



INTERNATIONAL WORKSHOP ON SCIENCE EDUCATION FOR CHILDREN WITH DISABILITIES AND SPECIAL NEEDS

“Inquiry Based Science Education Program as a
Strategy to Enhance Cognitive Development in
Students with Disabilities and Special Needs in
Mexico”



INNOVEC
Innovación en la Enseñanza de la Ciencia



GOBIERNO DEL
ESTADO DE VERACRUZ



SEV
SECRETARÍA DE EDUCACIÓN
DE VERACRUZ



CEVIC
Colectivos para la Enseñanza Vivencial
e Indagatorio de la Ciencia en Zacatecas

Background



- Formal practices to attend people with special education requirements were started in Mexico in the 19th century, with the creation of the National School for Deaf People and The National School for Blind People, in 1867.
- In 1942, as a result the Education Law Reform, the School for Special Education Teachers' Training was created.
- In 1945, new academic programs for Special Teaching for Blind and Deaf Persons were added. At the same time, schools in various parts of the Republic were created, which attended a greater number of children and young people with disabilities.

Background

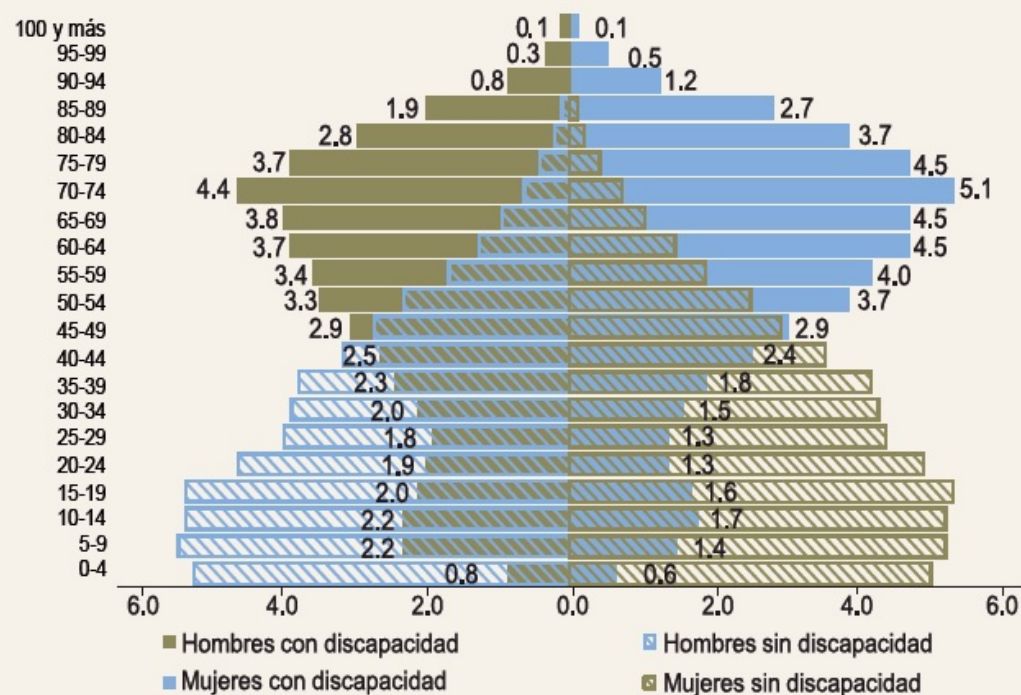
- In 1993, the General Education Law, in its 4th chapter, 41st article, recognized the obligation of the State to attend to persons with disabilities, ensuring their integration into basic education campuses. It also includes guidance to parents and staff of regular schools.
- In March 1997, the National Conference on Education for Children with Special Educational Needs: Fairness for Diversity, was carried out in Huatulco, Mexico.
- The conference defined the criteria to select basic education requirements of flexibility, relevance and equity for educational care for people with special educational needs, with or without disability; and define proposals and recommendations to the attention of special educational needs within the framework of the diversity of the Basic Education in Mexico.

Population & disability in Mexico

- According to the results of the Population and Housing Census 2010 in its expanded questionnaire, 5 million 739 thousand Mexican people declared to have difficulties to perform at least one of the seven assessed activities: walking, move, go up or down; see, even using lenses; talk, communicate or have a talk; hear, even using hearing aids; dressing, bathing or eating (who need personal care); pay attention or learn simple things (pay attention or learning); mental limitation (INEGI, 2011).
- That represents 5.1% of the total population of the country.

Disability in Mexican Population

Estructura de la población por sexo y condición de discapacidad según grupo quinquenal de edad, 2010



Nota: No se grafica el no especificado de edad para cada sexo; alrededor de 0.1 por ciento.
Fuente: INEGI. Censo de Población y Vivienda 2010. Base de datos de la muestra.

Disabilities in each age group

- Seniors are those with the largest number of people with difficulties: around 26 per each 100.
- There are about 5 people with disabilities by each 100 adults; in young people there are 2 of every 100, and there are 1.6 children of every 100.



INNOVEC and IBSE Program

- Innovation in Science Education (INNOVEC) was established in Mexico in order to provide the mechanisms to promote research, innovation and the development of strategies to improve science teaching in basic education, through an inquiry- based science education approach.



INNOVEC and IBSE Program

Its main objectives are:

- Promote and facilitate the implementation of the Inquire-Based Science Education Systems (IBSE) and collaborate with authorities, institutions, specialized agencies and professional groups on innovative programs in science and technology teaching.
- Promote and support local infrastructure through the creation of Resource Centers for the Science Teaching (CRECI) that allow the adequate implementation of SEVIC projects in regional contexts.
- Carry out professional development of teachers, managers, operations teams and other professionals who work with the SEVIC.
- Carry out projects of educational research related to science teaching.
- Undertake systematic evaluations of the SEVIC and determine the challenges for its implementation in the national context.
- Organize and conduct seminars, conferences and workshops on topics related to science teaching in basic education, in order to promote share experiences and best practices.

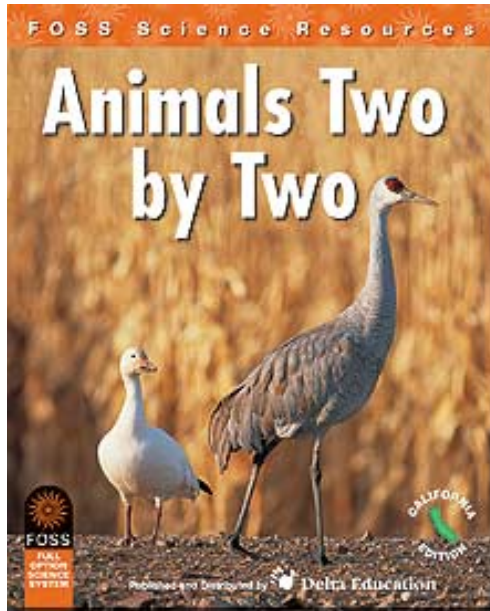
INNOVEC and IBSE Program

- In order to achieve its objectives, INNOVEC has established strategic alliances, both with the Smithsonian Science Education Center (known before as the National Science Resources Center) of the United States of America, and with the French program La Main to the Pate.
- The National Science Resources Center (NSRC) of The United States of America developed the program Science and Technology Concepts (STC) since 1985
- INNOVEC translated and adapted the modules of the STC program to the Mexican context in order to use them in the classrooms Mexico, with the support of the Mexican Ministry of Education, governments of the States and their Education Departments, as well as various private foundations and companies.
- Currently, the program attends close to 430 thousand students and 9 thousand teachers in each scholar year. Most of the coverage of the program is focused on regular primary schools.

Inquiry-Based Science Education Systems Applied Program (PASEVIC) in Veracruz.

- For the achievement of its objectives, INNOVEC establishes local partnerships with the governments of the States through their Education Departments.
- In the case of the State of Veracruz, the Government of the State and INNOVEC have been collaborating, since 2006. This collaboration has resulted in the creation of the PASEVIC program in 2007, with the purpose of "Strengthening the school community through the implementation of the SEVIC program favoring the domain of scientific content in the plans and curricula of basic education"

The SEVIC program in Special Education Schools



- Thanks to the interest of a group of educational advisors from the Directorate General of Special Education of the State of Veracruz who were involved in the year 2007 in the training of teachers in the module "Animals Two by Two" (developed by Delta Education, University of California) it was possible to initiate and to adapt the work the contents of that module for special education.

The purpose of the Inquiry Based Science Education Program for Special Education

To provide educational services and job training to students with severe, multiple disabilities or pervasive developmental disorders to whom may require reasonable accommodation in order to reduce barriers to their learning and participation in family, school, work and social contexts for meeting basic learning needs and skills development to enable the autonomous social and productive coexistence and improve their quality of life.



The purpose of the Inquiry Based Science Education Program for special education



- Sort observed data.
- Use specific tools
- Collect, analyze data and make records.
- Develop scientific attitudes.
- Understand the application of science in their lives and in their societies.
- Enjoy the learning processes of science.

IBSE for SEE learning Cycle

- **Promoting Interest:** Behold strategies that encourage curiosity and interest of students to the topics addressed, with the intention to focus on prior knowledge and contextualize children for subsequent strategies.
- **Observe and perceive:** At this time students can experience through their senses, those experiences will enable them to know themselves and the living beings they observe (possibility of movement, basic concepts of space, shape and size) while they develop thinking and daily living skills.
- **Translating what is learned:** This is the time that children, as they are able, may express their learning, using their body language, gestures, oral and graphic-plastic etc.
- **New words:** Consists of reinforcing the vocabulary used throughout the activity and it is considered as the closing activity.

IBSE program for Special Education as a whole aim that students:

- Develop their curiosity and interest through a self-observation and contact with living beings.
- Look and express the characteristics of living things and themselves by interacting with them.
- Relate and compare through imitating the behavior of living beings and of themselves.
- Express your observations and experiences through different means.
- Reaffirm everyday vocabulary and learn new words related to living things with which they interact.
- They realize they and other living creatures require care and feeding.
- Handled properly living things based on their care and feeding.

The module pilot test: First Stage (2008-2009)

- In the first stage the activities of the teacher's guide unit "Animals Two by Two" were developed by the teachers as they were structured for preschool level. This was done during the school year 2007-2008 in pilot Multiple Care Centres (CAM) in the municipalities of Xalapa, Coatepec and Banderilla.
- During the adaptation process the changes made in each activity were registered. To do that, teachers previously participated in a training workshop of 16 hours length.
- Material support was provided to perform the activities (living beings and other supplies).

Achievements & Challenges

Achievements of the first stage:

- A detailed monitoring process was performed and the changes to the activities were recorded in the classroom for an adaptation to the activities originally proposed in fish, snails, worms and woodlice.
- As an example: One of the adjustments was to develop mechanisms for the gradual approach of students with some of the animals such as earthworms where some of the teachers suggested using at first "spaghetti" with red dye to gradually familiarize students with the texture, consistency, and student behavior. All suggestions were evaluated and those that were relevant were incorporated into the guide.

Challenges of the first stage:

- Keep living organisms in optimal conditions during the school year and planning appropriate habitats to ensure their survival.

Second Stage (2009-2011)



- Activities to the level of special education were adapted throughout the state of Veracruz.
- Parents were actively involved.
- New adaptations to meet the needs of a heterogeneous population, in relation to the structure, teaching sequences, materials, space and furnishings were made.
- Developing the skills of pupils at the end of each teaching unit and end of each school year was assessed.

Achievements & Challenges



In teachers and parents:

- Collaborative work and peer communication was strengthened.
- A teacher responsible for activities within the school for each school year is designated.
- There was evidence of increased sensitivity to the importance of interaction, care, respect and conservation of living things and the environment.

Achievements & Challenges



In students:

- The development of individual skills in conceptual terms, communication and interaction was observed.
- The development and practice of values such as cooperation, tolerance, solidarity, respect and teamwork was observed.
- The development of socio-adaptive skills in some of the students (social norms, respect for shifts, integration and coexistence) was recorded.
- Materials teaching resources and activities were interesting for students who reacted favorably to the stimuli and sensory perceptions.

Challenges during the second stage:

- Responding to the interests of students to interact with other living beings during the didactic sequences (rabbits, lizards, dogs, chickens, turtles, mice, crickets, etc.).
- Need to link with community authorities at the municipal or state level to disseminate the results of the program and manage more support for schools.



Third stage (2011-2013)

- Knowledge and exploration of other living beings according to student interest (turtles, puppies and crickets) is incorporated.
- School planning group is performed. The use of information technology and communication (ICT) is incorporated.
- Field visits were conducted with students to parks, botanical gardens and social centers facilitating greater interaction between them, the environment and the family.



Achievements during the third stage of implementation

For teachers and parents:

- A system of evaluation and monitoring of learning through questioning was performed with students during the opening and closing sessions.
- Activities among teachers group were evaluated to assess the functionality of the materials, the degree of difficulty performing activities or exercises to analyze the variations suggested by teachers in activities (recreational, physical, tables, etc.). Their proposals were considered to improve the sessions.
- Portfolios of evidence were gathered incorporating student's work and photographs.
- Parents participated and were supportive in artistic activities and afterschool activities. This favored greater contact and interaction between teachers, students and parents.

Achievements during the third stage of implementation



In Students:

- The program favored socialization, interaction, and social integration of students with family and school teachers were observed.
- Attention, memory, logical reasoning, perception, visual and auditory discrimination and cognitive processes were strengthened.
- As well as conceptual skills, space-time location, sorting, counting, fine and gross motor skills, directionality, partnership, pairing.

The IBSE program in SEES during the current scholar year (2013-2014)

- In this school year the program has a second version of the module which incorporated the suggested proposals; the module also incorporated a new lesson on crickets and grasshoppers that was developed in collaboration with the Institute of Ecology AC.
- Zacatecas State through Its “CEVIC” Program is also using the SEVIC units for Special Education Program in CAM.
- The results seems to be the same that those gotten in Veracruz.
- We are paying attention to the new inputs derived from the context and local experiences.

Lessons learned during the process

For the Students:

- Students are easily engaged with living organisms, they arouse curiosity and learn to manipulate them; they are interested in their structure and behavior.
- The sensory stimuli that living organisms provide to students have been important to provoke motor reactions, expressions of enjoyment, disgust, or happiness among students.
- Some students have significant changes from their motor, hygiene and school liking.
- They have become more observant and now their children pay more attention and care for the living beings around

Lessons learned during the process

For teachers and educators:

- ❑ Teachers have noted that it is possible to do science in this type of education and have changed their original misconceptions about it.
- ❑ Teachers have reinforced the use of information technologies as an effective way to capture the interest and attention of students.
- ❑ Teachers and educators collaborate in working groups to analyze problems and suggest improvements and strategies to more effectively adapt activities for their students.

Lessons learned during the process



Regarding parents:

- They have become more involved in the behavior and progress of their children, they notice more carefully about their children's interests and achievements.
- They have been involved in more engaged in the activities that their children have in school.

Main challenges still present

- Getting closer to animals by educators has not been an easy process since many of them have still many prejudices about the safety of the organisms and their behavior.
- We need to systematize and monitor the concrete achievements and impact of science education through the time with each disability and condition.
- More support is needed for taking care and maintain the living organisms in schools because teachers are often themselves responsible for taking care of them.

Activities and challenges ahead

- ❑ We need diversification in the lessons for students who's age is beyond the average some activities are proposed for small students and they seems "too simple" particularly in the case of students with Down syndrome.
- ❑ It is necessary to promote the exchange of experiences and create an educational community that shares a common vision for this type of education.
- ❑ We need to know other successful experiences in other contexts to consolidate a national proposal for greater reach and impact mode for special education in the country.