

# Soft Skills and Advantages for Learning Mathematics at an Early Age

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## Abstract

**Objective:** Conduct a detailed review of the soft skills contributions to early math learning. **Methodology:** A qualitative/interpretative method was applied that took as a technique the revision of documents for the extraction of contributions derived from research in the last 15 years. **Findings:** Soft skills should be fostered in all educational settings, because with the constant changes in educational and productive settings it is necessary to give the individual more resources for their integral development. **Application:** The soft skills apply to promote the learning of subjects such as mathematics, as they promote a dynamic interaction between the child and knowledge which can give results in the short, medium and long term.

**Keywords:** Childhood, Learning, Math, Soft skills

## 1. Introduction

Education must be aimed at forming integral people for an increasingly complex society, where technical skills and abilities are developed equally, to those that favour personal growth, ethics and values for life<sup>1</sup>. In this sense, the educational space is transformed into an environment in which, in addition to knowledge, a series of elements are acquired that will allow children to adapt socially to their environment and context. For this reason, the school must become one of the best experiences during childhood, making new friends and developing surrounded by their peers, will make it easier for the child to learn new things every day<sup>2</sup>. However, this is an arduous stage for the child, since it will be his or her first separation from the family home, representing an important challenge for the teacher, who must favour the creation of a positive image of the school so that the child can adapt adequately to the institution, in order to overcome the difficulties inherent in the adaptation process<sup>3</sup>.

In this way, the school must be an attractive place, where they can play, have fun, in addition, it will be the space where they will meet new friends and live new experiences, however, it will also become a place where conflicts are presented which they must stir by themselves and in some cases, by the lack of basic skills in the child cannot be overcome, in this sense, bullying and other *bullying* activities can be overcome with a healthy school coexistence that provides a harmonious climate in the school<sup>4</sup>. In addition to the dynamics of interpersonal relationships that occur in schools, teaching strategies are an element that can favor or hinder the acquisition of soft skills<sup>4</sup>. Conventional education systems are based on theoretical study, which is based on memorization and focuses on the evaluation of knowledge through written and oral tests in order to finally reach a qualification. However, the focus of education evolved towards learning, in other words, teachers are no longer the center of the process, but the learners<sup>5</sup>.

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Consequently, the dynamics and social complexity of the environment makes it necessary to develop integral educational processes in children and also in adolescents, with which they will have the tools to face the challenges and demands of the environment<sup>6</sup>. Thus, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has proposed that all forms of education be oriented on the basis of four major pillars of a true education: for life, learning to be, learning to learn, learning to do and learning to live together, from there arises the concept of life skills<sup>7</sup>.

In the real world, the demands go beyond the remembrance of facts, characters and dates, of the knowledge acquired, of the steps to follow for a result and of the knowledge, since to achieve success it is necessary to have developed and integrated social skills with the hard or technical skills to achieve excellence in doing, this is when the need to combine the concepts of life skills in educational programs is born. On the other hand, it is emphasized that the role of the teacher in this case is to provide teaching strategies that allow children to develop and strengthen social skills, so that they can internalize them and in turn, have an impact on their process of adaptation and learning in school<sup>8</sup>.

## 2. Methodology

For the development of the research that leads to this document, a qualitative profiling method was proposed, which will make it easier to observe, describe and reflect on the aspects related to the subject of study<sup>9</sup>. An interpretative approach was also chosen, since the general idea is to examine the aspects made known<sup>10</sup> by recent research in the field of education and, on the basis of these contributions, to make interpretations that lead to reflections on the subject. For the collection of information, a documentary matrix was designed with the following sections, among others: year of publication, contribution of the publication, environment of the publication and methodology used. For the web inspection, databases such as Scielo, Elsevier, Emerald, Springer and Scopus were used, using key words such as: education, childhood, and mathematics, learning and soft skills. The phases completed throughout the process are described in Figure 1.

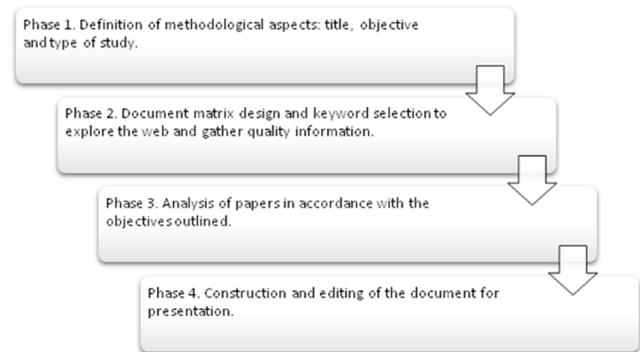


Figure 1. Phases of the investigation.

## 3. Results

Turning attention to learning problems, it is known that they occur frequently in schools, teachers constantly state that some of the students show behaviors different from those of the common, showing distraction, with low academic performance and characterized by low grades, even from pre-school levels, it should be noted that learning is a lifelong process, which integrates each of the individual's areas (cerebral, psychic, cognitive, social, among others) and is influenced by the environment, allowing the person to acquire new behaviors, adapt to the environment and survive<sup>11</sup>. This type of problem is usually identified by means of unexpected school failure, when children present characteristics such as difficulty in reading, writing, reasoning, concentrating, among many others<sup>12</sup>. For this reason, it is necessary to reinforce and develop personality elements, soft and hard skills, so that the child has a better academic performance and a better adaptation to the school classroom<sup>13,14</sup>. Figure 2 with the problem cited.

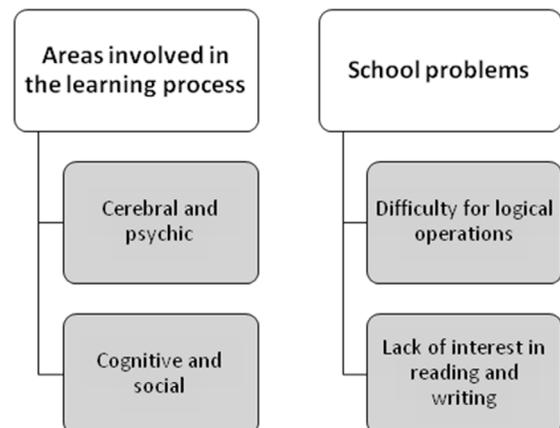


Figure 2. Learning problems.

Soft skills are learned and instruction begins in early childhood. Educators and counsellors talk about them by presenting them as a set of non-cognitive practices, which often take a variety of names<sup>15</sup>, such as assertive communication, adaptability and flexibility, proactivity, initiative or teamwork. Whatever their name, what is important is that they are essential factors for successful learning and development in all areas of life. The development of soft skills implies a long-term process and that is why they should be promoted from early childhood<sup>16</sup>.

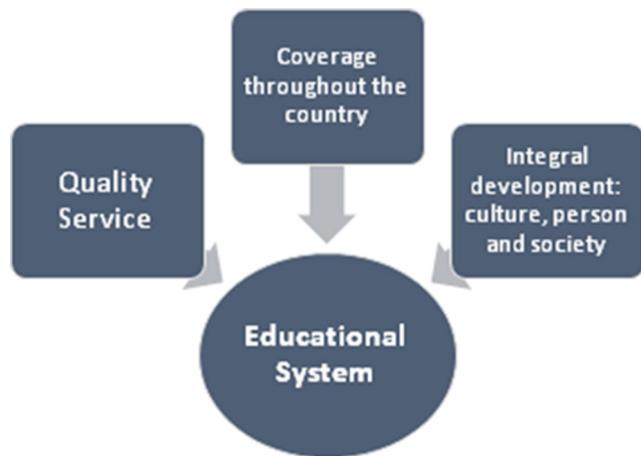
The contributions of applied cognitive neurosciences have made it possible to know that transcendental neurological processes are generated in childhood, which in an adequate and effectively stimulated manner allow the acquisition of skills, abilities and competencies for the achievement of self-regulation<sup>17</sup>. As for the role of teachers, they must start from the conception that students are active, so that their role is centered on elaborating and organizing didactic experiences that achieve these ends, not focusing on imparting exclusively content or taking a unique role in relation to the participation of their students<sup>18</sup>. The studies also show how key is the language of the teacher in the classroom, as a mechanism to guarantee a satisfactory learning process for students that delves into other aspects of teaching<sup>19</sup>.

The teacher should be concerned with the development, induction and teaching of soft and hard skills, cognitive and metacognitive strategies of students, that is, the teacher should allow students to experiment and reflect on topics defined or arising from the concerns of learners with continuous support and feedback<sup>20</sup>; in addition, the teacher should be deeply interested in promoting significant learning in their students not only in school content but in daily experiences, in which it is intended that these achieve comprehensive learning. Within the learning process, the teacher should be concerned not only with the contents to be taught, but also with the way in which he or she imparts, that is to say, how he or she is going to provide the information to the student.

Because of the importance of the child's adaptation to the educational environment and the role of the teacher and the acquisition of soft skills, it is necessary to identify the existence of obstacles that prevent the full development of these elements and to propose strategies that contribute to their promotion<sup>21</sup>. At present, schools try to include in their curricula activities that develop soft skills in their students, despite the fact that they contemplate the transversal development of this type of skills, how-

ever, there are no concrete proposals on how to work with them and what strategies are the most appropriate to do so. Likewise, the literature highlights the need to develop these life skills, beyond the numerical and analytical skills required in the current context<sup>22</sup>.

From a legal perspective, the development of soft skills can be related to what is established in the Political Constitution of Colombia in article 44, which establishes education and culture, among others, as a fundamental right of children. Based on this, Law 115/94 of Education exposes the importance of the development of social and emotional skills in children with a view to fostering critical and reflective capacity<sup>23</sup>, as shown in Figure 3.



**Figure 3.** Education Law 115/94 in Colombia.

Therefore, this research becomes relevant in the field of education since, as time goes by, soft skills in the world of work become stronger and stronger. However, these are not developed in adulthood, but can be strengthened from preschool even from home, traditional education or rather conservative, has focused its energies on the formation of those cognitive and procedural skills, but scarcely in the emotional control or development of attitudes and values, so it is of vital interest the development of transversal values to achieve knowledge, the big companies of the world put their eyes on professionals who have been able to develop their soft skills in parallel to their studies<sup>19</sup>.

The preeminence of this study is unavoidable, since neuro-pedagogical strategies have the capacity to develop soft competencies in children. This branch of knowledge allows any educational agent to know and understand how the brain learns or assimilates how to learn or assimilate the brain<sup>24</sup>, how to learn and how to handle the brain, how to handle the brain, and how to deal with the brain.

This branch of knowledge allows every educational agent to know and understand how the brain learns or assimilates how it processes information, how it controls emotions, feelings, behavioural states and how it is fragile in the face of certain stimuli, essential data for innovating pedagogical intervention within the classroom<sup>25</sup>. This research leaves the way open for future research within the programme and above all a basis for the formation of neuro-pedagogues, which must be directed towards a holistic and integral formation<sup>26</sup>.

By allowing teachers to understand the particularities of the nervous system and the brain and, at the same time, relate this knowledge to the behavior of their students<sup>27</sup>, their learning proposal, their attitude, the classroom environment, among other factors, can be the initial step in teacher education and training that will make a difference in the quality of education. For this reason, the importance of achieving a comprehensive understanding of certain elements of human brain functioning can represent tangible benefits and impact on the teaching and learning processes of children through the design of various teaching strategies to strengthen their brain hemispheres<sup>28</sup>.

The relevance of this study at the global level is framed within the imminent need in the field of education to deepen knowledge of soft skills and how teachers can exploit them from their area<sup>26</sup>. Recent studies show the importance of developing soft skills not only in students but also in faculty, beyond the belief that these are acquired naturally in personality<sup>27</sup>. On the other hand, labour market trends are increasingly demanding professionals with the ability to master soft skills, as well as techniques, and the importance of incorporating transversal chairs in students' training plans<sup>28</sup>.

### 3.1 Background Information

This research work addresses several theoretical aspects related to neuropedagogy and soft skills; we intend to make this thematic exploration from applied neurosciences and pedagogy. What is sought with these antecedents is to make a balance of those previous investigations to international, national and local level referring to the raised study, that are relevant to develop in a wide way this investigation. At the international level it is possible to find research such as that of this authors<sup>28</sup>, in a study carried out in Havana where they established the basic elements and principles of a strategy that contrib-

utes to the formation of soft skills in the first cycles of basic education; stating that soft skills constitute a high priority for contemporary employers and that these skills must be formed from an early age. It is evident the need to apply a new strategy that includes specific activities for the formation of transversal competences in primary school students, and this unquestionably implies the incorporation of informal education and the clear conceptualization of soft competences, any strategy that is applied must contemplate technological development, accompanied by the new learning strategies that the modern world imposes.

Among the publications in the field of emotional education are those by another author, founder and first director of the Group de Recerca en Orientació Psicopedagògica (GROP) and co-founder of the Fundació per a l'Educació Emocional (FEM) which stand out in literature as a reference on the subject. Among the most important are *La Psicopedagogía de las Emociones*<sup>29</sup>, *Educación emocional y bienestar*, *Educación per a la ciutadania y convivència*, *El enfoque de la educación emocional*, among others. The work emphasizes emotional education and competencies for life, as well as emphasizing emotional education in teacher training. In this sense, it constitutes an educational first that responds to social needs not met in ordinary academic subjects, whose purpose is the development of emotional competencies that contribute to a better personal and social well-being<sup>30,31</sup>.

According to these statements, the initial training of teachers should have a solid background in terms of emotions and, above all, emotional skills. This is for various reasons: as an essential aspect of the professional development of the teacher and by extension to enhance development in the student body. This allows us to better face the educational task in all its complexity.

Next, in Spain, the research *Skills for a Cognoscent World*, carried out by another author<sup>32</sup>, who proposes that the curriculum based on competencies that is currently being promoted with such emphasis is not a current trend; What is new is the idea brought about by the novel practical and theoretical scheme with which it is being supported, which tries to extract the best from the traditional approach to competencies, such as effectiveness, productivity that is not only quantifiable but also qualifiable, complemented by socializing and constructivist pedagogical currents, which also give importance to the development of the individual as a reflective and affective person. It is important in this scheme based on a curriculum by competencies to carry out pedagogical

components that accompany it coherently in its direction and fulfillment<sup>30</sup>.

Another important study was that of the International Commission on Education for the Twenty-first Century (chaired by Jacques Delors), which was published in 1996 on behalf of UNESCO under the title: *Learning: the Treasure Within*<sup>33</sup>. Among its objectives was the indispensable role of education as a tool for humankind to progress towards the ideals of peace, freedom and social justice. Lifelong education is based on four pillars: learning to know, learning to do, learning to live together, learning to be<sup>34</sup>. Education must be organized around four fundamental learning's that in the course of life will be for each person, in a certain sense, the pillars of knowledge: learning to know, that is, acquiring the instruments of understanding, each person seeks to learn to understand the world around him, at least sufficiently to live with dignity, develop his professional skills and communicate with others; learning to do, in order to be able to influence one's environment; learning to live together, to participate and cooperate with others in all human activities; finally, learning to be, a fundamental process that gathers elements from the previous three<sup>33</sup>.

In general, school education is essentially, if not exclusively, oriented towards learning to know and, to a lesser extent, learning to do. Well, the commission believes that, in any structured education system, each of these four *pillars of knowledge* must receive equivalent attention so that education is for the human being, as a person and as a member of society, a global experience that lasts a lifetime on the cognitive and practical levels<sup>34</sup>. In the United States, another author<sup>35</sup> demonstrated that cognitive skills alone cannot explain all variation in life outcomes, and that soft skills are also associated with benefits beyond education, including health, happiness, and social behavior. On the other hand, some longitudinal evidence from the United States suggests that the social benefits of pre-school tend to persist while the cognitive benefits tend to disappear over time<sup>34</sup>.

Continuing the exploration of research in the United States, there are programs that promote soft skills in early childhood, such as the *Tools of the Mind Model*<sup>36</sup>, which is applied in preschool and includes curricula and teacher training that helps children develop cognitive and socio-emotional skills through an integrated approach that includes planned play, reflection, and fundamental academic skills. In this sense, the study carried out by others authors<sup>37</sup>, stated that in order to have a successful future, the development of soft skills in the infancy stage

is fundamental; the early stimulation of these skills would generate success in areas such as work, affective and quality of life in general.

Some international experiences indicate that there is a growing interest in promoting soft skills, such as the *Promoting Alternative Thinking Strategies (PATHS)* initiative, which is a curriculum used primarily in the United States and Europe and in schools in Israel, Pakistan, Thailand, Hong Kong, Singapore and Australia<sup>38</sup>; it is a strategy to promote social-emotional skills and improve learning among pre-school and primary school students. The curriculum emphasizes skills such as self-control, interpersonal relationships, conflict resolution and self-esteem through integrated lessons with social studies and language two to three times a week for 20 to 30 minutes. In this way, students are taught to reflect on their feelings and appropriate responses. In turn, the *Knowledge is Power Program (KIPP)* is a network of semi-autonomous schools that helps students in underserved educational communities develop the knowledge, skills, character, and habits necessary to succeed in college and in the competitive world.

There is a great variety of soft skills programs in Latin America, however, most of these are aimed at young people between 16 and 29 years of age, in order to develop soft skills, provide them with training, internships<sup>30</sup>, and job search assistance, and very few early childhood pedagogical interventions are available, yet both others authors, determined that existing research on soft skills training programs generally shows promising results<sup>34</sup>.

International evidence seems to indicate that there is a mismatch between the curricular proposals of universities and the needs of the labor market<sup>28</sup>. In addition, it is estimated that a modern curriculum should offer training in labor qualifications and personal skills, since the labor world not only requires specific competencies, but also those generic or transversal, such as effective communication, leadership, teamwork, pro-activity, autonomy, decision making, and problem solving that, among others, are the attributes that positively determine individual performance<sup>29</sup>. At the national level, education in Colombia is understood as a necessary service for the development of the country, to which the Government has obligations in terms of coverage and quality, however, it offers a certain level of flexibility to educational institutions. The normative framework for education has been defined since the Constitution of 1991 and Law 115 of 1994. Traditionally, education in Colombia has focused on the contents of the

curriculum, neglecting a little the skill that are part of the sensitivity and the tools that the student will need for his work and personal life. In this sense, programmatic content is called hard skills, while soft skills are mostly related to emotion, motivation and values<sup>26</sup>.

Thus, the revised literature suggests that if we want to change the focus that has been given until now to the traditional classroom, especially for subjects as relevant to the life of every individual as are mathematics<sup>32</sup>, we must change the way of teaching, to promote that the student with the support of playful, emotional and didactic tools, can receive for all instances of life the necessary knowledge and thus develop remarkable skills in any of their fields<sup>27</sup>.

## 4. Conclusions

The global context goes through an unprecedented transformation, which demands, among other aspects, that individuals can be trained from an early age with the necessary tools to face all the vertiginous demands of today's environments. In this way, many questions arise about the learning of those key aspects that every person must adhere to achieve an integral development in his life. Thus, it is found that nowadays neuropedagogy theories suggest that the teaching of subjects such as mathematics can be given with greater hope of success, if aspects are incorporated that denote not only technical but also emotional aspects. To the extent that children from an early age can be stimulated to promote their learning, more competitive results can be achieved both for the individual and for society.

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