ANALYSIS OF THE EFFECTIVENESS OF AN EDUCATIONAL PROGRAM FOR READING STIMULATION TO PRESCHOOL CHILDREN IN YARINACOCHA, PERU, BASED ON NEUTROSOPHIC STATISTICS

Janett Karina Vasquez Pérez[1*], Wilmer Ortega Chávez*, Juan Lopez Ruiz*, Ronald Gamarra Salinas*, Jesús Alcibiades Morote Mescua*, Jani Monago Malpartida**, and Gina Real Zumba***

*Universidad Nacional Intercultural de la Amazonia Pucallpa, Perú
**Universidad Nacional Hermilio Valdizan Huánuco, Perú.
***Universidad Técnica de Babahoyo, Babahoyo, Ecuador

ABSTRACT

This research was carried out on a population of 5 and 6-year-old children belonging to bilingual educational institutions in Yarinacocha, Peru, during the year 2019. Specifically, the effectiveness of the traveling notebook method is analyzed, which consists in the introduction of children of this age in reading, without yet using the traditional methods to acquire this skill. The traveling notebook method also takes into account the languages spoken in the region, which include Spanish and native languages. Neutrosophic statistics was used to carry out the study, because the data collected contain indeterminations, obtained that teachers were allowed to evaluate with some imprecision in case they could not assign a crisp value to the evaluations. Neutrosophic statistics generalize classical statistics, where crisp data become interval-valued data.

KEYWORDS: Preschool education, reading stimulation, neutrosophy, neutrosophic statistics

MSC: 03B50, 03B52, 62P25.

RESUMEN

Esta investigación se llevó a cabo en una población de niños de 5-6 años de edad pertenecientes a instituciones educativas bilingües en Yarinacocha, Perú, durante el año 2019. Específicamente, se analiza la efectividad del método "Cuaderno Viajero", que consiste en la introducción a la lectura de los niños de esta edad, sin la utilización aún de los métodos tradicionales para adquirir esta habilidad. El método del "Cuaderno Viajero" toma en cuenta las lenguas que se hablan en la región, que incluye el español y las lenguas nativas. La estadística neutrosófica se usó para llevar a cabo este estudio, debido a que los datos recolectados contienen indeterminaciones, obtenidas a partir de que a los maestros se les permitió evaluar con alguna imprecisión en caso de que ellos no pudieran asignar un valor exacto a la evaluación. La estadística neutrosófica generaliza la estadística clásica, donde los datos escalares se convierten en datos en forma de intervalos.

PALABRAS CLAVES: Educación preescolar, estimulación a la lectura, neutrosofía, estadística neutrosófica.

MSC: 03B50, 03B52, 62P25.

1. INTRODUCTION

Education has always been the pillar of social and cultural transformation for the progress of a nation, region or community. In recent decades more importance has been given to preschool children, that is, that the educational activity is focused during the first six years of life. Recently, Peruvian's education has been implementing processes to focus attention on the cognitive, affective, physical and social development of pre-school children.

That is why initial education has become the first step of educational initiation schooling and there is a lot of commitment on the part of managers and actors involved with the quality of teaching in children. Then, the greatest weight of academic responsibility falls on the classroom teacher, since the parents, on multiple occasions trusts in the teachings of the teachers of initial education, with the conviction that their children are in expert hands.

Very often time limitations excuse the parents of the little dedication necessary to reinforce the learning

---

[1]Email: jvasquezp@unia.edu.pe

of their child, it is common to shift the responsibility to the teacher or a distractor as video games or internet, to keep them distracted. This belief does not contribute in the acquisition of the academic challenges of the world taught as an introduction to the reading, and other skills that are associated with assessments of reading comprehension, [10]. Bilingual intercultural education seeks mechanisms for family and school interaction and integration with activities of stimulation to reading.

It is in the first years of life that the acquisition of language is closely linked to the social, family and cultural context of the child. Colomer says that reading is one of the most significant processes of the human being, since it constitutes the fundamental gate of knowledge, and is one of the basic tools for the solution of problems, [11]. Similarly Solé defines comprehension strategies as "procedures that involve the planning of actions that are triggered to achieve the objectives", [11]. Strategies are actions that are actively performed by the reader, before, during and after the reading. In relation to what was expressed by the previous authors, it coincides with the activity of reading stimulation called the development of the "traveling notebook", whose proposal adds to the multiple strategies that an innovative teacher must use in the classroom, to favor the link between the child, the family and the school.

It is the "traveling notebook" that enables children the development of oral expression, reading comprehension and production of texts, with practical applicability in initial classrooms. Children are converted into co-authors of stories that are created within the family, in a playful and enjoyable way, by using images and words, which will be shared by reading aloud in the classroom, where the child along with the teacher becomes the narrator giving a value to the writings of the children that are reflected in the plain sheets, as a bridge of contact with the readings that the children bring to the classroom. There are expectations and waste of imaginative children, which every day will be feeding the taste for reading, without they feel it is a laborious or overwhelming task, including short and illustrated texts, it highlights the commitment of bringing the traveling notebook home to collectively write a story, which brings the thematic variety, the use of the native language, the bonding of the family, the child and the school.

Thus, it was undoubtedly the best experience of reading, because the experience of reading in home and in the school becomes the traveling notebook on a strategy of practical applicability, dynamic stimulation of reading, making the time of the children more expressive, eager to know what reading brought the mate, a fact that is a constant motivation for reading an entertainment, an unforgettable experience that provides an alternative to motivate young readers.

The traveling notebook serves as a mediator in the teaching-learning processes, an experience in the initiation to reading and the training of readers. The teacher through the use of this strategy of reading emphasizes his/her role as a guide for guiding the processes of reading, without which the children feel compelled to read, but that makes them to be partakers of the author and situates the children of narrators, it has been necessary to the constant coordination, with the children and also with the family on the delivery of the traveling notebook, which involves first listening, write, draw, and count in the classroom, in this case tales and stories, that will provide the traveling notebook as a social and individual construction at the same time.

This strategy of the traveling notebook has collected stories to be told by the children, involving them ever more in the process, the reader, until it becomes a habit, the act of reading, that is, based on the images, improvising new texts, as we must remember that it is not a reading itself, that the children of initial education are still in a process of adaptability to the formal education, in this sense, the fact of re-creating the stories that are embedded in the sheets of the traveling notebook, it is this sense regarded as a process of creation and narration at the same time, it combines other elements such as oral expression, comprehension and production of texts in a phase of initiation, which despite being small, they can achieve significant levels of understanding, causing emotions, memories, experiences, and interaction because they wrote compositions in Spanish and native language.

Another important factor that is rescued in this strategy is the valuation of the native language that contributes to the transmission of culture and promotion of identity in bilingual classrooms. It has also made it possible to have the traveling notebooks of each participating institution, which are reading materials for all levels, which are part of the classroom library or reading sector of each institution.

The present research responds to the question: What is the effectiveness of the traveling notebook in reading stimulation in 5-year-olds of the bilingual initial educational institutions of Yarinacocha in 2019 in the dimensions: playful activities, book world, simulated situations, visual imagination, and family coexistence? The objective is to test the effectiveness of the travel notebook as a didactic strategy in the stimulation of reading in the 5-year-old children of the educational institutions of Yarinacocha 2019.

The population consists of 5 and 6-year-olds from a total of 11 educational institutions in the Yarinacocha district, Coronel Portillo province of the Ucayali region and a sample of 140 children. The proposed hypothesis was that the traveling notebook as a strategy contributes effectively in stimulation to reading

in children of 5 years of the initial educational institutions of Yarinacocha.

There was imprecise data in the research, because teachers were asked to assign imprecise assessments if they were not sure enough to use a crisp value. This type of situation is quite common in the pedagogical field. Therefore, neutrosophic statistics was used in the research as a tool to study the effectiveness of the traveling notebook method in preschool education in Yarinacocha, [22].

Neutrosophic statistics refers to a set of data, such that the data or a part of them are indeterminate in some degree, and to methods used to analyze these data. In classical statistics all data are determined; this is the distinction between neutrosophic statistics and classical statistics.

In many cases, when indeterminacy is zero, neutrosophic statistics coincides with classical statistics. We can use the neutrosophic measure for measuring the indeterminate data. The neutrosophic statistical methods will enable us to interpret and organize the neutrosophic data (data that may have some indeterminacies) in order to reveal underlying patterns. This neutrosophic branch and others have been successfully applied in many real-life problems, read [2][3][4][5][6][8][13][14][16][19][20][23].

This paper is divided into the following sections; section 2 contains the main concepts of neutrosophic sets and neutrosophic statistics. Section 3 is devoted to the study with neutrosophic statistics methods of the efficacy of the traveling notebook method. The final section provides the conclusions.

2. SOME NOTIONS ON NEUTROSOPHY AND NEUTROSOPHIC STATISTICS

This section contains some basic concepts of neutrosophic sets and neutrosophic statistics.

Definition 1: ([21]) Let X be a universe of discourse. A *Neutrosophic Set* (NS) is characterized by three membership functions, $u_A(x), r_A(x), v_A(x) : X \rightarrow]-0, 1^+[$, which satisfy the condition
$-0 \leq inf u_A(x) + inf r_A(x) + inf v_A(x) \leq sup u_A(x) + sup r_A(x) + sup v_A(x) \leq 3^+$ for all xX.
$u_A(x), r_A(x)$ and $v_A(x)$ are the membership functions of truthfulness, indeterminacy and falseness of x in A, respectively, and their images are standard or non-standard subsets of $]-0, 1^+[$.

Definition 2: ([21]) Let X be a universe of discourse. A *Single-Valued Neutrosophic Set* (SVNS) A on X is a set of the form:
$$A = \{\langle x, u_A(x), r_A(x), v_A(x)\rangle : x \in X\} \tag{1}$$

Where $u_A, r_A, v_A : X \rightarrow [0,1]$, satisfy the condition $0 \leq u_A(x) + r_A(x) + v_A(x) \leq 3$ for all xX. $u_A(x), r_A(x)$ and $v_A(x)$ denote the membership functions of truthfulness, indeterminate and falseness of x in A, respectively. For convenience a *Single-Valued Neutrosophic Number* (SVNN) will be expressed as $A = (a, b, c)$, where a, b, c [0,1] and satisfy $0 \leq a + b + c \leq 3$.

Neutrosophic Statistics extends the classical statistics, such that we deal with set values rather than crisp values, [22].

Neutrosophic Descriptive Statistics is comprised of all techniques to summarize and describe the neutrosophic numerical data characteristics.

Neutrosophic Inferential Statistics consists of methods that permit the generalization from a neutrosophic sampling to a population from which it was selected the sample.

Neutrosophic Data is the data that contains some indeterminacy. Similarly to the classical statistics it can be classified as:

● *Discrete neutrosophicdata*, if the values are isolated points.
● *Continuous neutrosophicdata*, if the values form one or more intervals.

Another classification is the following:

● *Quantitative (numerical) neutrosophic data*; for example: a number in the interval (we do not know exactly), 47, 52, 67 or 69 (we do not know exactly);
● *Qualitative (categorical) neutrosophic data*; for example: blue or red (we do not know exactly), white, black or green or yellow (not knowing exactly).

The *univariate neutrosophic data* is a neutrosophic data that consists of observations on a neutrosophic single attribute.

Multivariable neutrosophic data is neutrosophic data that consists of observations on two or more attributes.

A *Neutrosophical Statistical Number* N has the form $N = d + I$, [12], where d is called *determinate part* and I is called *indeterminate part*.

A *Neutrosophic Frequency Distribution* is a table displaying the categories, frequencies, and relative frequencies with some indeterminacy. Most often, indeterminacies occur due to imprecise, incomplete or unknown data related to frequency. As a consequence, relative frequency becomes imprecise, incomplete, or unknown too.

Neutrosophic Survey Results are survey results that contain some indeterminacy.

A *Neutrosophic Population* is a population not well determined at the level of membership (i.e. not sure if some individuals belong or do not belong to the population).

A *simple random neutrosophic sample* of size n from a classical or neutrosophic population is a sample of n individuals such that at least one of them has some indeterminacy.

A *stratified random neutrosophic sampling* is the pollster groups of the (classical or neutrosophic) population by a strata according to a classification; afterwards the pollster takes a random sample (of appropriate size according to a criterion) from each group. If there is some indeterminacy, we deal with neutrosophic sampling.

Additionally we describe some concepts of interval calculus, which shall be useful in this paper.

Given $N_1 = a_1 + b_1 I$ and $N_2 = a_2 + b_2 I$ two neutrosophic numbers, some operations between them are defined as follows, [12]:

$$N_1 + N_2 = a_1 + a_2 + (b_1 + b_2)I \text{ (Addition)},$$

$$N_1 - N_2 = a_1 - a_2 + (b_1 - b_2)I \text{ (Difference)},$$

$$N_1 \times N_2 = a_1 a_2 + (a_1 b_2 + b_1 a_2 + b_1 b_2)I \text{ (Product)},$$

$$\frac{N_1}{N_2} = \frac{a_1 + b_1 I}{a_2 + b_2 I} = \frac{a_1}{a_2} + \frac{a_2 b_1 - a_1 b_2}{a_2(a_2 + b_2)}I \text{ (Division)}.$$

Additionally, given $I_1 = [a_1, b_1]$ and $I_2 = [a_2, b_2]$ we have the following operations between them ([15]):

1. $I_1 \leq I_2$ if and only if $a_1 \leq a_2$ and $b_1 \leq b_2$.
2. $I_1 + I_2 = [a_1 + a_2, b_1 + b_2]$ (Addition);
3. $I_1 - I_2 = [a_1 - b_2, b_1 - a_2]$ (Subtraction),
4. $I_1 \cdot I_2 = [min\{a_1 b_1, a_1 b_2, a_2 b_1, a_2 b_2\}, max\{a_1 b_1, a_1 b_2, a_2 b_1, a_2 b_2\}]$ (Product),
5. $\frac{I_1}{I_2} = \left[\frac{a_1}{b_1}, \frac{a_2}{b_2}\right]$, always that $0 \notin I_2$ (Division).

6. $\sqrt{I} = [\sqrt{a}, \sqrt{b}]$, always that $a \geq 0$ (Square root).
7. $I^n = \underbrace{I \cdot I \cdot \dots \cdot I \cdot I}_{n \text{ times}}$

3. RESULTS

This section deals with the results of the statistical study of the effectiveness of the traveling notebook in Yarinacocha district. An explanation of what this method consists of and its importance will be initially given.

3.1 Traveling Notebook method

Fonseca in her research about travel book for socio–affective development in children from 5 to 6 years of the educational institution "Magic Sky" of the D. Q. M., period 2016, defines the traveling notebook as a didactic activity that is generally used for the development of language, it is a book that helps the teacher to motivate different activities, allows socialization between the teacher and the student, but also promotes the participation of parents and people outside the institution, [11].

It is an empty booklet, which should be socialized with parents and teachers, a function can be elaborated in the classroom, can be decorated by the participants, the book will have to be filled step by step according to the chronogram established by the participants, it will have rules, norms and guidelines within its pages, it is a very fun way to work and learn.

The traveling notebook, in addition, is a tool that allows us to improve communication with those children who have difficulties or alterations in communication.

This traveling notebook is a research of great cultural value and also tends to be very successful among the families of the children who achieved their participation.

The traveling notebook is easy to use, the activities will be described by the teacher in a written and oral way if necessary, the resources and necessary materials will be requested in each activity and provided by the teacher if necessary. It will be evaluated using an evaluation scheme that is in a range of satisfactory, good and very good. The activities will be carried out on the blank sheets that will only have the name of the participating girl or boy. It will be developed according to alphabetical order so that the traveling

notebook can go to all the homes of the participants, in an orderly and synchronized manner.

The traveling notebook is also known in another context, as a teaching-learning book, therefore:

● The traveling notebook will be sent to each child's home.
● They will have to return to the appropriate classroom of the educational institution of the initial level the next day that the activity is assigned.
● When reading, the development of the activity will be the necessary guide to perform it.
● The activities will have to be carried out with the help of the parents or tutors.
● The traveling notebook is a creativity notebook; each decorating activity will be a key requirement.
● The notebook or travel book belongs to everyone and for everyone, it must be taken care of, stains and wrinkles must be avoided.

Usually in the traveling notebook they can develop: songs, tongue twisters, riddles, news, poems, sayings, jokes, anecdotes, short stories, etc. they can do it in native language, address topics of everyday life, life experiences, stories of children's culture or even free writing.

Reading stimulation is understood as a series of activities, strategies, techniques that seek the act of reading. The development of reading comprehension, the adequate one, we have not all achieved, this is how the need arises to start the habit of reading as soon as possible, as Frank Smith says: "you learn to read by reading", [11]. It is therefore possible to affirm that the student should start many real reading activities much earlier, with themes generated by the child's own interest.

The reading stimulation is to try to convince students of the excellence of reading with a mere theoretical discourse. It is to create the structural conditions for the reader to take place in the school, such as the opening of the school library and/or classroom libraries. In addition, to enhance creativity in its many facets: theater, texts, illustrations as well as collaborate with the family in the development of reading habits. Robert Escarpit wrote "it is probably during that stage (pre-school childhood) of life that fundamental attitudes towards the book are born [...].It is therefore of the utmost importance that the book must be introduced into the child's life before school age and be inserted from that moment on into both his or her games and daily activities.", [11].

3.2. Study based on neutrosophic statistics

For the evaluation of the children, two tests were applied, one before the programme and another one after, where the following subcategories were evaluated for each of the following five categories:

1.   Ludic activities.
1.1.   He/she participates in playful games.
1.2.   He/she uses resources that amuse him/her.
2.   World of books.
2.1   Proximity to books.
2.2   He/she distinguishes the books.
2.3   He/she builds books.
3.   Simulated situations.
3.1   He/she imitates his/her teacher.
3.2   He/she simulates writing.
3.3   He/she writes or draws.
4.   Visual imagination.
4.1   He/she imagine cases.
4.2   He/she assigns meaning to what he/she observe.
5.   Family life.
5.1   He/she narrates facts about his/her environment.
5.2   He/she participates in the reading.
5.3   He/she asks to be read a story.

For the study we basically counted on the measurement scale that appears in Table 1 to measure each of the aforementioned aspects:

Linguistic term	Equivalent numerical evaluation
Very low	1
Moderate	2
Medium	3

High	4

The teachers were given both linguistic and numerical values in Table 1. To achieve more accuracy, in case of doubt, they were asked to add a symbol "+" or "-" to the numerical term in the right column, when there were doubts about the appropriateness of the evaluation. For example, 2+ means that the aspect is evaluated as "moderate" and near of "medium", however 2⁻ is understood as bordering on "moderate", but could be considered near of "very low".

Thus, if a criterion is classified as g+ (with g = 1, 2, 3, 4), the data is represented using the interval [g+0.51, g+0.9] (4+ is understood as 4), if it is classified as g⁻ (with g = 1, 2, 3, 4) the data is replaced by the interval [g-0.49, g] (1⁻ is understood as 1). For example, 2⁻ is replaced in calculations by [1.51, 2], while 2⁺ is replaced by [2.51, 2.9]. If symbols "+" or "-" are omitted, crisp datum is used, although if necessary in calculations g can be replaced by [g, g] for convenience. This evaluation system is very common, especially in Higher Education, teachers are familiar with the system.

The advantages offered by this way of evaluating is that in case of doubts, which are common in evaluations of this type, the teacher can gain in accuracy if one value is replaced by an interval, although it gains in imprecision and complexity in the calculations. With this way of evaluating, teachers can better express their opinion, than if they use a single numerical value.

A sample of 140 children from 11 educational institutions in Yarinacocha corresponding to the age of 5 years old 80 per cent of them and 6 years old the remaining 20 per cent was studied. The total population of pre-school children is 629 in this district.

This sample size is larger than the recommended size with a confidence level of 95% (K = 1.96) and an error e = 0.08 (8%), according to the well-known formula below, [17][18]:

$$n = \frac{K^2 Npq}{e^2(N-1)+K^2 pq}$$

(2)

Where N = 629 is the population size and p = q = 0.5. According to this formula the recommended sample size is about 122.

Each of the 140 children was evaluated in each of the 13 aforementioned aspects in both moments, before passing the "Traveling notebook" programme, and after passing this programme. For each boy and girl was assigned an average grade in the form of interval value for each moment before and after, where the arithmetic mean of each of their evaluations is calculated in the 13 aspects specified above. The following equation is used to calculate the interval arithmetic mean:

$$G_j = \frac{\sum_{i=1}^{13} g_{ij}}{13} = \left[\frac{\sum_{i=1}^{13} g_{Lij}}{13}, \frac{\sum_{i=1}^{13} g_{Uij}}{13}\right]$$

(3)

Where $g_{ij} = [g_{Lij}, g_{Uij}]$ is the interval that represents the rating given to the jth boy or girl (j = 1, 2,..., 140) on each of the ith aspects that are measured (i = 1, 2,.., 13), according to the scale shown in Table 1 and the evaluation method explained above.

The statistical test is used to prove that there is a difference in the results before and after the boys and girls passed the programme. It should be noted that the data is given in the form of interval values, rather than crisp values.

The results of the students in the previous and subsequent tests are summarized in Table 2.

Average intervals	Pre-test results (%)	Post-test results (%)
[1, 2)	68.571	0
[2, 3)	31.429	9.2857
[3, 4]	0	90.714

According to Table 2, the results of the programme can be considered satisfactory. To determine if the difference between the results before and after is significant, the sign test is applied, which is a non-parametric test, therefore it is not necessary to prove that the results correspond to a given distribution, [18]. If X are the results G_j (j=1,2,...,140) of the pre-test and Y are the results of the $\bar{G}_j$ (j=1,2,...,140) post-test, in the sign test the following are assumed as null-hypothesis and alternative hypothesis, respectively:

$H_0 : prob(X > Y) = prob(Y > X) = \frac{1}{2}$,

$H_a : prob(X < Y) \neq \frac{1}{2}$.

The interval of p-values, let us recall that in the data there are intervals, is equal to $p = [1.4708 \times 10^{-43}, 7.1746 \times 10^{-43}]$. For this test it is assumed that a binomial distribution is followed with parameters $N = sum\ (X \neq Y)$ and $P = \frac{1}{2}$. The null-hypothesis is tested against the alternative $prob\ (X < Y) \neq \frac{1}{2}$.

Due to these p-values, it can be determined that the null hypothesis is rejected, that is, the difference between the
results before and after the tests is significant, which is interpreted as that the proposed programme is successful.

Now, the McNemar test is applied to further deepen the results, in order to prove that there was a significant children´s evolution from the qualitative point of view, [1][7][9]. Previously, the data were classified into "low" (assessment strictly less than 3) and "high" (assessment greater than or equal to 3). It is considered that there was a positive child´s evolution if there was a change from "low" to "high" from the first test to the subsequent one, in the same way it is considered a negative evolution if it was the other way around. Otherwise, it is considered that the qualitative change remained the same.
Table 3 contains the results of the frequencies that meet these conditions:

		Classification of Y	
		Low	High
Classification of X	Low	A = 13	B = 127
	High	C = 0	D = 0

Table 3: Frequencies of child's evolution.

The hypotheses are as follows:
H_0: passing the programme does not induce significant qualitative changes in children.
H_a: passing the programme induces significant qualitative changes in children.
In this test the used statistic is the following:

$T_1 = \frac{(|B-C|-1)^2}{B+C}$

$\qquad\qquad\qquad\qquad\qquad\qquad (4)$

Then, we reject H_0 if the following condition is satisfied:

$T_1 \geq \chi^2_{\frac{\alpha}{2}}(1)$

$\qquad\qquad\qquad\qquad\qquad\qquad (5)$

Where $\chi^2_{\frac{\alpha}{2}}(1)$ is the chi-square distribution with one degree of freedom.

So, $T_1 = \frac{126^2}{127} = 125.01 \geq 3.841$. Where 3.841 is the chi-square value for p<0.05, therefore, it is inferred that the null hypothesis is rejected and it is corroborated that the "Traveling notebook" method induces significant qualitative changes in children.

4. CONCLUSION

This paper was dedicated to verify that the travelling notebook programme is effective for the introduction of children to reading in preschool institutions in Yarinacocha district, Peru. For this purpose, 140 boys and girls were randomly selected, mostly at the age of 5 years, and a minority at 6 years of age, to whom an evaluation on 13 aspects was applied, in both moments before and after passing the programme. In order to gain more accuracy, although losing precision, the teachers were suggested that in case of doubts in the evaluation based on an evaluative system of four crisp values, they could include imprecise data, which were processed statistically in the form of intervals, using the neutrosophic statistics theory. The sign test of paired data was applied and it was concluded that the results are significantly higher after passing this programme. Additionally, the McNemar test was applied, which corroborated that qualitatively speaking, there was a significant evolution in the children who passed the programme. This programme has the pedagogical importance that positively predisposes children to learn reading and writing in the next grade, in addition to taking into account the linguistic differences of the students, which include the native languages.

REFERENCES

[1]   AMARO GUERRA, I. and CHÍA GONZÁLEZ, Y. (2013): Algunas consideraciones sobre el uso de la prueba de McNemar en las intervenciones educativas. **MEDISAN**, 17, 8121-8126.

[2]   ASLAM, M. (2019): A Variable Acceptance Sampling Plan under Neutrosophic Statistical Interval Method. **Symmetry**, 11, 114-120.

[3]   ASLAM, M., ARIF, O.H. and KHAN-SHERWANI, R.A. (2020): New Diagnosis Test under the Neutrosophic Statistics: An Application to Diabetic Patients. **BioMed Research International**, 2020, 1-7.

[4]   BATISTA HERNÁNDEZ, N., FIERRO VEGA, J.A., UHSCA CUZCO, N.E. and MARCIA MERCHÁN, M.M. (2020): MétodoNeutrosófico para la toma de decisiones sobre procedimiento de licitación para la adquisición de bienes y servicios en la contratación pública. **Neutrosophic Computing and Machine Learning**, 11, 1-8.

[5]   BATISTA HERNÁNDEZ, N., LEYVA VÁZQUEZ, M.Y., GONZÁLEZ CABALLERO, E., VALENCIA CRUZATY, L.E., ORTEGA CHÁVEZ, W. and SMARANDACHE, F. (2021): A new method to assess entrepreneurship competence in university students using based on plithogenic numbers and SWOT analysis. **International Journal of Fuzzy Logic and Intelligent Systems**, 21, 280–292.

[6]   CADENA PIEDRAHITA, D., HELFGOTT LERNER, S., DROUET CANDEL, A., COBOS MORA, F. and ROJAS JORGE, N. (2021): Herbicides in the Irrigated Rice Production System in Babahoyo, Ecuador, Using Neutrosophic Statistics. **Neutrosophic Sets and Systems**, 39, 153-163.

[7]   CAVADA, C.G. (2014): El test de McNemar. **Revista Chilena de Endocrinología y Diabetes**, 7, 107-108.

[8]   CENTENO MALDONADO, P.A., PUERTAS MARTINEZ, Y., ESCOBAR VALVERDE, G.S. and INCA ERAZO, J.D. (2019): Neutrosophic statistics methods applied to demonstrate the extra-contractual liability of the state from the Administrative Organic Code. **Neutrosophic Sets and Systems**, 26, 29-34.

[9]   CORONEL CARVAJAL, C. (2020): Forma correcta de presentar los datos y uso de McNemar en las intervenciones educativas. **AMC Archivo Médico de Camagüey**, 24, 1-1.

[10] FONS ESTEVE, M. (2004): **Leer y escribir para vivir: Alfabetización inicial y uso real de la lengua escrita**, Graó, Barcelona.

[11] FONSECA MOSCOSO, D.A. (2017): Tesis de Maestría: **Libro viajero para el desarrollo socio–afectivo en niñas y niños de 5 a 6 años de la institución educativa "Mágico Cielo" del D.M.Q., período 2016**.Universidad Central del Ecuador, Quito.

[12] MA, Y., ZHANG, X., SMARANDACHE, F. and ZHANG, J. (2019): The Structure of Idempotents in Neutrosophic Rings and Neutrosophic Quadruple Rings. **Symmetry**, 11, 1254-1268.

[13] MELÉNDEZ CARBALLIDO, R., PARONYAN, H., ALFARO MATOS, M. and SANTILLÁN MOLINA, A.L. (2019): Neutrosophic statistics applied to demonstrate the importance of humanistic and higher education components in students of legal careers. **Neutrosophic Sets and Systems**, 26, 174-180.

[14] MENA SILVA, P.A., ROMERO FERNÁNDEZ, A. and GRANDA MACÍAS, L.A. (2020): Neutrosophic Statistics to Analyze Prevalence of Dental Fluorosis. **Neutrosophic Sets and Systems**, 37, 160-168.

[15] MOORE, R.E. (1966): **Interval Analysis**, Prentice Hall, Englewood Cliffs.

[16] PATRO, S.K. and SMARANDACHE, F. (2016): The Neutrosophic Statistical Distribution - More Problems, More Solutions. **Neutrosophic Sets and Systems**, 12, 73-79.

[17] PÉREZ JUSTE, R., GARCÍA LLAMAS, J.L., GIL PASCUAL, J.A. and GALÁN GONZÁLEZ, A. (2009): **Estadística aplicada a la Educación**, UNED - Pearson, Madrid.

[18] SIEGEL, S. and CASTELLAN, N.J. (1998): **Estadística No Paramétrica aplicada a las ciencias de la conducta**, Editorial Trillas, México.

[19] SIERRA MORÁN, J.C., ENRÍQUEZ CHUGA, J.F., ARIAS COLLAGUAZO, W.M. and MALDONADO GUDIÑO, C.W. (2019): Neutrosophic statistics applied to the analysis of socially responsible participation in the community. **Neutrosophic Sets and Systems**, 26, 19-28.

[20] SILVA JIMÉNEZ, D., VALENZUELA MAYORGA, J.A., ROJA UBILLA, M.E. and BATISTA HERNÁNDEZ, N. (2021): NeutroAlgebra for the evaluation of barriers to migrants' access in Primary Health Care in Chile based on PROSPECTOR function. **Neutrosophic Sets and Systems**, 39, 1-9.

[21] SMARANDACHE, F. (1998): **Neutrosophy. / Neutrosophic Probability, Set, and Logic**, Amer. Res. Press, Rehoboth.

[22] SMARANDACHE, F. (2014): **Introduction to Neutrosophic Statistics**, Sitech & Education Publishing, Craiova.

[23] VALENCIA CRUZATY, L.E., REYES TOMALÁ, M., CASTILLO GALLO, C.M. and SMARANDACHE, F. (2020): A Neutrosophic Statistic Method to Predict Tax Time Series in Ecuador. **Neutrosophic Sets and Systems**, 34, 33-39.