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## UNIVERSITY SOCIAL RESPONSIBILITY: BRINGING SCIENCE TO CHILDREN

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**Abstract:** Scientific spaces are fixed in universities and only a small population has access to it, which limits the basic level or leaves it outside the possibility of achieving it. However, international studies in education show that it is necessary to bring all levels closer to the scientific environment in order to promote, guide and stimulate new talents from a young age.

In this sense, in Mexico work with Aptitudes has been implemented since 1986, until 2006 when *the Intervention Proposal emerged: educational attention to students with outstanding abilities* (SEP 2006); This way, it becomes an imperative for basic education throughout the country.

In view of the above, the purpose of this work is to show that, by combining efforts, it is possible to achieve a meeting point and articulation between these two educational levels (basic and higher) in the state of Morelos, which allows opening the scientific panorama in students from an early age. Particularly, applying and taking advantage of the principles that govern the Autonomous University of the State of Morelos (UAEM), which literally has as features: social commitment, open to the world and generator of knowledge.

The experimental work was carried out in three parts: exploration, application of psychometric tests and intervention through extracurricular enrichment.

The results of this work made it possible to show that the approach of science to basic level populations positively strengthens the outstanding aptitudes of students and allowed us to see first-hand how these two historically distant levels can intertwine and nourish each other and thereby can improve the academic level of students at all levels in our country.

**Keywords:** Outstanding abilities, talents, childhood, university, extracurricular enrichment, Autonomous University of the State of Morelos.

## INTRODUCTION

Searching for a meeting point or articulation between higher education and basic education is not an issue that worries or occupies the different educational systems. Higher education has always been considered independent of basic education, which it looks askance at and unimportant. However, at the basic level there are the seeds that germinate at the higher level and generally arrive with little clarity of their aspirations, which is a result of the disconnection between the institutions whose approach could drastically improve student performance and in consequently reduce the dropout of students at higher level. Particularly, science has been established in higher level spaces, which limits the basic level, science is widely diversified as well as its environments, and in many cases basic level institutions are found in less favored areas or very far from the area. metropolitan, while the scientific spaces are located in centralized areas, additionally, the entry of students to these spaces requires the fulfillment of basic knowledge and sometimes they must pass evaluations designed by the receiving scientists, which is why students of the level basic they have few opportunities to achieve an approach to those spaces; On the other hand, basic level academic programs do not consider the scientific aspect relevant, excluding activities or topics related to it; They have maintained that science is the responsibility only of people with great abilities because it has been that way since the teaching history of our country.

However, it is time to begin to break those ideals that have not allowed the adequate promotion of the seeds that, when sown in the appropriate soil, will undoubtedly be fruitful in due course, which is why, at a global level, it has been detected that when applying Appropriate strategies are addressed from an early stage to new talents

who show outstanding aptitudes, and those who do not show this type of talent can be stimulated because they generally only require strengthening their skills with the appropriate teaching techniques in conjunction with the particular contributions of experts. In different scientific and dissemination topics. Countries that have applied the correct tools, as has happened in Spain, reveal the effectiveness of efforts at the basic and higher levels. Based on this evidence, this work aims to show that, by combining efforts, we can achieve a meeting point and articulation between these two educational levels. In Mexico, work with Outstanding Aptitudes has been implemented, the origin of which occurs in 1986 when the defunct General Directorate of Special Education (DGEE) designed the project to care for children with Outstanding Aptitudes and Capacities (CAS). In 2004, within the framework of the National Program to Strengthen Special Education and Educational Integration (PNFEEIE), at the national level, work with the child population that presents outstanding abilities was again proposed.

After piloting the research project, it emerged in 2006 *the Intervention Proposal: educational attention to students with outstanding aptitudes* (SEP 2006); Thus, attention to this population becomes an imperative for basic education throughout the country, since it has among its objectives: attention to the population that presents outstanding abilities. In this sense, the principles that govern the Autonomous University of the State of Morelos (UAEM), which literally has as features: social commitment, open to the world and generator of knowledge, can be articulated with the new demand for basic education. Both educational levels can work as a team to join forces by promoting, discovering and strengthening new students with outstanding skills, who can meet and receive support directly in university

spaces; bringing science and technology to schools, thus carrying out extracurricular, school or classroom enrichment.

That is why, in this work, a project was developed in which science was brought closer to the basic level using workshops where biologists, chemists, engineers, nutritionists and psychologists participated, whose tasks converged in transmitting complex knowledge in practice. For students, additionally, psychopedagogical instruments were implemented to categorize student profiles and make appropriate decisions regarding the link of science with the basic level.

## THEORETICAL REFERENCES

When talking about a fundamental right such as education, it is also necessary to rely on international treaties and agreements, which are intended to guarantee that these rights are respected in each of the countries that sign them. Thus, we see how in 1948 the United Nations (UN) recognized in the Universal Declaration of Human Rights, a set of rights considered essential to live with a minimum of well-being and security; These are: health, education, housing and work.

Likewise, in 1959 the UN approved the declaration of the Rights of the Child with 10 principles, among which it stands out that the child is a being that needs care before and after birth, equality, protection, etc., but the most interesting thing is that since then there has been talk of caring for the highest good of childhood; It will not be until 1989 that the Convention on the Rights of the Child is approved, which in its article 29, in section one, subsection a) points out the importance of developing the personality, attitudes and mental and physical capacity of the child to the maximum of their possibilities (UN 1989). In 2015, the Incheon Declaration aimed to guarantee inclusive, equitable, quality education and lifelong learning for all

within the framework of the achievement of the 2030 goals. In the 2030 action framework in its objective number IV focuses everything related to education, referring to it as quality education itself that will guarantee inclusive, equitable, quality education and promotes lifelong learning opportunities for all, without leaving anyone behind; In its goal 4.7, it states that by 2030 it is guaranteed that all students acquire the theoretical and practical knowledge necessary to promote sustainable development, among other things through education for development and the adoption of sustainable lifestyles (Agenda 2030, Goal Sustainable Development 4. UN 2015).

Mexico has signed all these agreements, therefore, the educational policy is qualified by them, in such a way that the New Mexican School, proposed by the current government, in addition to establishing a change in the third article, in which it is now talks about education: universal, inclusive, public, free and secular; It also establishes that no one can be left out and no one can be left behind; and in the modifications made to the General Education Law of September 30, 2019, article 41 is eliminated, which was dedicated to indicating how the regular school was obliged to receive and provide attention to students who had special educational needs; This law, as noted before, had significant reforms in relation to the issue of Inclusion, now there are nine articles that explicitly state the responsibility that schools have to attend to the diversity of students (7, 8, 9, 63, 64, 65, 66, 67 and 68), all referring to inclusive education and where the importance of providing attention to students with disabilities and those with outstanding abilities is prioritized (it is worth mentioning that to date no determined the validity or not of articles 63 to 68).

Regarding higher education, the UAEM university model (2022) is based on basic principles: oriented by critical humanism,

social commitment, generating knowledge and open to the world; principles that allow it to give meaning and fulfill its three substantive functions: teaching, research and dissemination of culture and extension of services. In this framework, it is observed that the conditions exist for the UAEM, a knowledge-generating institution, to facilitate and promote the production, application, dissemination and dissemination of scientific, technological, artistic and humanistic knowledge, and to share it with basic education students who present outstanding aptitudes and who in the future could join their different academic units. By considering it oriented by a critical humanism, the development of people in their professional, personal and civic dimensions, as well as their creativity and sensitivity, can be promoted. Social commitment indicates how the UAEM can serve various groups of the population that demand continuous training throughout life, including vulnerable groups and, strange as it may seem, students who present outstanding aptitudes in the intellectual area are part of this vulnerable group, for not receiving the attention they need. Finally, knowing that it is a university open to the world, it is clear that it will always be open to diversity and difference.

Likewise, in the Institutional Development Plan (PIDE) of the UAEM 2018-2023, the strategic axes are described, among which is the connection of its students with the public and private sectors and with society in general; as well as extending university services with the purpose of contributing to their professional training, achieving an impact on the transformation of society. From this objective we highlight two institutional policies: "Strengthen regionally the dissemination of culture, dissemination of science and technology; as well as the extension of UAEM services" and "Produce and disseminate actions by the university

community that promote social well-being; as well as citizen participation aimed at all social sectors.” This way, we can observe the social commitment that the university has with the community.

As mentioned before, work with Outstanding Aptitudes in the country has its origins in 1986 when the General Directorate of Special Education (DGEE) designed the project to care for children with Outstanding Aptitudes and Capacities (CAS). So, since the 1991-1992 school year, work with this child population began in Morelos by 5 Special Education teachers who were trained by DGEE personnel. In this first moment of attention, we worked with Joseph Renzulli’s Triadic Model of School Enrichment and Calvin Taylor’s Multiple Talents Model (Taylor, 1968). After three school cycles in 1994-1995, Special Education Services were reoriented throughout the country and the CAS Program became Regular Education Support Services Unit number 26 (USAER 26). The aforementioned USAER continued with the task of serving students with Outstanding Aptitudes in an independent and self-managed manner, since with the reorientation of services the CAS program had disappeared.

It will not be until 2004, within the framework of the National Program for Strengthening Special Education and Educational Integration (PNFEEIE), that at the national level, work with the child population that presents outstanding skills after piloting the research project is proposed again. In 2006, the Intervention Proposal emerged: educational attention to students with outstanding abilities (SEP 2006); Thus, attention to this population becomes an imperative for basic education throughout the country.

The “proposal” as it is commonly known, clearly states the theoretical foundation regarding giftedness, clarifying the four

models proposed by Monks and Mason: the capabilities model, performance-oriented models, cognitive models and sociocultural models.

The performance-oriented model was the one developed in the CAS Program (1991); The Proposal (Intervention Proposal: Educational attention to students with outstanding abilities 2006 mentioned above) is based on the Sociocultural Model, since it explains how giftedness develops from the interaction between individual factors and social factors.

Likewise, the following principles are considered: As human beings we have potential abilities; skills are dynamic; It is observed how intelligence alone is not enough; It is required that some skill be above average, that there are factors that indicate the disposition and interaction of environmental aspects. Outstanding abilities are developed as long as there is an adequate interaction between individual and social factors; no case of outstanding aptitude is similar to another; and, students with outstanding aptitudes may have specific educational needs (SEP 2006). Part of the theoretical foundation of the proposal is the determination of the types of aptitude, in such a way that we find the following five aptitudes:

- a) Intellectual, is the provision of a high level of cognitive resources for the acquisition and management of verbal, logical, numerical, spatial, figurative and other contents typical of intellectual tasks.
- b) Artistic is the provision of resources for the aesthetic expression and interpretation of ideas and feelings through different media, including dance, theater, plastic arts and music.
- c) Creative is the ability to produce a large number of ideas, different from each other and infrequent, which results in



the generation of original and innovative products as an appropriate response to the situations and problems posed by the environment.

d) Socio-affective, ability to establish appropriate relationships with others, based on the management and understanding of social content associated with feelings, interests, motivations and personal needs.

e) Motor is the ability to use the body in very different ways for expressive purposes and to achieve goals.

After determining the outstanding aptitude that the child may have, the challenge of offering a path to eliminate the barriers that the child may face is presented; It cannot be forgotten that intervention can occur at three levels: prevention, enrichment or correction, the latter being the most useful. In this case, for students with outstanding aptitudes, it is proposed to resort to enrichment, as it is a strategy that can contribute significantly to the identified students and to the school population in general; thus favoring the construction of an inclusive education, since by taking into account the aptitudes and differences of the students to plan the activities, their culture as an educational center will be transformed. In this case, enrichment can occur in three areas: school, classroom context and extracurricular.

The enrichment of the educational context is aimed at making it the educational center that makes the curriculum more flexible and diversified, thus responding to the characteristics of the students. This leads to proposing a different work within: greater dialogue, collaboration and participation of the teaching staff with their directors; closeness with parents and the institutions that are in their context; That is, begin to build an inclusive culture with the purpose of offering experiences aimed at promoting learning and

development of skills.

Classroom enrichment refers to the consideration that the teacher has towards strengthening the skills identified in his students, which leads him to make the pertinent adjustments in his planning.

Extracurricular enrichment refers to the way in which the educational process is strengthened thanks to the participation and cooperation of institutions outside the educational center that can offer programs that respond to the interests of the students and that, due to various situations, are not contemplated in the school programs.

## **MATERIALS AND METHODS**

The methodology of this work consisted of providing *extracurricular enrichment* to students with outstanding aptitudes in the intellectual area and dissemination of science in less favored communities in the state of Morelos as a means that allows them to have greater opportunities in their near future. The project is worked in collaboration with the Regular Education Support Services Units (USAER), units that are part of the Institute of Basic Education of the State of Morelos (IEBEM), the USAER is the technical-operational and administrative body to support the attention to students who face barriers to learning and social participation, specifically with disabilities and/or outstanding abilities. The methodological stages were divided into the following phases:

## **PHASE 1. EXPLORATION AND ANALYSIS OF OUTSTANDING APTITUDES**

Basic level teachers applied exploratory tests that allowed them to categorize students according to their performance, and subsequently the inventory was obtained to identify Outstanding Aptitudes. Based on this, interviews were carried out with the parents, as well as the application of a questionnaire to the students with the purpose of organizing data according to their categorization (special abilities or insertion in the strengthening program), and A report was made to determine actions in the following phases, qualified students moved to phase two, while those who did not pass were directed to extracurricular enrichment activities.

## **PHASE 2. PSYCHOPEDAGOGICAL EVALUATION**

WISC-IV tests were applied to determine their skill in cognitive abilities or neuropsychological functioning, which allowed screening and diagnosing the level of IQ. Students with aptitudes in the intellectual area were selected, and according to the proposal this aptitude was characterized by “the availability of a high level of cognitive resources for the acquisition and management of verbal, logical, numerical, spatial, figurative, and others, typical of intellectual tasks” based on the Intervention proposal: Educational attention to students with outstanding abilities 2006.

## **PHASE 3. IDENTIFICATION OF THE STRENGTH OF STUDENTS WITH OUTSTANDING APTITUDE PROFILE**

Students categorized as having Outstanding Aptitude were administered tests to identify the contexts in which they perform best, as well as the detection of those disciplines or areas that are not their strength.

All students indifferently underwent activities such as extracurricular enrichment, the implementation of which was divided into two parts:

### **STAYS IN UNIVERSITY FACILITIES**

The intervention with students with outstanding aptitudes is carried out through *extracurricular enrichment*, for this, based on knowing their interests and strong areas, with the participation of different researchers, a plan for the development of experimental skills is implemented based on the method scientist to serve students from different school zones in university facilities such as the different laboratories.

### **WORKSHOPS IN PUBLIC SCHOOLS**

With the purpose of providing attention to all the diversity of students and disseminating science to those marginalized communities in our state, *school enrichment* is carried out, for which *on-site* visits were made to primary schools to give workshops, talks, demonstrations and experiments. This made it possible to provide a greater approach to science and to come into direct contact with researchers and science disseminators who design learning strategies in a playful and interesting way.

## **DISCUSSION OF RESULTS**

### **IDENTIFICATION OF STUDENTS WITH OUTSTANDING APTITUDES (AS)**

The detection process is initiated by the group teachers with the support of the teacher from the Regular Education Support Unit (USAER), certain activities are carried out that allow us to know the skills that the child may possess in any of the five categories. referred, as a second step a questionnaire is applied to the parents and with all the

information collected it is determined if the student is a candidate to be evaluated; This is how, through the USAER psychologists who are in primary and secondary schools in the state, the analysis is carried out to detect students with outstanding aptitudes in the intellectual area. For the 2021-2022 school year, 326 students with AS were detected in primary and secondary schools, of which 92 correspond to the intellectual area.

### STAYS IN UNIVERSITY FACILITIES

From 2017 to date, we have worked with students who present AS belonging to primary and secondary schools (from first to sixth grade of primary school and the three grades of secondary school) in the state of Morelos in small groups and, where appropriate, personalized in laboratories and cubicles of the UAEM. Prior to the diagnostic evaluation, an experimental science work plan (physics, chemistry and biology) was designed for the development of critical thinking skills based on the scientific method to provide tools that are not accessible at the basic level.

The work carried out was multidisciplinary, involving biologists, chemists, nutritionists and psychologists, with gratifying results, from the testimonies of the children, parents and teachers. At the end of each stay, closing sessions were held (image 1) where the children presented some of the work they had completed in front of their parents and teachers; Recognitions were given to the children, their parents and the university community that supported them during these stays, as was the case with the workshop: "A day without insects."



*Image 1.* Student observing for the first time under a microscope.

### WORKSHOPS IN PUBLIC SCHOOLS

In this phase of the project, talks, workshops and experiments were designed that were attractive to students so that scientific topics could be addressed in a different way. Among the workshops taught in each of the schools were: Making telescopes, Use of microscopes, Ecology, Rabbit farming, Making gel and Making shampoo (images 2a and 2b).

Among the results obtained, it can be highlighted that basic level students broke the barrier between observers and participants that allowed them to develop experimental skills; Most importantly, the seed was sown for the development of critical and scientific thinking and they had exciting experiences. Another result derived from the students' interactions with the experiments they developed is that more students with AS who had not been previously detected could be identified and this may be because they had not had the opportunity to interact with instruments or substances that would allow them to manifest their capacity (remember that the capacity and/or ability can be counted on, but if there is no context or opportunity to manifest them, they will remain hidden even from the person themselves). The above opens the way for us to perceive how extracurricular enrichment breaks down barriers that, sometimes, are generated in a confined space within the classroom.





Image 2. a) Teaching the workshop on the use of microscopes b) Teaching the gel preparation workshop.

Therefore, the link between university and society, meeting the needs of different sectors, is a reality today. This has been achieved thanks to the multidisciplinary and altruistic work of university students and academics; as well as the link between the university and different institutions and the sum of wills to contribute to the social well-being of our state.

## CONCLUSIONS

The link between university and society (in this case with basic education in the state of Morelos), addressing the needs of the different sectors, is possible as long as there is clarity in which point(s) at which they can converge, there is willingness and interest on both sides and there is also systematic monitoring that allows evaluating the results of the project in question.

As a result of the generation of extracurricular enrichment spaces, to work with students who have already detected outstanding aptitudes, specific talents were discovered that on many occasions are not detected in their regular group, since, since the children are in such large groups, they are not It has time for its analysis, and it is precisely in a different space, with researchers, laboratories and different teaching-learning strategies where children can show and develop what their true interests are.

The university work carried out to provide attention to basic level students with

outstanding aptitudes has benefited both the basic level and the university, as it has made it clear that academics and researchers can work together to design work plans that benefit to the child population, it is a process of sensitization since they must adapt the conceptual part to the level of these students.

As for the university students who have been part of the academic staff, interest, commitment and discipline are observed, traits that are not always noticed in the classrooms, a situation similar to that of children and in the development of the different projects they are observed satisfied with their work of disseminating knowledge (some up to that point value their knowledge); Adhering to this work greatly encourages their comprehensive training since they are involved in such a way that without explicitly realizing it they are developing as professionals and sensitive citizens, with the ability to respond to the needs of our environment.

In relation to university policies, these activities allow compliance with the established goals regarding social commitment, linkage and dissemination of science. Beyond a university policy, it is the presence of the UAEM in the state as a retribution to society itself, it is the possibility that the population has of benefiting from the accumulation of knowledge and facilities by having an institution like the UAEM

The students with outstanding aptitudes served have had the opportunity to be at a university many years before the majority of the population, a situation that places them in a privileged situation, since this opportunity is not the same for everyone.

Adding the attention of students with AS, with the dissemination of science *in situ* in schools (extracurricular enrichment), increases the probability that students reach university, thus achieving cultural enrichment and a better quality of life.

Stepping onto the ground of a university for many may be something natural or even something you will be forced to do; However, it is not a reality for the majority of the population; Only a low percentage of

students manages to arrive, so projects like the present one open horizons by linking the needs of basic education with the scientific, technological and humanistic knowledge that the university generates.

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