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AUTONOMOUS LEARNING IN PRIMARY EDUCATION STUDENTS

José Manuel Martínez Ramírez
https://orcid.org/0000-0002-6056-8007

Arturo Guzmán Arredondo
https://orcid.org/0000-0002-6081-4589

Abstract: E The goal of the research was to verify that the development of autonomous learning in the classroom, of fifth and sixth grade students of primary education, with the support of the teacher, contributes to academic achievement in the subject of mathematics. The problem addressed refers to the difficulty of students to self-regulate their cognitive processes, identify their needs and develop particular styles that allow them to learn by themselves. The research was developed from the quantitative approach, with the experimental method at its quasi-experimental level and a non-equivalent control group design. The control group was made up of 13 students and the experimental group by 14; in both groups a pretest and a posttest were applied. The didactic intervention to develop autonomous learning in the experimental group was configured for 42 class sessions of 50 minutes each, in congruence with the curricular contents related to the management and use of fractional numbers, located in the first trimester of the programs. current studies in fifth and sixth grades. The technique for obtaining empirical information was the goal test, which allows measuring the academic achievement of students through a mathematics exam of 29 reagents with 4 response options each. The data analysis was carried out with the support of the statistical program SPSS version 26.0 and it was concluded, with statistically significant differences between the two groups, that the experimental group registered a greater development of autonomous learning.

Keywords: Autonomous learning, Learning to learn, Self-efficacy, Primary education, Academic achievement

INTRODUCTION

Education must evolve, just as society and knowledge do. One of the ways to contribute to this evolution is to test new pedagogical methods aimed at transforming the teaching and learning processes in the classroom, bearing in mind the responsibility of the State to guarantee a comprehensive education of girls, boys and adolescents (NNA), which meets their educational needs and the aspirations of society. Society is constantly changing and education must respond to these changes.

In the search for new ways to favor the formation of students, the concept of autonomous learning arises, considered as the ability of people to assume responsibility for their own learning, make decisions and reflect critically. It requires that NNA acquire knowledge, develop skills and particular styles that allow them to learn by themselves. For Herring (2012, cited by Luna, 2015), autonomous learning is one of the essential skills in the 21st century.

According to Rué (2009), autonomous learning must be considered as one of the main keys to success, with a fundamental value to be applied strategically. This idea allows us to consider autonomous learning as one of the responses to current educational needs and the path that leads to an excellent education.

In primary education, various educational models, approaches and methods have been tested in study plans and programs; Different theories have been tested to generate in students the necessary skills for life, through the construction of knowledge and the development of skills that allow them to solve situations in their daily lives. Advances have been made in training students to build their own knowledge, generate significant learning and discover learning, but the need for students to be able to control their cognitive processes that allow them to continue learning, take

decisions, identify their learning needs and set goals.

According to Pedró (2017), students learn better by actively participating in the construction of their own knowledge, through direct experiences, when they form their own interpretations and interact with their peers; that is, if the student acquires this responsibility he will be learning autonomously, restructuring his thoughts to analyze, reflect and learn consciously.

Autonomous learning is present in educational research in the world. In China, they have tried to develop autonomous learning in the English language (Xu, 2009), have explored how cooperative learning improves autonomous learning in university students (Shi and Han, 2019), and have implemented a model of computer-assisted autonomous learning. (Wang, 2010; Liu, 2014). In Turkey they have inquired about: the factors that affect autonomous learning behaviors in future German teachers (Deregözü and Hatipoglu, 2018), the strategies of graduate students in autonomous learning competences (Kucukler, 2018) and the participation of students in autonomous learning activities outside the classroom to see if they are independent, self-directed and self-regulated (Öztürk. 2020). In Latin America, and different investigations place autonomous learning as a current concern of international scope (Medina and Nagamine, 2019; Pérez, 2013; Reyes, 2017).

From the recognition of the importance of autonomous learning, the little exploration that it has had in primary education and the difficulties that are perceived for students to advance in their academic achievement, the need arises to carry out an investigation that seeks elements that contribute to the solution of the causes for which unsatisfactory results are presented in the academic achievement of the students.

The question that guides this research and through which it is intended to specify the object of study is:*What is the effect of the stimulation of autonomous learning, with the support of the teacher, on the academic achievement of the mathematics subject of fifth and sixth grade students of primary education?*

This question guides the search for elements that contribute to clarifying the influence of autonomous learning on the academic achievement of students, through a set of self-learning teaching strategies that are implemented in the classroom. The research hypothesis is as follows: *If the teacher develops autonomous learning in the students, then they will increase their academic achievement in the subject of mathematics.*

The goal of this research is: to verify that the development of autonomous learning in the classroom, of fifth and sixth grade students of primary education, with the support of the teacher, contributes to academic achievement in the subject of mathematics.

DEVELOPMENT

LITERATURE REVIEW

Since 1981, Holec addressed autonomous learning in the field of English language learning, in 1990 this concept gained strength and at the beginning of the third decade of the 21st century, four decades later, attempts are being made to develop autonomous learning in all educational types and levels, mainly upper secondary and higher. For this reason, the concept has evolved considering new features.

For Holec, autonomous learning is the ability of students to take charge of their learning, according to their own needs (Shi and Han, 2019); it is assumed that an autonomous student must take charge of her learning without depending on anyone and do so considering their own learning needs.

According to Benson (2001), autonomous

learning consists of the person taking control over their learning in the classroom and outside of it; it can be described as the ability to take responsibility or have control over one's own learning in formal and non-formal educational contexts. In other words, the leading role in the development of learning now passes to the student who, based on her needs, will control her own learning process.

The Turkish Ministry of National Education (2017, cited in Karademir and Akgul, 2019) refers to autonomous learning as the competencies of the individual to insist on learning to organize their individual or group learning actions, as well as effectively time and space. knowledge. These competencies give the individual the ability to be aware of her needs and processes, to develop particular learning styles that will allow her to learn by herself.

Autonomous learning is a capacity for detachment, for independent actions that allow decision-making and critical reflection to engage in learning processes (Little, 1991, cited in Orakcı and Gelişli, 2019). Autonomous learning is appreciated when the student establishes areas of action to learn to learn, identifying her strengths and weaknesses with respect to the skills that she needs to develop (self-regulate).

Autonomous learning is defined as the state in which the student is able to control their cognitive processes that allow them to learn by themselves, has developed skills and particular styles to know how to learn, controls their thought processes, reflects critically, identifies their areas of opportunity, self-assess their processes and achievements, and make decisions to achieve the skills they need, with a commitment and responsibility for individual and group learning to be used in different contexts.

Based on the reviewed literature, it is assumed that there is no solid theory around the development of autonomous learning, which allows submitting its postulates to empirical verification. In different empirical investigations, autonomous learning has been sought to understand or explain from different theories such as: cognitive development, which maintains that learning is obtained when the subject interacts with the object of knowledge (Piaget); sociocultural theory, which states that learning occurs when the individual interacts with another (Vygotsky) (both authors cited in Bravo-Cedeño, Loor-Rivadeneira and Saldarriaga-Zambrano, 2017); the significant learning theory, which postulates that learning occurs if it has meaning for the subject (Ausubel, cited in Caballero, 2009); and the social cognitive theory whose basic premise is that humans are motivated due to cognitive processes resulting from personal actions or the observed actions of others (Bandura, cited in Ponton and Rhea 2006; and Alfaiz, Hidrayah, Hambali and Ligya, 2019).

One of the approximate theories to autonomous learning is that of active learning, which maintains that it is not possible to learn for another person, but that each person must learn for himself, learn different perspectives and the implications of what is learned, that is, learn to reflect (Huber, 2008).

To verify that autonomous learning contributes to the academic achievement of students, an experimental didactic intervention was designed based on different substantive theories that have emerged from empirical research and the reflections of various scholars who have treated autonomous learning in different contexts and under different circumstances. various denominations: complex learning and cognition (Ormrod, 2005), free learning (Rincón-Gallardo, 2019), autonomous learning model (Zimmerman, 2002), guidelines for learning to learn autonomously

(Crispín Bernardo et al., 2011), autonomous learning strategies (Pang, 2003, cited by Zhou and Bao, 2018), how we think (Dewey, 1989) and autonomous learning didactics (Chicas Cañas, 2011).

Ormrod (2005) mentions that the student must be aware of their own learning and memory capacities, know which learning strategies are effective and which are not, plan learning tasks in order to be successful, use effective learning strategies, supervise the own state of knowledge and retrieve previously stored information. These skills will allow the student to think about thinking.

Rincón-Gallardo (2019) presents a proposal to make an educational change with a macrosocial scope through free and autonomous learning. In his proposal, learning to learn tops his list, mentioning that the best thing we can do for our boys and girls is to cultivate the ability to learn on their own. The author presents the three main actions of his for a generalized pedagogical transformation on a large scale: political, social and pedagogical sphere.

Zimmerman (2002) proposes a model for the self-regulation of learning divided into three phases, according to the order of the internal psychological process of the students that will allow them to learn more efficiently and obtain more satisfaction: anticipation, the students adopt strategies to analyze their tasks and get motivated; performance, students adopt and use self-monitoring and self-monitoring strategies; and self-reflection, students judge themselves and self-react.

According to Crispin et al. (2011), autonomous learning is a process where the student self-regulates their learning and becomes aware of their cognitive and socio-affective processes; the authors call this awareness metacognition. The authors emphasize the role of the teacher, collaborative work, the process of cognitive self-regulation, and the affective and motivational aspects to achieve autonomous learning.

Pang (2003, cited by Zhou and Bao, 2018) proposes three groups of strategies for autonomous learning, which vary from one individual to another: autonomous learning cognitive strategies to process, classify, store and memorize knowledge; metacognitive autonomous learning strategies to monitor and control their cognitive processes and outcomes; and knowledge application strategies where they manage the resources of the environment, stimulating their motivation.

Dewey (1989) mentions that even when we cannot learn or teach to think, we can learn how to think well, especially how to acquire the general habit of reflection, which is developed through innate tendencies: curiosity, suggestion and order.

Chicas Cañas (2011) presents a pedagogy for the development of autonomous learning, which includes self-regulation strategies to learn to learn content in a meaningful and contextualized way. The didactics of autonomous learning have the maximum empowerment when the student educates himself, through the mastery of higher order thinking skills; that is, educating oneself consists of being a teacher of oneself to reach the maturity of autonomous learning.

METHODOLOGICAL FRAMEWORK

The research is located in a quantitative approach: it is based on the postpositivist conception to develop knowledge, which assumes that it is possible to know the causes that determine the effects; it is a deterministic philosophy that upholds the principle of causality and that knowledge is based on observation and careful, goal measurement (Creswell, 2003).

The method used is the experiment. Campbell and Stanley (1973) express that experimentation demonstrates its importance

in the testing, exploration and selection process; experimentation leaves nothing to chance, as it is a meticulous testing process that provides a clearer perspective. This method is current and is mainly used to prove or verify a theory (Creswell, 2003).

In order to achieve the proposed goal, and once the different levels and experimental designs proposed by Campbell and Stanley (1973) had been analyzed, a design belonging to the quasi-experimental level was chosen. At this level, made up of several designs and where specific variables that cannot be controlled are identified, the experimental group is formed naturally, it does not need to be random.

The non-equivalent control group design was chosen to empirically test the postulates of the substantive theories around autonomous learning. According to Campbell and Stanley (1973), this design consists of applying a pretest and a posttest to both an experimental group and a control group, both groups formed naturally.

The participants are integrated into two groups: the experimental group, made up of 14 fifth and sixth grade students; and the control group with 13 students. Both groups are similar with respect to the socioeconomic and cultural conditions of the localities where the two primary schools are located; each of these groups corresponds to a multi-grade primary school where three teachers serve students from the six school grades.

Autonomous learning is translated as the independent variable, which would be the cause or the influence that would affect the results in academic achievement, that is, in the dependent variable; allowing to control autonomous learning in students to know its effect on their academic achievement.

For the manipulation of the independent variable, a didactic intervention was designed that includes 42 sessions of 50 minutes each, in four large dimensions: skills to know how to learn, cognitive process, self-regulation and application of knowledge. The intervention was developed during the first trimester of the 2020-2021 school year, without affecting the natural course of curricular development. The contents and expected learning of the mathematics subject refer specifically to the use and handling of fractional numbers, in accordance with current study programs.

The technique for obtaining empirical information in the pretest and posttest was the goal test; It consists of two instruments, each with 29 multiple-choice items, with only one correct answer. For its elaboration, reagents that have been used in national evaluations of academic achievement in primary education were recovered and modified.

The instruments underwent expert judgment to guarantee their validity and piloting to calculate their reliability. In general, the evaluation of the expert judgment indicated that the reagents are adequate to measure what is established in the map of the instrument; they also mentioned pertinent changes that improved understanding of the issues and reduced confusion and ambiguity.

Once the changes suggested by the experts had been made, the instruments were piloted with fifth and sixth grade students. In the analysis of the results, statistical software was used to calculate the reliability of the pretest and posttest, obtaining a Cronbach's Alpha reliability index 80 in the pretest and 86 in the posttest. According to the literature, these values are considered adequate to proceed with the definitive application of the instruments.

In addition to reliability, the quality of the instruments that would be used as pre-test and post-test was analyzed with the piloting data, assessing the level of difficulty and the discrimination index.

According to the values obtained in the pretest, the average of the 29 items is 47, which

places the exam in general at the "medium difficult" level of difficulty. In the posttest, the average of the difficulty values of the 29 items is 0.48, which also places the exam in general at the "medium difficult" level of difficulty.

Regarding the discrimination index, according to the Classical Test Theory: in the pretest, most of the items (16 out of 29) have an "excellent" level of discrimination (values between 822 and 408); and in the posttest, most of the items (21 of 29) also have an "excellent" level of discrimination (values between 767 and 393). In both instruments, the "poor" items were reviewed, which had a lower contribution to the discrimination index.

CONCLUSIONS

The statistical analysis carried out for the description and interpretation of the research results was achieved by using the statistical package SPSS version 26.0, to answer the research question, achieve the goal and contrast the proposed hypothesis.

The question that guided the research is: What is the effect of the stimulation of autonomous learning, by the teacher, on the academic achievement in the subject of mathematics, of the fifth and sixth grade students of primary education? Given the statistical results, as a synthetic answer to the question, it is stated that: when implementing a didactic intervention with the purpose of developing autonomous learning in the students, the academic achievement of the fifth and sixth grade students of primary education, belonging to a multigrade school in a rural area close to the municipal seat, improves significantly.

The research goal was fulfilled. It was found that the development of autonomous learning, in this reality, has a significant effect on the academic achievement of students in the subject of mathematics (see table 1).

Given the statistical evidence, the hypothesis is not rejected. "*If the teacher develops autonomous learning in the students, then they will increase their academic achievement in the subject of mathematics*", because the results show a statistically significant difference between the experimental and control groups after applying the experimental intervention. It is concluded that if the teacher develops autonomous learning in the students, there is a significant increase in their academic achievement.

According to the results of the data analysis, it is stated that the fifth and sixth grade students of primary education developed autonomous learning skills with a positive effect on their academic achievement in the subject of mathematics.

Among the lessons learned from the research, there are areas that require further exploration, such as: the possible improvement of cognitive strategies to process knowledge, with emphasis on the efficient processing and classification of information; and the importance of complementing the process to process information, with count, elaboration and organization strategies.

From the experience of the implemented didactic strategy, the importance of the role of the teacher to prepare students in the development of their autonomous learning is recognized. Within the framework of the development of activities by the student to know how to learn, under the leadership of the teacher, the best results were obtained with the strategies to arouse the curiosity of the student; while the need to improve the strategies of order, experience and mental elaboration of ideas is noted.

The strategies with the best results used within the first dimension, skills to know how to learn, were those that stimulated the student's curiosity and materialized their ideas in problematic situations, based on their

Group	Dimensions of academic achievement	Pre-test		Post-test		Mean difference
		Arithmetic average	D Standard deviation	Arithmetic average	Standard deviation	
Experimental (GE)	Reading, writing and comparing natural numbers, fractions and decimals. Explanation of the comparison criteria.	7.8	4.4	14.4	6.7	**6.6**
	Solve problems that involve adding or subtracting fractions whose denominators are multiples of one another.	1.6	1.4	3.2	1.7	**1.6**
	Resolution of additive problems with natural numbers, decimals and fractions, varying the structure of the problems.	1.1	1.1	2.4	1.2	**1.3**
	Total	**8.6**	**4.2**	**16.6**	**6.7**	**8.0**
Control (GC)	Reading, writing and comparing natural numbers, fractions and decimals. Explanation of the comparison criteria.	9.6	4.7	7.5	2.9	**-2.2**
	Solve problems that involve adding or subtracting fractions whose denominators are multiples of one another.	2.0	1.8	.6	.6	**-1.4**
	Resolution of additive problems with natural numbers, decimals and fractions, varying the structure of the problems.	1.3	.9	.9	.9	**-0.4**
	Total	**10.9**	**4.9**	**7.1**	**2.5**	**-3.7**

Table 1. Differences of arithmetic mean in the pretest and posttest of the EG and GC.

suggestions, as part of the process of learning to think. Something similar happened with strategies to test hypotheses; the students realized that not all their ideas are wrong.

During the development of the dimension associated with the cognitive process, where the responsibility for learning is gradually transferred to the student, the strategies for classifying information were the most effective; On the other hand, the strategies that must be improved are those that are linked to the storage and long-term memorization of information.

The self-regulation strategies (third dimension) allowed us to anticipate good results in the development of autonomous learning; According to the theoretical contributions, it was assumed that by applying strategies that allowed the student to set their own learning goals, establish their own goals, design their own learning strategies and self-assess their achievements, it would be decisive to achieve autonomous learning. According to the results of the research, self-regulation strategies gave the expected results.

Regarding the fourth dimension, application of knowledge, the support strategies were the most effective during the work sessions, particularly those linked to the tutorial groups.

According to the research findings, it is stated that to develop successful autonomous learning there must be a balance in the control of activities between the teacher and the student; although the teacher must focus his guidance on the student setting goals according to her learning needs and not on actions that are easier for them to do, that is, that they propose challenges and recognize the need to overcome those challenges.

Autonomous learning favored the development in students of the expected skills: ability to control their cognitive process to learn by themselves, particular styles to learn, control their thought processes, identification of areas of opportunity and self-assessment of their achievements.

An important difficulty for the students was to understand a problematic situation related to mathematics, from real or imaginary actions that represented a meaning in their mind. Only one session was allocated to gain understanding of a real or imagined problem; Although the process was correct and the most outstanding students managed to achieve it, one or more sessions were missing to facilitate the formation of the mental structures of the problem in the students.

The strategies to process and classify information within the student's cognitive process were satisfactory. The students developed skills to discriminate information, use logic and deduction, reflect on possible results and more efficient processes.

Strategies based on collaborative work were expected to have a considerable positive effect on the development of students' ability to learn by themselves; however, the desired results were not obtained, with the exception of the tutoring groups, which made it possible to seek help from peers based on their skills and thus improve their own.

SUGGESTIONS

The results of this research allow its authors to suggest that the experience of the development of students' autonomous learning extends to other training fields of basic education and other grades of primary education, as well as to advance in the construction of pedagogical strategies to develop in students their autonomous learning and thus contribute to their comprehensive training.

A possible line of research is to explore the relationship between the student's socio-emotional skills and their autonomous learning process. In the process of this study,

although the student's state of mind, his availability to learn, or his emotions before learning were not considered, it was possible to notice the probability that there is an effect of socio-emotional skills on autonomous learning, or vice versa.

With the purpose of having complementary methodological approaches to experimental research, it is suggested to explore, from the qualitative approach of research, the sense and meaning that the development of their autonomous learning ability has for students.

Given the results obtained through the implementation of the didactic intervention to develop autonomous learning in the students, it is suggested to promote and disseminate the findings to put their application and possible contribution to the improvement of the educational practice of students for consideration by the educational authorities. school communities.

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