The impact of the Strategic Learning Achievement Program in primary education students in Arequipa

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Abstract. This work aims to determine the relation of the results of the Peruvian national assessment of students that finish the third cycle of compulsory education in the area of mathematics and the knowledge and development of abilities considered at second level in the national assessment of students by the elementary teachers of nine schools under feedback-based monitoring by the Strategic Learning Achievement Program in the Local Educational Management Unit of South Arequipa. According to the results obtained, there is a high correlation between the Educational Quality Exam results and the results of the teachers' test and the observation form applied to the teachers. In light of the results, it is found that the ignorance of the prioritized skills of mathematics in the Peruvian national assessment and the deficient application of strategies by the teacher influences the low results in learning achievements of students who finish compulsory education. The research concludes that the high correlation (0.9) between the strategies used by the teacher to develop skills prioritized by the census evaluation, in the area of Mathematics, and the number of students.

Keywords: Mathematics skills, general assessment, monitoring, learning program, primary education.

1 Introduction

Since 2004, the Peruvian Ministry of Education reports year after year the results of the national assessment (in Spanish, ECE, *Evaluación Censal de los Estudiantes*) applied to second-grade primary education students in Reading Comprehension and Mathematics. The ECE consists of the application of standardized tests to second-grade primary students and fourth-grade primary students who have a native language other than Spanish and attend an Intercultural Bilingual Education School. This assessment classifies students at different levels according to their results. If students get minimum expected achievements, they are upgrading to the second level of ECE.

These results at the national level in the area of Mathematics are not very encouraging. Since by 2014, at the national level, it reached 25.9% and at the regional level in Arequipa, 32.9%. At the international level, this situation has been reflected in unfavourable results. The results obtained by Peru in PISA 2012 in Mathematics are low. There is no doubt that these results are due to multiple factors such as, for example, use of educational materials, effective use of classroom time and strategies used by the teacher, as pointed out by SERCE [12] in its report on factors associated with the cognitive achievement of students in Latin America and the Caribbean.

The results of learning achievements in the area of Mathematics at the national level in ECE of students who complete the third cycle of compulsory education are not very encouraging in the region of Arequipa, and the situation becomes even more complicated at the national level. This is due to different factors such as the family economic situation, the investment of economic resources by the State in education, the differences in cultural assimilation and, of course, the quality of human resources involved in the teaching-learning process.

It is known from statistical results of recent years that people who choose to be primary education teachers enter with low average performance in addition to not having positive attitudes towards the area of Mathematics because they consider it difficult. Besides, undergraduate universities develop few mathematical contents, which implies that future teachers training in the area of Mathematics is insufficient. Graduate teachers with these characteristics have the mission during their careers to develop the mathematical competencies established in the National Curricular Design, making the teacher an essential factor in the low performance of students in the area of Mathematics.

The practices that are developed in the school for the treatment of mathematical knowledge are today subject to a substantial revision. School mathematics, its meaning, its nature and its possible meanings have been substantially modified. Its existence in the curriculum of compulsory education is justified by considering Mathematics as a fundamental part of the knowledge that every citizen should have as a minimum cultural background and, consequently, its treatment should be directed fundamentally to study, understanding and intervention in their daily environment. This implies different ways of understanding, knowing and making Mathematics very distant from the dominant forms in our educational environment, in which we basically teach and work on mathematical representations or symbols, without facilitating a real understanding of their meaning and application [1].

The purpose of education is to lead the student to realize his personality, given that it is everything that contributes to project the abilities, aptitudes and possibilities of the individual; and to create, correct and order his ideas, habits and tendencies. The proposal of the curricular framework mediated by the eight fundamental learnings represents today the instrument whose purpose is to concretize the ultimate goal of our Peruvian educational system [14].

Now, with respect to the teachers who produce a significantly higher academic performance in their students, Brophy [3] affirms that they are those who successfully organize the classroom, design objectives, communicate with their students, select and design academic tasks. This same author comments that successfully carrying out these activities demands a combination of knowledge, energy, motivation, communication, decision making and teacher skills. According to the curricular framework, it could be indicated that in the educational system, the teacher that in a context of standardized evaluations evidences better learning achievements with his students is the one who at all times in the development of pedagogical processes is aware of competencies mediated by capabilities and these are observed through indicators.

Nowadays, the purpose is to cover the deficiencies in the mathematical training of teachers through in-service training programmes. On the other hand, it is assumed that no one teaches what they do not master, clearly alluding to specialized training and solid knowledge of mathematical concepts.

A fundamental premise without which it is not possible to think of efficient education systems is the centrality of learning. In short, we can say that an educational system is of quality insofar as it provides students with significant, relevant, and high cognitive demand learning. Unfortunately, in Peru this is only a desire that is not fulfilled by the majority of students, as indicated by various national assessments at the national level [6-9] and international ones such as PISA and LLECE that have been applied in Peru.

This work analyzes the relation between the results of the Peruvian national assessment of students that finish the third cycle of compulsory education in the area of mathematics and the knowledge and development of abilities considered at second level in the national assessment of students. The main goal is to determine the impact of the Strategic Learning Achievement Program implemented in the Local Educational Management Unit of South Arequipa through the feedback-based monitoring of the elementary teachers of nine schools.

2 Strategic Learning Achievement Program

The Strategic Learning Achievement Program or PELA according to the acronym in Spanish (*Programa Estratégico "Logros de Aprendizaje al finalizar el III ciclo de EBR"*) is a set of interventions and articulated actions that generate products and results in favor of children from 3 to 7 years of age, which are being implemented to improve the levels of effectiveness and efficiency in a sustained manner towards the goals of learning achievements expected at the end of the third cycle of compulsory education in Peru.

It consists of a pedagogical accompaniment through planned, continuous and respectful advising to improve the pedagogical performance and management of the teachers of initial and primary education through actions of feedback and technical support, continuous reflection, the construction of links and friendly relations.

All the official information provided by the Peruvian Ministry of Education is available in http://www.grell.gob.pe/datos-de-programa.

3 Materials and methods

The It is basic research, as it will expand information on the problem to be investigated and then explain it and propose possible solutions. The research is relational since the correlation between the results of the ECE at the end of the third cycle of compulsory education and the knowledge of the classroom teacher about the capabilities prioritized in ECE will be analyzed.

In order to avoid biases due to the particular characteristics of rural educational institutions, this research opted to take only those of urban scope, i.e., nine urban institutions covered by the Strategic Learning Achievement Program. The techniques were observation, testing and analysis of data recording. We worked with an observation card and an objective test applied to nine teachers from the same number of educational institutions, corresponding to the second grade of primary school in the area of South Arequipa.

The instruments used were the Observation Sheet, the Field Notebook, an objective test applied to second-grade teachers and the results of the ECE in second grade. To characterize the teacher's pedagogical practice, a field notebook was designed and elaborated, considering the following categories: curricular programming, pedagogical processes, classroom climate, educational material, evaluation, and classroom organization.

The data were managed quantitatively from information obtained from the observation card, survey and field notebook, identifying the correlation with the results obtained in the ECE 2014 in the area of Mathematics. For the statistical treatment, the software SPSS 24 was used.

4 Results

For the analysis of the results, the categories were considered that show the level of knowledge of the second level of compulsory education capabilities prioritized by ECE. Concerning curricular programming, in most cases, they do not consider the capacity to be achieved. Those prioritized by ECE reflect expectations of low cognitive demand since they are reduced to addition and subtraction, without alluding to the resolution of additive problems. In this regard, it is also important to point out that several teachers did not present their curricular programming. About pedagogical processes, it is observed that teachers do not interact with students through questions or additive situations of high cognitive demand, related to second level capabilities.

In most cases, they simply ask "What is done?" or "Is it added or subtracted?". Regarding the educational material, it is important to emphasize its importance for the process of interaction with the student, generating reflexive questions that lead them to complex learning. In this dimension, it was observed that teachers value the use of educational material only in the first few months, then consider that it is not necessary since they assume that all children are at the abstract level of mathematical thinking. Finally, the evaluation dimension shows that a large percentage of teachers do not evaluate according to previously established indicators and capacities, since they do not have their curricular programming; they simply limit themselves to placing operations at the reproductive level (mechanical and symbolic), or stop working on problems that are not reviewed in the next class.

Regarding the results of the observation sheet applied to second-grade primary teachers in the Local Educational Management Unit of South Arequipa with PELA accompaniment, urban area, it was obtained that 44.4% of teachers observed do not use strategies for their students to compose and break down a number. From the observation made during classroom visits, six teachers, who make up 66.7%, on no occasion used strategies to establish equivalence relations between different ways of representing the same number, this being the most critical capacity. The 55.6% of teachers observed do not use adequate strategies to develop in their students' abilities in the resolution of additive problems that require establishing relations of equalization, comparison, combination, change, etc. The 22.2% do not use strategies that encourage their students to solve problems involving concepts of double, triple and half; in this case, the majority of teachers, 78.8%, do develop this ability in their students.

Concerning the objective test, 55.6% do not correctly identify the ability of second level "Identifies the composition and decomposition of a number in groups of 10 units"; while 77.8% of teachers do not identify the ability "Establishes equivalence relations between different ways of representing a number", corroborating this resulting with what is specified in the reports of the Ministry of Education. Moreover, 66.7% of teachers do not correctly identify the ability called "Resolve additive problems of up to three stages that require establishing relationships, selecting useful data or integrating a set of data".

These results show that teachers think that the items presented for this ability correspond to calculating additions and subtractions; that is, they do not take into account the mathematical context. The results already show a relationship between what has been worked in the classroom and what the teacher says he or she knows about the capacities assessed in the ECE that are considered to be of high cognitive demand. These results show us the need to organize and plan training programs aimed at strengthening the professional capacities of teachers, since they are closely related to learning achievements, as indicated in a study conducted in 2014 [4].

The results reported in the area of Mathematics by the Quality Measurement Unit (UMC) in 2014, for the institutions of this research are in Table 1.

Table 1. Learning achievement results for the area of Mathematics ECE 2014, corresponding to the 206 students considered in the research.

District	Name	ECE 2014
Mariano Melgar	40695 Los Olivos	93.3
Mariano Melgar	40139 Andrés A. Cáceres	56.3
Miraflores	40158 El Gran Amauta	30.3
Characato	40123 San Juan Bautista	6.7
Socabaya	40701	75
Socabaya	40221 Pueblo Viejo	27.3
Socabaya	40676 La Mansión de Socabaya	28
Sabandía	40193 Florentino Portugal	54.5
Socabaya	40680 Horacio Zevallos Gámez	26.1

As far as the normality test is concerned, both sets of data have a parametric behavior, i.e. they have a normal distribution; this is because the significance, in both cases, is greater than .05. This result is important because it allowed us to decide between Pearson's r or Spearman's rho. Therefore, Pearson's r will be used to determine the degree of correlation between both variables.

Table 2. *Pearson Correlation Results*

		Results ECE 2014
Observation Sheet	Pearson's Correlation	.950(**)
	Sig. (bilateral)	.000
	N	9
ECE Results	Pearson's Correlation	.847(**)
	Sig. (bilateral)	.004
	N	9

** Correlation is significant at level 0.01 (bilateral).

Regarding ECE, the level of correlation between the strategies used by the teacher in the classroom and the ECE results in the area of Mathematics is high (Table 2), reaching 0.950, which means a high degree of dependence.

In this case, the correlation reaches a value of 0.847, which turns out to be high, which evidences a high degree of dependence between the teacher's knowledge of the abilities considered in Level 2 and the result obtained by his or her students in the census evaluation, where the least that is expected is that the student satisfactorily resolves the questions aimed at verifying the mentioned abilities.

According to the results obtained, it is observed that there is a high correlation between the Educational Quality Examination results and the results of the Teacher Test and the Observation Card applied to teachers.

The results presented as a product of the application of the instruments designed for this research it is proven that the lack of knowledge of the prioritized capacities of Mathematics in ECE and, on the part of the teacher, the deficient application of strategies influence the low learning achievement results of students who complete the third cycle of compulsory education in Peru.

5 Discussion and conclusions

The methodological strategies for teaching are integrated sequences of procedures and resources used by the teacher with the purpose of developing in the students capacities for the acquisition, interpretation and processing of information; in addition, the use of these in the generation of new knowledge allows their application in the diverse areas of daily life in order to promote significant learning. Strategies should be designed to encourage students to observe, analyze, express an opinion, formulate hypotheses, seek solutions, and discover knowledge for themselves [11].

Currently, the teaching of Mathematics undoubtedly considers constructivism, a paradigm by which it is assumed that each constructs and is capable of constructing mathematical concepts through interactions with objects and actions with them; in addition, it is considered that the student himself constructs knowledge from his previous cognitive structures [2, 5].

Concerning the resolution of learning problems and achievements, the Maps of Progress and Achievement conceive learning as a continuum that is enriched throughout the school trajectory. From this perspective, learning is not a sum of knowledge that is acquired in isolation, but rather a process of developing competencies that are deepened and expanded from simpler to more complex levels.

Using the premise that factors with an average greater than 4 are adequately considered, worked and/or prioritized in the environment of the organization, 100% (6 out of 6) of the motivational factors exceed the 4 average points, which indicates that the work developed is good for the labor motivation of the workers. Also, since the characteristics of the jobs in the organization allow for a positive stimulus for people, there would be high chances that the level of motivation would improve if the organization took into account the results of this research.

Pedagogical accompaniment is a strategy of professional strengthening in service, which consists of classroom counseling for teachers in their educational institution, based on their pedagogical practice and specific needs, applying the critical reflective approach, which is continuous and sustained. Accompaniment is provided through dialogue, in a climate of horizontality, interaction, personal disposition, and commitment [13]. Thus, within the framework of continuous teacher training systems, accompaniment is combined with and complemented by other teacher training strategies in which, in addition to training events (in its traditionally known version), it promotes rapprochement between trainers and teachers and teachers among themselves [10].

Another dimension associated with changes in the in-service training model has to do with the redefinition of the role of teachers as active subjects, protagonists of their own training, capable of identifying their needs. An interesting analysis of the effectiveness of teacher performance lies in the potential of personalized tutoring as a strategy capable of changing over time, adapting to needs.

At another level of analysis, substantive problems are identified regarding aspects such as the lack of clarity regarding the attributions and functions of each level of government in the hierarchical structure of the sector. These references indicate that there is currently a line of reflection that focuses not only on the redefinition of old forms of teacher training, but also on including in-service teacher training programs mechanisms for rapprochement between trainers and teachers, and more personalized and practical ways to improve teacher performance. This theoretical review coincides with the success achieved with the teachers studied, who not only improved their teaching performance but also perfected their practice of teaching problem-solving in the area of mathematics.

Therefore, this research concludes that the value obtained for Pearson's correlation between the strategies used by the teacher to develop ECE prioritized mathematics skills and the number of students at second level is high (0.9). The level of knowledge of fundamental aspects to be considered for the area of Mathematics in the III cycle by teachers is deficient and has a high correlation (0.8) with the results obtained in ECE. The didactic-mathematical treatment of mathematical situations and tasks in primary education, and specifically in the third cycle, must start from the selection, study, and formulation of oriented strategies. However, with a small sample size, caution must be applied, as the findings might not be transferable to other regions in Peru.

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