Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 6326 – 6340
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5234

Universal Design for Learning and Diversity Attention: A Look from the Perceptions and Skills of Teachers

Gloria Anabel Alcívar Pincay[1], Josselyn Nicole Romero Salcedo[2], Vanessa Zambrano Vélez[3]

Abstract

The Universal Design model for learning provides a pathway to curriculum from a responsive approach to diversity. It is a real and applicable option to promote and enable the learning of all student bodies, but its application is conditioned to the competence level of the teacher. The purpose of this research is to know the teacher competence skills on the application of the three principles of Universal Design for learning. This work is a mixed descriptive cross sectional investigation, where 123 teachers from Manabí-Ecuador participated, same ones that belong to private, fiscal and fiscomisional educational institutions. The instrument used to measure teachers' perception of Universal Design for Learning -Perception of Universal Design for Learning. It was applied by survey means and the information collected was complemented with focus group. The results allowed us to confirm that teachers have an adequate perception and skills to apply the principles of UDL, however, there are also training needs to strengthen the learning processes and participation of all students, with emphasis on competence skills to attend to the disability-derived diversity.

Keywords: *UDL; diversity; inclusion; participation; competencies.*

Introduction

Currently, inclusive education is considered a comprehensive and ongoing learning process (Sánchez & Martín, 2016) aimed at guiding individuals towards their maximum potential and promoting the reduction of learning and participation barriers (Berríos Armijo & Herrera Fernández, 2021; Duk et al., 2019) that commonly arise in the various social and cultural contexts in which individuals develop.

Blanco (2006) states that inclusion is related to access, participation, and achievement for all students, with a particular emphasis on those at risk of exclusion or marginalization for various reasons. However, the traditional educational curriculum is designed to meet the needs of the average student, consequently tending to exclude those with disabilities, those in vulnerable groups, and those with other disadvantages or who deviate from the learning styles and preferences of the majority group (Valencia & Hernandez, 2017).

The academic literature points to UDL as a tool to promote inclusion (Diaz de la Garza et al., 2020). UDL is a model proposed and defined by the Center for Applied Special Technology (CAST) as "a research-based approach to curriculum design — that is, the goals, methods, materials, and assessment — that enables all individuals to develop knowledge, skills, and motivation and engagement with learning" (CAST, 2011).

Applying the UDL model requires improving teachers' practices in order to respond to the diversity of students. In this vein, through UDL, teachers present course content in different ways through representations, questions, diagrams, posters, projects, and presentations, among others, respecting different learning styles and paces (C. A. Pastor et al., 2014). However, in reality, it is common for teachers to focus on a single way of teaching from a homogenizing perspective of students (Segura & Quirós, 2019).

[1] Universidad Laica Eloy Alfaro de Manabí. E-mail: gloria.alcivar@uleam.edu.ec
[2] Universidad Laica Eloy Alfaro de Manabí. E-mail: josyromeros1999@gmail.com
[3] Universidad Laica Eloy Alfaro de Manabí. E-mail: vanessazambranov28@gmail.com

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Reviewing teachers' perceptions and competencies for the implementation of UDL is of particular importance, given that they are the ones who orchestrate the different elements of the curriculum and can apply different methodologies and strategies to promote inclusion, the application of the principle of equity, and the effective learning and participation of ALL (Lagos, 2019; Tobón, 2020; Echeita, 2017). In this regard, it is necessary to quote Rose and Meyer (2002) to highlight that "[…] barriers to learning are not, in fact, inherent to students' abilities, but rather arise from their interaction with inflexible methods and materials." 1This understanding is a foundation of inclusive education (Valencia Pérez, 2017; Gutiérrez et al., 2020).

Although UDL emerged approximately four decades ago, its impact and application in the educational field can be considered something new and still little explored at the practical level (Sánchez et al., 2016; CAST, 2011). Its implementation requires an approach to the school reality and a strengthening of skills, attitudes, and values in the pedagogical foundations, placing the student at the center and as the main actor in the teaching-learning process (Berríos, 2021).

Information and communication technologies (ICT) have played an essential role in the development of UDL since its inception; the evidence that students with disabilities obtained better results with technological media than with traditional printed materials, and that students for whom these materials were not initially designed also improved their learning experience when using them as a didactic resource, became the basis of a model that seeks to flexibilize teaching methods and resources (Cabero-Almenara & Valencia-Ortiz, 2019; Cabero et al., 2008; C. Pastor et al., 2015).

Cabero-Almenara & Valencia-Ortiz (2019) point out that ICT and inclusive education can be understood from two perspectives: a) that their use can promote the achievement of quality education and eliminate the barriers that prevent all people from accessing culture and education, and b) that through their design and structure, both accessible environments for individuals and environments that hinder access can be created; that is, they can facilitate inclusion or promote exclusion. However, it should be borne in mind that the mere use of technology does not improve the learning process; it is necessary to carefully plan how digital media will be used to achieve curricular objectives (Morra and Reynolds, 2010).

Some authors who research on teachers' competencies and UDL, such as Espada et al., (2019), have found that, in the public school system, which is inclusive by definition, only 29% know what UDL means, while most teachers can only make approximations to a real definition of it, linking it to help, a methodology, or relating it to learning difficulties.

In recent years, teacher professionalization has been promoted with an emphasis on continuous and ongoing training, with the aim of raising the quality of education for all students, including training in UDL principles and their application to address diversity in the classroom. However, the view that only with individualized curricular adaptations can the special educational needs of students be met still prevails (Quesada, 2021; Costa et al., 2020). This is a departure from the perspective offered by the UDL model, which takes into account the term diversity in its broadest sense, promoting a flexibilization of the curriculum so that it is open and inclusive from the beginning, trying to minimize barriers to learning for any student, as well as the necessary and inevitable subsequent adaptations (Paz, 2021).

UDL Principles for Analysis and Teaching Planning

UDL is integrated by three fundamental principles and guidelines that break down the dichotomy between students with and without disabilities that can be observed in Table 1. The first refers to the fact that teachers must provide multiple means of representation in their pedagogical mediation (Coppiano & Corral, 2021), the second refers to the student's ability to express their learning, which they acquire during pedagogical mediation, and the third is that of motivation and interests (Lagos, 2019).

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Subsequently, according to Alba et al., (2018), the principles of UDL are based on the study of neuroscience, determining that the neural networks involved are:

- Knowledge networks of the "WHAT" of learning, whose main function is to receive, process, and classify information, assigning meaning.
- Strategic networks of the "HOW" of learning, which are related to the actions of planning, coordinating, and executing actions.
- Affective networks of the "WHY" of learning, which imbue the information received with emotional content, relating it to the motivation to learn.

Table 1. Neuroscience-based Principles of UDL

Principle	Guidelines
I. Multiple Means of Representation (The "WHAT" of learning)	1. Provide options for perception.
	2. Provide options for language, mathematical symbols, and notations
	3. Provide options for comprehension
II. Multiple Means of Action and Expression (The "HOW" of learning)	1. Provide options for physical interaction.
	2. Provide options for expression and communication.
	3. Provide options for executive funcetions.
III. Multiple Means of Engagement (The "WHY" of learning)	1. Provide options for recruiting interest.
	2. Provide options for sustaining effort and persistence.
	3. Provide options for self-regulation.

Enfoque del Diseño universal del aprendizaje basado en el currículo.

The UDL approach in educational practice is considered important due to the advantages it provides as a result of the curriculum flexibility for teachers (Díez Villoria & Sánchez Fuentes, 2015) to diversify their teaching methods and enhance their students' skills, seeking to make them analytical, critical, reflective, and motivated to learn more (Coppiano-Loor & Corral-Joza, 2021).

The Universal Design for Learning (UDL) approach is grounded in four interconnected components that serve as a framework for curriculum development and planning, as suggested by Sánchez Vázquez (2020). These components are detailed in Table 2.

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Table 1. Components of UDL

Goals	Methods	Materials	Assessments
Defined by considering the variability among students and distinct from the means to achieve them. This allows for setting higher expectations for each student's potential.	Facilitates greater differentiation of methods based on student variability in relation to the task context. They are characterized by being flexible and varied.	Provide the tools, resources, and supports necessary to allow students to access, examine, organize, abbreviate, and demonstrate their understanding of knowledge in different ways.	Allow for adaptation to variability, in order to reduce and eliminate barriers in the fair assessment of students' knowledge, skills, and engagement.

Source: Sánchez Vázquez (2020).

In recent decades, teachers and education professionals have focused their attention and efforts on effectively addressing the special educational needs of their students, whether or not they have a disability (Quesada López, 2021). A clear example of this is the presentation of theoretical content in a more engaging, accessible, and dynamic manner, for instance, through videos, podcasts, and interactive presentations.

Therefore, the greatest challenge faced by education professionals is to develop strategies and teaching methodologies that implement UDL and foster educational inclusion and participation. The objective of this research is to identify teachers' perceptions and competencies for applying UDL in inclusive contexts.

Methods

This is a descriptive-cross-sectional study aimed at revealing the reality as it presents itself in a given space and time (Rojas, 2015). The study follows a mixed-methods approach. It is qualitative because, according to Silveira et al. (2015), "it studies reality in its natural context as it occurs, extracting and interpreting phenomena according to the people involved" (p. 17), and quantitative because, according to Monje (2011), "its purpose is to seek explanations for phenomena by establishing regularities in them, that is, to find general laws that explain social behavior."

Participants

The reference population consisted of Basic Education and High School teachers in Zone 4 of Ecuador, the western region comprising Manabí and Santo Domingo de los Tsáchilas. The sample consisted of a total of 123 teachers affiliated with public (65%), private (30%), and fiscomisional (5%) institutions, with a total of ten centers participating. Participants completed a survey and participated in two focus groups. The sample was composed mainly of female participants (F: 74%; M: 26%) aged between 20 and 60 years (M = 43.76; SD = 6.65). Twenty percent reported having 1-5 years of teaching experience; 38% had 6-10 years; 25% had 11-15 years; and 13% had over 20 years of experience.

Instrument

The "Instrument for Measuring Teachers' Perceptions of Universal Design for Learning - Perceptions of Universal Design for Learning" (Sánchez Fuentes et al., 2019) was used to collect data. This scale

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consists of 26 items: 9 items for principle 1: options for presenting information to the student; 8 items for principle 2: options for action and expression; and 9 items for principle 3: means for engagement and motivation. This instrument has demonstrated solid psychometric properties, validity, and reliability.

This instrument was complemented by a section on sociodemographic data and a section of open-ended questions to delve deeper into criteria and training needs based on the items that make up each principle of UDL. Additionally, a question was included for each UDL principle, inquiring about its applicability in the context in which the teacher works. For example: Principle 1 of UDL proposes "providing multiple means of representing information to students." Considering the reality of the center where you work and its context, as well as the resources available in the national education system, how feasible is it to apply Principle 1 of UDL in your classroom?

Data collection and analysis procedure

For ethical considerations, the respective permits were obtained from the management teams and informed consent from the participants. The link to the online survey was sent to the directors and was available for responses for a period of three months. The average completion time of the battery was 12 minutes. The provisions of the ethics committee of the Laica Eloy Alfaro University of Manabí were complied with, and the provisions of the Declaration of Helsinki for research with humans were followed.

The triangulation of the data collected in the survey was carried out through the focus groups, based on the same survey instrument, but with the objective of delving deeper into barriers, facilitators, and exploring the training needs considered necessary to apply the UDL principles in the classroom. In the focus groups, participants were explained the objective of the study and the anonymous, confidential, and voluntary nature of their participation was emphasized.

Results

The following presents the primary results, categorized by the principles outlined in UDL.

Results on Principle 1: Providing multiple means of representation for the student.

Principle 1 was assessed using a total of 8 items. Participants expressed their perceived teaching competence in offering students various ways to receive information (see Table 3).

Table 3. Teacher Perceptions of Principle 1 Implementation

Items Principle 1	N	Media	Desv.	Varian.
I know methods to present information in class that can be adapted to the needs of students (font size, electronic documents, etc.).	123	3,80	1,032	1,065
I am familiar with alternative forms of communication such as Sign Language, Braille, and the use of AAC (Augmentative and Alternative Communication).	123	2,96	1,183	1,400
I know how to offer alternatives to visual information.	123	3,41	1,207	1,456

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It is important to explain concepts in detail.	123	4,36	,821	,674
It is important to present a clear structure in class content.	123	4,56	,667	,445
It is important to explain main ideas in different ways and with examples	123	4,53	,772	,595
It is important to connect content with prior knowledge.	123	4,62	,707	,500
It is important to highlight the main ideas.	123	4,62	,608	,369
I know guidelines for guiding learning.	123	4,40	,710	,504
Valid N (listwise)	123			

Table 3 reveals that the lowest mean scores were found in the first three items evaluated under Principle 1 regarding teachers' competence in providing multiple means of representation for students. Specifically, there is evidence of a weakness in the competence related to methods of presenting information in a way that can be adapted to the needs of students (M: 3.80; SD: 1.032); knowledge of alternative forms of communication such as Sign Language, Braille, and the use of AAC (Augmentative and Alternative Communication) (M: 2.96; SD: 1.183); and knowledge of ways to offer alternatives to visual information (M: 2.96; SD: 1.183). On the other hand, the remaining five items showed mean values above 4.36, suggesting a high level of competence for their application.

To complement the items of Principle 1, the following question was posed: "Principle 1 of UDL proposes 'providing multiple means of representation of information to students'. Considering the reality of the center where you work and its context, as well as the resources available in the national education system, how feasible is it to apply Principle 1 of UDL on a daily basis?" The rating options ranged from 1 (never) to 5 (always). Participants responded with a mean of 3.92 (SD: 0.804). Table 4 and Graph 1 present these data, showing that the largest percentage falls in the "almost always" (39.8%) and "always" (29.3%) categories; however, a considerable group also fell into the "occasionally" category (32%).

Table 4. Applicability of Principle 1 of UDL.

	Frequency	%
Never	2	1,6%
Almost never	4	3,3%
Occasionally	32	26,0%
Almost always	49	39,8%
Always	36	29,3%
Total	123	100,0%

The key findings from the focus groups on Principle 1 are summarized in Table 5 below

Tabla 5. Información del grupo focal sobre el Principio 1 del DUA

Indicator	Expressions	Code
Barriers	- In most schools, there is a very high student-to-teacher ratio and few	Ratios

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	resources to address student diversity" (GF1.P4) - Teachers have not been trained in augmentative and alternative communication systems and attention to children with disabilities, or the training we have received has always been theoretical" (GF1.P2) - There are no technical or technological resources available to diversify the way information is presented, such as computers, projectors, or interactive whiteboards" (GF2.P5)	Training Resources
Facilitators	- After reading about the UDL principles and how they are applied, I think it's just a matter of will. Teachers have a lot of creativity that can be transferred to teaching and allows us to vary our strategies when students tell us they don't understand something, explain it in other ways, with other examples, with other resources" (GF1.P3) - Today, you can find a lot of information on the internet and on specialized education sites that share resources that allow us to vary the way we develop a class (GF2.P1)	Teacher attitude Information
Training Needs	- I would like to learn Braille, sign language, easy reading, etc., because that way I could improve my classes for children with disabilities and implement this principle (GF2.P6) - I think we need to be trained in learning styles and strategies from the UDL model to respond to those styles (GF1.P3). - I have realized that, in my day-to-day work, I apply many of the elements of Principle 1 of UDL - without being aware of it - but I would like to learn how to adapt teaching materials for children with disabilities, for example, I use a lot of pictures and drawings, but I don't know how I would work if I were assigned a blind child (GF1.P1).	Braille, Sign language, Learning styles, Adapting materials

Principle 2: Provide multiple options for action and expression.

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DOI: https://doi.org/10.62754/joe.v3i8.5234

In Principle 2, a total of 8 items were included where participants evaluated their perceptions and teaching competencies related to providing multiple options for student action and expression.

Tabla 6. Percepciones y competencias docentes para la implementación del principio 2: Proporcionar múltiples opciones para la acción y la expresión

Items Principle 2	N	Mean	Std. Deviation	Variance
You know the means for students to express themselves in class in various ways.	123	4,11	,760	,577
You are familiar with support software for electronic materials (e.g., screen readers like Jaws).	123	3,10	1,308	1,712
You know the importance of communication through different means - tutoring, email, forums, etc.	123	4,04	1,148	1,318
I accept that students use different means/ways to present the tasks I propose.	123	4,30	,914	,835
I have the skills to ensure that learning is gradual and sequenced.	123	4,25	,865	,747
Support is essential to achieve students' goals; I have the skills to manage it.	123	4,51	,823	,678
Teacher support is necessary in the construction of the strategies that students use in activities.	123	4,46	,803	,644
Help is needed to manage the resources and tasks necessary for classes.	123	4,39	,796	,633
Valid N (listwise)	123			

Table 6 presents the scores for Principle 2, and the results allow us to identify that in this principle there is one item that differs considerably from the average scores of the block, and it is item 2, which asks "Are you familiar with support software for electronic materials (e.g., screen readers like Jaws)" which has an average value of 3.10 (SD: 1.032). These tools have a specific character for addressing the special educational needs derived from disabilities, such as visual and/or auditory.

It can be observed that the other seven items reached scores above 4.04 on average, which suggests a high level of perception and competence for the application of Principle 2. However, it should be noted that, despite this, the items with lower scores are those that evaluate mastery of the means and resources to put the principles of Principle 2 into practice.

As a complement to the items of Principle 2, the following statement was also made: Students have differences in the way they act in the environment and in the way they express what they know. This is because each one has their own particular characteristics, preferences, difficulties in strategic and organizational skills, etc. In this sense, Principle 2 of UDL proposes "providing multiple options for

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action and expression." Considering the reality of the center where you work and its context, as well as the resources available in the national education system, answer: How possible is it to apply Principle 2 of UDL on a daily basis?

To this question, the participants responded with a mean of 4.04 (SD: 0.814). Table 7 and Graph 2 collect these data, showing that the highest percentage is located in the options that almost always (50.4%) and always (29.3%) Principle 2 can be applied in the classroom.

Table 7. Applicability of Principle 2.

	Frequency	%
Never	1	0,8%
Almost never	4	3,3%
Occasionally	20	16,3%
Almost always	62	50,4%
Always	36	29,3%
Total	123	100,0%

The most significant qualitative data collected in the focus groups on Principle 2 is presented in Table 8.

The key qualitative findings from the focus groups on Principle 2 are summarized in Table 8

Indicator	Expressions	Code
Barriers	- We are used to working in a certain way, and sometimes we say it's because it has always worked for us, but I think our classrooms lack innovation so that students have more ways to express themselves" (GF1.P1).	Traditionalism
	- Developing an innovative class with alternative forms of participation requires time and material resources, and as a teacher in less favored sectors, we don't always have access to those means" (GF1.P5).	Resources
	- Honestly, I've never received training to respond to other forms of expression beyond those we use day to day. That is to say, we repeat the same forms for presenting tasks, for participating in classes, for evaluating" (GF2.P3)	Training
Facilitators	- Students have good proposals, if we listen to them we can adapt our classes to make them motivating for them" (GF2.P2)	Student attitude
	- Today there are many resources that make classes attractive and resources to mediate content, some of them have accessibility features(GF1.P4)	Digital resources
Needs for training	- Through this conversation I have discovered that I have many things to learn to improve my professional	

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	practice, for example, using technologies for accessibility and attention to disability" (GF1.P3) - It would be very beneficial to comply with this principle (2) to learn about active learning strategies - student-centered learning. To be able to innovate and offer other alternatives to students" (GF2.P2)

Principle 3: Provide multiple options to recruit interest and sustain effort

Table 9 presents the results of a rating scale used to assess participants' self-perceived perspective and competence in providing multiple means of engagement (motivation) for students, as outlined in Principle 3.

Table 9. Teachers' perceptions and competencies for implementing Principle 3: Providing multiple means of engagement.

Items Principle 3	N	Mean	Std. Deviation	Variance
It is important for students to have autonomy	123	4,37	,832	,693
It is important to provide real-life and relevant examples	123	4,54	,803	,644
It is important to minimize distractions	123	4,23	,990	,981
It is important to highlight the importance of goals to be achieved	123	4,51	,823	,678
I accept different levels of achievement of objectives depending on the capacity of each student	123	4,33	,836	,699
Supports should be individualized based on the needs of each student	123	4,34	,895	,800
Motivation should be appropriate for students	123	4,48	,833	,694
Valid N (listwise)	123			

The results allow us to determine that teachers recognize the importance of different forms of engagement and motivation and that they have the competence to foster autonomy and metacognition as variables that positively influence the learning process and student participation. This is evidenced by the results of the 7 items evaluated in this principle, whose average scores are above 4.23.

Following the dynamics of the previous two principles, a complementary assessment was carried out for Principle 3 based on the following premise: motivation and the emotional component have a special relevance in learning. In this sense, for some students novelty and challenges are a stimulus, while for others it is a confusion, preferring the daily routine. In this sense, Principle 3 of UDL proposes "providing multiple means of engagement." Considering the reality of the center, its

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context, and the resources available in the national education system, how feasible is it to apply Principle 3 of UDL on a daily basis?

To this question, the participants responded with a mean of 4.09 (SD: 0.779). Table 11 collect these data, which brings it closer to the category of "almost always," which means that Principle 3 is applicable in the contexts and with the resources available to the participants. The detailed distribution (see Table 11).

Tabla 11. Aplicabilidad del principio 3

	Frequency	%
Never	1	0,8%
Almost never	2	1,6%
Occasionally	20	16,3%
Almost always	62	50,4%
Always	38	30,9%
Total	123	100,0%

Following the dynamics of the other two principles, focus groups were used to gather information to deepen the understanding of perceptions and competencies for providing multiple means of engagement and motivation, Principle 3 of the UDL model. Table 12 presents the most significant data.

Table 12. Focus group information on Principle 3 of UDL.

Indicator	Expressions	Code
Barriers	- Adapting the curriculum to achieve the participation of students with disabilities requires specific knowledge that not all teachers have" (GF2.P3). - I understand the concepts of UDL and its principles quite well, but applying them is difficult for me due to the lack of practical guidance in educational centers (GF1.P2). - Students are very motivated by technology, however, most educational centers do not have these resources (GF1.P5).	Training Resource Facilitators
Student Attitude	- Students are receptive to teacher motivation" (GF2.P4). - when we know the students and their contexts, it is easier to involve them through real examples and according to their interests (GF1.P4)	Actitud Est.
Training Needs	- Training on curricular adaptations for children with disabilities, especially significant and very significant adaptations (GF2.P4). - to apply principle 3, it is important to train in competencies to enhance students' metacognitive skills" (GF1.P6). - it would be important to strengthen our leadership and student motivation competence (GF1.P4). - Training on how to adapt the curriculum for children with disabilities (GF2.P3),	

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Discussion

The following presents the main findings of this research regarding the proposed objective: to know teachers' perceptions and competencies about Universal Design for Learning and the operationalization of its three principles of application. According to the results, this research reinforces the arguments of authors such as Berríos & Herrera (2021), Duk et al. (2019) who describe UDL as a useful tool to achieve universal access to education, through a flexible, open, and inclusive curriculum. Where, from the recognition and respect of the different learning styles and rhythms of students, learning can be orchestrated towards the development of students' maximum potential and the reduction of learning and participation barriers.

Teachers report favorable levels of perception and competencies to implement most of the guidelines of principle 1; thus, they recognize as important explaining in detail the concepts that are relevant, presenting a clear structure in class content, explaining the main ideas in different ways and with examples, connecting the content with previous knowledge, highlighting the main ideas and guiding learning. This is consistent with what is stated by Meyer et al. (2014), who point out that providing multiple means of representing content provides a greater and broader spectrum of options for all students to access learning.

Likewise, in the results, teachers indicate that, depending on the context and available resources, the guidelines for applying principle 1 can be incorporated always or almost always in the classroom. However, there is a lower valuation in teachers' competencies on methods for presenting information in class in such a way that it can be adapted according to the needs (font size, electronic documents, etc.), alternative forms of communication such as Sign Language, Braille, use of augmentative and alternative communication, and means to offer alternatives to visual information. And they report as barriers to its application the ratio and the lack of teacher training in specific aspects such as Braille, LS, AAC, and the development of varied and adapted didactic resources for the sensory and information processing needs of students with disabilities. These barriers and training needs deserve special attention if we want to provide multiple means of representation to all students and respond to the specific needs derived from disability. Because, as Gutiérrez et al. (2020) point out, the application of this UDL principle implies that educational institutions develop accessible curricula and materials, that is, that all students have access regardless of their abilities and needs, and thus facilitate inclusion with an emphasis on students most vulnerable to experiencing barriers to learning and participation.

In principle 2, teachers declare good perception and competence to provide multiple options for action and expression; as well as possibilities to apply them always or almost always. Except for one of the guidelines, which corresponds to the mastery of support software such as screen readers, for example, Jaws, which is of great importance to ensure accessibility in curriculum development, since the special educational needs derived from disability, for example, visual. These results demonstrate what is pointed out by Gutiérrez et al. (2020), Rose and Meyer (2002) and Valencia Pérez (2017) who indicate that barriers to learning and participation are not inherent to students (and their individual characteristics, e.g. disability), but emerge from the interaction of these with teaching methods, strategies, and resources. Authors such as Cabero-Almenara & Valencia-Ortiz (2019) and Pastor et al., (2015) highlight that there is a close relationship between Information and Communication Technologies -ICT-, inclusive education, its use can favor the elimination of the barriers that prevent all people from accessing culture and education; also pointing out that, with its design and application, both accessible environments and environments that hinder access can be created; that is, with it we can either facilitate inclusion or promote exclusion. In the identification of barriers to the application of principle 2, the results report a lack of training and resources, but also the use of traditional methods not centered on the student. This latter coincides with Segura & Quirós, (2019) that frequently teachers focus on a single way to develop the curriculum, making it difficult for all students to participate and learn. As for training needs, the results in this principle point towards training in the use of accessibility technologies and attention to disability and training in active learning methodologies.

Journal of Ecohumanism
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Volume: 3, No: 8, pp. 6326 – 6340
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5234

In principle 3, on providing multiple means of engagement, teachers' perceptions and competencies were high in all seven items (above M: 4.23). Teachers identify as important the use of varied resources to promote engagement and motivation, through the link with previous experiences, with the context and with their own metacognitive processes. This is consistent with the objective of guiding the person towards their maximum potential and promoting the reduction of learning and participation barriers, as proposed by authors such as Berríos & Herrera (2021) and Duk et al., (2019). Also in the results, it is stated that the participants indicated that principle 3 can be applied almost always and always, attending to the context and the available resources. However, among the results it was also found that, it is identified as a barrier to its application and as a training need, curricular adaptations for students with disabilities, which is related to the persistence of believing that curricular adaptations are the essential way to address diversity and the special educational needs of students, which is consistent with previous findings (Quesada, 2021; Costa et al., 2020). Finally, it must be emphasized that the training factor appears as a constant among the barriers declared for the application of the three principles of UDL in this research. This was expected, since as Sánchez et al. (2016) point out, the UDL model emerged about four decades ago, however, its application is not generalized and as suggested by Espada et al. (2019) from their study in public education, it is estimated that only 29% know what UDL really means, while most teachers associate it with educational attention directed at people with disabilities or complain about not having the necessary training to implement it effectively.

Conclusions

As analyzed in this study, it is common for curriculum planning and development to assume that all students can access learning through a single pathway. However, it is necessary to understand that, according to their motivations, learning styles, sensory or cultural characteristics, etc., students have different ways of perceiving and understanding the information presented to them and that, therefore, there is no optimal means of representation, action, and expression for all students.

Given the heterogeneity of students, UDL emerges as a didactic alternative that allows responding to diversity and promoting inclusion. This model aims to eliminate barriers to learning and participation, addressing the principle of curriculum flexibility to make it accessible to all. Although the UDL model is not new, there is a lack of knowledge about the guidelines of each principle and strategies for its application, which results in a detriment to the quality of education from an inclusive approach. Especially if we consider that some students will be at a disadvantage and even at risk of exclusion if a homogenizing view is maintained when developing the curriculum. A proper incorporation of the UDL approach will even allow reducing and even avoiding curricular adaptations, remaining only for exceptional situations.

In order to advance the implementation of UDL in classrooms, ongoing and continuous teacher training is needed, but this must go beyond theory and must allow obtaining practical strategies and tools to provide students with multiple means of representation, multiple means of action and expression, and multiple means of engagement. [1] Highlighting the need for training in specific supports such as Braille, Sign Language, Augmentative and Alternative Communication, Easy Reading, Use of digital ramps, etc., because, although UDL does not focus solely on addressing the special educational needs derived from disability, it is frequent that teachers do not have these competencies and therefore cannot incorporate them into their planning from the UDL approach.

In this sense, ICT emerges as a key that enables the implementation of UDL, providing tools for accessibility, cooperation, and communication, key elements of the UDL principles. And while it is true that ICT alone is not a guarantee of an inclusive and flexible curriculum, nor of the application of the UDL model, there is evidence of the undeniable favorable link that exists between them. Through ICT, it is possible to provide flexible alternatives that respond to the complexity of learning in diverse contexts, and it is also possible to build bridges of accessibility and motivation to address the different needs, styles, and learning paces manifested in the classroom.

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DOI: https://doi.org/10.62754/joe.v3i8.5234

Regarding planning, it can be highlighted that the implementation of the UDL model greatly reduces the need for curricular adaptations because planning content based on it allows reducing the hours of designing materials and increasing the understanding of content at the classroom level and not individually. The UDL model takes into account the heterogeneity of students and proposes flexibility in objectives, methods, materials, and evaluation, promoting pedagogical processes that are accessible to all. That is, the UDL model is universal accessibility to education, from a humanist vision, remembering that we are all different and unique, and that diversity is the rule, not the exception.

Acknowledgements

This work is part of the project "Inclusion and Educational Response to Special Educational Needs, in Zone 4 of Ecuador" of the Laica Eloy Alfaro University of Manabí, Ecuador. Special thanks are extended to the faculty of the Special Education Career of the Faculty of Educational Sciences.

References

Alba, C., Sánchez, P., Sánchez, J., & Zubillaga, A. (2018). CAST-Guidelines on Universal Design for Learning (UDL)-Alba-and-others-Updated version-2018.pdf.

Berríos Armijo, X. del P., & Herrera Fernández, V. (2021). Universal Design for Learning in the Practice of Elementary School Teachers: Didactic innovation or imposed training? Journal of Studies and Experiences in Education, 20(43), 59–73. https://doi.org/10.21703/rexe.20212043berrios3

Blanco, R. (2006). Equity and social inclusion: One of the challenges of the school. Ibero-American Journal on Quality, Effectiveness and Change in Education is Making Important Efforts to Expand Coverage, Improve Infrastructure, Design New Courses and Train Teachers.Ación, 4(3), 1–15.

Cabero-Almenara, J., & Valencia-Ortiz, R. (2019). ICT for inclusion: a look from Latin America. Aula Abierta, 48(2), 139. https://doi.org/10.17811/rifie.48.2.2019.139-146

Cabero, J., Córdoba, M., & Fernández, J. M. (2008). ICT for equality: new technologies and attention to diversity (E. MAD (ed.)). https://dialnet.unirioja.es/servlet/libro?codigo=345994

CAST (Center for Applied Special Technology) (2011). Universal Design for Learning guidelines version 2.0. Wakefield, MA: Author. Spanish translation version 2.0 (2013): Alba Pastor, C., Sánchez Hípola, P., Sánchez Serrano, J. M. and Zubillaga del Río, A. Guidelines on Universal Design for Learning (UDL). Full text (version 2.0). http://www.udlcenter.org/sites/udlcenter.org/files/UDL_Guidelines_v2.0- full_espanol.docx

Costa-Renders, E. C., Bracken, S., & Aparício, A. S. M. (2020). Universal design for learning and pedagogy of the seasons: the multiple temporalities/spatialities of learning in schools. Educação Em Revista, 36, 229690. https://doi.org/10.1590/0102-4698229690

Cristina Valencia Pérez, O. H. G. (2017). Universal Design for Learning, an alternative for educational inclusion in Chile. Athens, 4(40).

Delgado Valdivieso, K. (2021). Universal design for learning, a practice for inclusive education. A case study. International Journal of Support for Inclusion, Speech Therapy, Society and Multiculturalism, 7(2), 14–25. https://doi.org/10.17561/riai.v7.n2.6280

Diaz de la Garza, A. M. E. D., Gutierrez Aceves, M. de L., & Ozuna Figueroa, A. (2020). Design of Specialized Teaching Material for Teaching English to People with Visual Disabilities. In Inclusive Education: experiences from a multidisciplinary approach 2. (Vol. 68, Issue 1).

Díez Villoria, E., & Sánchez Fuentes, S. (2015). Universal design for learning as a teaching method in order to meet the need for diversity in universities. Aula Abierta, 43(2), 87–93. https://doi.org/10.1016/j.aula.2014.12.002

Duk, C., Cisternas, T., & Ramos, L. (2019). Teacher Training from an Inclusive Approach. 25 Years after the Salamanca Declaration, New and Old Challenges. Latin American Journal of Inclusive Education, 13(2), 91–109. https://doi.org/10.4067/s0718-73782019000200091

Espada Chavarria, R. M., Gallego Condoy, M. B., & Gonzalez Montesino, R. H. (2019). Universal Design for Learning and Inclusion in Basic Education in Ecuador. Alteridad, 14(2), 207–218. https://doi.org/10.17163/alt.v14n2.2019.05

Gutiérrez-Saldivia, X. D., Barría, C. M., & Tapia, C. P. (2020). Universal design for learning mathematics in initial teacher training. Formación Universitaria, 13(6), 129–142. https://doi.org/10.4067/s0718-50062020000600129

Lagos Garrido, O. M. (2019). Universal design for learning: an innovative experience in the eighth grade mathematics classroom. Journal of Studies and Experiences in Education, 18(36), 257–267. https://doi.org/10.21703/rexe.20191836lagos3

Meyer, A., Rose, D., & Gordon, D., Universal design for learning: theory and practice, 1st Ed., 1-238, CAST, Wakefield, MA, United States (2014).

Monje Álvarez, C. A. (2011). Methodology of quantitative and qualitative research. Teaching guide. Universidad Surcolombiana, 1–216.

Morra, T. & Reynolds, J. (2010). Universal Design for Learning: Application for Technology-Enhanced Learning. Inquiry, 15(1), 43–51.

Pastor, C. A., Sánchez, J. M., & Zubillaga, A. (2014). Universal Design for Learning (UDL) Guidelines for its introduction in the curriculum. Universal Design for Learning (UDL), 1–45. https://doi.org/10.1016/0164-1212(95)00086-0

Pastor, C., Zubillaga del Río, A. &, Sánchez, S., & José, M. (2015). Technology and Universal Design for Learning (UDL):

Journal of Ecohumanism
2024
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ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5234
experiences in the university context and implications for teacher training. RELATEC: Latin American Journal of Educational Technology, 14(1), 89–100. http://dialnet.unirioja.es/servlet/articulo?codigo=5118309&info=resumen&idioma=ENG

Paz-Maldonado, E. (2021). The educational inclusion of university students with disabilities in Honduras. Essay: Assessment and Public Policies