LOS ALGEBLOCKS COMO HERRAMIENTA LÚDICO-PEDAGÓGICA PARA EL APRENDIZAJE DE OPERACIONES BÁSICAS CON NÚMEROS ENTEROS

ALGEBLOCKS AS A PLAYFUL-TEACHING TOOL FOR LEARNING BASIC OPERATIONS WITH WHOLE NUMBERS

ALGEBLOCKS COMO FERRAMENTA LÚDICA E DIDÁTICA PARA APRENDIZAGEM DE OPERAÇÕES BÁSICAS COM NÚMEROS INTEIROS

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RESUMEN

El mundo del álgebra es muy complejo y la utilización de herramientas o técnicas que faciliten su comprensión son fichas claves en el proceso de enseñanza aprendizaje, es así como este proyecto educativo busca mejorar la enseñanza de números enteros en operaciones de suma y resta a estudiantes de Premedia a través del uso de Algeblocks. Se realiza una capacitación a futuros docentes de matemática los cuales valoran la experiencia de utilizar los Algeblocks como herramienta lúdica para un aprendizaje más significativo.

Palabras clave: Algeblocks. Didáctica. Números enteros. Adición. Sustracción.

ABSTRACT

The world of algebra is very complex, and the use of tools and techniques that facilitate its understanding are key elements in the teaching-learning process. This educational project seeks to improve the teaching of integer addition and subtraction operations to pre-school students through the use of Algeblocks. Training is provided to future mathematics teachers, who value the experience of using Algeblocks as a fun tool for more meaningful learning.

Keywords: Algeblocks. Teaching. Integers. Addition. Subtraction.

RESUMO

O mundo da álgebra é muito complexo, e o uso de ferramentas e técnicas que facilitem sua compreensão são elementos-chave no processo de ensino-aprendizagem. Este projeto educacional busca aprimorar o ensino de operações de adição e subtração de números

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inteiros para alunos da pré-escola por meio do uso de Algeblocks. A formação é oferecida a futuros professores de matemática, que valorizam a experiência de usar Algeblocks como uma ferramenta divertida para uma aprendizagem mais significativa.

Palavras-chave: Algeblocks. Didática. Números inteiros. Adição. Subtração.

INTRODUCTION

The implementation of Algeblocks as a playful-pedagogical tool in the learning of addition and subtraction with whole numbers in third and fourth year students of the Bachelor's Degree in Mathematics, in order to provide them with a new tool in the learning process of their future students.

Castillo and Vásquez (2008) state that: "by working on whole numbers with a playful, critical and creative spirit; students can acquire significant knowledge in their learning processes, as long as they start from specific situations, where experimentation and observation are encouraged as a working method; which will lead the student to apply the knowledge acquired in new situations, starting in the formulation of simple generalizations."

Through this educational project, it seeks to develop a manual for teachers and a guide for students, with the purpose of working on situations of daily life with the playful-pedagogical tool Algeblocks and to be able not only to solve these situations, but also to extrapolate, generalize and assume the rules that they have been able to deduce through their manipulation. in permanent knowledge.

This project is presented to students of the Bachelor's Degree in Mathematics who are about to enter the labor field and who will be in charge of taking their future students to the transition from the set of natural numbers to the set of whole numbers, in the initial levels of Premedia.

FRAME OF REFERENCE

The main objective is the implementation of Algeblocks as a playful-pedagogical tool in the learning of addition and subtraction with whole numbers in third and fourth year students of the Bachelor's Degree in Mathematics, in order to provide them with a new tool in the learning process of their future students. Through this educational project, it seeks to develop a manual for teachers and a guide for students, with the purpose of working on daily life situations with the playful-pedagogical tool Algeblocks.

According to Dreyfous, Ortíz, and Villafañé (1996): "Algeblocks have as their main objective to operate with integers, with algebraic expressions, to construct basic concepts of algebra, to explore and conceptualize basic notions of algebra, solving equations and inequalities. Considering their wide field of action, Algeblocks are considered as a playful-pedagogical resource at any stage of basic education and can be implemented in an infinite number of activities that can be carried out in the classroom." (Dreyfous, Ortíz, & Villafañé, 1996).

From the experience obtained with the Algeblocks resource in some classes, a better development of the students can be noticed and the proposal of this project is to provide students of a degree in Mathematics, who are about to enter the labor field, a playful-pedagogical tool to address the issue of the addition and saturation of Integers.

Below are relevant data from the survey carried out, which provides more information on the didactic component that students of the University of Panama have, in the Mathematics degree of the Regional University Center of Los Santos.

90.01% of students of the Bachelor's Degree in Mathematics have heard about didactics, but when it comes to dealing with the concept of it, 18.18% do not know it and if we continue to delve into the area, there are 81.82% who do not know didactic tools that can help the transmission of the mathematical knowledge obtained in the degree; this serves as an indication to realize that we must reinforce the didactic area of future Mathematics teachers, since it is not enough to handle the concepts, but it is a matter of bringing them to reality through the practice of didactics in the classroom. This leads us to the need to provide didactic tools that can be used for an optimal development of the teaching-learning process. In addition to this, the survey yields a very telling fact, 100% of undergraduate students are willing to know, manage, work and use the educational recreational tool Algeblocks, this being a resource that can enrich their didactic knowledge and at the same time, be put into practice with their students.

JUSTIFICATION

Didactics in the field of Mathematics provides tools that can significantly benefit student learning and therefore academic performance. According to Niebla and Guzmán (as cited in Zapata, et al., 2009), academic performance is defined as the student's ability to respond to educational stimuli, and this is linked to the teaching strategies used by the teacher and the resources used by the student to achieve the proposed objectives.

Some of the factors that could influence student learning are related to the socioeconomic reality of the student, the breadth of the study programs, previous concepts, the teaching methodologies used, as well as their level of formal thinking (Morales, 2017).

Bearing in mind this reality and seeing the need to apply some didactic resource so that the learning of integers is meaningful, Dreyfous, Ortíz, and Villafañe (1996) affirm that with Algeblocks, students can create rules inductively based on examples, and thus have the opportunity to reconstruct them if necessary at a later time.

In view of the limited existence of written evidence on the problem in question at the time of carrying out the current educational project, the concern arises to implement the

Algeblocks as a playful-pedagogical tool for learning addition and subtraction with whole numbers through workbooks for students and a manual for teachers. which are presented to students of the Bachelor's Degree in Mathematics in the third and fourth year, who are close to the labor market and will be responsible for carrying out this teaching process.

GENERAL OBJECTIVE

To design and evaluate a guide on the use of Algeblocks as a playful-pedagogical tool for learning addition and subtraction with whole numbers to students who are in the third and fourth year of the Bachelor's Degree in Mathematics.

SPECIFIC OBJECTIVES

To identify the importance of Algeblocks as a playful-pedagogical tool for learning addition and subtraction with whole numbers to students who are in the third and fourth year of the Bachelor's Degree in Mathematics.

Implement the Algeblocks as a playful-pedagogical tool for learning addition and subtraction with whole numbers through workbooks for students and a training manual for teachers; presented both to students who are in the third and fourth year of the Bachelor's Degree in Mathematics.

3THEORETICAL FOUNDATION

ALGEBLOCKS

According to Hernández (2010), Algeblocks are defined as the set of blocks designed for the student to develop mathematical concepts from a constructivist perspective, which allows them to contribute to the development of their logical thinking through a series of situations that allow them to acquire certain mathematical concepts.

Dreyfous, Ortíz, and Villafañe (1996) state that the main objective of Algeblocks is the following goals: To operate with whole numbers, with algebraic expressions, to construct basic concepts of algebra, to explore and conceptualize basic notions of algebra, to solve equations and inequalities.

Undoubtedly, Algeblocks are considered as a pedagogical resource at any stage of basic education, in addition to the fact that, thanks to them, it is possible to design an infinite number of activities that can be carried out within the classroom. (Dreyfous, Ortíz, & Villafañe, 1996).

According to Tangarife (2013) Algeblocks are made up of pieces that represent the variables x, y, x^2, y2, xy, $x^{2y,\ xy2}$, x3, y3, as well as the units that will be the ones that will have the greatest prominence in this research. By using these pieces, students explore

and conceptualize the basic notions of pre-algebra and algebra, as well as they can create rules inductively, that is, they go from the concrete to the abstract.(Tangarife, 2013)

OPERATIONS WITH INTEGERS USING ALGEBLOCKS

According to Castillo and Vásquez (2008), in order to work with Algeblocks, it is necessary to learn how integers are represented with these blocks. When building the blocks it is preferable to paint one side blue and the other side of the block red that the blue color represents a positive unit and when we turn the block we then have the red color that will indicate that we are working with the opposite of the unit that is, with a negative unit. Other colors could be used according to mutual agreement between the teacher and the students

Some examples will be presented to verify the above.

Representation with blocks of the number +4

Representation with the number -5 blocks

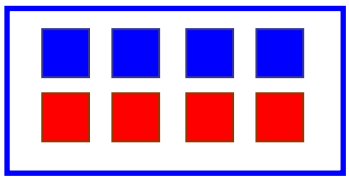
Representation with blocks of the number +5

How would the number +5 and the number -5 compare?

Both have the same number of blocks, but represented with different colors because they have opposite signs.

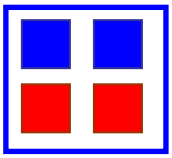
How would zero be represented using the blocks?

The representation will be drawn in the next box.



0

Two different representations are proposed that symbolize the number zero.



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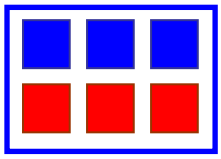

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How many representations can be made of zero?

Countless representations of zero can be made.

After observing the following diagram, try to symbolize it with the blocks and conclude the number it represents.

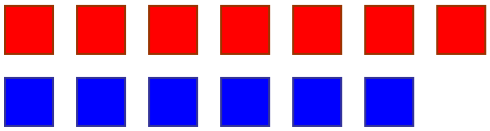


Diagram represents -1

ADDING INTEGERS USING THE ALGEBLOCKS RESOURCE

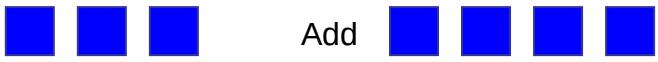
Now that the representation of the whole numbers with the blocks has been done, it will be easier to discover the rules of addition. It is important to note that adding means adding.

Addition solves two different types of problems: the calculation of a final state from an initial state and a variation; and the calculation of the resulting of two variations.

Case 1: Both signs are positive

What does the expression 3 + 4 mean?

The expression 3 + 4 or (+3) + (+4) means that four positive units are going to be added to three positive units.



and when added together, seven positive units are obtained.

In symbols we have (+3) + (+4) = +7

Will we get the same result if we add (+4) + (+3)?

when added together, seven positive units are obtained.

In symbols we have (+4) + (+3) = +7

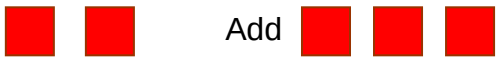
The same result is obtained, by commutativity.

What might be assumed about what happens when two positive integers are added together?

If the numbers are positive: the result will be positive and will be obtained by adding the numerical parts as if they were natural numbers

Case 2: Both signs are negative

Let's represent with the blocks the sum of (- 2) + (- 3).



When added together, they are

In symbols we have (- 2) + (- 3) = - 5

What can we assume about what happens when two negative integers are added together?

If the numbers are negative: the result will be negative and will be obtained by adding the numerical parts as if they were natural numbers.

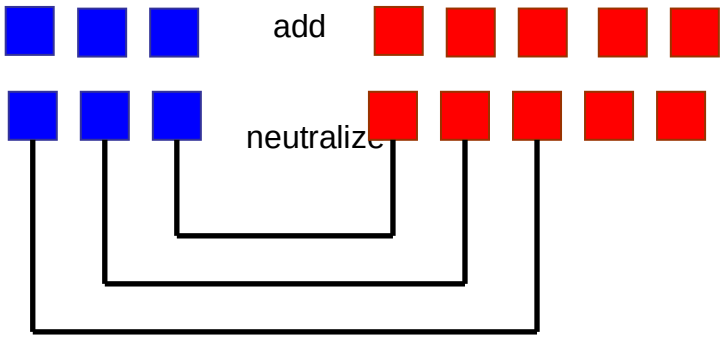
Case 3: Different signs

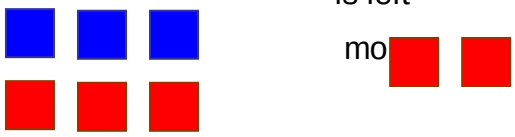
In this part it is necessary to carefully study the exercises to make hypotheses about the sum of integers with different signs.

What will be the result of (+3) + (-5)?

If you organize a negative unit (-) with a positive unit (+) what you do is form zeros (neutralize), as you learned by working on the part of representing whole numbers.

See:





is left

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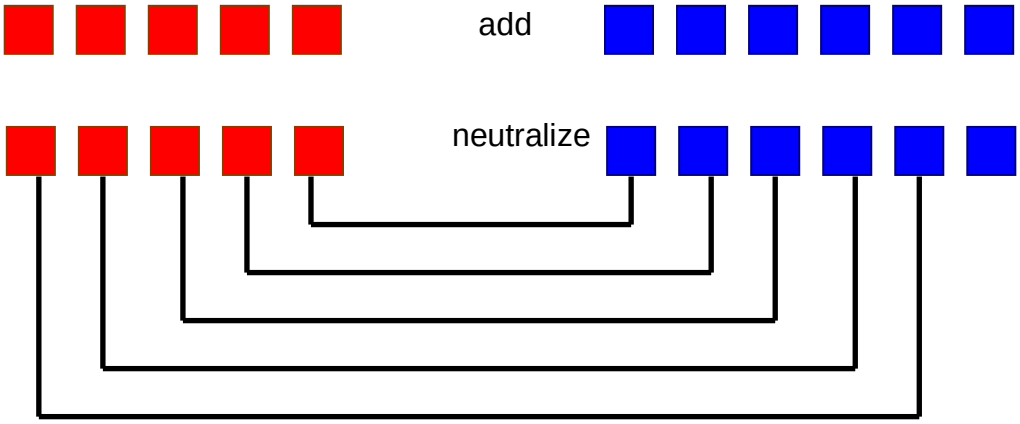
that is

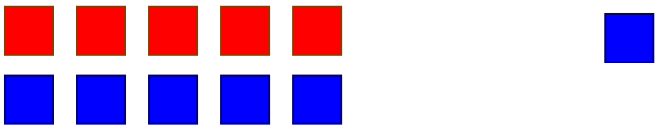
0 + - 2 = - 2

The result of (+3) + (- 5) = - 2.

What will be the result of (-5) + (+6)?

Next, the representation with the blocks



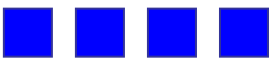


0 + +1 = +1

Therefore, (-5) + (+6) = +1

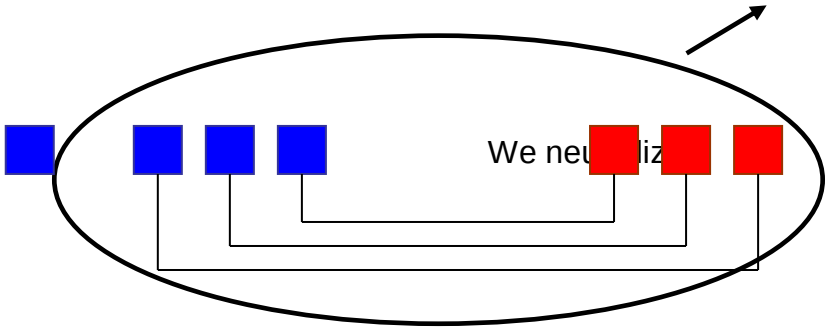
The following example will be developed: +4 is added - 3

Four positive units are sought:



To these four positive units are added three negative units:

Now, positive units are neutralized with negative units and will be removed, that is:



Finally there is: th s, (+4) + (- 3) = +1

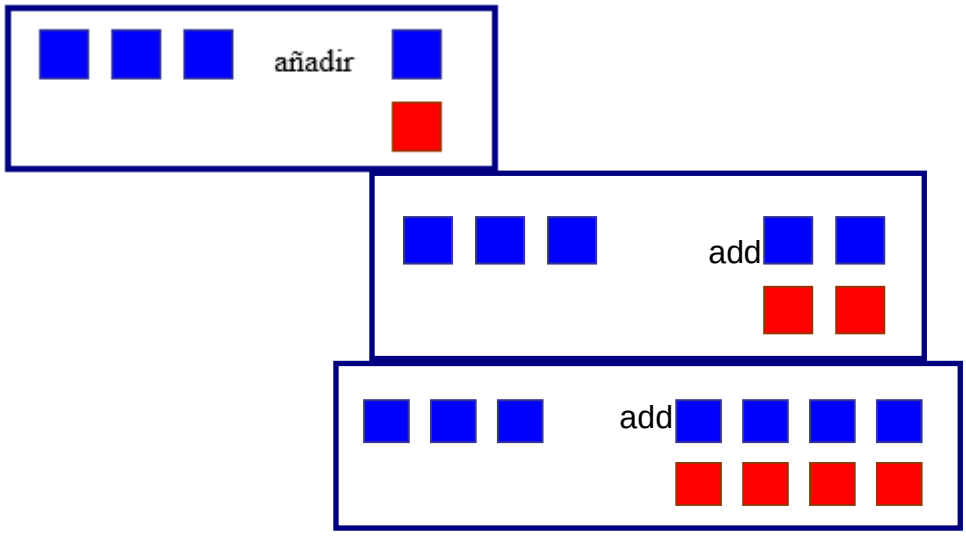
What can be assumed about what happens when two integers with different signs are added together?

If one of the numbers is positive and the other negative, the numerical parts would be subtracted as if they were natural numbers and the result will have the same sign as the number of the largest numerical part.

Case 4: Adding zero

The representation of zero is a very important concept. This is why it must be very clear how to represent it. For example:

There will be three different ways to represent the following expression: (+3) + 0



What is the result of (+3) + 0?

If we look at the above representations, we can say that (+3) + 0 = +3

Look at the three representations that were made, are they the only possible ones?

In fact, they are not the only possible ones, countless representations can be made.

By way of summary, all the sums could be classified as follows:

If the two numbers are positive: the result will be positive and will be obtained by adding the numerical parts as if they were natural numbers.

If the two numbers are negative: the result will be negative and will be obtained by adding the numerical parts as if they were natural numbers.

If one of the numbers is positive and the other negative, we will subtract the number parts as if they were natural numbers and the result will have the same sign as the larger number of the number of the largest number part.

If one of the numbers is zero, the result is the same number you added to the zero and the sign will be the same as it had.

In order to perform the respective additions, it is necessary to keep in mind that integers have the following properties:

Closing: a + b = c ε z

Associative: (a + b) + c = a + (b + c)

Commutative: a + b = b + a

Neutral element: zero is the neutral element of the sum, a + 0 = a

Additive opposite: every integer a has an opposite –a, a + (-a) = 0

SUBTRACTION OF WHOLE NUMBERS USING ALGEBLOCKS

According to Castillo and Vásquez (2008): "subtraction should be treated as an operation with its own identity and not simply as an inverse operation of addition, although this fact will be used to deduce the calculation rules, its identity should not be lost sight of.

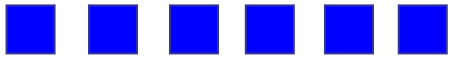
We do this operation when we want to calculate a variation, known, the initial and final state or know the initial state, known, the variation and the final state.

Previously, the rule for adding whole numbers was discovered. Now the rules are going to be built to subtract whole numbers; In this way, there will be no difficulty in carrying out this operation. First you have to review what it means to subtract one number from another.

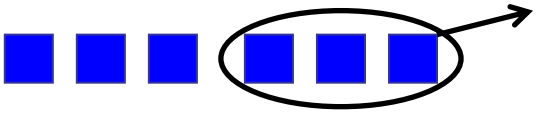
Case 1: Equal Signs

From positive +6 we are going to subtract +3

Since elementary grades it has been heard that subtraction is synonymous with removing or removing. The above expression indicates that out of six positive blocks



Three positive blocks are going to be removed



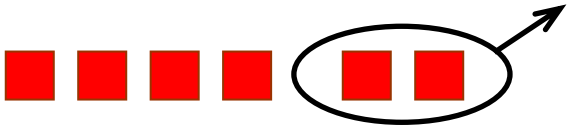
It can be seen that when three blocks are removed, three positive blocks remain, that is:

therefore, (+6) – (+3) = (+3)

It can be observed that the effect of subtracting positive units from positive ones was to add negative units

What does (-6) - (-2) mean?

It means that we subtract two negative units from six negative units, that is:



Therefore, (-6) - (-2) = - 4

We can see that the effect of subtracting negative units from negative ones was to add positive units

GRAPHICAL REPRESENTATION OF SUBTRACTIONS

Expresión	Representación Gráfica	Diferencia
(+7) – (+5)		+2
(+10) – (+6)		+4
(+9) – (+4)		+5
(-11) – (- 5)		- 6
(- 9) – (- 9)		0
(-7) – (- 6)		-1

Source: Castillo and Vásquez (2008)

Case 2: Different Signs

What does (+5) - (- 3) mean?

It means that five positive units

Three negative units must be removed.

Can this be done?

At this point, different signs would be needed and zero would be used to neutralize.

It should be remembered that, if we add zeros to a number, the result is not affected as we worked on previously in the lesson on adding integers. Examples:

(+5) + 0 = +5

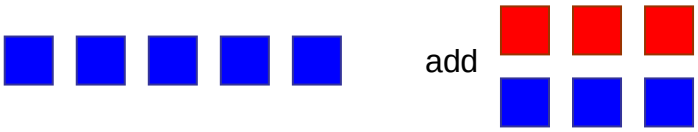
(+5) + 0 + 0 = +5

How many zeros do you need to add to the expression so that you can get the two negative units that need to be removed?

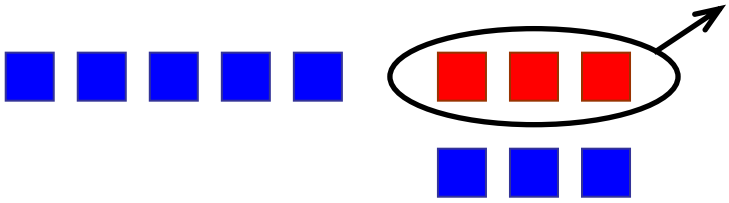
It is observed that there are only five units, that is,

In effect, it is necessary to add a zero represented by three negative units and three positive units.

this is:



Now you can eliminate the three negative units



When the three negatives are removed, the following expression remains:

(+5) + (+3) = +8

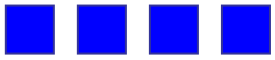
We start with the expression (+5) - (-3) and end with the expression

(+5) + (+3), which is equal to +8

It can be seen that the effect of subtracting negative units from positive units was that of adding positive units

Let's calculate (+4) - (- 1)

+4 graphical representation:



Since you can't remove a negative unit, we add a zero.

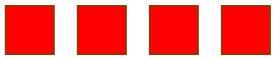
Now and the negative unit can be removed and we are left with the following expression represented:

(+4) + (+1)

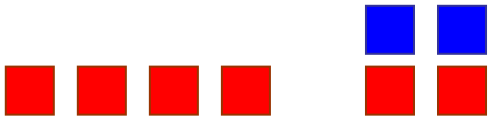
Therefore, we say that (+4) - (-1) = (+4) + (+1) = +5

Now we will work on the following example: Negative four minus positive two, that is, (- 4) + (+2)

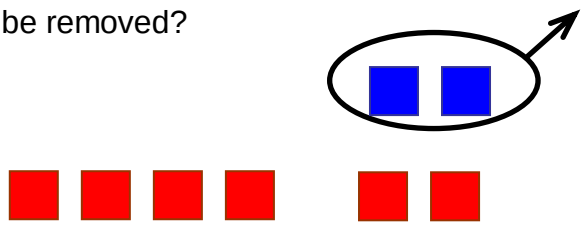
Can?



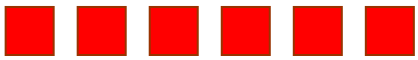
Zeros must be added



Can +2 be removed?



Finally, we have:



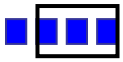
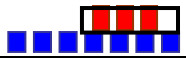
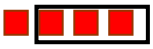
(- 5) - (+4) = (- 5) + (- 4) = - 6

Case 2. Comparison between addition and subtraction.

The following table will be able to graphically verify the similarities and differences between addition and subtraction.

GRAPHICAL REPRESENTATION OF SIMILARITIES AND DIFFERENCES BETWEEN ADDITION AND SUBTRACTIONS

Addition		
Expression	**Representation Graphic**	**Result**
(+4) +(-3)		
(-4) +(-3)		
(+4) +(+3)		
(-4) +(+3)		

Subtraction		
Expression	**Representation Graphic**	**Result**
(+4) -(+3)		
(-4)–(+3)		
(+4) -(-3)		
(-4)–(-3)		

Source: Castillo and Vásquez (2008)

Whenever you have a subtraction of whole numbers you can transform it into a sum, changing the sign of the subtraction:

(+a) - (+b) is equivalent to (+a) + (-b)

(+a) - (-b) is equivalent to (+a) + (+b)

(-a) - (+b) is equivalent to (-a) + (-b)

(-a) - (-b) is equivalent to (-a) + (+b)

The numbers (+b) and (-b) represent variations of equal length, but in the opposite direction. It would seem that they are opposite integers

The only property that the subtraction of integers fulfills is the closing one, since the result that is obtained is always an integer.

ANALYSIS OF RESULTS OBTAINED

The results obtained in the execution of the educational project, where work is done with both a guide for the student and a manual for the teacher; with the purpose that the future Bachelors in Mathematics of the National University of Panama based in the Regional University Center of Los Santos, have a playful-pedagogical tool that they can implement when teaching the subject of basic operations with whole numbers, thus arising the theme of this project:

Algeblocks as a playful-pedagogical tool for learning basic operations with whole numbers to students of the Bachelor's Degree in Mathematics.

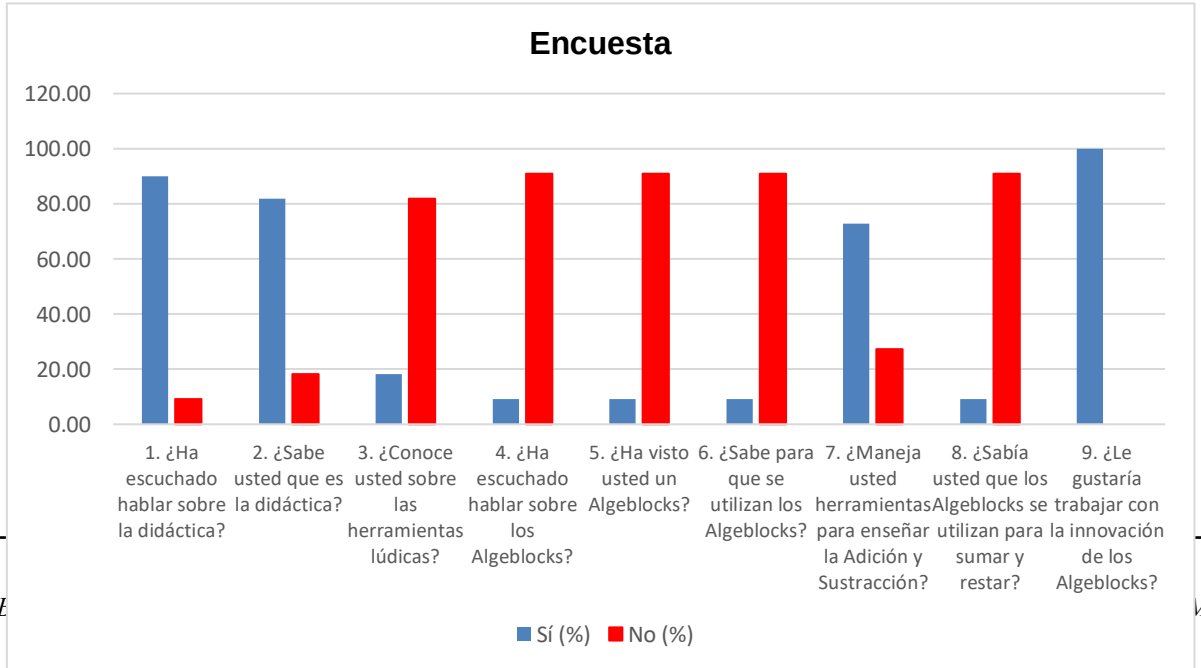
This project was based on the teaching and application of a manual for both the teacher and a guide for students using the Algeblocks as a playful-pedagogical tool for learning basic operations with whole numbers.

Before training the third and fourth year students of the Bachelor's Degree in Mathematics, a survey was applied to determine the possible didactic context.

Table 1: General aspects of Algeblocks as pedagogical tools

Items	Yes (%)	No (%)
1. Have you heard about didactics?	90.01	9.09
2. Do you know what didactics is?	81.82	18.18
3. Do you know about play tools?	18.18	81.82
4. Have you heard about Algeblocks?	9.09	90.91
5. Have you seen an Algeblocks?	9.09	90.91
6. Do you know what Algeblocks are used for?	9.09	90.91
7. Do you have tools to teach addition and subtraction?	72.73	27.27
8. Did you know that Algeblocks are used for addition and subtraction?	9.09	90.91
9. Would you like to work with Algeblock innovation?	100.00	0.00

Graph N°1



Analyzing the data obtained in the survey, it can be observed that a percentage of 90.01% have heard about didactics and 81.82% handle the concept of didactics; however, it cannot be affirmed that in the particular case of the Algeblocks didactic resource, there is significant knowledge, since the percentage part shows that they have not seen (90.91%), nor handle it (90.91%) and even more, 90.91% were unaware of its use.

In this sense, Amézquita & Murillo (2007) in their work: "The Mathematics laboratory as a mediator in the study of the linear function in the school", propose, through situations in the Mathematics laboratory, involving didactic materials, to favor a significant approach to conceptual and procedural elements of algebra, particularly in the linear function. The results show that with the application of this tool, it was possible to engage the student in their learning, in such a way that an environment of freedom is created when acquiring significant knowledge through their own discovery. On the other hand, it is also concluded that the situations proposed with these materials lead the student to develop active thinking, relating the elements of their environment and stimulating the construction of new mental schemes, in addition to the manipulation of concrete materials promotes the modeling of real situations, these contributions sustain the interest of graduates in Mathematics in applying these pedagogical tools.

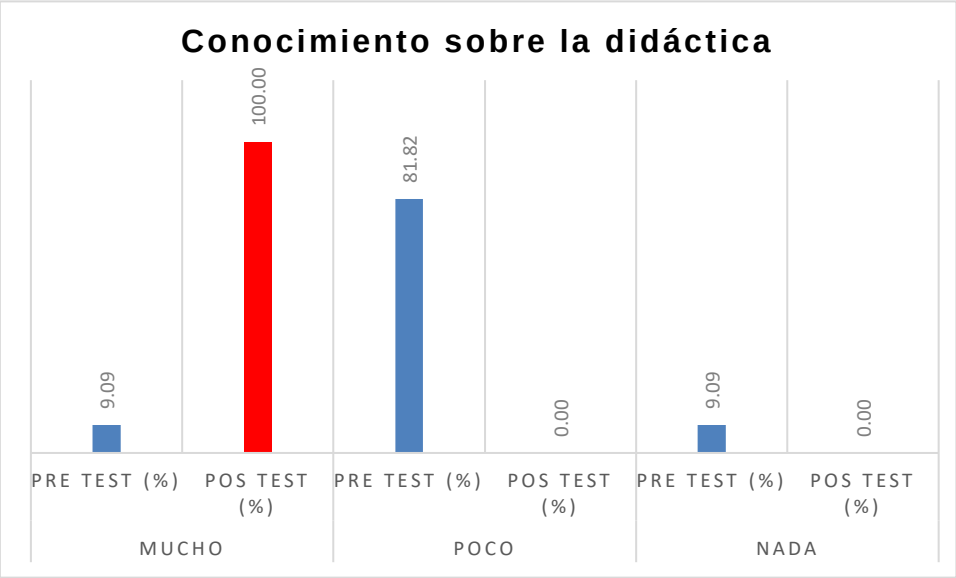
In this survey, when questioned about their desire to work with Algeblocks, 100% answered yes, this being crucial data to continue delving deeper

Table 2: Basic aspects of didactics

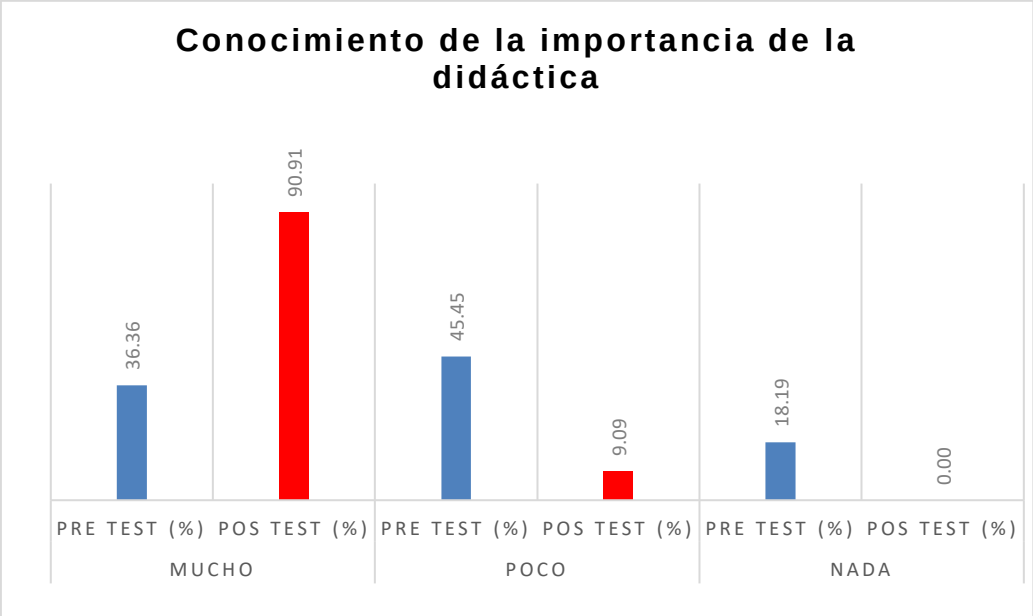
ITEMS	A lot		Little		Nothing	
	Pre-Test (%)	Post-Test (%)	Pre-Test (%)	Post-Test (%)	Pre-Test (%)	Post-Test (%)
1. Knowledge about didactics.	9.09	100.00	81.82	0.00	9.09	0.00
2. Knowledge of the importance of didactics.	36.36	90.91	45.45	9.09	18.19	0.00

Source: Castillo, L; Vargas, C. (2018).

Graph N°2



Graph N°3



In the basic aspects of Didactics, as can be seen in item No. 1 of Table No. 1, in the pre-test it can be noted that the highest percentage (81.82%) is located in a little knowledge about didactics and only 9.09% claim to have a good knowledge of didactics. Subsequently, having concluded the Seminar-Workshop, the post-test is carried out, which yields 100% on the point of didactic knowledge, which provides students of the Bachelor's Degree in Mathematics with greater tools when working on a topic with a didactic approach.

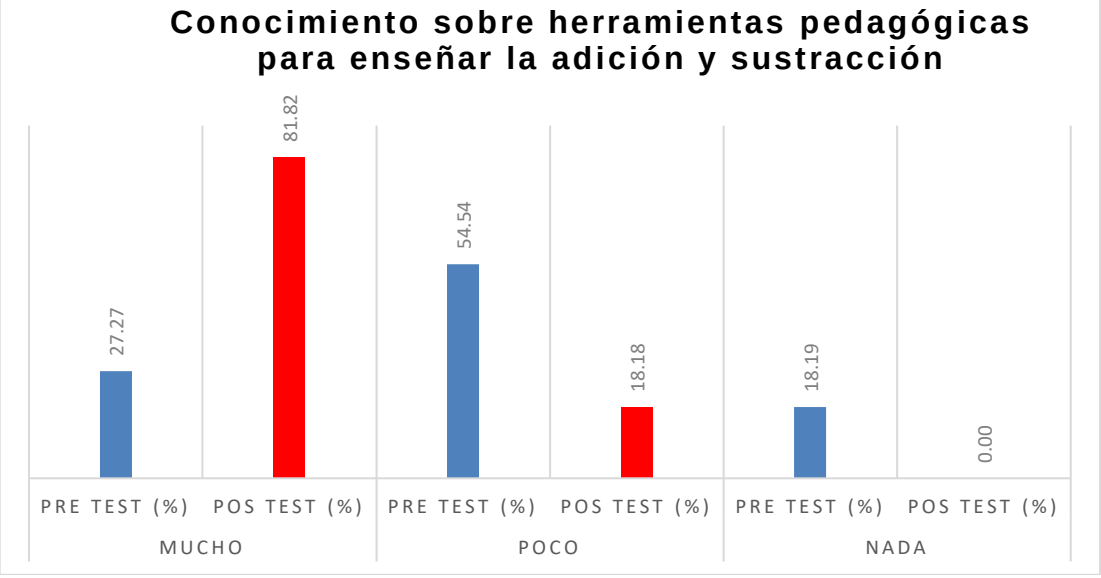
In item No. 2 of Table No. 1, it can also be noted how the knowledge of the importance of didactics is growing, since at first (pre-test) undergraduate students considered 36.36% of the degree of great importance to didactics, but at the end of the seminar workshop (post-test) it can be seen how this value rises significantly to 90.91%. which allows us to assume that undergraduate students were able to analyze and conclude the true importance of didactics when working on a certain topic.

Table 3: Pedagogical tools in the teaching of addition and subtraction.

ITEMS	A lot		Little		Nothing	
	Pre-Test (%)	Post-Test (%)	Pre-Test (%)	Post-Test (%)	Pre-Test (%)	Post-Test (%)
1. Knowledge of pedagogical tools for teaching addition and subtraction	27.27	81.82	54.54	18.18	18.19	0.00
2. Teaching addition and subtraction through a didactic resource	27.27	18.18	45.46	54.55	27.27	27.27

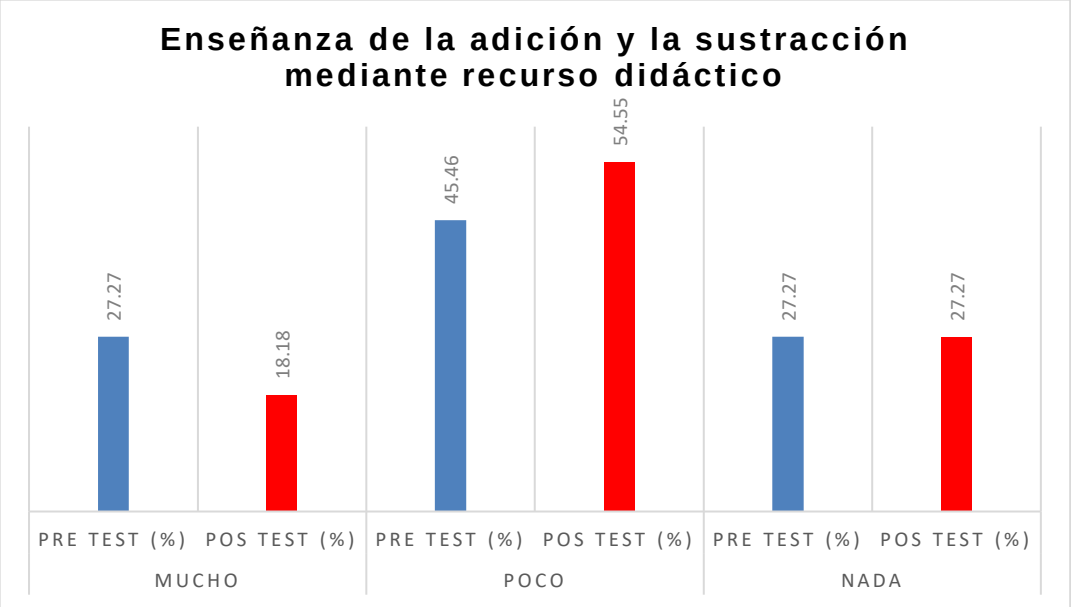
Source: Castillo, L; Vargas, C. (2018).

Graph N°4



Source: Castillo, L; Vargas, C. (2018).

Graph N°5



Source: Castillo, L; Vargas, C. (2018).

In relation to the knowledge about pedagogical tools to teach addition and subtraction, as it appears in item No. 1 of Table No. 3, it is verified that at the time of the pre-test, the highest percentage of undergraduate students (54.54%) have a "little" scale knowledge of these pedagogical tools; while at the end of the workshop seminar, it can be noted how this percentage increases significantly (81.82%), now placing a knowledge on a "high" scale, of the aforementioned didactic tools.

Pointing now to item No. 2 of Table No. 3, which deals with the teaching of addition and subtraction through didactic resources, it can be verified that the implementation of resources in general is minimal on the part of Mathematics degree students, since 27.27% in both the pre-test and post-test are the ones that represent the percentage that make use of them. which allows us to deduce the need and importance of a seminar workshop of this nature. It is important to note here that although undergraduate students have not yet completed their studies, the vast majority are working as teachers in schools this year.

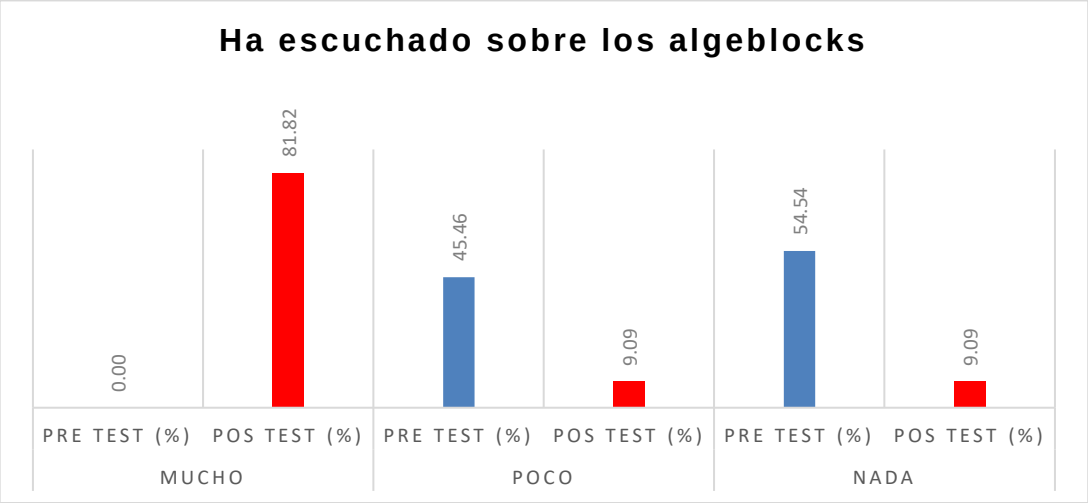
Table 4: Algeblocks as a teaching resource

ITEMS	**A lot**		**Little**		**Nothing**	
	Pre-Test (%)	Post-Test (%)	Pre-Test (%)	Post-Test (%)	Pre-Test (%)	Post-Test (%)
1. You've heard about Algeblocks	0.00	81.82	45.46	9.09	54.54	9.09
2. Knowledge about the use of Algeblocks	0.00	81.82	45.46	18.18	54.54	0.00

3. Algeblocks in Teaching Addition and Subtraction	0.00	90.91	45.46	9.09	54.54	0.00

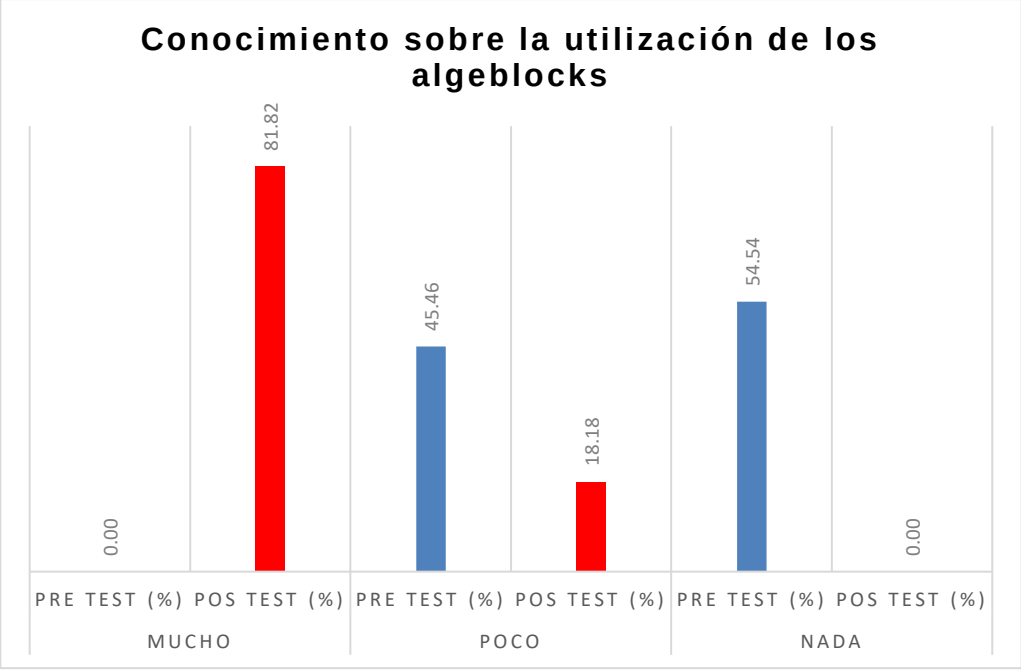
Source: Castillo, L; Vargas, C. (2018).

Graph N°6



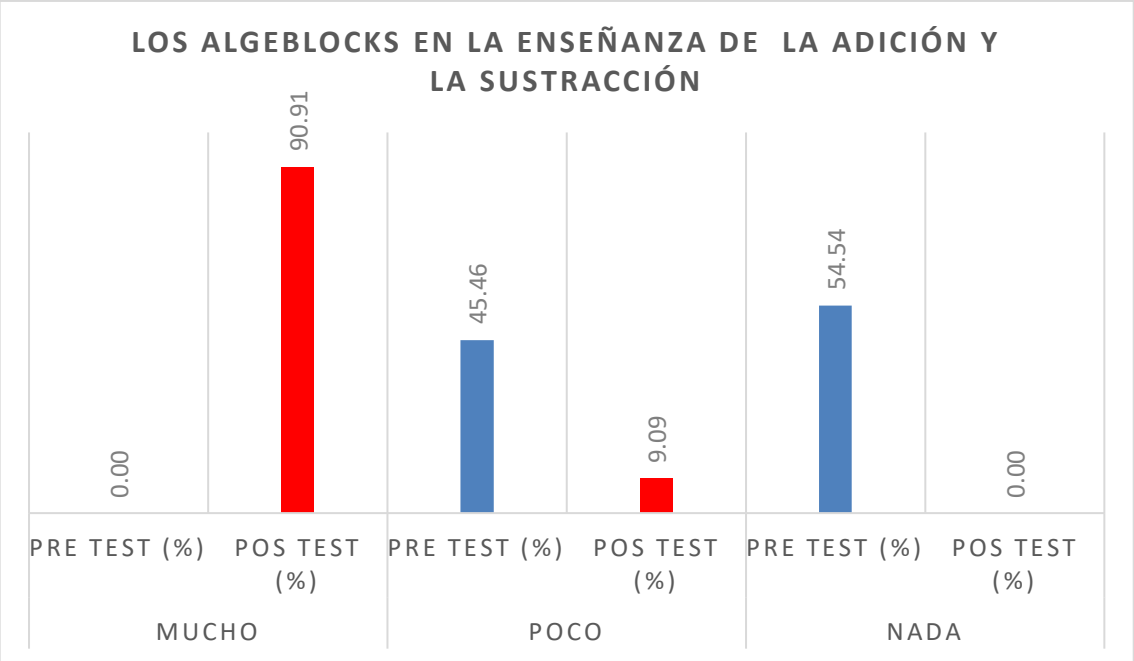
Source: Castillo, L; Vargas, C. (2018

Graph N°7



Source: Castillo, L; Vargas, C. (2018).

Graph N°8



Source: Castillo, L; Vargas, C. (2018).

When analyzing the results of item N°1 found in table N°4, it can be noted how in the pre-test carried out the knowledge of the didactic resource Algeblocks is null (0.00%), which changes significantly when applying the post-test after having carried out the seminar workshop, since the percentage rises to 81.82%; verifying with this, students of Mathematics are acquiring, particularly with Algeblocks, an optimal tool to address the issue of addition and subtraction with integers.

In the case of item No. 2 of Table No. 4, the following data can be contrasted obtaining a valuable conclusion, for example before the seminar workshop the highest percentage (54.54%) was located according to the scale in "nothing" and 45.46% according to the scale was located in "little" in terms of knowledge of how to use the Algeblocks, while having finished the seminar workshop, the highest percentage (81.82%) and significantly is placed according to the scale in "a lot", which allows verifying the productivity of the training.

When talking about Algeblocks as a playful-pedagogical tool in the teaching of addition and subtraction, it is highlighted in item N°3 of table N°4 that when the pre-test was carried out at first, the percentage of manipulation of said resource was at 0.00%, while at the end of the training this percentage is framed at 90.91%. highlighting with this a significant and efficient management of the Algeblocks resource so that when its use is necessary, it can be applied properly.

FINAL CONSIDERATIONS

Mathematics students at the Regional University Center of Los Santos (University of Panama) have a general knowledge of didactics, although according to the survey data it can be deduced that, although they have such knowledge, when it comes to putting it into practice, they do not have enough tools to achieve it satisfactorily. Together with this situation and according to the subjects that they must take throughout their training as professionals in the area, it can be evidently verified that the didactic component is almost nil throughout their training as graduates.

Delving into the subject of didactics, it can be concluded that after the training carried out, the students of the Bachelor's Degree in Mathematics have acquired a significant knowledge of didactics and have given the corresponding importance to it; since at first most of the students of the degree considered that their knowledge in didactics was little and the issue of the value and importance of didactics was relegated to a not at all encouraging percentage.

It is important to highlight how thanks to the training carried out with the students of the Bachelor's Degree in Mathematics, they were able to acquire a new didactic tool to address the issue of addition and subtraction of whole numbers. Despite the fact that there was a knowledge of the concept of didactics as a basis, the didactic action was not being put into practice since they did not manage resources related to the subject.

After the training with the students of the Bachelor's Degree in Mathematics, it was concluded that not only does it have a new resource to apply in the subject of addition and subtraction with whole numbers, but it was also possible to verify how through this resource easy to manipulate due to its pedagogical playful component, the passage from numerical thinking to abstract thinking is also significantly achieved in a simple and practical way.

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