EDUCATORS' INITIAL REACTIONS TO UNIVERSAL DESIGN PRINCIPLES AND IMPLEMENTATION PROSPECTS DURING ONLINE PROFESSIONAL DEVELOPMENT

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ABSTRACT

This study investigates the implementation of Universal Design for Learning (UDL) principles through an online professional development module designed for educators in Latvia. The research focuses on the emotions and perceptions of 264 educators as they experience UDL during a four-hour training session. Utilizing a comprehensive methodology that includes unstructured surveys, the study explores how educators feel about the flexibility and choices provided by UDL principles. The findings reveal that educators responded positively to the ability to choose between different task formats and ways of answering tasks. This flexibility heightened their satisfaction and interest during professional development. The study underscores the significance of offering choice and modeling UDL principles during professional development, which fosters a supportive and inclusive teaching environment. Moreover, the results highlight the role of experience exchange and knowledge sharing among educators as critical components in the professional development process. These elements contribute to a more engaging and effective learning experience for educators. This research adds insights to the existing literature on UDL, emphasizing the importance of practical application and emotional engagement in professional development. Overall, the study suggests that integrating UDL principles into professional development can positively influence educators' perceptions of inclusive teaching practices. The positive emotional responses to choice and flexibility underscore the need for adaptable instructional strategies that cater to diverse learner needs, ultimately promoting a more equitable and accessible educational landscape.

Keywords: Universal Design for Learning; UDL; universal design; teacher professional development; online training; emotions.

Introduction

In 2021/22, educational systems prioritized equity and inclusion in their policy agendas, leading to alterations in curriculum approaches and the customization of both

instructional and additional support services for students (Varsik, 2022). Universal Design for Learning (UDL) is a framework that aims to create inclusive and effective learning environments by accommodating diverse learner needs (Thoma et al., 2023; CAST, n.d.). This study explores the implementation and impact of UDL principles during a four-hour online professional development training module designed for educators. The module was a key element in a two-year professional development course focused on enhancing educators' digital competencies. The research delves into the experiences of 264 educators, spanning various educational levels, who participated in the digital module. Employing a methodology that includes three unstructured surveys, the study investigates educators' reflections on learning activities, including emotions, content, and progress toward individual learning goals, particularly emphasizing the practical application of UDL principles.

UDL is an innovative educational framework designed to provide inclusive and efficient learning environments that accommodate the different needs of learners (Novak, 2022). At its core, UDL recognizes the inherent variability in learners, acknowledging that individuals possess unique strengths, challenges, and preferences in their approaches to learning. According to Ribeiro et al. (2021), the framework strives to break away from the traditional one-size-fits-all educational model by providing a flexible and adaptable structure that accommodates this diversity. UDL aims to enable educators to create instructional strategies and materials that accommodate a diverse range of learning styles, skills, and backgrounds by providing multiple options for presenting information, engaging students, and expressing understanding.

In embracing UDL, educators are prompted to proactively consider how students comprehend information, engage with content, and express their understanding. This proactive approach not only addresses the needs of students with diverse abilities, including those with learning disabilities as well as gifted students (Connor & Wheat, 2023), but also benefits the entire student population, creating a more inclusive and enriching educational experience. Griful-Freixenet et al. (2021) determined that the overarching goals of UDL are to dismantle barriers to learning, promote equity and accessibility, and ultimately cultivate a learning environment where every student can thrive and reach their full potential.

As education continues to evolve, UDL stands as a cornerstone, advocating the belief that diversity is not a hindrance but a valuable asset that, when embraced, leads to more robust, engaging, and effective learning experiences for all. On this basis, the following research question was framed for the present study:

"What are the teachers' emotional reactions to tasks designed according to the Universal Design for Learning (UDL) principles in the professional development process?"

Understanding the answers to this research question is crucial as they provide insights into educators' emotional responses toward flexibility in actualization tasks (following Gagne's Nine Events of Instruction), which can significantly influence their engagement and effectiveness in the professional development. Finally, building on this knowledge

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can lead to more tailored professional development training and contribute to the overall improvement of educational quality and accessibility.

Literature Review

The concept of UDL, as outlined on the website of the Center for Applied Special Technology (CAST), has gained prominence in recent decades in educational research and practice due to its emphasis on fostering inclusive learning environments. At its core, UDL advocates for providing multiple means of representation, engagement, and expression to accommodate the diverse needs and learning styles of all students (Shin, 2022). This pedagogical framework recognizes the inherent variability among learners and seeks to address this diversity through flexible and adaptable instructional strategies.

The literature on UDL emphasizes the importance of providing multiple means of representation, engagement, and expression in educational settings. According to Ribeiro et al. (2021), educators play a pivotal role in the successful implementation of UDL, requiring both understanding and commitment. The existing research underscores the need for professional development opportunities that enhance educators' capacity to integrate UDL into their teaching practices. Teacher training should include, in its curricula, practices and evidence that support teachers in developing skills for working in inclusive contexts (Rusconi & Squillaci, 2023). Additionally, Griful-Freixenet et al. (2021) noted that studies have shown that when educators experience positive emotions and satisfaction during UDL implementation, they are more likely to continue applying these principles in their teaching.

Educators are essential agents in the successful implementation of UDL, playing a pivotal role in shaping inclusive and effective learning environments. According to Saab et al. (2021), to apply UDL principles effectively, educators must possess a deep understanding of the framework's core tenets, which encompass providing multiple means of representation, engagement, and expression. This understanding involves recognizing and addressing the diverse learning needs of students and acknowledging that one-size-fits-all approaches may not be conducive to optimal learning outcomes. Educators must be well-versed in the principles of UDL to tailor their instructional strategies, materials, and assessments to meet the unique needs of all learners in their classrooms (Craig et al., 2022).

However, understanding alone is not sufficient; commitment is equally crucial for successful UDL implementation. Mansir and Karim (2020) identified that educators must be dedicated to embracing and consistently applying UDL principles in their teaching practices. This commitment extends beyond mere theoretical knowledge, requiring educators to actively integrate UDL strategies into their daily instruction, adapt lesson plans, and create an inclusive learning environment that accommodates various learning styles and abilities. According to Hayward et al. (2022), the commitment to UDL involves a willingness to invest time and effort in ongoing professional development, staying abreast of best practices, and continuously refining teaching methods to foster an inclusive educational

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experience for all students. In essence, educators serve as catalysts for change, driving the transformation of traditional educational approaches into dynamic and inclusive learning environments through their understanding and unwavering commitment to UDL principles. Such commitment is forged through the practical application of UDL principles, shaping the professional advancement of individuals and their students.

Multiple Means of Representation

One key tenet of UDL is the provision of multiple means of representation, acknowledging that learners vary in their abilities to perceive and comprehend information. There is not one means of representation that will be optimal for all learners (Meyer et al., 2014). In the view of Saab et al. (2021), this principle advocates for presenting content in diverse ways, such as through visual, auditory, and kinesthetic modalities. By offering varied representations of information, educators can cater to different learning preferences, ensuring that each student has equitable access to the curriculum. This approach not only supports students with diverse learning needs but also enhances the overall learning experience for the entire classroom.

Multiple Means of Engagement

UDL also underscores the importance of providing multiple means of engagement to capture and maintain students' interest and motivation because learners differ in how they perceive and comprehend the information presented to them. Mansir and Karim (2020) identified that in view of students having different interests, preferences, and levels of engagement, educators are encouraged to offer a variety of instructional methods, materials, and activities. This approach ensures that students can connect with the content in ways that resonate with their individual interests and learning styles. According to Hayward et al. (2022), multiple means of engagement contribute to a more inclusive and dynamic classroom environment by fostering a sense of relevance and personal connection.

Multiple Means of Expression

The third pillar of UDL focuses on providing multiple means of expression, allowing students to demonstrate their understanding and knowledge in diverse ways. This principle recognizes that students have varying strengths and challenges in terms of communication and expression (Derakhshan et al., 2021). By offering options for how students can express themselves, such as through written, oral, or visual formats, educators empower learners to showcase their abilities and understanding in a manner that aligns with their strengths. This flexibility not only accommodates diverse learning styles but also promotes a more inclusive assessment approach (Rusconi & Squillaci, 2023).

The literature on UDL underscores the fundamental importance of providing multiple means of representation, engagement, and expression in educational settings. Embracing these principles supports the diverse needs of individual learners and contributes to the creation of inclusive learning environments (Lee, 2021). By recognizing and valuing

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learner variability, educators can design instruction that is responsive, flexible, and accessible, ultimately enhancing the educational experience for all students. Through the implementation of multiple means, UDL seeks to promote equity, engagement, and academic success in the diverse landscape of today's classrooms. UNESCO's Global Education Monitoring Report (2020) suggests that in order to provide equitable learning opportunities to all students in a classroom, UDL should be embraced at the governmental level, integrating it into the inclusive education policies of nations worldwide.

Methodology

The present study employed a four-hour online professional development training module designed for educators focusing on UDL. This study employs a mixed-methods approach (qualitative analysis and quantitative analysis) to analyze the impact of a four-hour online UDL-focused professional development module on 264 educators. The module included an introductory video and various digital resources, such as Genially, Padlet, and Moodle, allowing educators to choose the tools most relevant to their needs. Data was collected through three unstructured electronic surveys, which prompted educators to reflect on their experiences with UDL principles, the learning content, and their progress towards individual learning goals.

The first survey contained two open-ended questions: "How did you feel when you were given a choice between different formats while completing the actualization task?" and "How did you feel when you could choose the way to answer the actualization task?" The second survey contained three open-ended questions: "Did the tasks proposed in the independent work and the lesson help you progress toward the planned lesson result, and if so, how?", "What did you find most valuable when doing independent work and participating in the lesson?" and "What would you have liked to have done differently?" The third survey contained two open-ended questions: "What was your biggest success while carrying out your learning goals?" and "What was your biggest challenge while carrying out your learning goals?" The survey also provided a free text field for participants to express any further opinions and comments.

The data was collated in a Google Spreadsheet before content analysis was performed. Initially, all texts were translated into English using Google Translate to avoid any potential bias from author translation while also making the most of the language model capabilities of wordcounter.net. Next, word count and weighted percentages were computed to identify the most frequently used words for each open-ended question in the first and second surveys, and filters to exclude irrelevant words were applied. For larger amounts of text, word combinations of two words were counted instead of singular words. All words or word combinations mentioned at least five times were included in the analysis; in some datasets, words and word combinations mentioned fewer than five times were also reviewed to determine if they aligned with broader categories of words already summarized. Afterward, similar words were grouped. For deeper analysis of the results, all participant responses were read, discussed, and interpreted by multiple researchers,

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applying a double-blind approach. A similar approach was applied to analyze the surveys. Quotations from the comments provided by research participants, translated by the authors to convey their ideas accurately, were incorporated into this article to support the interpretations presented by the authors.

All procedures conducted in studies involving human participants adhered to the ethical standards set by the institutional and national research committee. The research followed the principles outlined in the 1964 Helsinki Declaration and its subsequent amendments, or comparable ethical standards, and complied with GDPR. Participants were duly informed that the data collected in the survey might be utilized for research purposes, and the organizers of the learning event gave explicit written permission to use the data in research. Additionally, the research methodology received approval from the Ethics Committee of the University of Latvia (Riga, 08.03.2023, Nr. 71-46/55).

Results and Discussion

Emotions amongst educators when experiencing and applying UDL principles

The results of the study reveal insights into educators' emotions and perceptions regarding UDL principles. The first survey (Table 1) indicates that educators felt positive emotions when given choices in task formats. The first survey revealed that educators experienced predominantly positive emotions when given choices in task formats and methods of response. Words like "choose," "like," and "options" were frequently mentioned, indicating that the flexibility offered by UDL principles resonated well with participants. This suggests that the integration of choice and autonomy in professional development modules can significantly enhance educators' engagement and satisfaction.

Table 1   Word count and frequency for the first survey question: "How did you feel when you were given a choice between different formats while completing the actualization task?"

Word	Count	Frequency, %
choose	18	4
like	17	4
options	16	4
task	15	3
choice	14	3
could	10	2
good	5	1

Table 2 highlights the positive sentiments offered when educators could choose how to give their answers in the task. This also underscores the positive emotional impact of having options in the learning process.

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Table 2   Word count and frequency for the first survey question: "How did you feel when you could choose the way to answer the actualization task?"

Word	Count	Frequency, %
like	15	4
good	13	3
choose	11	3
could	10	2
interesting	9	2
more	8	2
very	8	2
most	5	1

The findings from the first survey (Table 1) underscore a significant connection between educators' emotional experiences and the provision of choices in task formats within the UDL framework. The data reveals a prevailing sense of positivity among educators, as evidenced by expressions of liking and satisfaction. Derakhshan et al. (2021) also mentioned that when educators are granted the autonomy to choose from various task formats, it engenders a favorable emotional response. This positive sentiment suggests that integrating flexibility and choice in instructional tasks resonates well with educators, potentially enhancing their engagement and satisfaction in the learning process. Fostering positive learning experiences for teachers in professional development programs is crucial for enhancing their effectiveness and efficiency in the educational environment (Seprudin, 2024). The correlation between positive emotions and the freedom to choose task formats underscores the importance of incorporating such adaptable approaches into educational methodologies, providing insights for educators and curriculum designers seeking to create more inclusive and engaging learning environments.

Table 2 sheds light on the positive sentiments experienced by educators when provided with the option to choose how to give answers during the actualization tasks. The findings reveal a prevailing sense of liking and goodness among participants, indicating a favorable response to the flexibility inherent in the learning experience. Educators expressed a sense of satisfaction and appreciation for the ability to choose their preferred methods of response. This positive emotional response is further echoed in the emergence of words like "interest" and "good" in their reflections. Following Lee (2021), the significance of these sentiments lies in the affirmation that educators value autonomy and choice in their teaching practices. The positive emotional impact of having options in the learning process contributes to a more engaging and enjoyable experience.

The analysis of the second survey (Table 3) suggests that educators' reflections include key UDL-related concepts, which may influence their perceptions of effective teaching practices.

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Table 3 Word count and frequency for the second survey question: "Did the tasks proposed in the independent work and the lesson help you progress toward the planned lesson result, and if so, how?" (combinations of two words)

Word combination	Count	Frequency, %
universal design	20	4
learning disabilities	18	3
independent work	16	3
special needs	13	2
very helpful	10	2
better understand	10	2
inclusive education	9	2
think about	9	2
digital tools	9	2
helped understand	8	1
group work	7	1
design lesson	5	1
information about	5	1
made think	5	1

In previous research, participants have highlighted the critical significance of practical UDL training within professional development programs (McKenzie et al., 2023). The emphasis on concepts like "inclusive education" and "digital tools" in educators' reflections further highlights the broader impact of UDL principles on creating diverse and accessible learning environments. The combination "universal design" underscores the overarching framework that seeks to create inclusive and accessible learning experiences for all students (Craig et al., 2022). The prominence of "learning disabilities" suggests that educators recognize the importance of tailoring instructional approaches to address diverse learning needs and create an environment that supports every student, including those with specific challenges. The emphasis on "independent work" highlights the role of autonomy and self-directed learning in the UDL context, indicating that educators perceive independent work as a valuable component contributing to the achievement of planned lesson outcomes. According to Rusconi and Squillaci (2023), these identified word combinations reflect the nuanced interplay between the core principles of UDL and the practical considerations that educators prioritize in their pursuit of effective and inclusive teaching practices.

The recognition of specific word combinations, such as "experience exchange" and "knowledge sharing," highlights the importance of collaborative learning in fostering a supportive environment for UDL practices (Table 4). However, it is crucial to acknowledge that the study's reliance on surveys may capture perceived attitudes rather than actual behaviors. Therefore, future research could benefit from incorporating observational methods or interviews to provide an understanding of how educators apply UDL principles in their day-to-day teaching after experiencing UDL practice in their professional development.

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Table 4 Word count and frequency for the second survey question: "What did you find most valuable when doing independent work and participating in the lesson?" (combinations of two words)

Word combination	Count	Frequency, %
experience exchange [with colleagues]	33	6
learning disabilities	24	5
universal design	18	4
information about	18	3
digital tools	17	4
special needs	17	4
group work	10	2
inclusive education	8	2
independent work	6	1

Tables 3 and 4 also demonstrate how educators positively perceive the use of digital tools in learning and applying UDL principles. Specifically, in the four-hour online professional development training module, all tasks were crafted using digital tools such as Genially, Padlet, and Moodle. These tools, particularly Padlet and Moodle, have been recognized by Latvian educators as among the most effective for implementing differentiation and UDL principles (Sarva & Rektina, 2024). Nowadays, the increasing emphasis on digital competence and the wide range of digital solutions available create opportunities to tailor learning experiences for students (UNESCO, 2023). The growing importance of digital competence in teacher education is evident in many countries (Sarva et al., 2023; Seprudin, 2024). Leveraging technology-enhanced learning can thus vitalize the core principles of UDL, a strategy designed to foster inclusive educational settings that cater to a variety of learners (Meyer et al., 2014; Novak, 2022).

Conclusions

This research offers insights into the emotional and cognitive reactions of educators to UDL concepts while engaging in online professional development. The results indicate that including adaptability, autonomy and cooperative learning into professional development programs can greatly increase educators' readiness to embrace UDL concepts. Nevertheless, the study also highlights certain domains that require additional investigation, such as the necessity to examine the lasting effects of UDL implementation, variations in reactions depending on the levels of expertise among educators, and the practical implementation of UDL concepts in classroom environments.

Future research should adopt a longitudinal methodology to evaluate the long-term sustainability of UDL adoption. Furthermore, using qualitative methodologies such as in-depth interviews or classroom observations might offer a deeper understanding of the practical implementation of UDL concepts. It would be beneficial to broaden the participant pool to include a more diverse variety of educators to improve the generalisability

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of the results and foster a more nuanced knowledge of the factors influencing UDL adoption.

To enhance the effectiveness of professional development programs that promote broad adoption of UDL principles in education, future research should focus on addressing these gaps.

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