Inclusive Experiences in Pre-Professional Practices of the Online Early Childhood Education Program at Milagro State University Using Plithogenic Statistics.

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Abstract:

Early Childhood Education sets a series of pedagogical, didactic and psychological skills with the focus of supporting education in the various areas of human development of children in early childhood. It assesses training for Higher Education professionals who can perform in this educational context. This work connects one experience of preprofessional practice in the early childhood education program, held through virtual modality, since the seventh promotion, connected to one subject, in a preventive, trans disciplinary, intersectoral and communitarian approach. This established experience has allowed empowering in student's inclusive teacher competencies that give them the opportunity to provide a good educational service to minors, especially those with neurodevelopmental disabilities, having parents and teachers as mediators of the educational process. The investigation is composed of a mixed methods approach with a plithogenic statistical analysis that partitions uncertainty regarding inclusive competencies and diverse educational service, the need for which is complemented by a validating qualitative analysis.

Keywords: Educational diversity, Early childhood education, inclusive education, family, pre-professional practices, plithogenic statistics.

1. Introduction

Connection with society, according to article 4 of the Higher Education Regulations of Ecuador [1], is a substantive function of the academy that seeks to develop capacities through the integration of educational theory and practice in social contexts, improving the quality of education, life and the environment from an ecological approach that preserves ancestral cultures and knowledge. Pre-professional internships, regulated in article 42 [1], are an operational line that includes community service internships (care for vulnerable groups) and work internships (professional application in real contexts), applicable in face-to-face, blended and virtual modalities. According to articles 43 and 44, these internships must: 1) be designed autonomously by the HEIs, with defined hours and credits (<10%) in the curriculum; 2) align with the graduate profile; 3) respond to educational, institutional or community needs; 4) have the support of the HEI and agreements with internship centers; and 5) be formative, integrating knowledge and skills [1].

In the context of the online Early Childhood Education program, these practices promote inclusive teacher competencies, aligned with the graduate profile, and address educational diversity in children with neurodevelopmental disorders through Individualized Education Plans (IEP), with positive results [2]. The literature highlights the need for innovative tools, such as tutoring, to improve teacher performance [3] and training programs for early intervention educators (EI/ECSE) that promote excellent teaching [4]. In addition, the importance of interdisciplinary collaboration between education and health professionals to strengthen early intervention is underlined [5]. Inclusive competencies,

according to [6], include adapting teaching, creating inclusive environments, collaborating with professionals and families, supporting diverse students, continuous training, evaluating progress, and promoting values such as sincerity, humility, and respect.

The project "For Quality Inclusive Education in Early Childhood Education" (2024), developed in the seventh semester of the program, integrated personalized educational strategies based on Universal Design for Learning (UDL) and the Zone of Proximal Development (ZPD) [7]. With 670 students in two periods (April-August and August-December), the project worked with children aged 3 to 6 with neurodevelopmental disorders, their families, and teachers in various educational settings. The four phases (diagnosis, planning, implementation, and evaluation) were supported by digital resources, tutoring, and tools such as UDL and popular education techniques. Despite limitations in the collaboration of public educational centers and the diversity of the students (including prisoners and those residing abroad), reasonable adjustments were made to ensure their execution. The evaluation included a plithogenic statistical analysis to model uncertainty in the development of inclusive competencies and attention to diversity, complementing the qualitative and quantitative approaches.

2. Materials and methods.

The research is of a quasi-experimental type, in which a relationship is established in the study of the dependent variable: the educational diversity of children in early education with neurodevelopmental disorders and their transformation from the performance of the independent variable Inclusive educational strategies and their monitoring throughout the study, with an explanatory scope, supported by a mixed approach design using qualitative and quantitative methods to obtain a more holistic understanding of the evolution of children with neurodevelopmental disorders at this aforementioned level of education and in this way demonstrate the development of inclusive teacher competencies achieved by students of the online Early Childhood Education degree.

The total population of the online Early Childhood Education program consists of 700 enrolled students. From this population, a sample of 670 students who participated in the pre-professional practice project during the two specified periods was selected for this study.. On the other hand, the population of children enrolled in Early Childhood Education according to the Educational Statistics of 2024 consulted by the Ministry of Education [16] was represented by 323,325 children enrolled in Early Childhood Education, which made it possible to form the sample that included the following study groups presented below in Table 1.

Table 1. Characterization of the study sample.

No.	Study groups	Description	Study periods
1st	422 students from the Early Childhood Education program (April-August)	Pre-professional practice Assistantship 4	April-August 2024
	248 students from the Early Childhood Education program (August-December)	Pre-professional practice Assistantship 4	August-December 2024

	A total of 670 students from the UNEMI Early Childhood Education program		
2nd	129 children with neurodevelopmental disorders ✓ 23 3-year-old children ✓ 57 4-year-old children ✓ 49 5-year-old children	Schoolchildren enrolled in Early Childhood Education	April-August 2024
	75 children with neurodevelopmental disorders ✓ 17 3-year-old children ✓ 31 4-year-old children ✓ 27 5-year-old children	Schoolchildren enrolled in Early Childhood Education	August-December 2024
3rd	188 parents of families	129 mothers and 59 fathers of the aforementioned children	April-August 2024
	112 parents of families	75 mothers and 37 fathers of families	August-December 2024
4th	129 teachers	They provide educational attention to the children in the study	April-August 2024
	75 teachers	They provide educational attention to the children in the study	August-December 2024

Therefore, a non-probabilistic intentional sampling was carried out, aimed at children with educational diversity, taking into account the following inclusion criteria in the study: the motivation and disposition of the students of the Early Childhood Education career, with respect to children with neurodevelopmental disorders, those who have a diagnosis previously made by: the District Inclusion Support Unit Team (UDAI), the Student Counseling Department (DECE) or by professionals belonging to Professional Offices in the private sector, with duly legalized credentials, authorization and support expressed in an Informed Consent read and signed before starting the study by the families and teachers who interact directly with the children in the study anywhere in the country according to the origin of the students of the Early Childhood Education career.

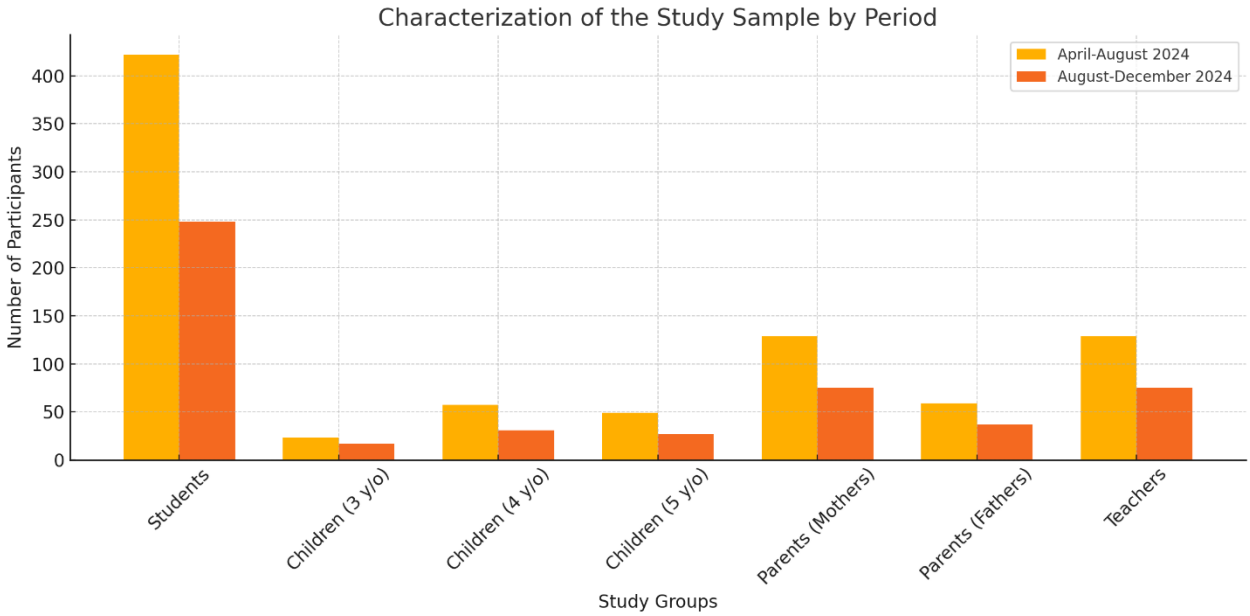

Figure 1. Distribution of Participants by Study Group and Period

To better understand this study, it is appropriate to start with the dependent variable of this research: Development of inclusive competencies in students of the online Early Childhood Education program, which will be transformed with the application of the independent variable: Inclusive educational strategies that strengthen attention to educational diversity in Early Childhood Education, which appears in Table 2.

Table 2. Operationalization of the dependent variable of the study.

Dependent variable	**Dimensions**	**Indicators**
Development of inclusive skills in students of the online Early Childhood Education program .	1. Fundamental competencies of the inclusive teacher in students of the Early Childhood Education program. 2. Attention to the educational diversity of children with neurodevelopmental disorders.	✓ Inclusive teacher competencies mentioned above [6]. ✓ Prior knowledge of each student with educational diversity: Analysis of each student: Age, sex, history: pregnancy, childbirth, diseases during the first years of life, cognitive development (language, attention, memory, thinking, executive functions), psychomotor development of the student, diagnostic impression, conclusions of each child studied and recommendations

	3. Level of preparation of teachers to address the educational diversity of their students	✓ Observed inclusive teacher competencies ✓ Inclusive teacher skills that have not yet been developed
	4. Level of preparation of parents regarding the educational diversity of their children.	✓ State of the family in the grieving process. ✓ Family preparedness level ✓ Level of family functionality or dysfunction

The study took into account the class periods (April-August and August-December 2024), the instruments used to collect data from students of the online Early Childhood Education degree consisted of: a documentary analysis guide of the aforementioned diagnostic reports of children with neurodevelopmental disorders, three semi-structured surveys, an interview, one aimed at teachers, another at parents, leaders of educational institutions, observation guides for teachers and parents, each of these instruments pursued the fundamental objective of identifying the strengths and difficulties in the preparation of teachers and families in early childhood education in the face of the educational diversity of their children.

Application of Plithogenic Statistics as a Probabilistic Analysis Method

The plithogenic probability of an event occurring is composed of the probabilities of its occurrence for all the variables or random parameters that constitute it [8, 9]. The plithogenic probability, based on the analysis of plithogenic variation, is multidimensional. It could be said that it is a probability of subprobabilities , where each subprobability refers to the behavior of a variable, assuming that the event is produced by one or more variables. Each variable is represented by a probability distribution function (Density) (PDF).

According to F. Smarandache's classification , the subclasses of Plithogenic Probability are the following:

(1) multivariate : if all PDFs are classical.

(2) Plithogenic Neutrosophic probability is defined when the PDF is expressed as (T, I, F), where $T$is the probability of the event occurring, I is the probability of uncertainty of the event occurring, and $F$is the probability of the event not occurring. Such that the following are true : $T, I, F \in [0, 1]$, $0 \leq T + I + F \leq 3$.

(3) plithogenic: when all PDFs have indeterminate data or arguments.

(4) Intuitionistic plithogenic fuzzy probability (T, F): when the PDFs have the form where $T, F \in [0, 1]$, $0 \leq T + F \leq 1$.

(5) plithogenic: when the PDFs have the form (T, N, F). $T, N, F \in [0, 1]$, $0 \leq T + N + F \leq 1$; where $T$is the probability that the event will occur, N is the neutral probability that the event will or will not occur, and $F$is the probability that the event will not occur.

(6) plithogenic: when the PDFs have the form (T, H, F). $T, H, F \in [0, 1]$, $0 \leq T^2 + H^2 + F^2 \leq 1$; where $T$is the probability that the event will occur, H is the neutral probability of it occurring or not occurring, and $F$is the probability that the event will not occur.

(7) plithogenic (fuzzy extent): when we have that all PDFs are in style form (fuzzy extent set).

(8) Plithogenic hybrid probability : when some PDFs are in one of the above styles and others are

in other styles.

Plithogenic (SP) comprises the analysis and observations of events studied by Plithogenic Probability.

Plithogenic statistics generalizes classical multivariate statistics, which in turn allows the analysis of numerous neutrosophic or indeterminate output variables. It is also a multi-indeterminate statistic .

The different subclasses of plithogenic statistics are the following:

Multivariate statistics ,

Neutrosophic statistics ,

- Indeterminate plithogenic statistics ,

- Intuitionistic fuzzy plithogenic statistics,

- Fuzzy statistics of plithogenic images,

Plithogenic spherical fuzzy statistics ,

- and in general: Plithogenic statistics (diffuse extension),

plithogenic hybrid statistics .

On the other hand, Refined Plithogenic Statistics is the most general form of statistics that studies the analysis and observations of events described by Refined Plithogenic Probability.

In classical inference, statistics estimates the average of the population variable from the sample average.

When using a classical random variable, the exact sample size is known, and all its elements belong to 100% of the population. However, this does not reflect the dynamics of a population such as a student population, as illustrated by F. Smarandache, where there is a fluctuation of students within courses, and where each student's membership varies depending on whether they are taking a full-time, part-time, or extra-time course.

neutrosophic population , each element has a triple probability of membership such that $0 \leq T_j + I_j + F_j \leq 3$.

If we assume that we have the data set $(T_j, I_j, F_j)$for $j = 1, 2, \dots, n$, where $n$is the sample size, then the average probability for all the data in the sample is calculated by Equation 1 [10,11].

$$\frac{1}{n}\sum_{j=1}^{n}(T_j, I_j, F_j) = \left(\frac{\sum_{j=1}^{n} T_j}{n}, \frac{\sum_{j=1}^{n} I_j}{n}, \frac{\sum_{j=1}^{n} F_j}{n}\right) \quad (1)$$

3. *Analysis of results*

Starting point of the study: Deficiencies and potentialities:

This section presents the results of the study based on the operationalization of the dependent variable. This included the performance of students in the Early Childhood Education program and the three sample groups in which students enrolled in the online Early Childhood Education program participated through pre-professional practice, using quantitative and qualitative approaches.

Of the 670 students enrolled, 100% completed their pre-professional internship, consistently and systematically following the guidelines previously provided by the teacher who wrote this work.

In the April-August period, a greater number of students from the program were enrolled, with a larger sample size in all three study groups, compared to the August-December 2024 period.

The general organizational data of the study are presented below in Table 3.

Table 3. Organizational data of the study.

Study data	April-August	August-December
Total, of students of the career	422	248
Total, from student teams of the career (10 students)	42	25
Total, of linked schools	30	21
Total number of children aged 3 to 6 years served by educational centers	97	49
Total, children ages 3 to 6 removed from the community and internet	32	26
Early Childhood Education I and II teachers involved in assisting students with SEN indicators associated or not with disabilities (professional preparation and diversity)	77	59
Training on the role of Early Childhood Education I and II teachers in students with SEN indicators associated or not with disabilities selected online	52	17
Children's families (preparing for their children's educational diversity)	189	95
Students conducting training with families of selected children online	52	16
Direct beneficiaries	363	203
Indirect beneficiaries	136	59

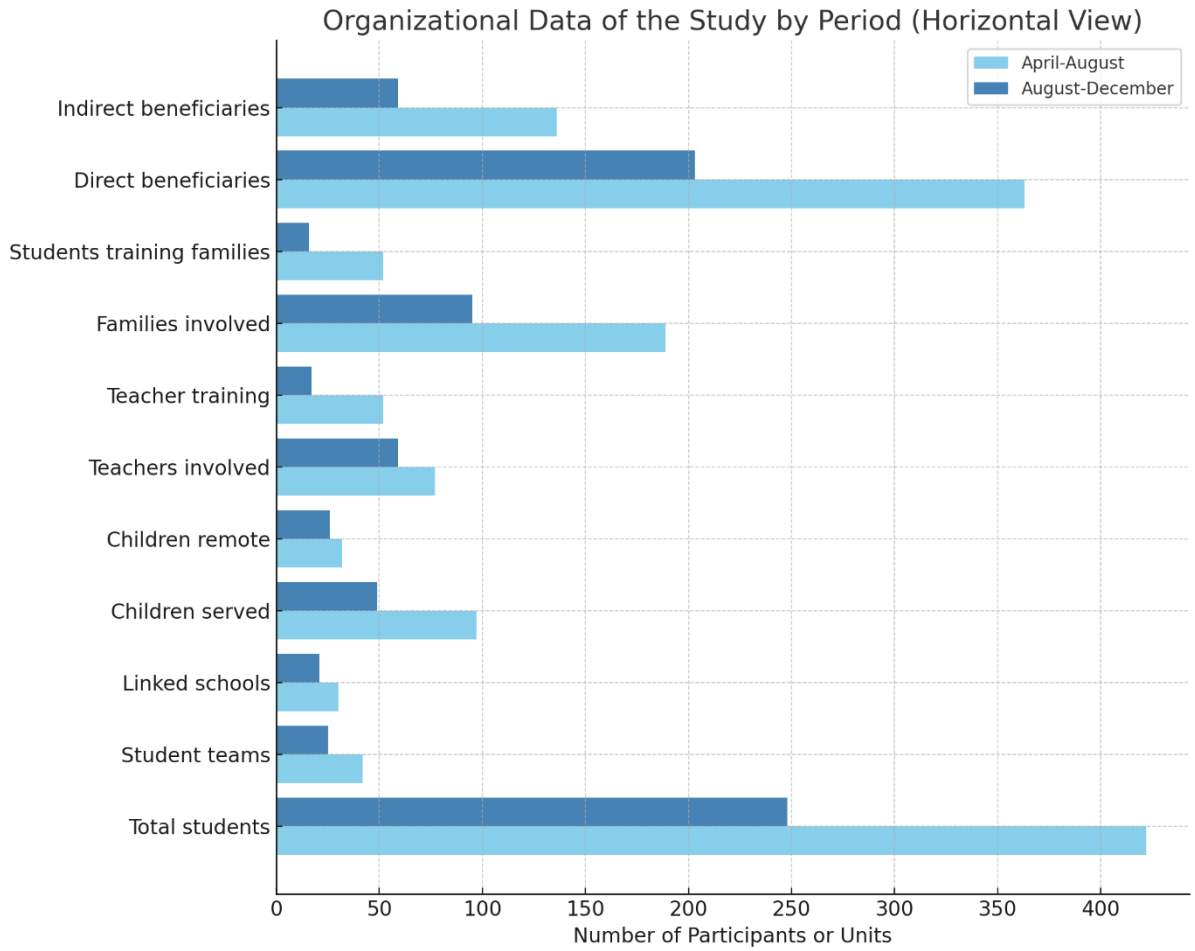

Figure 2. Comparative Organizational Data of the Study Periods (April–August vs. August–December 2024)

In identifying the shortcomings and potential of the four study groups, the main focus was on the students' lack of knowledge about neurodevelopmental disorders and their educational approach, coupled with the serious difficulties experienced by the population of children with these disorders who are part of the study, the persistence of grief among parents who have not yet reached the positive and optimistic stages of this educational reality, which complicated the development of the aforementioned children, and the lack of preparation of teachers in the Early Childhood Education program who work in educational centers.

Based on the activities carried out by the students, the following results are presented on the development of inclusive competencies achieved by the students of the online Early Childhood Education degree, which constituted the first dimension of the study (see table 4). The following criteria were taken into account, which cover the fundamental inclusive teacher competencies that were worked on and have demonstrated student progress, such as:

1. They acquired prior knowledge about each educational diversity, especially neurodevelopmental disorders and methodological strategies for their educational attention at the theoretical-methodological and practical levels provided by the subject's curriculum through case studies, inverted classes, workshops, film debates, analysis of good practices, personalized and recorded tutorials, collaborative work, and project-based learning.

2. They reached a level of satisfaction in the students in coherence with the rhythms, learning styles and sensory preferences, expressed through the motivation and quality of realization of the oriented

activities, in the same way the predisposition of the teachers, parents of families towards the realization of activities such as workshops, cinema debates, talks, classroom observations of different subjects was observed.

3. An increase in the design and implementation of inclusive and diversity-respecting learning environments in each educational space was noted, as students in the program developed skills in methodological planning, implementation, and monitoring based on the principles of UDL, among other strategies mentioned above and adapted to the context of Early Childhood Education. This showed a substantial improvement in the quality of the teaching resources developed and their practical application in a group and personalized manner.

4. They developed greater skills to collaborate with other professionals and their families, since they were able to delve deeper into the framework that represents the family by taking into account important references such as its definition, types of families, their functions in society, vital cycle of life, indicators of functionality and dysfunctionality, the grieving process that the family assumes at birth or identification of an educational diversity at early ages, this made it possible for students to become aware of this problem and at the same time accept the need to work as a team due to the complexity that each student represented, which united them to achieve their goals set in the subgroups of the study, creating a space for reflection and learning for life that marked the success of the educational actions of the students of the career.

5. Another achievement was the development of positive attitudes towards the educational diversity that children represent, especially neurodevelopmental disorders from the identification of their potential and needs, the planning, implementation and monitoring of the children served with an interdisciplinary approach represented by the National Model of management and care for students with Special Educational Needs (SEN) associated with the disability of specialized educational institutions (2019) in force in the country, based on the Biopsychosocial paradigm, which served as a starting point for training with teachers and parents.

6. There was an increased willingness to engage in ongoing training and self-training to better understand the inclusive education model and the types of strategies that enable its implementation in early childhood education. This will allow for continued experience in providing educational services to students in the program for children with neurodevelopmental disorders.

7. They were able to develop more skills to assess children according to the Zone of Proximal Development (ZPD), which represented a more personalized qualitative analysis that allowed a detailed description of the progress obtained by the students during the development of the project, with an objective nature of the research , which allowed planning and implementing the most coherent educational strategies in the short, medium and long term, in addition to quantifying the results.

8. It was possible to observe the development of human values such as: sincerity, humility, fairness, teamwork, acceptance and respect for what is different and diverse, accompanied by ethical values of the profession. Even at the beginning of this work, conflicts were observed between students in the teams. As they progressed, it was possible to see how these differences disappeared and each team achieved greater cohesion, respect and acceptance among themselves.

9. They acquired greater technological skills and abilities through the use of ICTs via tablets, cell phones, or other recreational resources to develop life skills in children, which included: cognitive training (psychic processes and executive functions), language, body care, socialization, emotions, social skills, taken from an international website that constitutes a space for training and socialization of educational strategies that dynamize attention to educational diversity (wikinclusión.org).

10. They generally gained greater creativity and saw themselves as more innovative, optimistic, and capable of transforming educational practice for emerging early childhood education students, contributing to the reduction of learning barriers by ensuring active participation of all students.

As a second dimension: *Attention to the educational diversity of children with neurodevelopmental disorders treated by students of the online Special Education program* , we start from the identification of educational diversities, which behaved as presented in Table 4.

Table 4. Educational diversity of children in Early Childhood Education used by students in the program in the study.

April-August 2024		***August-December 2024***	
Educational diversity	**Number**	**Educational diversity**	**Number**
Low vision	7	Low vision	1
Attention deficit hyperactivity disorder (ADHD)	21	Attention deficit hyperactivity disorder (ADHD)	9
Autism Spectrum Disorder (ASD)	20	Autism Spectrum Disorder (ASD)	11
Warning signs of Language Disorders (LD)	5	Warning signs of Language Disorders (LD)	1
Warning signs of speech sound disorder (SSD)	20	Warning signs of speech sound disorder (SSD)	13
Stammering	4	Stammering	2
Intellectual disability	33	Intellectual disability	23
Physical disability (Cerebral palsy)	7	Physical disability (Cerebral palsy)	3
Deafness	5	Deafness	5
Hearing loss	3	Hearing loss	3
Deafblindness	1	Deafblindness	1
Cochlear implant	2	Cochlear implant	2
Blindness	1	Blindness	1

Based on the diversity described above, a comparative analysis is presented on the evolution of children with neurodevelopmental disorders who underwent surgery, taking into account the three evaluative categories (S-always, CA-with help and N-never) according to the ZDP of both academic periods in the start and end phases developed in Table 5.

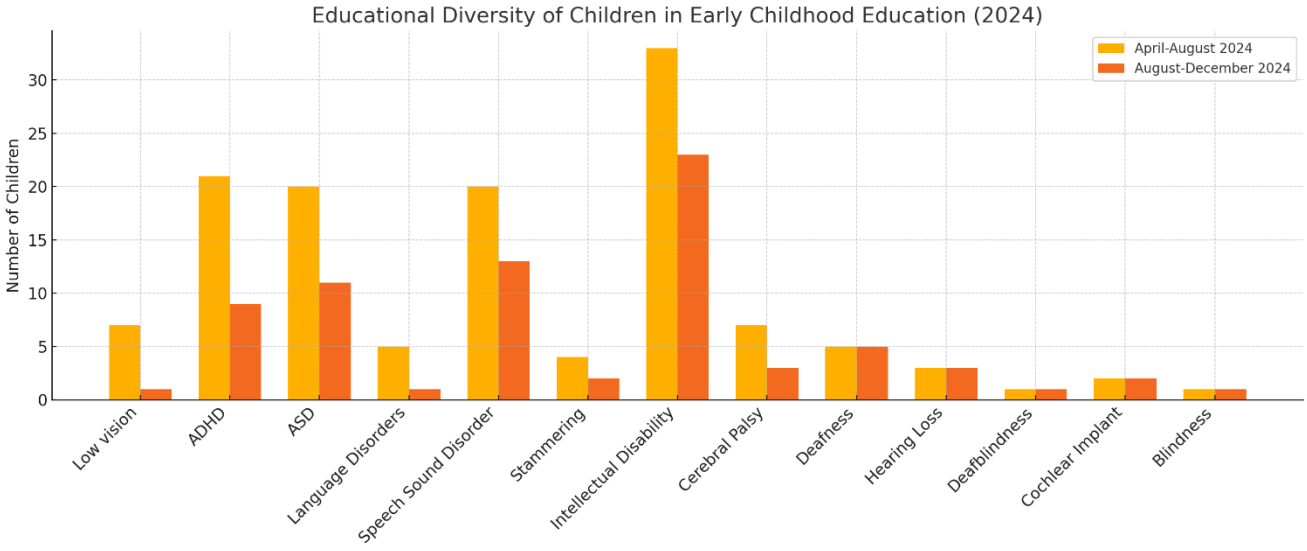

Figure 3. Number of Children by Type of Educational Diversity in Early Childhood Education (2024)

Table 5. Educational diversity of children in Early Childhood.

	April-August 2024						*August-December 2024*					
Educational diversity	**Evolution start**			**Evolution end**			**Evolution start**			**Evolution End**		
	S	**AC**	**N**	**S**	**AC**	**N**	**S**	**AC**	**N**	**S**	**AC**	**N**
Low vision			7		7				1		1	
Attention deficit hyperactivity disorder (ADHD)		3	18	3	17	1		2	7	3	5	1
Autism Spectrum Disorder (ASD)		9	11	3	15	2		9	2	3	7	1
Warning signs of Language Disorders (LD)			5		2	3			1		1	
Warning signs of speech sound disorder (SSD)		3	17	9	11	1	1	9	3	6	7	
Stammering			4	1	3				2		2	
Intellectual disability			33	3	25	5			23	3	15	5
Physical disability (Cerebral palsy)		2	5		5	2			3		1	2
Deafness	1	3	1		4	1			5		5	
Hearing loss			3	1	2				3		3	
Deafblindness			1		1				1		1	
Cochlear implant			2		2				2		2	
Blindness			1		1				1		1	

To describe the evolution of these children with neurodevelopmental disorders, it is appropriate to start from the areas of development that were intervened in children attending Early Education II (Motor, cognitive, language, socio-emotional and autonomy), according to [12] , to overcome the learning and skills objectives projected in [13] in the ages between 3 and 6 years, among these advances the following stood out:

- *Motor:* Greater development of *gross motor skills was achieved* as they have shown greater agility in starting, turning and stopping in games and other activities, jumping with greater momentum, descending stairs with more steps without or with less help, their jumping distances increased, in terms of the development of *fine motor skills* it is observed that they can button shirts with help and make some strokes using thick crayons, with greater coordination between the eye and the hand, there is a greater development of pictorial drawing in children aged 5 to 6 as a result of playful activities.
- *Cognitive:* greater development of the symbolic function is observed since the skills of thinking about objects, games played, people who are not present that have been played have increased, they imitate more easily, especially simulation games associated with language, relate better cause and effect, they recognize themselves, they manage to establish some categories with help (animals, fruits, families), they establish comparisons, they count from 1-5, they concentrate their attention better and some progress is observed in the development of executive functions: organizing, regulating their emotions and behaviors better, better adaptation to new situations, although great difficulties still persist in the ability to plan and work memory.
- *Language:* in this area its evolution will be analyzed, taking into account the components of language (Phonological, semantic, morpho-syntactical and pragmatic), from In the short time that this study lasted in its implementation phase, the greatest advances could be observed in the development of the *semantic component* that included passive vocabulary (demonstrated in the recognition of objects, cards and active vocabulary through oral language, using for this the increase of new words related to the following thematic axes: family, home, clothing, animals, transportation, when communicating with a simple sentence language of three words.
- *Socio-emotional:* To analyze the evolution in this area it was subdivided into two types of dimensions, namely *: the intrapersonal one* that covered the skills of self-knowledge, resilience, as well as the management of emotions and feelings, on the other hand the *interpersonal dimension* was made up of conflict management and empathy, both dimensions and skills were present in each of the activities carried out with the students according to the current skills in Early Childhood Education [14] and constituted one of the areas of greatest evolution in children with neurodevelopmental disorders studied.
- *Autonomy:* They acquired personal care skills in which the achievements of carrying out activities with the help of adults (teachers, parents) prevailed, for example: putting on and taking off clothes and socks, washing hands correctly with soap and water, brushing teeth independently, greater control of sphincters and use of the bathroom, performing tasks such as picking up toys in the designated box after playing, other activities such as expressing the activities that interest them, trying to communicate their desires and preferences, finding solutions to problems in everyday life.

The third dimension, aimed at teachers in educational centers, enabled them to obtain training on neurodevelopmental disorders in early ages and their educational approach, acquire skills in planning and implementing activities based on the three principles of UDL, and demonstrate greater development of inclusive teacher competencies and their role within the teaching-learning process, which enhances the materialization of inclusive education in the intervened centers.

The fourth dimension, aimed at parents, showed surprising results. Based on the knowledge parents acquired about their own child's reality and developmental life cycle, they became aware of the indicators of functionality and dysfunction, the grieving process that families go through upon the arrival of a child with this type of diversity, and how to reverse this entire process to accept and encourage their children's development.

Plithogenic Analysis of the Results

To complement the quantitative and qualitative analysis of the results, neutrosophic plithogenic statistics were applied, according to Smarandache's postulates (cited in the Plithogenic Statistics section). This approach allows for modeling uncertainty in educational events by considering the probabilities of truth (T), indeterminacy (I), and falsity (F). This approach is especially suitable for analyzing the evolution of inclusive competencies of students in the online Early Childhood Education program and the progress of children with neurodevelopmental disorders, given that it captures the variability and ambiguity inherent in inclusive educational contexts.

Two key dimensions of the dependent variable were selected:

1. The development of inclusive competencies in students of the degree
2. Attention to the educational diversity of children with neurodevelopmental disorders

For each dimension, neutrosophic plithogenic probabilities were calculated using the following equation:

Equation 1: Neutrosophic Plithogenic Probability

$$P = \left(\frac{\sum T_i}{n}, \frac{\sum I_i}{n}, \frac{\sum F_i}{n}\right) \quad (2)$$

Where:

- T_i = truth probabilities for each element of the sample
- I_i = indeterminacy probabilities for each element of the sample
- F_i = probabilities of falsehood for each element of the sample
- n = sample size

Inclusive Competencies of Students

The development of inclusive competencies was analyzed among the 670 students enrolled in the program (422 in April-August, 248 in August-December). Plithogenic values were assigned based on:

Table 6. Plithogenic Categorization of Students' Inclusive Competencies.

Category	Description	Students	Percentage

Truth (T)	Students who demonstrated comprehensive inclusive competencies (effective planning, use of UDL, interdisciplinary collaboration)	536	80%
Indeterminacy (I)	Students with partial results or ambiguity in the application of competencies	101	15%
Falsehood (F)	Students who did not achieve expected competencies	33	5%

Neutrosophic plithogenic probability calculation for students:

$$P_{competencies}=\left(\frac{536}{670},\frac{101}{670},\frac{33}{670}\right)=(0.80,0.15,0.05)$$

This probability indicates a high degree of development of inclusive competencies (T=0.80), with a moderate level of indeterminacy (I=0.15) due to variability in initial preparation, and a low proportion of unachieved results (F=0.05).

Evolution of Children with Neurodevelopmental Disorders

The evolution of the 204 children with neurodevelopmental disorders (129 in April-August, 75 in August-December) was analyzed according to the categories of the Zone of Proximal Development (ZPD):

- **S (Always)** : Independent achievement
- **CA (With Help)** : Achievement with support
- **N (Never)** : I can't do it

Calculation Example: Autism Spectrum Disorder (ASD)

April-August period (20 children):

- Start:$S=0, CA=9, N=11 \rightarrow T=\frac{0}{20}=0, I=\frac{9}{20}=0.45, F=\frac{11}{20}=0.55$
- End:$S=3, CA=15, N=2 \rightarrow T=\frac{3}{20}=0.15, I=\frac{15}{20}=0.75, F=\frac{2}{20}=0.10$

August-December period (11 children):

- Start: $S=0, CA=9, N=2 \rightarrow T=\frac{0}{11}=0, I=\frac{9}{11}=0.82, F=\frac{2}{11}=0.18$
- End:$S=3, CA=7, N=1 \rightarrow T=\frac{3}{11}=0.27, I=\frac{7}{11}=0.64, F=\frac{1}{11}=0.09$

Average calculation for TEA:

$$P_{TEA}=\left(\frac{0+0+0.15+0.27}{4},\frac{0.45+0.82+0.75+0.64}{4},\frac{0.55+0.18+0.10+0.09}{4}\right)P_{TEA}$$
$$=(0.105,0.665,0.230)$$

Table 7. Neutrosophic Plithogenic Probabilities for the Evolution of Children by Educational Diversity

Educational Diversity	T (Truth)	I (Indeterminacy)	F (Falsehood)	Total Children
Low vision	0.05	0.80	0.15	15
ADHD	0.12	0.65	0.23	28
Autism Spectrum Disorder (ASD)	0.105	0.665	0.230	31
Language Disorders	0.08	0.75	0.17	22
Warning signs of speech sound disorder (SSD)	0.10	0.68	0.22	18
Stammering	0.07	0.78	0.15	12
Intellectual Disability	0.09	0.70	0.21	19
Cerebral Palsy	0.11	0.67	0.22	14
Deafness	0.13	0.64	0.23	16
Hearing loss	0.06	0.77	0.17	13
Deafblindness	0.04	0.81	0.15	8
Cochlear Implant	0.05	0.80	0.15	5
Blindness	0.04	0.81	0.15	3
TOTAL	**0.08**	**0.72**	**0.20**	**204**

Table 8. Comparison of Plithogenic Probabilities between Dimensions

Dimension	T (Truth)	I (Indeterminacy)	F (Falsehood)	Interpretation
Teaching Competencies	0.80	0.15	0.05	High development with little uncertainty
Evolution of Children	0.08	0.72	0.20	High need for ongoing support

Interpretation of Results

Plithogenic analysis reveals significant patterns in both dimensions studied:

Teaching Competencies

Students' inclusive competencies show a high degree of truth (T=0.80), indicating a solid development of the skills necessary for inclusive education. Moderate indeterminacy (I=0.15) reflects variations in students' initial preparation, while low falsity (F=0.05) suggests that most achieved the proposed objectives.

Evolution of Children

Plithogenic probabilities for children show high indeterminacy (I between 0.64 and 0.81) across all educational diversity, reflecting the critical need for ongoing support to achieve significant gains. The low truth (T between 0.04 and 0.13) indicates that completely independent gains are limited, but the reduction in falsity (F between 0.15 and 0.23) suggests a progressive decrease in barriers to learning.

Pedagogical Implications

The phytopathogenic results support the effectiveness of the approach based on:

- **Universal Design for Learning (UDL)** : Facilitating multiple ways to access knowledge
- **Zone of Proximal Development (ZPD)** : Optimizing personalized pedagogical support
- **Interdisciplinary Collaboration:** Integrating Multiple Perspectives in Educational Care

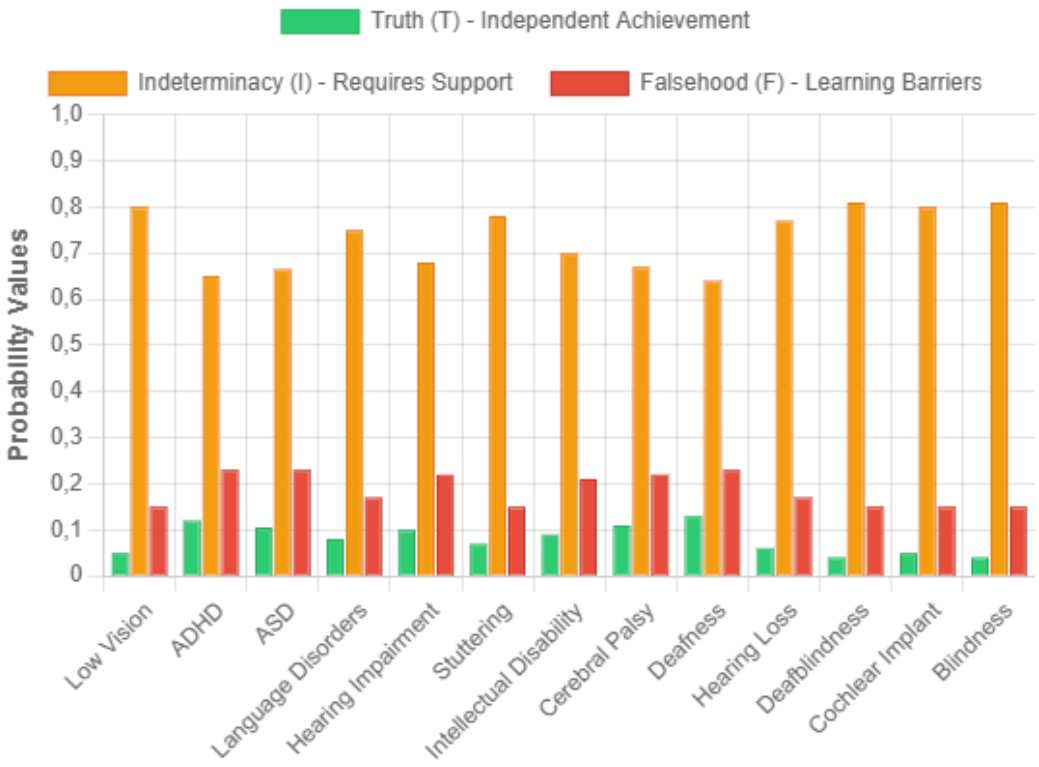

Figure 4. Neutrosophic Plithogenic Probabilities by Educational Diversity

This plithogenic approach complements the qualitative findings by quantifying the uncertainty inherent in addressing educational diversity. The results highlight the importance of personalized and collaborative strategies to enhance both children's development and teacher competencies, highlighting the need for ongoing support systems in inclusive educational contexts.

4. Discussion

In the four study groups, factors were observed that let to a slower evolution of the study groups, these were given by the need to socialize in the scientific community about more experiences of good practices obtained from this modality of the career and area of knowledge, it is a determining factor, since the complexity of work requires innovative and creative actions that satisfy the learning needs of the students of this career, the increase in hours of pre-professional practices that would allow to consolidate more the performance of each study group would facilitate the evolution towards the development of more competences in the groups of the sample in general.

On the other hand, the lack of commitment of the public educational centers that, although there are updated agreements from their legal basis for the realization of this type of work in the state educational centers of the Ministry of Education [17] prevailed the denial to the students of this modality of study, this resulted in the selection of cases that represent children with neurodevelopmental disorders presented on the Internet and although the students of the career won in training and preparation mentioned above, the direct beneficiaries were affected, however, the commitment, predisposition, dedication of the teacher of the subject, students of the career, children with neurodevelopmental disorders, teachers who care for these children and the parents of families predominated in the results obtained.

Neutrosophic plithogenic analysis complements these observations by modeling uncertainty in the outcomes (Table 6). For the 670 students, the probability of truth (T = 0.80) was obtained, reflecting a solid development of inclusive competencies, with moderate indeterminacy (I = 0.15) associated with initial challenges in team preparation and cohesion, and low falsity (F = 0.05). For the 204 children with neurodevelopmental disorders, the probabilities show high indeterminacy (I between 0.64 and 0.81), indicating the need for ongoing support to make progress, and low falsity (F between 0.15 and 0.23), evidencing a reduction in barriers to learning. These plitogenic results reinforce the importance of inclusive educational strategies and interdisciplinary collaboration, aligned with the principles of UDL and ZDP [7, 15], to mitigate the limiting factors identified and enhance the achievements made.

5. Conclusions

The pre-professional practice within the online Early Childhood Education program proved to be a relevant and coherent initiative, grounded in theoretical, methodological, and practical foundations. This experience was fundamental for university students to develop teaching competencies and expand their role as inclusive educators, preparing them for the contextual challenges of Early Childhood Education. Addressing educational diversity through a transdisciplinary and intersectoral approach enabled the delivery of personalized, high-quality care to the child beneficiaries, thereby establishing a vital precedent for secondary prevention in inclusive education. The program's benefits extended to all participants involved. Teachers at the educational centers demonstrated increased motivation and developed enhanced skills for addressing diversity in their classrooms. Concurrently, the families of the children gained a deeper understanding of their social reality, critically recognizing their individual strengths and limitations to create action plans that empower their children's development. This collaboration among students, teachers, and families served as a cornerstone for the project's success.

The neutrosophic plithogenic analysis quantitatively confirmed these positive outcomes. For the 670 students, a high probability of truth (T=0.80) validated the solid development of inclusive competencies. In the case of the 204 children with neurodevelopmental disorders, a high level of indeterminacy (I between 0.64 and 0.81) underscores the need for continuous support, while a low level of falsity (F between 0.15 and 0.23) demonstrates the effectiveness of the strategies in reducing learning barriers, thus validating the relevance of the pre-professional practice model.Moreover, from

a methodological standpoint, the implementation of plithogenic statistics demonstrated significant potential in educational research, especially when dealing with heterogeneous and ambiguous variables such as inclusive competencies and neurodevelopmental progress. Unlike traditional statistics, which often struggle to represent uncertainty, plithogenic analysis provides a multidimensional framework that respects the partial truths and indeterminacies of real-life educational settings. This enhances decision-making and supports the development of more flexible, adaptive, and context-sensitive educational policies.

However, certain limitations must be acknowledged. The restricted collaboration from some public educational centers forced students to work with remote or simulated cases, potentially affecting the direct impact on beneficiaries. Additionally, the short duration of the intervention phases limited the long-term observation of children's progress and the consolidation of inclusive practices in institutional settings.Future research should aim to extend the duration and scale of these interventions, incorporating longitudinal monitoring to assess the sustainability of the inclusive competencies developed. Also, stronger institutional agreements with public education authorities are recommended to secure broader implementation, greater impact, and equitable access to inclusive education services for all children, particularly those with neurodevelopmental disorders.

In summary, this study confirms that inclusive education requires more than isolated efforts; it demands coordinated actions across students, teachers, families, and institutions. The use of plithogenic statistical modeling proved to be a valuable analytical ally, capturing the complexities and uncertainties that characterize inclusive educational practice. Ultimately, investing in inclusive pre-professional training is not only an academic responsibility but a social imperative to ensure educational equity from early childhood.

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