Farewell to Virtual Environments and Welcome to Post-pandemic Mathematical Problem Posing and Solving

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Abstract **– In the classrooms, teachers faced the dilemma of whether or not to use virtual environments to continue teaching, because students were able to pose and solve mathematical problems with the help of ICT. The objective is to analyze the student's perspectives when applying real situations, remote real situations and situations from the mathematical poem to solve the posing and solving of mathematical problems. The methodology is descriptive, quantitative, exploratory and observational, with a sample of 72 elementary school students. Resulting significant effects and positive acceptance of the methodology. In Conclusion students no longer used virtual environments and ICT to pose and solve mathematical problems.**

Keywords **– mathematical problem posing, mathematical problem solving, real situation, remote real situation, mathematical poem situation.**

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1. Introduction

To argue that holistic education has emphasis on real world application with sustainable purposes, deployments and solutions is to direct education towards data science [1], science that shows that the difficulties in solving mathematical problems are still in didactic proposals due to the lack of understanding of mathematical problems (meaning of words) [2], of beliefs and/or mathematical phobias that students have [3]. Positive emotions and affective aspects are very important points to carry out the development of learning in topics such as facing mathematical problems from their approach to resolution, i.e. applying a remote and/or close real situation (text with images or data) as well as applying the visual poem (hybrid mathematical content) [4] to generate creative solutions and improve the performance in solving mathematical problems of students [5].

There are didactic and learning strategies for online mathematical contents where they assimilate, promote and motivate [6], because there is a tendency to unify methodologies combined with learning capsules and with the inverted classroom whose support is collaboration and evaluation [7] because the teacher from the practices when they teach have a shadow called "beliefs" of how to approach to reach the students and teach them to solve mathematical problems [8].

1.1 Problem Statement

Mathematical imagination is gaining strength in its application at different educational levels to face and solve mathematical problems, but with not very encouraging results due to the existence of two groups with different points of view (1st: "intuition is the consequence of analytical thinking and a sequence of conscious and gradual steps" and 2nd: "intuition is the result of unconscious processes that occur only after a deadlock has occurred") [9].

The experience of teachers to the multiple reforms of the mathematical curriculum to address this problem of posing and solving mathematical problems are faced entirely in teaching and learning with few favorable results, but with the incorporation of ICT (Information and Communication Technology) in the classroom thanks to e-learning education the posing and solving of problems has significant changes little hopeful [10], [11].

The evaluation by competencies is complex and multivariable while the continuous evaluation does it in a progressive way and takes advantage of providing feedback proactively to students, so that in problem solving, lectures and other activities the curricular strategy is used individually [12] as well as metacognitive strategies with the sole purpose of discovering the metacognitive needs for the area of mathematics and improve student learning. The use of psychometric tools in learning is of utmost importance and with the use of appropriate strategies it is possible to pose and solve mathematical problems [13] as well as to develop probabilistic thinking that still present difficulties in mathematical arguments and statements [14], this comes from or are caused by the topics that are presented with greater difficulty and with pattern errors despite focusing with constructivist meaningful learning [15].

There are problems derived from mathematics that help to develop students' skills, attitudes and knowledge through geometric research [16], the effect of didactic strategies of e-learning environment during Covid-19 is learning whose development of problem solving skills in primary level students were positive [17], these effects also impacted with interactive mathematical games in an online way demonstrating characteristics and numerical influences on students [18]. The data process that reflects the development of problem solving provides greater understanding in the classification of perspectives to understand mathematical competencies [19] and its implementation of the curriculum is necessary and of utmost importance to generate adjustments and changes in the methodology, thanks to the pandemic the use of the blackboard has been left to use technological tools and devices that were very helpful for teachers and students [20], [21].

The difficulty of problem solving brings with it the development of personalized type learning models where even interactive novels are included [22], with carefully supervised and planned blackboard work to opine in the form of plenary during the session was with the sole purpose of improving the pedagogical system [23].

There are many universities that train future mathematics teachers with great knowledge of complex and multifaceted type that achieve sometimes successfully, challenges, tension and experience in developing the identity of being a teacher and facing the problems of teaching [24].

1.2 Mathematics in the real world as creativity (social, professional and scientific).

The relevance of seeking the solution of mathematical problem solving in elementary level students has repercussions in finding a mathematical model that can work and provide a solution to this problem of yesteryear, it is for this reason that creativity manages to bear its first fruits in adapting the skills of approaching and solving mathematical problems [25], as well as in the curricula of schools with a degree of difficulty to achieve a modeling process and favor the current concepts of mathematical modeling competence in which creativity is immersed as an important point [26], the models currently have as a basis the technology which supports educational environments whose purpose is to develop creative and technical thoughts with psychodiagnostic type approach (creative thinking) [27].

Mathematical modeling develops problem solving skills based on real environment problems, demonstrating that women (teachers) have better mathematical modeling than men (teachers) at all educational levels [28], which implies that in group work this practice has become a great help to teach those who solve less and using common sense in group evaluations, collaborative work is present to support the development of learning [29] and even more so if ICT is present as a link between mathematics learning and students because it is an accessible medium in all classrooms and educational levels, reaching the conclusion that the more ICT is used, the better academic performance is achieved at school [30].

The advance of ICT has allowed the use of multiple methodologies, applications and video software to analyze the interactions of students in the classroom when sharing problem-solving learning [31], studies were conducted with self-determination theories to interpret new courses or problems to achieve meaningful learning (competence, relationship and autonomy) and that students are empowered, confident and able to solve all kinds of problems [32].

It was possible to use mixed reality simulators to analyze the actions of students when solving mathematical problems [33], also supported by the use of algorithms that aim to improve teaching and learning in problem solving whose results are effective and efficient [34] within the activities of problem posing, whose factors reveal the influence of formulating problems from teachers to students either with arithmetic reasoning (Indonesia) or algebraic reasoning (Hungary) [35] where problem solving is action research type with students performing mathematical model understanding [36].

The development and collaborative contribution of creativity is in an explorative process in the full swing of artificial intelligence, where creative mathematical problem solving manages to have a great demand for research, as well as creative collaboration is of utmost importance these days [37], machine learning has support from metaheuristics to improve the quality of solving a problem [38], demonstrating that the interaction between teacher-student helps mathematical reasoning and supports student learning through questions and suggestions that leads to reasoning as a central point [39] with which it is possible to build a deep and systematic learning [40] using algebraic language connections to solve concrete problems, where the intervention in the theoretical framework is developed in an environment to achieve problem solving with the indicators (transformation, contingency, foundation and connection) [41].

The existence of algorithms based on teaching-learning has as a new strategy to the experience which will achieve to give possible solutions to mathematical problems [42], even the incursion of video games in problem solving has drawn attention and caused impact within blended learning, demonstrating that video games are practical and adapt to the courses providing capacity and support [43] in mathematical reasoning whose module are every day and real problems to follow a non-boring and exciting learning development [44].

The development of mathematics in children has main sources within the professional vision (participation in solving and proving, belonging to a university network and looking at a mathematical future) [45] that requires creativity and spatial skills to improve performance in mathematics and other areas of science, which are channeled through additional tasks with themes of mental rotation, mental cutting and creativity [46].

1.3 Justification and objective of the study

The incursion of mathematics in science has a lot of importance, but only a few hundreds of students want to pursue that career, why is this?

The answer that many researchers try to solve by finding multiple good and bad factors. The PISA reports before the pandemic are not at all encouraging for Peru because we are below expectations. With the arrival of Covid-19, the digital blackboard and virtual environments are used to reach students, leaving aside traditional teaching, which has caused routine changes at a social and educational level.

This research is developed with students of the 6th grade of primary school of the integrated educational institution Próceres of American Independence of the district of Talavera in the region of Apurímac, that is to say, it has a Peruvian context where all types of virtual environments and ICT are left aside to return to the classroom and traditional teaching, where the teacher observes that students need electronic tablets, laptops, cell phones and their applications to be able to face the approach and solution of mathematical problems. This research aims to determine the student's perspectives on the approach and solution of mathematical problems with real situations in students of the 6th grade of primary school Post Pandemic, i.e. to present the problems leaving aside the digital environments and ICT so that the student manages to raise the exercises from their own perspective from the environment that surrounds them. From the general objective, the following specific objectives are also established and they are:

- Determine the perspectives of the student in front of the real situation in the approach and resolution of mathematical problems in students of the 6th grade of primary school Post Pandemic.
- To determine the student's perspectives on the situation far from reality in the approach and resolution of mathematical problems in students of the 6th grade of primary school Post Pandemic.
- To determine the student's perspectives in front of the visual poem in the approach and resolution of mathematical problems in students of the 6th grade of primary school Post Pandemic.

2. Methodology

The methodology used for this research is descriptive, quantitative, exploratory and observational in order to obtain data on the reactions and behavior of the student when faced with problem posing and solving.

Sample

In this research, the students of the 6th grade of elementary school of the educational institution Próceres of American Independence have been chosen as a sample, which have training in mathematical subjects with the aspects of real situation, remote situation and visual poem as a methodology to approach in thinking and solving mathematical problems.

The total sample is made up of 72 students in the 6th grade of elementary school with an average age of 11 years (approximately), the gender of the participants has a minimal difference between girls and boys being superior; i.e. boys 52.8% (38) and girls 47.2% (34).

Experimental design

The research arose after the Peruvian government mandated 100% face-to-face instruction (April) at all educational levels and students stopped using virtual environments and returned to using traditional blackboards with marker pens. Students began to have difficulties in posing and/or solving problems, becoming very restless and always repeating: "on my laptop I would have already solved it", "with my little program this was easy", "on youtube I would have already found the solution" and other terms that implied that they were linked to the virtual environment to solve a problem and that they were looking for ways to pose and solve mathematical problems with the help of the internet. Therefore, it was decided to innovate and propose the following experiment for three months (June-August) and analyze the results; for which two moments were organized, in moment one (1) to guide and expose as a test the selected methodology (presenting a mathematical problem in image) to face the approach and resolution of the problem from another point of view and in moment two (2) to guide the selected methodology (proposing the creation of their own problems) to the students so that they can create their exercises (to pose and solve them) with the models and examples projected on the screen.

Moment 1: Problem statement

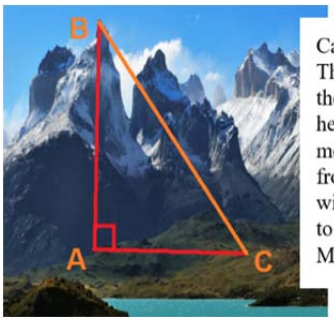
The students wanted to use technology again (cell phones, laptops, computers and other virtual environments) to try to pose a mathematical problem, but since the use of technological devices is not allowed in the classroom these days, the students still do not assimilate this change; due to this situation we propose to present the mathematical problems in a different way to encourage and motivate them to solve and learn mathematics, i.e. we present the exercises in three different cases, as follows:

Case 1: The mathematical problem is presented with an image where the student knows the figure shown (the mathematical problem) i.e. a mathematical problem is posed with the image of the park of the district where they reside and that they have ever visited to take a walk or be in some present activity (real situation), in the problem posed it is proposed to perform the respective calculations with all the information accompanied by the image and text (figure 1), the image is captured from Google maps.

Case 1:
The figure shows the image of the park in the district of Talavera. What is the shape of the park, if it has all sides equal? It is also known that one of the sides is 150 meters long. Then, how long will the entire perimeter of the Talavera park be?

Figure 1. Actual situation of the participants

Case 2: the mathematical problem is presented with an image where the student does not know the place (real situation far away) but he did manage to hear about it sometime, i.e. the image of the Andes Mountains is presented, in which it is posed as a mathematical problem, in this image is accompanied by the problem statement (text), In the problem posed, it is proposed to perform the respective calculations with all the accompanying information (to use the Pythagorean theorem, the image is the result of the Google search engine with the word "Andes Mountain Range" as image and is edited according to the mathematical problem posed).



Case 2:
The figure shows the image of the Andes Mountains. The height of the Cordillera is 400 meters; Edwin is 300 meters from the base at point C. What will be the distance from point C to the highest point of the Andes Mountains, located at point B?

Figure 2. Real situation far from the participants.

Case 3: the mathematical problem is presented with an image of pencils where the sixth grade student will put into practice his imagination to form different mathematical figures and will draw what he has been able to assemble as he works, this practice helps to improve the student's imagination in front of a problem of construct type.

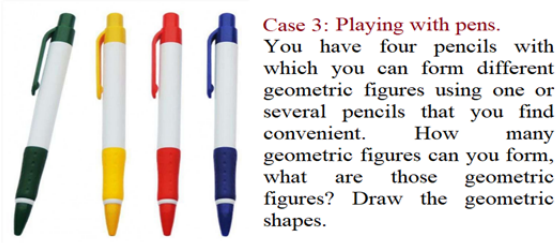


Figure 3. Visual poem situation

After the presentation of the mathematical problems in image version and the round of questions in which the students elaborated and with the help of a multimedia projector, we proceed to explain to them about the survey (validated instrument [4]) that they have to answer, the sociodemographic data were obviated because the Educational Institution has these data in the registration form, the survey process is done online, the link to access the survey was sent through the WhatsApp group that is still maintained with parents, in which indications are provided so that the student manages to respond anonymously to the following questions (case 1, case 2 and case 3) such as: 1. According to the problem posed in the previous image, what would be the score with which you would qualify? referring to the question proposed in each case, using the five-point Likert scale, where 1 = strongly disagree and 5 = strongly agree, finally proceed to consult in each case the following question 2. What is your opinion of the question? Accompanied by the following alternatives in all cases (case 1, case 2 and case 3): a. I found it boring to try to pose a problem from this situation, b. I enjoyed the problem statement based on this situation, c. I found it interesting to think of a problem statement from this situation, d. I think it is important to be able to pose problems from situations like this. These questions are asked with the sole objective of knowing the perspectives of the student's experience in the classroom in mathematics classes with this new methodology, leaving aside virtual environments and technologies.

Instrument

The data collected was done through a survey [4], which is validated with quantitative and qualitative tests (observational), this validated instrument has questions which can be measured and calculated with the SPSS program, the answers given in sheets were analyzed with experts in the area of mathematics (5 teachers and researchers in the area of mathematics).

3. Results

In moment 1, the methodology of teaching and learning mathematics from a visual point of view and creating their own mathematical problems was experimented, a methodology that manages to give free rein to the imagination of the students in the sixth grade of elementary school. With this methodology it is required to decrease the rate of students who have a phobia of mathematics as well as to increase the level of learning in the students of the 6th grade of primary school.

Moment 2: problem solving

In this part of the experiment, the answers of the students were analyzed and most of them were able to respond and each one of them was able to pose their own problem, which they also solved with much enthusiasm, so the students presented the following answers to the problems posed, which are presented below for each case.

In case 1 about the real situation, when the image was presented in the classroom, they were asked if they knew the place in the photo (figure 1) and they all answered that it was the park in the district of Talavera, a place they recognize because they visit it at least once a week for some family activity, after the presentation it was stated that: each side of the park has a distance of 150 meters, but because the park has the same measurements on all sides it forms a geometric figure called a square.

Then, with the data, students are asked to calculate the perimeter of the park, which is marked in red, and they proceed to develop the question on a sheet of paper, then some results are shown in figure 4. At this point, the students put all their imagination to the test in order to remember a place they know and relate it to a mathematical problem for the calculation of perimeters or areas of geometric figures.

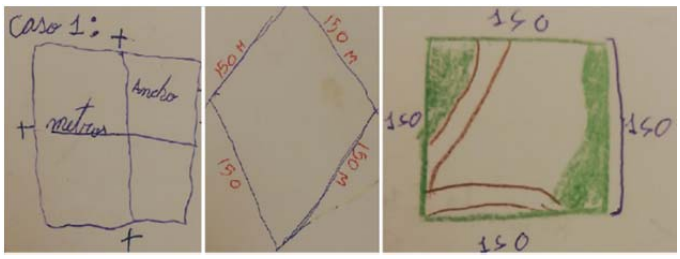


Figure 4. Answer to question No. 1

In the same way in case 2 about the remote real situation, an image is presented and it is explained that the image they observe is the Andes Mountains, which is part of Peru and belongs to the highlands region, the following question is asked: Do you know the Andes Mountains, the students look at each other

and answer that they do not know, then the next question is: Have you ever heard of it? Many of them raised their hands to answer: yes, and when asked again: "Where did you hear about the Andes Mountains?" they said: in a story, in a fable, in a literary work, in the news, in the newspaper, they even remembered that in that place (referring to the Andes Mountains) there were several mountaineers who disappeared. So the students are managing to work cognitively and they do manage to grasp the idea of a real situation far away.

In the problem statement, after showing the image, it is explained that Edwin is 300 meters away from the base of the mountain range (as shown in figure 2) and that from the base to the top of the mountain range is 400 meters high, so the question is: What is the distance from point C to point B, located at the top of the Andes Mountain Range? They are asked to use all their previous knowledge of the Pythagorean Theorem to calculate this distance and write the solution on a sheet of paper. After a reasonable amount of time, the answer sheets were collected for their respective analysis. Afterwards, it was requested to create another exercise in the same way and also to solve it in another sheet of paper for its respective analysis. At the moment of creating the questions, the students were a little nervous because they were able to remember several places they knew, but they did not have enough security to include it, with a little help from the teacher explaining that it was only to remember a place and pose a mathematical problem, they felt better, that is how they were able to capture the following ideas.

Figure 5 shows the creations of the questions and their respective solution to the exercise created and raised: a). The hill next to a river which is known as the Pampas River (located 2 hours away), b) The hill Ampay of Abancay (Hill full of snow located 3 hours away), c) The Forest of Stones (located 3 hours away) and d) The hill next to the Pacucha Lagoon (located 30 minutes away), all these places are located as reference travel from the city of the district of Talavera.

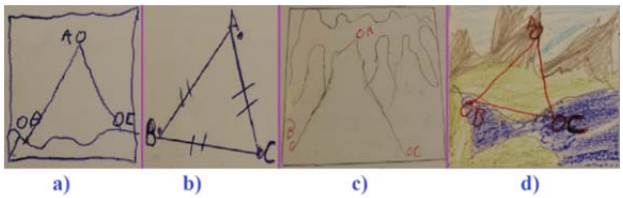


Figure 5. Some proposed questions with the real situation far away.

Finally, the image with four pencils is projected and the surprised students observe and mention in surprise: "teacher, are we going to add with pencils?", "we will not add, surely it is to put something together" or "will we paint the hill?" and this is how the reaction to the problems posed is shown and experienced when an image is projected after having taught to pose and solve mathematical problems, the students managed to grasp the idea and are "on the lookout for the images" to find the solution to the mathematical problem. Then they are instructed to put together geometric figures using one or more pens and write down the names of the geometric figures.

Once finished with the experiment (the classes) we proceeded to collect the students' notes to be reviewed and analyzed, finding some interesting responses and imagination of the students with the pens as shown in Figure 6, a) they formed geometric figures such as the square, rectangle and triangle, b) they formed a triangle with the four colored pens, c) they formed a rectangle with five pens, when the indication was to use only four pens and d) they formed geometric figures but with four pens of the same color.

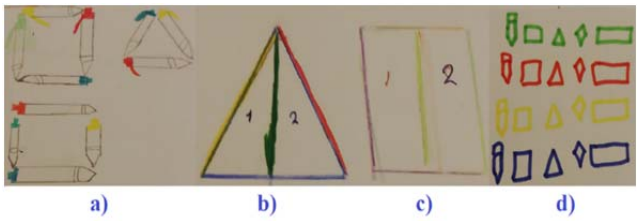


Figure 6. Response to the visual poem

With the different and multiple responses, it is observed that students in the first grade of primary school tend to understand mathematics better and manage to pose and solve the mathematical problems they generate from an example, and also manage to develop their learning in an imaginative and fun way, all with the sole purpose of having good results in the classroom and in the institution in order to perceive a good academic performance and leave math phobia behind.

The analysis of consistency or reliability of Cronbach's Alpha to know the perspectives of the question: What would be the score with which you would qualify?

In the three cases of the real situation, remote real situation and situation of the visual poem is 0.692, a value accepted by the scientific community because it is within the range of good according to the five-point scale (very low, low, moderate, good and very good).

Table 1 shows the values of the mean of the student's perspective when rating and proposing a value to the question in each case, thus the average value for case 1 on the real situation is the most valued because the students know the place and manage to relate cognitive learning, the mean or score is 4.54; while in case 2 on the remote real

situation is valued with the lowest score but still has acceptability with a valuation of 4.37 which means and it is observed that the student at the moment of imagining the remote place does not manage to capture the best illustration of the place causing a cognitive conflict in the development of their learning, but still manages to solve the mathematical problem in the classroom.

And finally in case 3 of the situation of the visual poem, the student achieves value with a score of 4.44 because at this point the student forgets mathematics and makes the imagination fly to relate some mathematical concept already learned and further develop their cognitive learning managing to solve the mathematical problem posed.

Table 1. Distribution of the means of the situations on the evaluation of the questions.

	Mean	Error Deviation	Deviation	Variance	Asymmetry	Kurtosis
C1.2	4.54	0.097	0.821	0.674	-2.099	4.937
C2.2	4.37	0.105	0.895	0.801	-1.309	0.756
C3.2	4.44	0.099	0.837	0.701	-1.893	4.182

Figure 7 shows the valuations of the three cases with respect to the real situation, remote real situation and situation of the mathematical poem where 69.4% have a valuation of 5 points for case 1 real situation; 58.7% have a valuation of 5 points in case 2 remote real situation and while in case 3 situation of the visual poem 59.7% have a valuation of 5 points. In conclusion, the three situations presented for the case of the research on problem posing and solving, the students do value very positively this type of problem posing and if it has a significant effect on the students of the 6th grade of primary school.

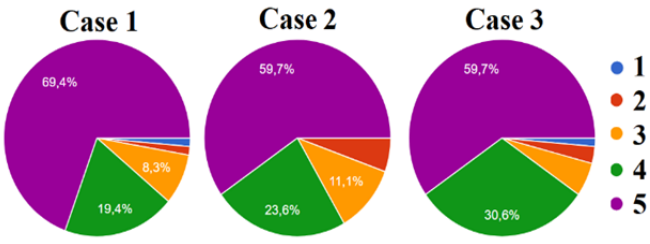


Figure. 7. Evaluation in each situation

While the analysis of consistency or reliability of Cronbach's Alpha to know the opinion of the question: What opinion would the previous question deserve? In each case posed in the real situation, remote real situation and situation of the visual poem is equal to 0.565 value accepted by the scientific community because it is within the range of moderate according to the five-point scale (very low, low, moderate, good and very good).

Table 2 shows the mean values of the student's perspective when rating and giving a rating according to the following scale:

1=I found it boring to try to pose a problem from this situation;
2=I enjoyed posing a problem based on this situation;
3 =I found it interesting to think of a problem statement from this situation and
4 =I think it is important to be able to pose problems from situations like this.

In each case of the real situation, remote real situation and situation of the mathematical poem a mean of 3.24 has been achieved, that is to say that the students responded that they found it interesting to think of a problem statement based on this situation, referring to case 1, in which the students had a little conflict because they remembered so many real cases and could not decide which case to work with, but finally with a little calm and patience they themselves managed to support and choose a real situation and try to propose how to solve the mathematical problem. In the case of the remote real situation, there is a mean of 3.26 (the highest), that is to say that the students responded that: they found it interesting to think of a problem statement from this situation, referring to case 2, because the students find it easier to remember a place they visited (far from their environment) or the place they heard about a place in the same area, but even so, the student manages to be inspired and poses the mathematical problem and also manages to solve the problem.

And finally in case of the situation of the visual poem, the student manages to value with a score of 2.85 (the lowest) that is to say: they found it interesting to think of a problem statement from this situation, referring to case 3, because in this situation the student manages to put in imagination his mind to form a question of abstract type but that has a simple solution.

Table 2. Distribution of the means of the situations on the opinion deserved by the question on the three situations.

	Mean	Error Deviation	Deviation	Variance	Asymmetry	Kurtosis
C1.2	3.24	0.085	0.722	0.521	-0.622	0.012
C2.2	3.26	0.097	0.822	0.676	-0.686	-0.703
C3.2	2.85	0.100	0.850	0.723	0.018	-1.070

Figure 8 shows the perspectives of the students measured in four opinions for each case of the situations thus achieving 47.2% of students said: I found it interesting to think of a problem statement from this situation in case 1 on the real situation, 48.6% of the students said: I think it is important to be able to pose problems from situations like this, in case 2 of the remote real situation and while 36.1% of the students said: I enjoyed posing a problem based on this situation, referring to case 3 on the situation of the mathematical poem. Thus, the 6th grade student experimented with this methodology for posing and solving mathematical problems, leaving aside virtual environments, leaving aside electronic devices to concentrate on posing a new way of presenting mathematical problems and achieving positive results for their academic performance as well as in their personal cognitive development.

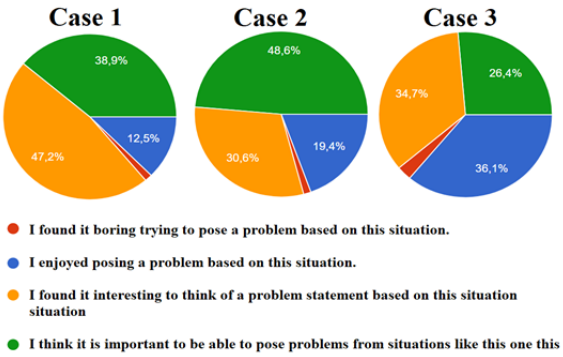


Figure. 8. Opinion with respect to the questions of each situation

4. Discussion

There are difficulties in mathematical operations and formulas that confuse students in the development of their learning, so mathematical content should be reviewed to incorporate new approaches on how to pose and solve mathematical problems [2] from the initial level in order to strengthen their mathematical abilities and skills from childhood and achieve a prosperous future of students with mathematical reasoning and thinking.

The experience of the mediators has achieved good academic performance of students thanks to the affective implications, but the "visual poem" has become a challenge for future teachers [4], because generating a problem of this type sometimes the students themselves can achieve much or little imagination.

Creativity in the approach and resolution of mathematical problems has significant and cognitive effects to face the solution and improve the academic performance of students [5], while this situation worries the teacher of the educational institution because it does not have materials available for its development during the academic work and has to intercalate this methodology with students to generate satisfaction and student learning. The existence of two groups (because of the methodology) with different perspectives still leads to many results in both directions without concluding and arriving at a single result, even though better results are obtained with the second point of view (method imposed by Gestalt) [9], i.e. they cannot be explained with only a few good results or points of view in an analytical way of what generates intuition.

Mutual help between parents and teacher's links and solidifies student learning in the short, medium and long term, since the relationship between academic performance and motivation is significantly positive for the development and progress of student learning [13]. The conclusions reached by the Program for International Student Assessment (PISA) are: (a) latent classes demonstrate better mathematical problem solving skills, (b) latent ability influences problem solving ability (c) interactions between skills have a rule [19], so the curriculum should be approached from another angle to obtain better results in mathematics and not always occupy the last places in the PISA results.Teachers in the area of mathematics do not agree with the national curriculum because it prioritizes the content and does not develop skills to address the approach and problem solving, so the teacher encounters serious problems to develop and plan actions to solve problems [20], to improve these difficulties the Peruvian government should socialize and train the topics of the curriculum to implement and readjust for the sake of student development. Better acceptability is obtained by the students when they manage to see an image with the mathematical problem and manage to solve a problem from different points of view, so the results show the important characteristics (detailed planning for the solution of a mathematical problem, exclusive and excessive time for a single problem and an infinity of solution alternatives), that is, there is enough support and richness in the use of the blackboard for the mathematical discussions that are generated from each case raised [23].

Research has identified that knowledge and experience are the basis for credibility in problem solving with approaches and capabilities to translate mathematical theory into practice [24]. In China, the mathematical model exists as a mathematical competence within the curriculum, which is responsible for providing solutions to real world problems, only using mathematics whose basis for solving these problems is creativity [25], which manages to develop problem-solving skills together with cognitive skills in group tests in which they were forced to create social networks to share information and solve the evaluations [29]. The tasks for students whose approach has creative reasoning overcome the complex versions of learning in the area of mathematics and it is much better if it is programmed because it becomes of great support for the teacher and helps to improve the quality of reasoning in the classroom [39] because there is a change of attitude and surprise in the students where they only exchange glances among them when they start to solve the mathematical problems posed with this methodology of presenting problems with each situation.

This method of presenting mathematical problems with each situation is very important in the classroom because it will help not only to use pencil and paper to solve a mathematical problem, but also helps the student to see the world and to relate any mathematical figure with a mathematical problem and solve it without using a pencil and paper. This process will help to improve the student to have a high quality spatial vision for a promising future when he/she starts to choose a professional career in aerospace engineering or future space engineers as well as other careers that are related to mathematics. We also invite to practice this method of cases (real situation, remote real situation and mathematical poem) combined with other methods and not only for the area of mathematics but for all areas in common and study the effects that this generates from its first application and in its different educational levels. We also invite to apply this methodology in related areas to investigate the effects in the classroom and in the academic performance of students.

5. Conclusion

The perspective of the students of the 6th grade of elementary school regarding the approach and resolution of mathematical problems in their three situations is positive and has acceptability in the great majority of students.

At first, the students of the 6th grade were surprised with the real situations and then they adapted themselves and had the respective acceptability to forget the virtual environments as well as the ICT when facing a mathematical problem.

The perspective of the students of the 6th grade of primary school with the real situations away was motivating and brought back memories to be able to pose mathematical problems, this method was able to adapt and have the respective acceptability to forget the virtual environments as to the ICT at the moment of facing a mathematical problem.

The perspectives of the students of the 6th grade of primary school were surprised with the situations of the mathematical poem which brought into play their imagination and more than anything their creativity to adapt and to have the respective acceptability, forgetting the virtual environments such as ICT at the time of facing a mathematical problem.

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