for their students.

To summarize, in response to the urgent need to improve the quality of emergency remote teaching in Ukrainian higher education, institutions should focus on building educator awareness of universal design principles. In particular, this can be achieved by delivering specialised training on multimodal information presentation (e.g., using advanced text, audio, and video tools), enhancing skills in virtual classroom management and interaction (e.g., using breakout rooms for group work, implementing digital tools for real-time feedback), creating university-wide best practice guidelines, and incorporate self-assessment and self-control techniques (e.g., reflective journals, time management workshops) within professional development programs.

Conclusions

UDL has been developing over the past 20 years, receiving significant recognition for its ability to support diverse learners. By combining UDL principles with ERT, this study highlights their potential to provide educators with both theoretical and practical tools to effectively address the needs of students, complementing existing research and offering actionable insights for future educational practices.

The findings of this study contribute to better understanding of where the educators stand when it comes to ensuring inclusivity and accessibility when faced with emergency remote teaching. Data collected form 129 educators who have first-hand experience of remote teaching in times of war sheds light on real challenges experienced in such circumstances and provides insight of what is needed to effectively support the quality of teaching in higher education. These findings complement existing studies in secondary education and allow policymakers to see the need and develop a comprehensive training and professional development programmes on UDL in emergency remote teaching for all levels of education.

Practically, effective use of UDL principles can potentially lead to improved engagement among learners, the development of coping skills in crises and emergencies, and autonomy and purposefulness in learning. This requires investing in UDL-based approaches to course design and emergency remote teaching making it a valuable resource for institutions, policymakers, and academic professionals. By fostering inclusive and adaptable learning environments, UDL can build resilient practices that equip students with problem-solving skills and empower educators to implement flexible teaching strategies, allowing both to effectively manage and sustain learning through unforeseen disruptions. This study contributes to the need to advocate for the integration of UDL principles into higher education, aligning with the evolving educational landscape and the increasing significance of remote teaching methodologies.

Overall, this study demonstrates that the quality of remote emergency teaching can significantly enhance learning experiences in challenging circumstances. Raising awareness of universal design principles ensures accessibility for diverse learners, while providing educators with training to master necessary tools and develop skills in classroom management enhances instructional effectiveness. Faculty-wide guidelines and continuous professional development that include self-control and self-assessment are crucial in fostering educators' ability to adapt to remote learning environments. By addressing these areas, institutions can ensure equitable access to quality education and support educators in delivering engaging, effective remote learning experiences for all students.

Finally, in order to truly understand whether the efforts taken by educators are sufficient to maintain the quality of higher education in remote environments, additional research is needed to examine the learners' perspective. This may yield some important insights similar to those in the latest study by Galarce-Miranda et al. (2022), where the findings assist in designing better and more effective methods to meet the evolving needs of learners (Galarce-Miranda et al., 2022). While educators may be implementing various strategies and techniques to ensure that learning continues uninterrupted in remote environments, it is important to determine whether these efforts are meeting the needs and expectations of students.

Future research on UDL should address challenges like traditional mindsets, limited digital resources, and technology integration, focusing on practical strategies for diverse contexts and ERT in particular. Studies could explore UDL's role in online education, multilingual settings, and inclusive practices, emphasizing administrative support, stakeholder involvement, and teacher training. Expanding the research base will help educators implement effective, inclusive practices globally.

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