

## "SCIENTIFIC TIC" program for strengthening the investigative skills in five-year-old children

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### Summary

It is true that research skills are developed throughout life, however, it is the duty of schools to promote and encourage children from childhood to develop these problem-solving skills, whose process is the problematization, analysis, solution and verification of problematic situations. We must also highlight the use of scientific ICT as a virtual pedagogical resource, which allowed us to develop scientific thinking skills in children. We seek to apply the "scientific ICT" program to strengthen research skills in five-year-old children. An experimental type of research was carried out, whose design was pre-experimental, the non-probabilistic sampling represented children of initial education, who worked with the "Scientific Tic" program, executing pedagogical activities to develop scientific skills in children, making use of digital platforms; descriptive and inferential statistics and SPSS hypothesis testing were applied. The results show that the implementation of the Scientific ICT program had a significant influence on the achievement of research skills in children. It is concluded that the application of the scientific ICT as a pedagogical resource does develop scientific skills.

**Key words:** Virtual programs, use of ICT, development of research skills.

### Introduction

In Peru, in recent years, scientific research was regressing and this postpones technological, economic and social modernization; human resources are the main source in the execution of this activity applying the domain they achieved in scientific literacy; but we can say, that there is little practice in the massification of scientific culture

(Tanaka, 2005; Silva-Díaz & Cajandilay-Díaz, 2018).

Educational institutions are responsible for achieving competencies in inquiry and scientific literacy at all levels (Pérez, 2017). Research skills arise from the need to solve problems, whose process is the problematization, analysis, solution and verification of problematic situations, according to

Sanchez (2009), these are the product of a dynamic and evolutionary process in human beings, in which new knowledge is acquired that allows students to solve problems based on their innate curiosity, however, in many cases this curiosity is not exploited so that in time it is lost and this can be corroborated in the results of science performance PISA (2018) which was deficient for Peru in relation to Latin American countries; however, the results according to the PISA evaluation. MINEDU (2017; 2018), evidence the poor performance evidenced by schoolchildren in the area of science and technology, Peru ranks sixth among Latin American countries, also evaluating the factors that influence these results, highlight the lack of knowledge to the approach to the area of Science and Technology, the poor execution of adequate didactic sequences and the use of insignificant strategies taught by teachers in the teaching and learning process; finally, we do not take advantage of technological tools as pedagogical resources in the classroom that can offer rich learning experiences for our students (Balarin, 2013).

It is necessary to reorient the real process of scientific literacy in the classroom from the initial level, MINEDU (2020), proposes in the curricular programming of the initial level, the competence "Inquire through scientific methods to build their knowledge", where children will mobilize their abilities to solve problematic situations of their environment, However, in the local context, Ugel Tambopata offers little training to teachers for this purpose, and the problems become more acute when observing the pedagogical practices where there are few activities that motivate curiosity to inquire and develop scientific thinking in children, due to methodological limitations and lack of resources; So our general problem is to know how the application

of the "scientific ICT" program strengthens research skills in five-year-old children? In the research conducted by Antunez (2019), "Development of research skills and use of technological tools in information management", concludes that research skills are important in the XXI century, it provides the subjects with skills and attitudes helping them to cope in everyday life, however, given the technological advances day by day, research has gaps and ruptures when applying it as an educational tool and for Escalante (2019), the learning that is generated in the classroom, we can complement them with the pedagogical use of ICT, it is important that teachers appropriate the technologies, giving the opportunity to new ways of learning.

Research skills arise from the need to solve problems, according to Calle's research (2018), concludes that the scientific literacy approach favors the achievement of competencies in students in the area of Science and Technology; also regarding the use of ICT as educational resources, in the research conducted by Zevallos (2018), "Application of ICT in early education" concludes that integrating ICT in the teaching and learning process brings improvements by applying innovative materials and technologies. Therefore, the objective of this research is to apply the "Scientific ICT" program to strengthen the research skills of five-year-old students.

### **Methodology**

The research approach is quantitative and of hypothetical deductive method. This research is of the applied type, it makes use of virtual programs and ICT to improve research skills in children. The level is explanatory, of the pre-experimental type (Sánchez Flores, 2019).

### **Sample**

We worked with a total population of 150 children aged 5 years. The calculation of the sample size was determined by applying the sample statistic and is 126 children, with a confidence value of 95% and a margin of error of 5%.

### **Instrument.**

The technique used for the collection of information was observation and the observation guide was applied as an instrument which, when submitted to hypothesis testing with SPSS, proves the level of performance of the children in the area of science and technology, this instrument consists of items 16 and measures the learning achievement: beginning, process, achieved, that the child has in relation to the competence "Inquire through scientific methods to build their knowledge". Having more than two alternatives, it was determined to apply the reliability coefficient of Cronbach's Alpha, being 0.954, determining that the instrument is reliable.

### **Procedure.**

The execution of the ICT program "scientist" for the development of research skills was developed with the execution of learning sessions using virtual pedagogical resources, ICTs, with 05 sessions of 45 minutes per week, which were developed in the process of teaching and learning with 5 year old children, meaningful learning experiences were planned and we used ICTs for children to inquire and allow them to collect data from interactive virtual sources, with them they tested their hypotheses through experimentation to consolidate their results and create new knowledge.

The activities were carried out by the teachers in charge of the classroom, these strategies were included in their plans and the children's achievements in each experience were evaluated.

At the beginning of the program, the observation guide consisting of 20 items was applied, which allowed us to collect the initial data and measure the previous skills that the children had, after the intervention of the program, the instrument was applied again in the two groups, to obtain the results that were obtained with the intervention of the "scientific" Tic program.

### **Results.**

A pilot test was conducted with 28 5-year-old children, and the following results were found when the instrument was applied before the application of the scientific ICT program. The table 1 describes the average levels reached by the students in the competency "Inquire through scientific methods to build their knowledge", before the application of the scientific ICT program.

It can be seen that 71.4% of students were at the low level, showing difficulties in problematizing situations and designing strategies for inquiry, generating and recording data or information, analyzing data and information, as well as evaluating and communicating the process and results of their inquiry; 25% were at the medium level and only 3.6% at the high level.

Table 1. Research skills before the scientific ICT program.

		Frequency	Percentage
Valid	Under	20	71,4

Medium	7	25,0
High	1	3,6
Total	62	100,0

**Source:** Research database

The table2 describes the levels achieved by the children in the competency "Inquire through scientific methods to build their knowledge", after the application of the scientific ICT program.

It can be seen that 71.4% of students were at the high level in pointing out alternatives to problems and situations

and designing strategies for inquiry, generating and recording data or information, analyzing data and information, as well as evaluating and communicating the process and results of their inquiry; 21.4% were at the medium level and only 7.1%, which corresponds to two students at the high level

Table Research skills2. after the scientific ICT program

		Frequency	Percentage
Valid	Under	2	7,1
	Medium	6	21,4
	High	20	71,4
	Total	28	100,0

Table3 , shows us the T-test for related samples, in which the means are compared both before and after the experience, observing significant differences, before and after the

application of the scientific ICT program, being the P-Value = 0.000 <  $\alpha$ = 0.05; so it is concluded that the students went up in level from 1.32 on average to 2.64.

Table4 : Paired sample statistics.

	Media	N	Desv. Deviation	Error average
Research skills prior to the scientific ICT program	1,32	28	,548	,104
Research skills after the scientific ICT program	2,64	28	,621	,117

## Discussion.

The objective of the research was to apply the "scientific ICT" program to strengthen the research skills of five-

year-old students. Investigative skills are the cognitive capacity that favor the construction of scientific thinking, where the individual is able to solve a problem or achieve an objective

effectively and efficiently (Salazar et al, 2019).

The data obtained in this research, allows observing that the children improved their investigative skills, in the paired statistics, it shows that the mean increased to 2.64; where 28 children developed their investigative skills after the intervention of the Tic Científico program. These results support the research of (Zevallos, 2018) where he concludes that integrating ICT in the teaching and learning process bring improvements by applying innovative materials and technologies. In this case previous theories are used as a framework to interpret new research based on previous theories. In addition, Arcos et al. (2020) indicate that the formation of research skills allows students to solve problems under the guidance of the teacher, linking the needs of educational centers with the contents of the different subjects.

The activities taught were significant, the children were able to observe, classify, formulate questions, experiment and test their hypotheses; these are the capabilities that can properly demonstrate a child who achieved the competence of inquiring through scientific methods to build knowledge, from the area of Science and technology, similar results found Salvador et al. (2019) who confirmed that the design and implementation of proposals aimed at improving knowledge and strategies to solve problems have a positive impact when working on the metacognitive skills of students.

### Conclusions.

1. The Tic Científico program implemented pedagogical activities using virtual platforms with 5-year-old children, demonstrating that the program has a significant and positive

influence on the achievement of scientific skills in children.

2. The execution of the Scientific Tic, demonstrates that it is possible to plan pedagogical activities using technological tools with children of the initial level, awakening in the child the interest, stimulating their learning and the capacity to self-manage their inquiry capacities, during the teaching and learning process.

3. The use of ICTs as pedagogical resources provides teachers with tools that can be used during learning sessions, offering interactive, accessible and manipulable spaces for children's exploration, as they will help in the construction of children's scientific skills.

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