RESEARCH PAPER

# Presenting Hope: Evaluating the Implementation of UDL in Inclusive Universities and the Impact on the Engagement of Students with Disabilities

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***ABSTRACT***

This research is mainly focused on the implementation of Universal Design for Learning (UDL) at inclusive universities including the impact on disabled students. The evaluation prompted the adoption of a mixed-methods with convergent design, proposed by John W. Creswell. The adoption of the proposed method was aimed to enable the simultaneous collection of quantitative and qualitative data, thereby providing adequate review of the topic. The quantitative data gathered through Likert scale surveys, assessed students' perceptions of faculty readiness based on the implementation process, including the impact on engagement and motivation among students. Furthermore, qualitative data realized through in-depth interviews with faculty members and students, including participatory classroom observations, allowed the review of subjective experiences gained from the demerits and merits of implementing inclusive learning environments. The acquired data were verified, with descriptive statistical and thematic analyses. The results showed that the implementation of UDL in inclusive universities faced significant challenges, particularly regarding faculty readiness to adapt learning materials and the use of assistive technology. Majority of faculty members (85%) reported the need for further training in designing flexible learning modules, and 63% of students with disabilities cited limitations in the accessibility of learning materials. The implementation of UDL also had a significant positive impact on social engagement, academic motivation, and self-confidence. Approximately 70% of those with disabilities reported an increase in classroom participation and social interaction. This led to the inference that despite the challenges in UDL implementation, the method held significant potential to designing more inclusive learning environments. Based on the perspectives, these environments supported the academic development of students with disabilities and also enhanced social and emotional skills. The results recommended the relevance of ongoing faculty training, provision of more adequate assistive technology, and strengthening of collaboration between universities, parents, and the community to support the success of inclusive education for students with disabilities.

**Keywords:** Universal Design for Learning, Inclusive universities, Students with disabilities, Assistive technology, Students' engagement.

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## 1. Introduction

Education is universally recognized as a fundamental human right, essential for both individual growth and societal progress. In higher education, the importance of inclusivity has gained increasing attention, driven by global awareness of the relevance to establish learning environments that address the diverse needs of all students, including those with disabilities. Universal Design for Learning (UDL) is a method that supports inclusivity. This framework provided flexible and adaptable learning environments that meet the varying needs of students. UDL aims to eliminate related barriers by offering multiple ways to present information, thereby engaging students and ensuring equal opportunities (Casebolt and Humphrey, 2023). The implementation process is crucial for students with disabilities as well as fosters an inclusive environment for all students (Edwards *et al.*, 2022).

Significant advances have been made toward inclusivity, in higher education, particularly through the Ministry of Education and Culture Regulation No. 46 of 2017, concerning special and inclusive education services. Although, the application of UDL principles in universities remained underexplored, especially the active participation of disabled students in the learning process. Prior research investigated the physical and administrative access, ignoring the role of adaptive instructional design in inclusive education (Li *et al.*, 2024). This gap led to the need for further investigation into how UDL triggered academic motivation, engagement, and general learning experiences (Griggs and Moore, 2022).

Historically, Indonesia shifted from a segregated model of disability education to a concept representing equal opportunities for all students (Rao, 2021). This transition lacked relevant institutional preparedness, particularly pedagogical practices and technology integration. Additionally, faculty members struggled to adapt teaching materials to meet the diverse needs, obstructing effective UDL implementation. Several institutions relied on the one-size-fits-all method, which conflicted with UDL's core principles centered on providing multiple representation, engagement, and expression avenues (Black, Weinberg and Brodwin, 2014). Recent research on faculty preparedness and students' experiences in respect to the UDL context were limited, proving the adoption process was in its early stages (Zorec *et al.*, 2022).

This research focused on how UDL principles, namely identifying the systemic barriers that hindered effective implementation and exploring ways to address the challenges, thereby ensuring equal access to education, was applied in the classroom (Rao, 2003; Almumen, 2020; Lambert *et al.*, 2023; Li *et al.*, 2024). The aim centered on exploring the implementation process, by mainly reviewing the impact on the students. Based on this perspective, the use of mixed-methods allowed absolute evaluation of the demerits and merits of the UDL, especially when associated with faculty readiness and the engagement of students.

Faculty perceptions of the implementation process, as well as the experiences of students gained from academic and social engagement, was evaluated using the quantitative and qualitative data gathered. Moreover, statistical data combined with narrative descriptions, provided absolute review of the topic (Lambert *et al.*, 2023), filling the existing gap in literature. This was achieved through the relationship existing between the implementation process and subjective experiences. The analysis contributed to the review on inclusive education, and provided relevant insights about the practical application of UDL in universities including policy recommendations.

The results obtained had numerous implications for both higher education and global discourse, leading to informed policies and practices for improving educational accessibility and effectiveness. It also contributed to global efforts associated with designing inclusive learning environments realized through adequate comprehension of the challenges and opportunities faced. Meanwhile, a multidimensional method was adopted to evaluate the numerous challenges, which promoted an inclusive, and equitable educational environment in relation to the complex factors affecting the adoption process. In this perspective, the complex factors consisted of faculty training, access to adaptive technologies, and institutional support.

The main objective enabled a policy-driven contribution to inclusive education. The practical aspects of UDL implementation offered legal insights that informed both academic practices and educational policies. The results from the analysis influenced the enactment of policies, focusing on faculty development, adaptive technologies, and collaboration between universities, families, and communities to improve learning experiences. This led to future investigations and policy development to improve inclusive higher education.

In line with the description above, the analysis contributed to the growing body of research on UDL and inclusive higher education. Practical solutions for improvement purposes was offered by reviewing the diverse experiences gained. The results also provided policymakers with evidence to support strategies that ensure equitable access to education as well as promote academic and social development. Additionally, the multidimensional method represented the complexity of the issue, outlining the need for coordinated efforts from all stakeholders to

provide an inclusive and supportive educational environment.

## 2. Theoretical Framework

Universal Design For learning has an internationally adopted theoretical framework, outlined in the following table:

**Table 1 Universal Design for Learning Guidelines**

| Provide Multiple Means of Representation | Provide Multiple Means of Action and Expression | Provide Multiple Means of Engagement |
|---|---|---|
| **1: Provide options for perception** | **4: Provide options for physical action** | **7: Provide options for recruiting interest** |
| 1.1 Offered ways of customizing the display of information. | 4.1 Varying methods for response and navigation. | 7.1 Optimizing individual choice and autonomy. |
| 1.2 Offered alternatives for auditory information. | 4.2 Optimizing tools such as assistive technologies. | 7.2 Optimizing relevance, value, and authenticity. |
| 1.3 Offered alternatives for visual information. | | 7.3 Minimizing threats and distractions. |
| **2: Provide options for language, mathematical expressions, and symbols** | **5: Provide options for expression and communication** | **8: Provide options for sustaining effort and persistence** |
| 2.1 Clarifying vocabulary and symbols | 5.1 Using multiple media for communication. | 8.1 Heightened salience of goals and subjective. |
| 2.2 Clarifying syntax and structure | 5.2 Using multiple tools for construction and composition. | 82 Varying demands and resources to optimize challenge. |
| 2.3 Supporting decoding of text, mathematical notation and symbols | 5.3 Building fluencies with graduated levels of support for practice and performance | 8.3 Fostering collaboration in communities. |
| 2.4 Promoting understanding across languages. | | 8.4 Increase mastery-oriented feedback |
| 2.5 Illustra | | |

| Provide Multiple Means of Representation | Provide Multiple Means of Action and Expression | Provide Multiple Means of Engagement |
|---|---|---|
| tions through multiple media. | | |
| **3: Provide options for comprehension**<br>3.1 Activate or supply background knowledge.<br>3.2. Outline patterns, critical features, huge ideas, and relationships<br>3.3 Guide information processing, visualization, and manipulation<br>3.4 Maximize transfer and generalization | **6: Provide options for executive functions**<br>6.1. Guide appropriate goal-setting.<br>6.2 Support planning and strategy development.<br>6.3 Facilitate the management of information and resources.<br>6.4 Enhance capacity for monitoring progress | **9: Provide options for self-regulation**<br>9.1 Promote expectations and beliefs that optimize motivation.<br>9.2 Facilitate personal copping skills and strategies.<br>9.3 Develop self-assessment and reflection. |
| **Resourceful, knowledgeable students** | **Strategic, goal-directed students** | **Purposeful, motivated students** |

Source: CAST, 2023

## 3. Method

This research adopted mixed-methods with a convergent parallel design, as proposed by Creswell and Plano Clark (Sherwood *et al.*, 2023). The method allowed for the simultaneous collection and analysis of quantitative and qualitative data, with the results integrated during the interpretation phase. Meanwhile, its use offered a comprehensive understanding of the implementation of UDL in inclusive higher education. Several previous research reported that inclusivity in education extended beyond statistical measures, comprising subjective experiences, best understood through individual narratives and perspectives (Viera *et al.*, 2019). The convergence of qualitative and quantitative analysis was essential for systematically exploring the complexities of UDL in an inclusive educational setting.

This present research was conducted at two state universities, established as inclusive campuses. Participants were divided into two groups, namely 28 lecturers teaching undergraduate courses and 40 students with disabilities actively engaged in various programs. The individuals were selected using purposive sampling, ensuring that those selected actively participated in the learning process, resulting in direct experience with UDL. The sampling method effectively identified the participants in similar research (Moore *et al.*, 2024).

Quantitative data were collected using a 5-point Likert scale questionnaire, developed based on the principles of UDL as outlined by CAST (Sherwood *et al.*, 2023). Both lecturers and students with disabilities completed the questionnaire, which assessed lecturers' readiness to implement UDL and students' perceptions of personal academic engagement as well as motivation. The validity of the instrument was confirmed through expert judgment from three inclusive education experts, and its reliability was tested using

Cronbach's Alpha (α = 0.87). This showed a high level of internal consistency in line with established research practices (Sushko *et al.*, 2024).

Based on the description above, qualitative data were collected through semi-structured in-depth interviews held with 10 lecturers and 15 students with disabilities, exploring respective experiences with UDL implementation in classroom settings. Participatory observation was conducted in six classrooms, using a structured sheet that focused on teaching strategies, the use of adaptive technology, and lecturer-student interactions. Regarding this perspective, all interviews were audio-recorded and transcribed verbatim. Thematic analysis was adopted to identify patterns and themes in the qualitative data, following the procedures recommended by Braun and Clarke (Guetterman, Fetters and Creswell, 2015; Silpia and Sari, 2023).

Descriptive statistical methods, including frequency distributions, means, and percentages, were used to analyze quantitative data as well as assess participants' perceptions. This analysis was conducted with SPSS version 26, providing insights into general trends regarding lecturers' readiness and the impact of UDL on students' engagement. However, qualitative data analysis, performed using Braun and Clarke's method, offered a deeper understanding of the context and nuances underlying the quantitative results (Pluye *et al.*, 2018; Rosairo, 2023).

Data integration took place during the interpretation phase, where results from quantitative and qualitative analyses were compared to identify areas of convergence, divergence, and complementarity. The joint display matrix, a visual tool used to present the results simplified the systematic integration of mixed-methods analysis (Anwar, 2015; Silpia and Sari, 2023). Following the description, the method reviewed the various challenges and opportunities faced in the application of UDL.

The current research was approved by the university's Ethics Committee, because participants were given detailed explanation of the objectives and procedures including presented with a consent form. Additionally, the confidentiality of the participants was protected using codes and pseudonyms in all publications, consistent with ethical research standards (Kaur *et al.*, 2019).

4. Results

The results from the investigation, relied on mixed-methods with a convergent design, namely quantitative and qualitative. Data collected from both methods were analyzed separately and then integrated into the interpretation phase through collaborative display to evaluate the convergence, divergence, and complementarity.

a. Quantitative Results (Perceptions of Lecturers and Disabled Students on UDL Implementation)

These results were obtained from the 28 lecturers and 40 students that participated in the survey.

Table 2. Perceptions of Lecturers and Students with Disabilities on UDL Implementation

| Aspect | Percentag of Participa s | Categor | Descriptio |
|---|---|---|---|
| Lecturer Readiness in UDL Implement ation | 85% (not fully ready) | Medi um – High | Lecturer s were not fully prepared to apply UDL principle s. The average score was 2.9 and 3.1 for flexibilit y in material preparati on and the use of adaptive technolo gy, respectiv ely. |
| Students' Perception s of Access and Engageme nt | 63% (limite d access) | Medi um | Students reported limited access to digital learning material s and |

| Aspect | Percentage of Participants | Category | Description |
|---|---|---|---|
| | | | classroom interactions, but 70% reported an increase in class participation due to adjusted teaching strategies. |
| Impact of UDL on Learning Motivation | Average score 3.7 | High | Despite the fact that not all lecturers fully applied UDL, flexibility and choice in learning had positively impacted students' motivation. |

*Source: Research Result Data*

As shown in Table 2, 85% of lecturers were not completely ready to implement UDL. This was reflected by the average scores of 2.9 and 3.1 (out of 5) for the ability to design flexible materials and use adaptive technology, respectively. Similarly, 63% of students had limited access to digital learning materials and meaningful interactions in class. Regarding this perspective, 70% reported increased class participation and social interaction due to adjustments in teaching strategies by some lecturers. The average motivation score of 3.7 for students showed a positive trend, suggesting that although UDL was not yet fully implemented, the flexibility and choice in learning were starting to make a positive impact.

b. Qualitative Results: Subjective Experiences of Students and Lecturers

1) Challenges in UDL Implementation

The implementation of UDL principles in higher education faced significant challenges, mainly due to a lack of sufficient training and resources. During the interview sessions, many lecturers were unable to design flexible courses to meet the diverse needs of students. According to a particular lecturer, I intended to use diverse media, but was unable to ensure it met the varying needs of students`. This statement reflected a significant concern among lecturers concerning the effective use of multiple avenues for representation, expression, and engagement as suggested by UDL guidelines.

The challenges faced when designing flexible learning environments was deepened by lack of awareness concerning the various technological tools reported to aid the adaptation process. The lecturers' admission defined the gap between the UDL strategies and appropriate skills or resources. In this context, several lecturers doubtfully accepted the various media options and adaptive learning technologies.

Based on the viewpoint of the students, the difficulties faced by lecturers during the implementation process were extreme. Some of the lecturers felt excluded when instructional materials were delivered different from learning preferences. According to a certain student, I felt left behind when lecturers presented materials without absolute delivery. The comment implied the frustration faced when the principles were not implemented, because students lacked access to the various methods and media used to facilitate effective comprehension and engagement. This led to the ignorance of students, specifically those with visual or auditory preferences.

2) Successful Adaptation Strategies

Majority of the lecturers that participated in formal UDL training shared successful strategies connected to the teaching methods,

including the adjustment to learning needs. The strategies were appreciated, thereby fostering an inclusive learning environment.

The UDL training focused on the integration of project-based learning activities, which aided engaging in hands-on, collaborative projects that served diverse learning styles. Some lecturer commented that, Project-based learning provided the opportunity to apply knowledge gained, independently. The method also helped those who struggled with conventional exams or lectures. Additionally, the provision of an inclusive and flexible learning environment, offered students the chance to select project topics, including the presentation in a variety of formats, namely written reports, videos, or presentations.

Another significant strategy was the exposure of students to choices regarding the learning process. Some lecturer reported that the provision of multiple formats, such as written reports, oral presentations, or multimedia projects, made assessments easier. Therefore, the flexibility was widely appreciated, with a participant reporting that the selection of a preferred format boosted the confidence level of students. The finding reflected the value of being in control of the course material. Additionally, it motivated the engagement with content in a way that supported learning preferences, leading to a more positive and effective educational experience.

The lecturers who had undergone UDL training reported success in using assistive technologies such as text-to-speech software. This tool was beneficial for students who had difficulty reading voluminous text or processing written information. For instance, a certain student expressed appreciation for the tool stating that, Text-to-speech technology helped in better understanding of the material. This was because it enabled the ability to hear the read material. The method outlined how UDL principles were applied through instructional design and strategic use of technology to improve learning accessibility.

3) Emotional and Social Impact

The implementation process had a significant impact on the emotional and social aspects of students' experiences. It impacted those with disabilities, because the adoption of flexible teaching methods resulted in increased confidence level and a sense of inclusion. According to a disabled student, I am no longer afraid to ask questions because lecturer offer various means of response, not just orally. The comment showed the emotional transformation undergone as a result of various inclusive teaching practices. When exposed to multiple ways of engaging with content and responding to questions, such as through written responses, online forums, or visual presentations, the students felt more comfortable participating in class discussions. The social anxiety that accompanied traditional modes of participation, namely speaking in front of peers, was relieved, allowing confident interaction in the learning environment.

Disabled students reportedly felt a greater sense of belonging, as certain needs were thoughtfully addressed. A particular student stated how the flexibile assignments and assessments led to feelings of inclusion rather than isolation. This feedback outlined how UDL improved academic outcomes and also enhanced the social experience of students, leading to feelings of being valued and respected as members of the academic community.

Regarding the benefits, other students reported positive emotional impacts due to increased variety and flexibility of teaching strategies. Lecturers designed a more engaging and less stressful learning environment for all students, by offering multiple methods of instructions and assessments. This positive emotional experience contributed to greater students' satisfaction and overall academic success.

c. Data Integration (Joint Display and Interpretation)

The following joint display table presents the integration of the quantitative results and qualitative results.

**Table 3. The integration of the quantitative results and qualitative results**

| Quantitative Results | Qualitative Results |
|---|---|
| 85% of lecturers were not ready. | Lecturers lacked training |
| 70% of students were actively engaged. | Students felt more confident. |

| Quantitative Results | Qualitative Results | Interpretation |
|---|---|---|
| 63% had difficulty accessing materials. | Students struggled with non-multimodal materials. | Need for diversified learning material formats. |

*Source: Research Result Data*

The results showed the convergence between quantitative and qualitative data, particularly in the dimensions of engagement and accessibility. Divergence evolved from the lecturers' perceptions, with some feeling sufficiently adaptive, though this was not completely experienced by students. The result suggested the need for deeper pedagogical reflection from the lecturers.

5. Discussion

The results were framed through the integration of both quantitative and qualitative data, aimed at addressing the research focus on lecturers' readiness to implement UDL and its impact on the learning experiences of students with disabilities in inclusive higher education settings. The results provided relevant insights into the current state of the implementation process, challenges faced by lecturers, and positive outcomes observed from students' perspectives.

Quantitative data showed that a significant proportion of lecturers, approximately 85% were not completely trained to implement UDL principles. Additionally, with average scores of 2.9 and 3.1 for designing flexible materials and using adaptive technology, respectively, the results represented the critical gap in faculty readiness. These led to the focus on the pressing need for professional development programs designed to equip the faculty with relevant skills. This was in line with existing literature, concerning the significance of providing extra training and support in terms of applying inclusive pedagogies (Saragih *et al.*, 2021).

The qualitative interviews strenghtened the quantitative results, with lecturers expressing concerns about lack of training and confusion on how to design media that met the diverse needs of students. According to a particular lecturer, I intend to use diverse media, but unsure how to design it to meet the relevant needs. This statement showed the challenges faced in pedagogical transformation, resulting in the need for basic instructions on UDL implementation, including innovative, and flexible strategies to design inclusive learning environments (Wahidah, Naimah and Utami, 2022). The convergence of quantitative and qualitative data proved that faculty readiness was a significant obstruction to UDL adoption. However, a discrepancy was observed within a small group of lecturers who adequately adapted the teaching methods, yet students felt left behind due to lack of multimodal delivery. The divergence led to the need for consistent pedagogical reflection and self-assessment by faculty members (Harita and Chusairi, 2022).

A positive trend was detected from students' data, where 70% actively engaged in class activities. This was due to the use of adaptive teaching strategies, and the provision of task choices, using assistive technology, as well as incorporating project-based learning exercises. These methods were valued, with a participant reporting that the strategies boosted confidence level. The result was consistent with previous research, which explored the role of project-based learning in improving engagement and building confidence (Sabardila *et al.*, 2021). Meanwhile, the selection of tasks connected to personal interests and learning preferences prompted greater autonomy and motivation to actively engage in learning activities. Assistive technology was used to access learning materials more effectively, enriching the educational experience.

The combination of the quantitative and qualitative results, showed increase engagement, as well as the relevance of autonomy and flexibility in the learning process. This depicted the significance of inclusive teaching strategies in improving academic and psychological outcomes. The results proved that UDL principles contributed to the general experience gained from the cognitive, emotional, and social dimensions (Septiana *et al.*, 2023).

The emotional and social benefits of the implementation process reportedly increased confidence and stronger social engagement in learning activities. The average motivation score of 3.7 for those with disabilities supported the qualitative feedback, which suggested that students felt more confident and less fearful of participating in class discussions. According to another participants, I am no longer afraid to ask questions because the lecturer provided various response measures, asides from orally. This conformed with the role that flexible teaching

strategies, such as providing multiple modes of communication, played in reducing social anxiety and fostering a more inclusive, supportive classroom environment. The results were in line with existing research that evaluated the positive impact of social support on learning process (Hidayati and Sukarddin, 2021). The integration of multiple teaching methods namely oral, written, and technological facilitated greater participation among students who felt excluded. The ability to choose how to respond to questions or engage with course material provided an environment where students felt empowered, reducing barriers that prevented one from expressing themselves. The novelty of this research relied on mixed-methods, including the triangulation of quantitative and qualitative data. This was aimed to examine the preparedness of lecturers, and the impact on students' engagement and well-being (Lips-Wiersma, 2022). The results contributed to the gaps between the perceptions of both parties in relation to readiness and experiences gained. The dissimilarity between perspectives was because the lecturers were confident in the methods while the students faced obstructions connected to reflective teaching practices and consistent feedback.

The scope of UDL theory was expanded beyond conventional academic outcomes to accommodate emotional and social learning dimensions. Furthermore, the view of how inclusive teaching strategies supported academic and personal development in higher education was illustrated by identifying the psychological impacts of UDL on the confidence and social engagement of students (Almumen, 2020). The results obtained had significant implications for policy enactment and practice in higher education. Firstly, the identified gap in relation to faculty preparedness relied on the need for reflective-practice-based UDL training. The professional development programs comprising basic technical instruction, should foster innovative, student-centered teaching methods that include varying learning needs. This effectively equipped the lecturers to design and deliver more inclusive learning experiences, ensuring access to relevant resources and support.

The inconsistency between lecturers' perceptions and students' experiences depended on the need for institutional policies that motivated reflective teaching practices. As a result, lecturers should be encouraged to regularly assess teaching strategies adopted from students' feedback for absolute improvements (Kermit and Holiman, 2018). The integration of digital infrastructure that supported multimodal learning formats, such as assistive technologies and flexible assessment methods, prompted engagement with course content. In a broader perspective, the results showed the designing of inclusive learning environments prioritized academic and psychological well-being. UDL proposed a framework that transformed the teaching and learning experience, as higher education institutions strived to meet the diverse needs of students.

This research reported that lecturers faced challenges in implementing UDL due to lack of training and resources. However, successful strategies namely the provision of task choices, using assistive technology, and project-based learning had a positive impact on engagement and confidence. The inconsistency between the perceptions of both parties regarding adaptation levels focused on the relevance of reflective teaching practices and the need for student-centered feedback mechanisms. This contributed to the numerous research on UDL by providing insights into the emotional and social impacts of teaching practices. The analysis further pointed out the significance of transformative policies in inclusive higher education.

## 6. Conclusion

In conclusion, the implementation of UDL in inclusive higher education, and the impact on disabled students were reviewed. The findings showed that the implementation process improved social engagement and learning motivation, asides from the challenges, encountered during faculty readiness and the use of adaptive technology. 85% of lecturers reportedly lacked training in designing flexible and responsive learning materials, while 70% of disabled students engaged in classroom discussion and social interaction. This was as a result of adjustments made to teaching strategies adopted by some lecturers.

The findings centered on the professional development for faculty members in implementing UDL principles, and the need for adequate access to adaptive technologies. Considering the challenges, the process prompted an inclusive learning environment

that supported academic development and social engagement. The recommendations for the policies comprised establishing faculty capacity, improving the accessibility of learning materials, and fostering collaboration to ensure success.

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