ACCADEMIA MEDICA DI ROMA

A HEALTH SCIENCE EDUCATION PROGRAMME

IN PRIMARY SCHOOL

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Rome, May 2015

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The participant school: *Comprehensive School Luigi Settembrini, Rome*.
The headmaster: Massimo La Rocca; the teachers: Paola Cherubini, Roberta Corvi, Grazia Cossu, Elena Feliziani, Maria Eleonora Medici, Annarita Pierini, Francesca Scrivo, Grazia Zimbalatti; the coordinators: Angelo Matrone, Claudia Regazzini.

The cover drawing is by Iv, a pupil of class IA (via Asmara school).

PREFACE

The ideas underlying this initiative are absolutely elementary. Firstly, through a targeted educational project, to contribute to the long-term prevention of chronic pathologies which have common risk factors such as incorrect diet, lack of physical activity, abuse of alcohol, smoking. Recent data from the World Health Organisation show that 86% of deaths and 75% of health costs in Italy, as it is in Europe, are caused by chronic pathologies which are the result of incorrect life styles.

Secondly, to target this educational activity at primary school children, because the fundamental elements of education are established at an early age, and because life styles are primarily determined in childhood and adolescence.

Thirdly, to introduce the children to a teaching method based on two principles: an inductive approach and the active participation in the learning process, a method that is considered to favour the re-elaboration of acquired knowledge in a structured and long-lasting form.

Assembling such a project involved a well-experienced and enthusiastic team of experts covering a wide variety of disciplines, as well as the collaboration of primary school teachers equally enthusiastic and willing to collaborate in the project.

Most incredibly, this improbable mix was put together and I am deeply grateful to the experts of the Gruppo Sciesa and the teachers of the Istituto Comprensivo Luigi Settembrini in Rome.

The most heartfelt thanks also go to the Fondazione Roma-Terzo Settore for financially supporting this initiative.

Mario Stefanini
President, Accademia Medica di Roma
Rome, October 2014

INTRODUCTION

A five-year project was conceived in 2013 as an initiative of the Accademia Medica di Roma and was funded for its first year of activity by the Fondazione Roma – Terzo Settore. The project aim was to test the effectiveness and feasibility of the educational programme "Health Sciences (*SCIEnze della SAlute* - Progetto SCIESA) in primary schools".

Underlying this initiative is an epidemiological analysis showing that, with the increasing age of the Italian population, there is a corresponding increase in chronic and degenerative pathologies. Consequently, there is an evident need to promote and support initiatives of primary prevention having the final aim to oppose the diffusion of widespread and serious risk factors for such pathologies.

The generally accepted key element in disease prevention activity is represented by healthy practices training in schools, the right place for training and the ideal institution by vocation to undertake initiatives of this kind.

It should be noted, however, that most teaching programmes of health practices in schools have limited effectiveness and do not usually have lasting effects, as they are generally organised in a sporadic and fragmented manner. Furthermore, the pupils are generally lacking the basic information needed to understand the educational content, which should be based on scientific evidence rather than on rules or precepts having no rational justification.

Thus, a drastic change in the way health education is taught in primary school is consider necessary: from the teaching of healthy practices to an evidence-based health science education based on the understanding of the general conformation of the human body and its fundamental regulatory processes. Such a systematic approach would eventually bring the child to become more receptive of healthy practices programmes aimed at promoting "health awareness" and correct lifestyles, leading to disease prevention. Given that lifestyles begin to be established at childhood, it is evident that educational activities in health sciences should consequently start at an early age. The aim of these activities should be to create awareness — even at an elementary level — of the structural and functional organisation of the human body, and of the health risks that can be prevented.

With this objective in mind, primary level school children seem to be the ideal target, in that the foundations of knowledge are set down in infancy; furthermore, compulsory schooling means that all children can be reached and, finally, it offers the opportunity to involve the families in the educational process.

Based on these considerations, the Accademia Medica di Roma not only promoted the "Progetto SCIESA" but also participated in its implementation in an experimental format at the Istituto Comprensivo Luigi Settembrini primary school in Rome.

This experimental programme — made possible by co-financing from the Fondazione Roma and the invaluable collaboration of the scholastic authorities (the Regional Superintendency and headmaster of the Istituto Settembrini) — began during the school year 2013-2014 in four first year primary school classes in two different centres (Via Asmara and Via Novara), both part of the Istituto Comprensivo Settembrini. For the next four years, this experimental programme will continue with the same group of children, until they finish their 5-year primary school cycle.

It may be of use to give some general information concerning the first year of the SCIESA project.

a. The planning phase of the activities, teachers training and monitoring of class activities was undertaken by the SCIESA working group directed by Mario Stefanini (physician, biologist, President of the Accademia Medica di Roma), which included Antonio Cappelli (physician, epidemiologist), Silvia Caravita (biologist, expert in scientific education), Barbara Muciaccia (biologist, teacher), Flavia Capozzi (physician, child neuropsychiatrist), Gregorio Siracusa (physician, anatomo-physiologist).
b. The teaching activity in class was run by the regular school staff, specifically: Maria Grazia Zimbalatti, Eleonora Medici (Via Novara IA), Francesca Scrivo, Paola Cherubini and Elena Feliziani (Via Novara IB), Roberta Corvi (Via Asmara IA), Annarita Pierini and Grazia Cossu (Via Asmara IB). Teachers Claudia Regazzini and Angelo Matrone coordinated the activities in the Via Asmara and Via Novara centres, respectively.
c. The in-class educational activities started in October 2013 and continued until the end of May 2014. The number of children involved in the programme in each class and the number of sessions (of variable duration from 1½ to 2 hours) for each teaching module can be seen in the following table.

Table 2. Number of children and number of teaching sessions

		Via Novara		Via Asmara	
		IA	IB	IA	IB
Number of children per class		24	24	14	14
Teaching sessions	Module 1	10	7	10	7
	Module 2	7	10	11	4
	Module 3	10	16	13	6
	Total	27	33	34	17

As can be seen from the above Table, 76 children were involved in the project. The variability in the number of teaching sessions (and therefore, in teaching hours) in the different classes depended on various factors such as the teaching method of the teachers, the children's social origin and knowledge of the Italian language and, above all, the availability of co-teachers for the modules.

THE PROJECT

A. Summary and general outline

Promotion of healthy behaviours is generally considered as one of the essential components of primary prevention. Initiatives aimed at encouraging healthy behaviours (health education programs) are currently being carried out in the Italian compulsory school as recommendations and guidelines. Such approach, however, has proved to be of limited effectiveness since at this school level the children lack the scientific knowledge required to understand and share the educational message. Health education programmes need to be supported by a systematic training in the field of health sciences, aimed at making the child/adolescent aware of the structural and functional organization of the body and the nature of preventable health risks. Compulsory school at the primary level represents a very important opportunity for intervention because it allows entire age segments to benefit from such activities. The present project aim is evaluate whether a health sciences education programme can be successfully implemented during the first cycle of compulsory school. It should allow the children to knowingly acquire at an early age correct and healthy lifestyles that may help them preventing or reducing the insurgence of diseases and disabilities. Specifically, training will be based on two basic strategies: inductive method and interactive teaching. This involves active participation of the pupil during the training process, the use of evidence-based scientific method, a teaching approach based on the pupil daily experiences, the collaboration of the families during all of the program activities, a very early start (beginning with the first year of the cycle). In this line a pilot study is being run in Rome under the auspices of the Accademia Nazionale dei Lincei and the Accademia Medica di Roma and the financial support for the year 2013 of Fondazione Roma Terzo Settore, Rome Italy, with the collaboration of the Ufficio Regionale Scolastico del Lazio (URS Lazio). Four first grade classrooms of the Luigi Settembrini Elementary School located in Rome have been involved in the pilot study that began on January 2013. Knowledge to be shared, in accordance with the learning ability for the various elementary grades, was to cover basic elements of the human body morphology and physiology, with the aim to allow the schoolchild to become indirectly aware of the most important and common health risk factors for different age groups and to establish healthy

lifestyles, and thus to avoid developing health risk behaviours in childhood and adult life.

The education programme is due to last five years and is going to be carried out in *three phases* according to the following outline.

First phase

(Reading the 'book of nature', the form and functions of the human body)

Pupils in their first and second year of compulsory school are going to be involved during the first phase. It is designed to introduce them to guided observations aiming to make them aware of the human body structure and various functions through "direct observation" *(perceptible anatomy)* at an elementary, but scientifically accurate level. The class work in this phase is based on the use of specific topic-related questions, to be addressed by means of evidence-based arguments.

The first stage of the programme has the following scheme:

First year

- People and their environment (the importance of the interrelationships between the individual and the environment, and among individuals).
- Movement (perceptible anatomy and physiology of the muscle-skeletal apparatus).
- Breathing (perceptible anatomy and physiology of the respiratory system).
- Nutrition (perceptible anatomy and physiology of the digestive system: what gets in and what gets out).
- Teachers will call upon the child's attention to the interconnections among bodily functions whenever appropriate, in order to foster the concept of body as an organism.

Second year

- Blood circulation and transportation of substances - what gets in and what gets out (perceptible anatomy and physiology of the cardiovascular system).
- The relationship with the world outside (perceptible anatomy and physiology of the nervous system and the sense organs).

- The elimination of bodily waste (perceptible anatomy and physiology of the excretory system)

NB – When possible and useful, reference is to be made to the process of body growth and to the cell as the smallest living structure that forms the body of animals, humans included.

Second phase

(Learning through an experimental approach the fundamentals of anatomy and physiology)

In the second phase (third and fourth year), the programme will further develop previously treated topics, taking advantage of the knowledge, the ability to observe and the learning by playing that the child has acquired during the first two years. To the awareness acquired from the hands-on experiences, additional knowledge will be added through the implementation of simple in-class experiments, together with simple scientific explanations. Teaching will include, when required, audio-visual media, drama etc.

The teaching method will be evidence-based and, for each topic, it will refer to personal experiences, direct or indirect, and to the development of hypotheses and arguments strictly adherent to the criteria of rational evidence.

The general outline of the training program planned for this phase is described below.

Third year

- The cell (the morpho-functional unit of living organisms).
- How the body is structured (muscle-skeletal system).
- How food travels (digestive system).
- How blood travels (respiratory and cardiovascular systems).
- How the body grows (endocrine system).

Fourth year

- How a child is born (the reproductive system).

- The defence mechanisms (general information about the immune system).
- The nervous system and sense organs.

Third phase

(Risk factors to health and how to tackle them)

The third phase of the programme (fifth year), that is going to conclude the course, is focused on making the pupils aware of risk factors and behaviours, an information that is generally considered as a prerequisite for active health protection and for primary prevention.

The outline for this phase of the program, to be carried out by the usual experimental approach, is as follows:

Fifth year

- The health risk factors (infectious, degenerative and accidental risk, toxicological dependencies etc.).
- The healthy lifestyles (how to defend oneself from risk factors).
- Well-being in our physical and social environment.

B. Detailed description

1. Background

The initiative is the result of careful analysis of the Italian epidemiological profile that, as it is in many countries with high social and economic development, is characterized by a progressive increase of demographic and health indicators, such as:

- life expectancy at birth;
- average age of the population;
- prevalence of both endogenous degenerative pathologies and chronic illnesses;
- prevalence of "affluent pathologies" (e.g., metabolic syndrome, obesity, drug dependence, work-related or accidental injury), which are strongly linked to unhealthy lifestyles (e.g., overeating or unbalanced diet,

sedentary lifestyle, stress, tobacco dependence, consumption of psychoactive substances).

A consequence of this phenomenon is the increasing lifespan of the Italian population, which is, at the same time, becoming more fragile from a health perspective, with growing numbers of persons requiring medical attention (e.g., the aged, disabled, chronically ill).

Thus, costs incurred by the National Health Service have increased progressively and have reached levels that are difficult to sustain due to the following factors:

- a growing demand for healthcare both in terms of the number of persons requiring healthcare and the quantity of medical interventions requested;
- the complexity of healthcare, which tends to grow in parallel with technological developments in the medical research sector.

For evident social reasons, the spiralling costs of curative treatments cannot be counterbalanced by a mere reduction in the level, quantity or complexity of the healthcare on offer. The only possible areas of intervention are restructuring the function of the entire healthcare system (e.g., organisational adjustments, elimination of unnecessary expenditure) and implementing preventive measures to meet the society's increasing demand for healthcare.

In preventive medicine certain primary measures assume a vital role in avoiding the insurgence of pathologies by either limiting or eliminating factors within the community that may be responsible for them. In addition to the need to contain the costs of treatments, the activities to prevent the onset of diseases resulting from unhealthy life-styles, represent the best strategy to attain a healthy life in the long run.

The promotion of healthy behaviours is generally considered as one of the fundamental components of primary prevention. Many experts agree that this should begin at the earliest possible age to encourage awareness, knowledge and skills that children need to lead a healthy life.

It must be acknowledged that the various initiatives aimed to encouraging healthy behaviours that are currently being carried out in compulsory school, in the form of recommendations and guidelines, have proven to be of quite limited efficacy due to the following reasons:

- initiatives are generally carried out on a sporadic basis and often perceived by the child as carrying imposed rules;
- the schoolchildren lack the scientific knowledge that is essential to understanding the educational message, and are thus unable to absorb and retain information in a lasting, comprehensive way.

It is, therefore, deemed appropriate to promote an educational programme in health sciences aimed at primary school children. Such programme should be aimed at sharing knowledge —at an elementary level — of the structure and functioning of one's own body. The programme should provide the the children with awareness of the importance of leading a healthy lifestyle in the prevention of illness without creating any feeling of constraint and make them ready to be usefully trained in health education.

In this perspective, compulsory school at the primary level represents a very important opportunity for intervention for the following reasons:

- the fundamentals of knowledge are established at a very early age;
- compulsory school allows entire age segments to benefit from such activities;
- this activity, if conducted efficiently, can also involve the students' families.

On the basis of these considerations, the Accademia dei Lincei has developed a project aimed at introducing a health science education programme in compulsory primary schools. This ambitious project, however, requires at the outset an assessment of feasibility to ensure the reliability of the training hypothesis formulated, the possibility of achieving the planned activities and the effectiveness of the activities.

2. Objectives

Training in health sciences in elementary schools should be aimed at transmitting to students knowledge on the human body structure and function. This knowledge would enable students to acquire and maintain proper health behaviours based on scientific evidence and would serve as an essential component in the prevention of pathologies.

Knowledge to be shared – tuned in accordance with the learning abilities for the various elementary grades – should basically cover:

a. the physiological functions of the human body;

b. the morphology of the various organs and apparatuses;
c. the most important and common health risk factors for different age groups;
d. information useful to help identify healthy lifestyles and to avoid developing health risk behaviours in childhood and adult life.

3. Preliminary activities

In October 2010, prof. Mario Stefanini, on behalf of the Accademia Nazionale dei Lincei, proposed to the Executive Committee (EC) dell'InterAcademyMedicalPanel (IAMP) - a network of Academies of Medicine belonging to over 80 different countries - to develop a *training programme on health science education* in primary schools, as an essential prerequisite for promoting the development of primary prevention. The proposal was received with great interest by all EC members, all well aware of how the increasingly unsustainable costs of curative medicine impose to definitely accentuate their commitment to prevention programmes in public health programs.

In the beginning of 2012 the Regional School District of the Rome Region (URS Lazio) was contacted to ask for their collaboration and support in introducing *a training programme on health science education* in a school located in Rome. In the course of several meetings, the officials from URS Lazio expressed great interest in the programme and agreed the programme activities to be introduced in four first grade classrooms of the Istituto Comprensivo Luigi Settembrini, two of which were located in the elementary school of via Novara and the other two in that of via Asmara.

4. Methods

The method is based on two basic strategies: inductive reasoning and interactive teaching. It does not follow the conventional, systematic methods of teaching, and involves:

- the active participation and involvement of students during the training process;
- helping schoolchildren to recall daily experiences
- promoting and systematically soliciting the collaboration of families during all of the programme activities;

Within this setting, the work programme consists essentially of the following stages:

1. Identification of the “core experiences”
2. Elaboration of a detailed teaching programme
3. Elaboration and production of teaching support material
4. Training of the teachers
5. Presentation of the project to the families
6. Implementation of the planned teaching activity
7. Assessment of results
8. Public presentation of results

The activities envisaged for each phase are indicated below.

4.1. Identification of "core experiences"

The training to the inductive reasoning strategy will involve as a preliminary step to identify experiences pertaining to the students' lives (scenarios of play, family, school, etc.) which can be used to develop a simple yet participative learning programme. The training programme will include exploring basic elements of the structure, function and, in certain instances, possible pathologies of the main organs of the body. The basic experiences to be chosen will take into account the age and social background of the children; this part will be worked out by the experts of the working group (experts in medical issues, child psychology, etc.), in collaboration with the teachers.

4.2. Elaboration of a teaching programme

The programme will be articulated around the following themes:

- identification of the vital functions to be illustrated (e.g. movement, nutrition, circulation of the blood, respiration, etc., see part 3.2) in relation to the experience or experiences that have been defined above;
- identification of the learning objectives (knowledge and appropriate life styles to be transmitted and definition of their contents, based on the morphological, functional and preventative characteristics of each;
- specific indications regarding the methods and materials to be used;
- identification of the criteria to be applied to assess the results of the learning process for each levels.

4.3. Elaboration and production of teaching support material

Once the teaching objectives for the programme have been established, the material (leaflets, posters, films, etc.) as considered useful in the teaching and learning process will be prepared. Special attention will be paid to the identification of the techniques to be used for the production of such material, so that it can be autonomously produced, to further stimulate the active participation of the students in the learning process.

4.4. Training of the teachers

In each class the teaching activity pertaining to the programme will be conducted by one or at most two of the normal teaching staff (see following point 4.6). A series of meetings between the project working team and the teachers will be organised. These meetings have the following objectives:

- to present and discuss a prepared programme;
- to identify any modifications to the programme, should these be considered as necessary;
- to identify the teaching staff to deliver the programme
  -to provide teachers with the guidelines and documentation needed for adequate teaching activities.

4.5. Presentation of the project to the families

A meeting will be held between the students' teachers and parents prior to the start of the teaching activity to stimulate the families' participation in the learning process. During the meeting the project and its aims will be presented.

4.6. Implementation of the planned teaching activity

To ensure that the training activity be considered "normal", it will be conducted by one (or maximum two) members of the regular teaching staff for each class. During the teaching phase of the programme, the staff will be guaranteed the constant monitoring and technical assistance by the project's working team.
The number of hours to be spent on the project teaching activities (lectures, practical exercises, games, etc.) will be defined with the head of the teaching staff.

4.7. Assessment of results

As a part of a feasibility project, assessment of the results evidently plays an important part.

This phase will be organised as follows:

- assessment of the level of learning achieved in the teaching process by simple measuring instruments (class tests, questionnaires, etc.);
- assessment of the levels of knowledge on the subject matters delivered during the programme by kids in the classes participating in the programme and control groups from non participating classes, matched by age and class grade ;
- evaluation of the level of appreciation and of any constructive criticism by the teaching staff and the management of the school;
- assessment of the level of appreciation of the programme by the students' parents through specific questionnaires.

4.8. Public presentation of results

At the end of the project a meeting is to be held to present to the general public the results obtained.

5. Human resources

The following human resources are foreseen in implementing the project:

•The *SCIESA* working group, formed by:

a. a morphologist
b. an epidemiologist
c. a biologist with teaching experience in primary schools
d. a physiologist
e. an expert in science education
g. a childhood neuropsychiatrist

•The *School* working group:

a. eight teachers active in the four first grade classrooms
b. two teachers in charge of the coordination of the activities

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DIDACTIC PROGRAMME

The programme for a first-year class of the primary school cycle was prepared along the methodological guidelines outlined below, in line with the general school curriculum. The number of hours assigned to the project for the first year was 40 hours.

The subject matter focused on the "functional morphology" of some apparatuses of the human body (locomotor, respiratory and digestive apparatuses), as these can be directly perceived through simple experimentation by young children in the pre-reading/writing phase. It was also considered useful to introduce the concept of "environment", to embed into the programme the importance that it has in promoting health, and to highlight the continual exchange that exist between the individual and the surrounding social and physical environments.

As for the teaching methodology, it was considered appropriate not to articulate the subject matter according to the traditional format of subdivisions in organ or apparatus, but rather in relation to a "logical elementary pathway" more suited to the level of comprehension and cognitive skills acquisition method of small children.

Following this approach, the subject matter for the first year was articulated across the following teaching modules:

- Module 1. *Us and The Environment* (relationship between the individual and the physical and social environments in which we live)
- Module 2. *The Human Body and Movement* (general configuration of the human body, locomotor apparatus and movement).
- Module 3. *Relations and Exchange between Man and the Environment* (what goes in and what comes out). This module is articulated into sections regarding respectively "the journey of air" (respiratory apparatus) and "the journey of food and drink" (digestive system).

The teaching method adopted to transmit the above subject matter is strictly inductive, based on the awareness of elementary and obvious personal experiences and/or on the active participation in simple experiments.

Each single module is detailed below with indication of the contents to share with the children and the experiences to be used.

MODULE 1 - US AND THE ENVIRONMENT
(Concept of environment and conditions of environmental well-being)

1. AIMS

This module aims to create awareness in the children of the important role that they have in determining a state of well-being, not only through individual factors but also by relations that are established with the environment that surrounds us; a place in which people live and with which they interact.

On completion of the module, the children will:

- have acquired an understanding of the general concept of environment as a series of places in which one lives and of persons with whom one interacts.
- be aware that one lives in continual contact with the environment that surrounds us.
- understand that well-being depends not only on individual factors but also on environmental factors.
- have acquired an understanding of the possibilities that each of us has to improve the quality of our lives by taking care of ourselves and maintaining positive relationships with the surrounding environment.

2. SUBJECT MATTER

The subject matter used to achieve the above aims is detailed below (in bold, know-how to be developed through an inductive approach; in italics, experiences to be done). All activities are carried out with the active participation of the children.

THE CONCEPT OF ENVIRONMENT

- **The environment is constituted by the places in which one lives (physical environment: land, air, climate, buildings, plants, panorama, etc.) and by the people present in these places (social environment).**

Help the children to identifyeach element that constitutes the environment in the class (floor, walls, ceiling, windows, door, lighting, school benches, teacher's desk, blackboard, pin boards, students, teacher, climate, the air that we breathe, sounds that give us information, etc.), highlighting that the people present in a place in that moment are also part of the environment.

- **The environment has different sizes, depending on the interests or the aim of the viewer (concept of enclosed or wider environment; the class as an "environment", but also the entire school, neighbourhood, city and so on).**

Represent the concepts of the enclosed or wider environment as a set of concentric circles or boxes of decreasing dimensions placed one inside the other.

- **The enclosed environment (e.g. the classroom) is influenced by the environments which surround it (e.g. climate, light, sounds, etc.).**

Ask the children to observe that the classroom environment depends also on factors external to it such as the condition of the building, the climate, air, external sounds, etc. (concept of wider environment).

- **Each of us lives in different environments during the course of a day.**

Ask the children to describe the family environment.
Ask the children how many different environments can they identify from the previous day.
Ask the children to describe different environments other than the family or school (holidays, trips, sport, play, etc.).

CHARACTERISTICS OF THE ENVIRONMENT

- **The environment has certain characteristics: closed or open environment, bright or dark, cold or hot, noisy or silent, happy or sad, dirty or clean, desert or crowded.**

Show pictures of different environments.
Describe the characteristics of the different environments shown in the pictures.

- **According to the characteristics, the environment can be pleasant or unpleasant.**

From the different environments shown, identify together which are pleasant and which are unpleasant.

- **The same environment changes continually.**

Help the children identify the possible changes in an environment regarding climate, night and day cycle, odours, noises, the sensations that we perceive (tranquillity, fear, anger, etc.).
Experiment together simple changes in the class environment (more or less light; silence, noise; colder or warmer; etc.).

- **Each of us continually takes from the environment substances which are vital for life and we release into the environment waste substances.**

Discover together that the environment that surrounds us is not empty but contains air by carrying out the following experiments:
- blowing up balloons;
- pushing and pulling a syringe in its cylinder;
- moving a fan through the air.
Experiment together with simple demonstrations of inspiration and expiration to show that each of us continually takes air in from the environment and breathes the same air out.
Let the children look at pictures of children eating and drinking to understand that each of us not only takes air from the environment but also other substances (food and liquids) which are vital for life.
Let the children observe that it is not only air that we release into the environment but also other waste products (expired air, excrement, urine).

- **The people that live in an environment can make it better or worse.**

Elicit from the children some proposals on how to improve the environment in the classroom.

CONDITIONS FOR WELL-BEING

- **There are some conditions which make us feel well (conditions for well-being).**

Ask or, when required, suggest things or events that make us feel good.
Note down and list the things and events elicited, writing each on separate Post-it notes.
Ask the children to draw in class or at home the things or events which make them feel good.

- **The state of well-being depends on individual conditions, environmental conditions and also on the relationships which are created between each individual and the surrounding environment.**

With the children, organise the various Post-its and drawings into the three following groups:

- *individual conditions for well-being (being healthy; protection from excessive cold and heat; cleanliness; being well-dressed, possessing a desired object; playing; eating tasty food or drinks; feeling at ease, etc.);*
- *environmental conditions for well-being (a well-organised environment; clean environment; open-air environments, relationship with animals, etc.);*
- *conditions for well-being that are determined by relationships with others (being close to one's parents and other relations; playing with friends; having good relations with one's teachers; listening to a story; helping someone in need; receiving a prize for good behaviour; taking part in a party, taking part in a trip; singing together; etc.);*

Put the children's drawings on a pin board in class, divided into the three groups as indicated above (individual conditions; environment; relationship with other).

- **Everyone can contribute to improve the quality of the environment in which we live and so, our level of well-being as well.**

Construct together "the happy child" by letting the children choose from a series of picture card drawings showing conditions of well-being and difficulty, letting the children choose those representing well-being.

3. TOOL KIT

- Series of boxes of various dimensions which can be placed one inside the other;
- Pictures (photographs and drawings) of pleasant environments (organised, bright, etc.);
- Pictures (photographs and drawings) of unpleasant environments (disorganised, dark, dangerous, etc.);
- Cards with drawings of children in conditions of well-being and difficulty (both personal and environmental conditions);
- Balloons;
- Pictures of children eating and drinking;
- Set of pictures of happy and unhappy children;
- Set of plastic syringes;
- Set of fans;
- CD with various pictures of pleasant and unpleasant natural and man-made environments.

MODULE 2 - THE HUMAN BODY AND MOVEMENT
(General structure of the human body and the perceptible functional anatomy of the muscular and skeletal structure)

1. AIMS

This module aims to make the children aware of the general conformation of the human body and the function of the locomotor apparatus.

On completion of the module, the children will:

- understand the general structure of the human body and will be able to identity its main components (head, neck, trunk, etc.);
- understand the general functions:
  - of the bones (to give form and solidity to the various parts of the body);
  - of the joints (to connect the bones and allow movement between them);
  - of the skeleton (to give form and solidity and to support the body in general);
  - of the muscles (to allow movement of bones through their contraction and relaxation).
- be aware that the voluntary movements of the human body are regulated by signals which come from the brain.

2. SUBJECT MATTER

The subject matter used to achieve the above aims is detailed below (in bold, knowledge to be acquired through an inductive approach, in italics, the experiences to be used).

GENERAL STRUCTURE OF THE HUMAN BODY

- **The human body is formed by different parts known as the head, neck, trunk, arms, hands, legs and feet.**
  Draw on a large sheet of paper the contour of a child lying on the floor. On the drawing, identify the main parts of the body (head, neck, trunk, arms, legs).

BONES

- **Inside the human body there are hard structures which are called bones.**
  Feel the different parts of the body to note the presence of these hard structures.

- **Bones have different shapes according to the part of the body where they are situated.**
  Show X-rays of the bones of different parts of the body (cranium, pelvis, bones of arms and legs, etc.).

- **The animals that we share our lives with (pets and farm animals) have bones inside their bodies as well.**
  Show different types of bones of animals (chicken, cow, etc.).
  Ask the children — with the help of their parents — to collect animal bones and bring them to school.

- **All of the bones together form the skeleton.**

Let the children draw a skeleton inside the outline of the human body.

Everyone has participated in the class in the construction of a scarecrow which has become a fixed presence in the class, and even has a name! Now everyone should realise the importance of having some form of support to keep this figure standing, but its rigidity does not correspond to the functions of our bodies.

SKELETON

- **The bones, connected to each other through the joints, form the skeleton which is indispensable to give form and support to the human body and that of many animals.**

  Show X-rays of the human body and of some animals, both quadrupeds and bipeds.
  Show hand puppet which takes shape only when some form of support is inserted (hand) but loses all shape when no structure is present inside.
  Help the children dress a wooden skeleton of a puppet (a model of a scarecrow).
  Construct a skeleton using plastic straws and plasticine.
  Let the children draw a skeleton inside the outline of the human body drawn on a large sheet of paper and compare this with the drawing made previously (see section "Bones").

Fig. 1 – Building a scarecrow: a very motivating activity in Module II.

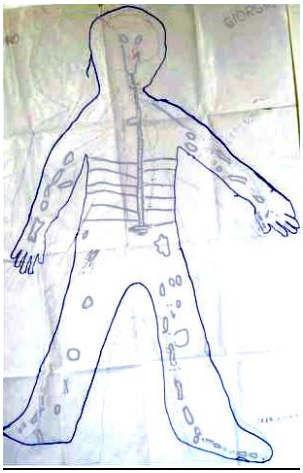

Fig. 2*a*. - Poster with the outline of a child drawn when lying on the floor; inside this silhouette the children have drawn how they think the bones of the body are distributed. Before doing this activity, ask the children to feel their own bodies to identify the hard and the soft parts.

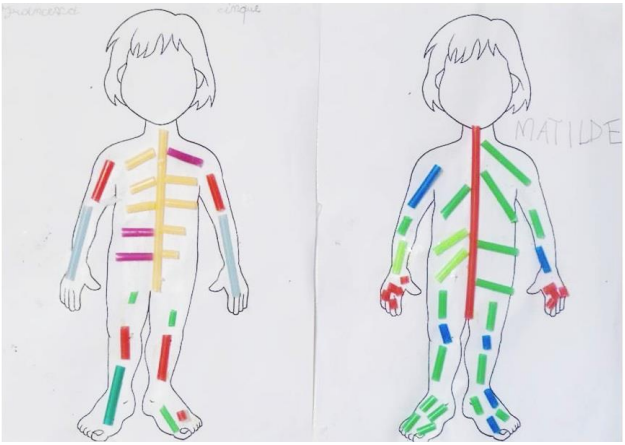

Fig. 2*b* e *c* - The drawings show various ways of representing the human skeleton. We can see here that the children progressively represent a more elaborate skeleton during Module II.

JOINTS

- **A statue is rigid because it has no joints. A doll can make some passive movements because it has some joints. The human body can carry out many more movements than a doll because it has many more joints.**

  Compare the rigidity of a statue with the passive movements that can be made with a doll.
  Ask the children to feel their own bodies and identify the greatest number of joints (fingers and toes, wrists, elbows, shoulders, neck, spine, knee, etc.).

- **Joints have the function of connecting different bones together and thus, they can move in relation to each other.**

  Assemble the different cut-out pieces of a cardboard model, using paper-fasteners to connect the pieces at the various joints.
  Verify what passive movements the model can make by attaching string to the relevant parts.
  Simultaneously, ask the children to carry out simple movements (raising a hand, shaking the head, etc.) at the teacher's command, and ask them to make the same movements with the model that they have just built.
  Ask them to check on themselves and also on the model how a joint can help different parts of the skeleton to move in relation to each other.
  Ask the children to check how blocking a joint will impede the normal movement of a bone in relation to adjacent ones (for example, how a plaster cast can block the joints of the wrist).

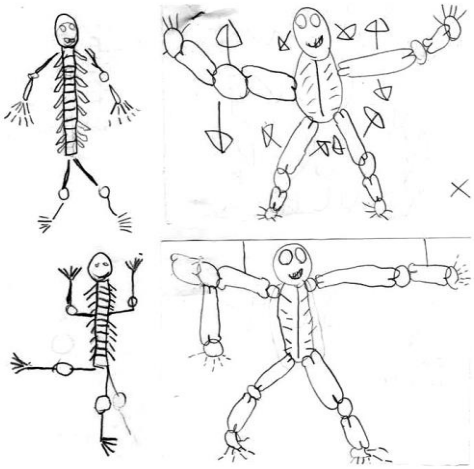

Fig. 3 – Drawings of the skeleton "in movement", made after exercises in the gym and without the outline of the body, show a greater level of understanding of the children: now the bones are seen as part of a single system which also includes the joints.

MUSCLES AND TENDONS

- **A doll can only make passive movements (movements which are caused by some external force) whereas a child can make active movements caused by his/her own will.**
  Compare the passive movements of the doll with the active movements of a child.

- **Active movements of the human body are the result of muscles which are attached by tendons (the tougher or harder parts with which the muscles terminate) to the various bones of the body.**
  Ask the children to feel their muscles (biceps, quadriceps) and to understand how the bones are covered with a softer material which are the muscles.
  Some tendons become particularly prominent during movement (e.g. at the back of the hand).

Examine the muscles of the leg of a chicken without the skin.
Show photographs of athletes with well-developed musculature.

- **Adjacent bones can change their position in relation to each other by the action of a muscle which is attached by a tendon to one bone, and by another tendon to the other bone. Muscles are able to contract and relax and so, may change the relative position of the bones.**
  Ask the children to observe how muscles change by touching them during the contraction and relaxation phase (biceps or other muscle).
  Ask the children to observe the movement of the forearm in relation to the rest of the arm; when the biceps becomes harder (contraction), the forearm pulls closer to the upper arm.

MOVEMENT

- **A child is able to move actively (as a result of his/her own will) because the brain elaborates signals which travel to all parts of the body through the nerves which reach the muscles.**
  Propose a series of perception games to stimulate the children to reflect and identify what type of external stimuli are received by the body and what motor reactions the body responds with.
  Encourage the children to identify the entry points of the signals that the body receives from the external environment (eyes, ears, skin, etc.).
  Identify the brain as being the "command centre".
  Turn on the lights in the classroom to demonstrate how a signal from the light switch travels through the electric wires to reach the light bulb to turn it on.
  Using a remote-controlled toy, demonstrate how a signal from the remote control can travel through the air and reach the toy to make it work.
  Encourage the children to make hypotheses on the possible functional connections between the brain and the muscles, and how this information travels inside the body.
  On an outline of the human body, draw possible connections between the brain and the muscles.
  Show a simplified diagram of the connections between the central nervous system and the skeletal muscles.

Check with the children how one's own will can control muscle-skeletal activity.
Through games involving different types of movement such as walking, standing erect and other types of movement, check the children's understanding of how movement involves the coordination of many different muscles.

3. METHODOLOGICAL NOTES

The fundamental theme of this module is movement, an experience which is particularly suitable for children, who are naturally given to engage in this type of activity positively and with joy, as it is seen as a type of game or sporting activity. This characteristic means that the module can be set up and delivered it in a way which is interesting for the children due to the continual reference to the "play" element present in the subject matter, to movement, and to their favourite sports.

The main hurdle encountered in delivering this module correctly is the connection between volition and movement, i.e. introducing the concept of a "signal" which starts from the brain and reaches the muscles to give input for them to contract or relax and thus produce movement. For the first year elementary school children it is sufficient that they be aware of the existence of this connection. Better explanations will be made at later phases regarding how nervous impulses are transmitted and the difference between voluntary and involuntary movements.

4. TOOL KIT

- Large white sheets of paper to draw the outline of a child's body
- Sheets of white A4 paper with a diagram of the outline of the human body, approximately two copies per child
- Set of X-rays of the skeleton of a child
- Bones of different animals
- Set of rigid plastic models
- An artist's dummy with joints
- Set of hand puppets
- Scarecrow
- Drawing of separated parts of a human silhouette, to be cut-out and mounted with paper-fasteners
- Remote-controlled toy
- Set of plastic straws and plasticine to build skeletons with joints
- Two bandages and some wooden splints of three different sizes to block joints.

MODULE THREE – RELATIONS AND EXCHANGE BETWEEN MAN AND THE ENVIRONMENT
"What goes In and What comes Out"

AIMS

This module is articulated into two sections ("the journey of air" and "the journey of food and water"). The objective is, through guided observation and personal experience or even simple experiments, to create basic awareness of the importance of these two exchange processes for life and for all human beings ("what goes in" and "what comes out"), and take place between human beings and the surrounding environment.

On completion of the module, the children will:

- have a general understanding that human beings continually take in substances from the environment such as air, food and water which are indispensable for survival and for the normal functioning of daily activities as well as for growth;
- have a general understanding of how these processes take place (respiratory and digestive apparatuses) within the human body;
- understand the basic ways in which respiration (inspiration and expiration of air) and digestion (digestion, absorption of foodstuffs and water) take place;
- understand how humans continually emit waste substances into the environment (expired air, excrement).

SECTION 1: THE JOURNEY OF AIR

1. AIMS

This section of the module aims to help the children acquire inductively elementary but fundamental concepts regarding the structure of the respiratory tree (pathway followed by air from the external environment to the lungs) and also its function (inspiration as a source of oxygen) which is indispensable for life, and expiration, (elimination of waste products).

On completion of the module, the children will:

- understand that respiration is a continual process and is indispensable for life;
- understand that the general organisation of the respiratory apparatus is represented by:
- access passages of air (nose, mouth);
- the respiratory passages through which air passes to reach the respiratory organs;
- the lungs, where the air arrives and from where it is expelled;
- understand that respiration is composed of two phases, inspiration and expiration;
- comprehend that, through inspiration, the body is continually supplied with oxygen which is indispensable for life;
- comprehend that, through expiration, waste products are continually eliminated from the body (carbon dioxide and water).

2. SUBJECT MATTER

The didactic material used to achieve the aims stated above is detailed below (in bold, know-how to be developed through an inductive approach; in italics, the experiences to be used).

BREATHING IS A CONTINUOUS ACTIVITY AND INDISPENSABLE FOR LIFE

- **The environments where we generally live contains air**
  Remind the children about the existence of air seen in the experiments completed in Module 1 (balloons, syringes, etc.)

- **To live, we have two take in a certain quantity of air into our organism**
  Use pictures of scuba divers or astronauts to underline the importance of air.
  Let the children experiment showing them that they can also stop breathing if they want to, but only for a very short time indeed.

- **Respiration (inspiration + expiration) is a continual and automatic process, even if it can be controlled voluntarily for a short time.**
  Let the children observe that respiration continues, even if we are not thinking about it and when we are sleeping.

- **Air contains a substance —oxygen—which gives us energy**

  Carry out the experiment with a candle on a plate and covered with a glass dome; after a short while the candle goes out. At the end of the experiment show the children how water has entered into the glass dome, substituting the oxygen (and gas contained in the air) which has been consumed. Ask the children the following: "Why did the candle though out?", and ask them to compare the role of oxygen in a burning candle and that with a battery in an electronic toy, or petrol in a car.

ENTRY AND TRANSIT OF AIR IN THE RESPIRATORY TRACTS

- **The air that we believe enters our bodies through the nose and mouth.**

  Experiment by blocking the nose with a hand to see if we can still breathe through our mouth; if we block our mouth, we can still breathe through our nose; if we block both our nose and mouth, we cannot breathe at all;

  Ask the children about their experience when they have a cold.

- **Therefore air passes through a system of tubes to reach two organs in the thorax; these are called the lungs**

  Ask the children to draw the pathway followed by air on a drawing of the outline of the human body;

  Experiment by breathing through the mouth to see it and feel the passage of air; repeat the same experiment with the mouth closed to feel how the air passes through the nose;

  Ask the children to identify where the air that we breathe goes to in the thorax, making them also observe how the thorax expands enduring inspiration and become smaller during expiration;

  With a stethoscope placed on the chest, listen to the noise of respiration when breathing;

  Observe how, when we hold our breath there is no breathing noise;

  Together with the children, construct the breathing bottle (see enclosure).

- **When we breathe out we eliminate waste products which our body passes into the lungs.**

Ask the children the following: "Is the air that we breathe out the same as what we breathe in? Why do we need to breathe air in and out?";
Breathe out through a straw into recipient containing a coloured liquid that changes colour (from violet to yellow or orange) when in contact with carbon dioxide contained in the expired air;
Let the children see that when we breathe on a mirror or glass window, it mists over is because our breath contains water;
Let the children see that the lungs of an animal (bought a butcher shop) is composed of a spongy structure of channels and little cavities (alveoli) which can contain the air that we breathe in;
Show the children a simplified diagram of the bronchial tree;
Ask the children once again to draw the pathway followed by air inside the body.

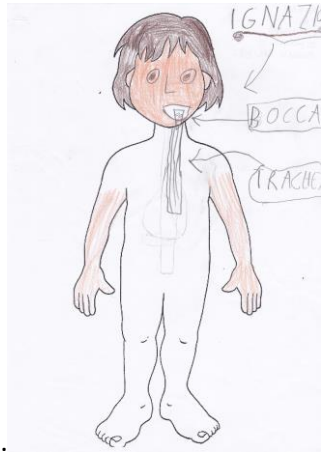

Fig. 4 - The initial drawing by Ig., This is perhaps one of the simplest produced by the class, even though Ig is one of the most participative child both in class activities and discussions.

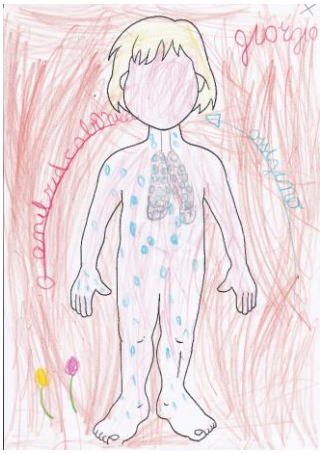

Fig. 5 - The drawing by Iv., (reproduced on the cover), and that of Gi., are examples of how children become more aware of the passage used by air in both directions, of the presence of the lungs which are connected to these passages, and also the presence of "oxygen" in the entire body.

3. TOOL KIT

1. A stethoscope complete with a bottle of disinfectant and a box of cotton gauze to clean the earpieces;
2. Kit for the candle experiment with a glass container with a pressure seal lid, six coloured candles, and a plastic container;
3. A set of pictures of scuba divers, astronauts and aquaria;
4. Kit to construct a breathing bottle, comprising: i) a plastic bottle, two packets of balloons, coloured adhesive tape, paper cutter; ii) instructions for the construction and interpretation of the experiment;
5. Kit for the completed experiment to highlight the differences between the expired air and the atmospheric air that we breathe, consisting of a bottle with a screw top and containing a pH indicator, plastic straws, single use plastic pipettes;
6. An elementary and simplified diagram of the bronchial tree.

SECTION 2: THE JOURNEY OF FOOD AND WATER

1. AIMS

Through an inductive methodology, this section of the module aims to introduce the children to the elementary but fundamental information regarding the digestive system (the journey of food and water inside the human body), its functions (utility, secretion, digestion, absorption, expulsion of waste products).

On completion of the module, the children will understand that:

- regular intake of food from the environment is indispensable for life and for the development and growth of the individual;
- regular intake of water (contained in all drinks) is indispensable for life because all living beings contain a great quantity of water which is lost to the environment and therefore, must be continually be renewed;
- intake of food and water creates pleasurable sensations which are also useful to stimulate everyone to nourish themselves and to drink;
- insufficient intake of food and water creates unpleasant sensations (hunger and thirst) which are also useful to signal the necessity to eat and/or to drink;
- the general organisation of the gastrointestinal tract is represented by:
  - the mouth (access point) which contains teeth and where saliva is gathered;
  - a long tube (gastrointestinal tract) along which ingested food moves and is modified, facilitating its absorption;
  - the anus, situated at the end of the gastrointestinal tract, is where faeces are expelled (waste product derived from food);
- in the passage along the gastrointestinal tract, foodstuffs undergo a long process of fragmentation into particles which continue to become smaller until they are absorbed and pass into the blood;

- in particular, this process of fragmentation occurs:
  - in the mouth where food is broken down by mastication and mixed with saliva to then be swallowed;
  - in the gastrointestinal tract where the food moves along under the effect of contraction of the tube and continues to be broken down into smaller parts by secretions (special liquids produced by the gastrointestinal tract) until they are reduced into particles so tiny that they can be absorbed through the wall of the intestine and reach the blood;
  - the last part of the intestine is where undigested food—and therefore not absorbed—arrives to form faeces which are then eliminated through the anus into the external environment.

2. SUBJECT MATTER

The didactic material used to achieve the aims stated above is detailed below (in bold, know-how to be developed through an inductive approach; in italics, the experiences to be used).

THE INTAKE OF FOOD AND WATER IS INDISPENSABLE FOR LIFE

- **Human beings take in food from the environment which is indispensable for life and growth.**
  Invite the children to hypothesise what would happen if we did not eat.
  Ask the children if they think they can grow and become big if they do not nourish themselves sufficiently.

- **Even water, contained in all drinks, is indispensable for life because the human organism—as for every living being—contains a lot of water, and at the same time loses a lot to the external environment.**
  Demonstrate to the children with appropriate observations (vapour released by cooking food; vegetable extracts or centrifuges; compare dry and fresh fruits) that all materials of animal or vegetable origin contain a lot of water;

Discuss with the children, the various ways in which the human organism loses water to the external environment (urination, defecation, sweating, expiring humid air);
Ask the children if they think that drinks (wine, beer, orange juice etc.) contain or do not contain water;
Ask the children what they think would happen if we did not drink.

NATURAL STIMULI FOR NUTRITION

- **Eating and drinking give us pleasurable sensations.**
  Ask the children if they enjoy eating and drinking and ask them also what their favourite food or drink is.
- **If we do not have food or drink or if in insufficient quantities then we have unpleasant sensations (hunger and thirst).**
  Ask the children to tell their experiences of hunger or thirst.

STRUCTURE OF THE DIGESTIVE TRACT

- **Food and water enter the human body through the mouth, which contains teeth and where it is mixed with saliva.**
  Ask the children to make a drawing of the journey of food and water inside the body;
  Draw the children's attention to the presence of teeth and saliva in the mouth;
  Ask the children to examine the mouth when it is closed and open and to describe its components; ask them to draw a mouth on a sheet of paper.
- **When we swallow food passes from the mouth into a long tube (gastrointestinal tract) where it is digested and absorbed.**
  Show the children a simplified diagram of the gastrointestinal tract.
- **Waste products from the digestive process (faeces) are eliminated through the anus into the external environment.**

FUNCTIONS OF THE DIGESTIVE TRACT

- **In the mouth food, is broken down by the teeth and softened with saliva.**
  Draw the children's attention to the function of the teeth;
  Get the children to break up some dried bread in a mortar and pestle and compare this action to the teeth breaking up solid food;
  Let the children experiment by seeing how water can dissolve sugar or salt crystals;
  Ask they children what they think is the function of saliva.

- **Solid food—broken down and softened by saliva—is swallowed and moves progressively along the digestive tract due to the contractions of its walls (*motility*).**
  Explain to the children how a mouthful of food can move along the digestive tract by using the example of the peanut in a rubber tube, soft enough to be compressed from the outside using the fingers.

- **The intestine produces substances (*secretions*) which soften and divide the food up into smaller and smaller pieces (*digestion*).**
  Experiment by digesting a thin slice of turkey using a slice of papaya or powdered papain.
  Encourage the children to verify how solid material can be transformed into smaller fragments, and eventually become invisible by using acidic substances (great care should be used when using these acid products).
  Ask the children to describe their experience when they had a sore stomach or an unpleasant sensation caused by vomit;
  Get the children to construct "food" made out of differently coloured building blocks and let them play a "digestion" game according to precise rules set by colour (which mimic the bonds to be broken). During the process of digestion, even a single blocks or small units of blocks and liberated thanks to "special scissors" which are able to recognise specific colours;
  Use two thin slices of turkey (which can be bought in any supermarket) to show the action of digestive secretions: put one of the two slices between two slices of papaya, or sprinkle with some animal casein or pepsin. Place both slices into separate transparent plastic bags and see day after day how the papaya, (which contains papain), acts on the meat.

- **The intestinal is capable of absorbing the tiny particles which are formed by the digestion of food, of water which has been drunk, or even that contained within other foodstuffs *(absorption)*.**
  Let the children experiment by trying to get breadcrumbs to pass through a sieve; the crumbs have to be smaller than the holes in the sieve if they are to pass through to the other side.
  Using a tea bag or chamomile immersed in hot water, ask the children to consider how such tiny holes invisible to the naked eye can still let the substances inside the tea bag pass through to the other side to change the colour and the taste of the water.
  Use the classroom benches or in some other way try to construct a model of the digestive tract which first widens and then becomes narrower and use this to explain the functions of the tract (digestion and absorption).

- **The part of the food that is not absorbed because it has not been digested and remains in the digestive tract is pushed towards the end of the tube where it is eliminated to the outside through the anus *(faeces)*. Also excess water is eliminated into the external environment (*urine)*.**
  Ask the children what happens to those foodstuffs that have not been digested and absorbed;
  Ask the children to draw once more the journey of food inside the human body.

How the children have drawn the journey of food through the body at the beginning and at the end of Module III.

Here we present two drawings of two different children in different classes.

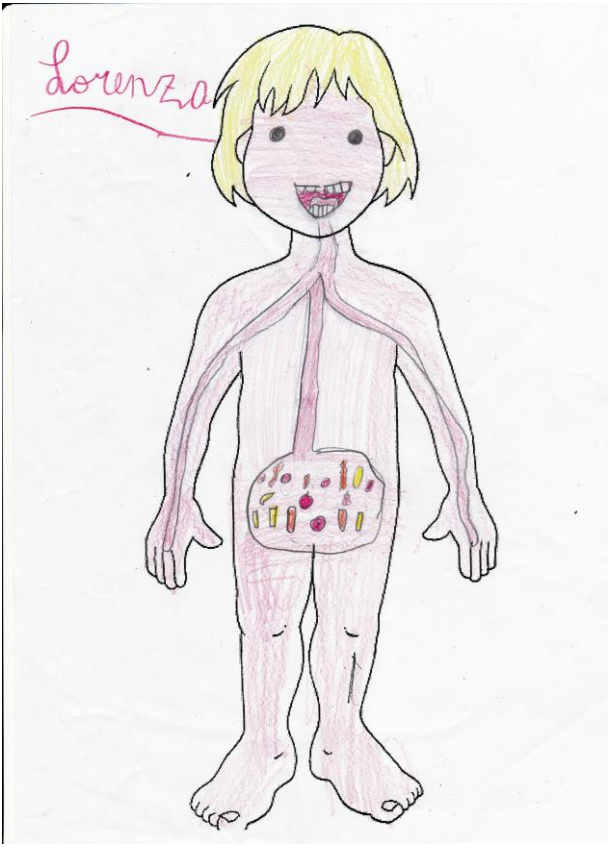

Fig. 6 - In the drawing by Lo., the digestive tract ends in a sack, which is quite a common feature in most of the drawings. The two "tubes" starting at the mouth and finishing in the arms could represents the journey of air dealt with previously in class.

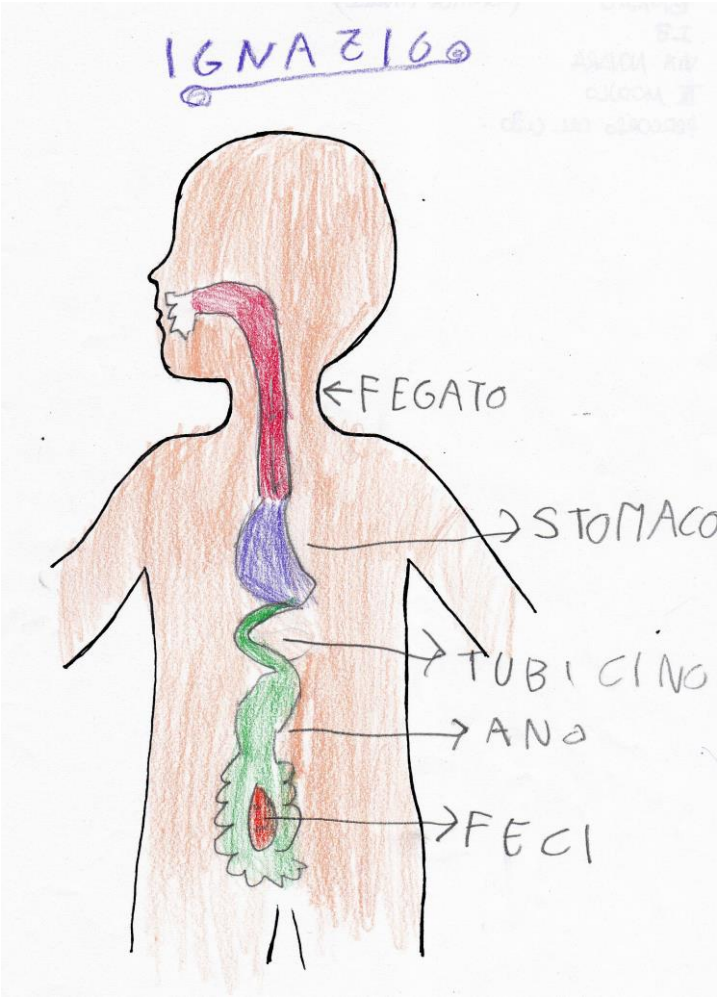

Fig 7. - The drawing by Ig. shows the changes that have taken place in his imagination regarding the digestive tract during delivery of the module. This drawing is one of the most complete and was not influenced by any other reference or book.

Fig. 8 - The photograph shows a puppet constructed by all of the children at the end of the academic year during which the teachers had spoken repeatedly to the children about the journey of food and air within the body.

3. TOOL KIT

1. A bucket of coloured building blocks;

2. Kit to make aqueous solutions: transparent plastic cups 200 ml, a packet of plastic spoons, 1 kg of course salt, 500 g of brown sugar, some tea bags (or chamomile).
3. Kit to simulate the generation of gases liberated during the digestive process, composed of: a plastic bottle, one bottle of wine vinegar, one packet of balloons, one packet of bicarbonate of soda.
4. Kit to grind and to sieve, composed of: a wooden mortar and pestle, a metal sieve with handle.
5. A length of soft rubber tube, peanuts or dried pulses.
6. Drawings of the silhouette of the human body on A4 paper showing the digestive system.
7. Kit to show the action of the digestive secretions. The demonstrations involve using two slices of turkey and some slices of papaya (bought in a supermarket), transparent and re-sealable plastic bags (used to conserve foodstuffs in a freezer). Instead of using papaya, animal casein or pepsin dissolved in water and lemon juice can also be used.

How the experiments were drawn by the kids

The following drawings show some moments of the digestive process which are used to explain some aspects of the process to the children.

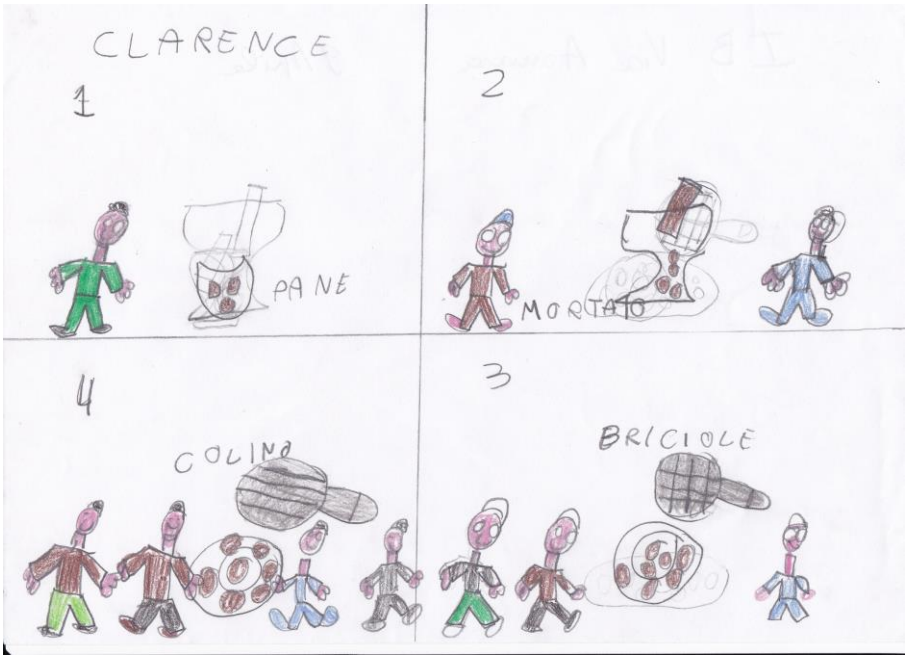

Fig. 9 - The drawing by Cl. illustrates the various phases of the process as proposed by the teacher: grinding dry bread and water to see how it can pass through the little holes in the sieve. From the drawing you can see that the activity was also accompanied by a lot of fun.

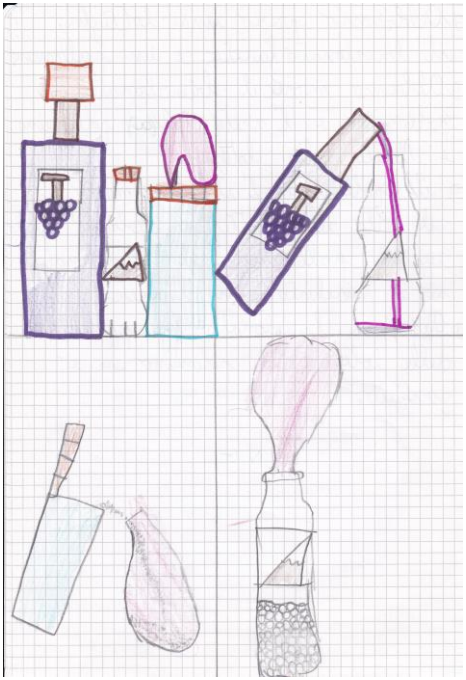

Fig. 10 – The drawing by Jo. illustrates clearly the experience of mixing vinegar and bicarbonate of soda to observe the effects that it has on a balloon placed over the neck of the bottle. Given that the end of the academic year the children start to write, the drawing is also accompanied by a precise description of the actions undertaken, which finishes with: "*the bicarbonate of soda was mixed with the vinegar. After, the bicarbonate made bubbles and the balloon was inflated*"

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TRAINING ACTIVITIES FOR TEACHERS

Overview

The teachers of all of the first classes in the two schools were asked to collaborate in the start-up phase of the SCIESA project in the academic year 2013-2014. All activities were delivered according to the indications contained in the specifically prepared training programme described below.

A group of eight teachers, all actively teaching in the Istituto Comprensivo Luigi Settembrini, participated in the project, specifically:

- three teachers in the first two primary classes in the Via Asmara centre (teachers: Anna Rita Pierini, Grazia Cossu and Roberta Corvi);
- five teachers from the first two primary classes in the Via Novara centre (teachers: Francesca Scrivo, Paola Cherubini, Elena Feliziani, Maria Grazia Zimbalatti, Eleonora Medici.

The school headmaster gave an important contribution in the teacher training activity and in the implementation of the entire project by collaborating in the preparation of the didactic project and in its delivery. An important contribution in implementing the project was also made by two teachers, Claudia Regazzini and Angelo Matrone, by coordinating and supporting all phases of the project during its delivery.

Activities

Training activities were divided into three distinct moments as follows:

1. Training seminars delivered before the start of the programme and held by experts from the SCIESA group;
2. Participation with a "team work", approach in assembling and delivering the didactic modules;
3. Participation in the work of assessing the results.

1. Teacher training seminars

The teacher training seminars were held in Via Sebènico and delivered by experts from the SCIESA group with the following calendar:

First seminar (22 January 2013)

Significance and motivation for teaching "health science" in primary schools

Epidemiological motivation for the project:

- Ageing of the general population.
- High prevalence of degenerative pathology with chronic or disabling characteristics.
- High health care costs.
- Importance of primary prevention and its consequences on quality and style of life.
- *Health Science* as a group of scientific studies aimed at creating awareness in children of their own bodies and its main functions.

Significance and value of using an inductive teaching methods.

- The opportunity to conduct teaching activities in scientific disciplines not based prevalently on notions backed up by authoritative sources (teacher or textbook) but more on direct observation or active experience in the classroom (an inductive or experimental methodology).
- A fundamental methodological characteristics of the inductive method in science teaching as an alternative to a deductive method.
- Experience (the creation of rational, objective observation of daily experience) and experimentation (programmed demonstration of new scientific evidence) are fundamental elements in an inductive method.

Second seminar (9 April 2013)

The active participation of the children

- Active participation guarantees the consolidation and long-lasting acquisition of know-how.
- Fundamental methodologies in active participation: collaboration in the execution of experimental activities (action) and appraisal of the meaning and value of the same experiments (emotion).

The role of the family

- The importance of the participation by the family.
- Ways of communicating and stimulating to encourage participation of the families.
  - Open meetings with families
  - Targeted communication
  - Written communications

Third seminar (7 May 2013)

Scientific content to be transmitted (didactic programme) during the first year of the project.

- Morphology and functions of the human body which can be "perceived directly" as subject matter for the first two classes of primary school.
- Contents of the didactic modules for the first year:
  - Us and the Environment
  - The Body and its Movement
  - What goes In and What comes Out (perceptible morphology and function of the respiratory and digestive systems).
- Techniques for the preparation and use of self-made didactic materials.

Fourth seminar (14 June 2013)

Results assessment

- Methodology for assessment of results
  - The log book
  - Self-assessment by the teachers
  - External assessment by experts

All teachers involved in the project participated in the meetings and manifested their interest in the initiative, and agreed to give continuity to the educational project through participation and re-modulation of the

teaching activities and identifying the methodology to be adopted for evaluating the results.

2. Participation in the teaching activities

Two three-hour preparatory meetings were held for each of the three didactic modules ("Us and the Environment", "The Human Body and Movement", "What goes In and what comes Out"). The participants included the teaching staff, experts from the SCIESA group, and the coordinators for both schools.

Activities during these meetings:

- presentation of the first drafts of the teaching modules prepared by the teachers;
- these drafts were examined by the group in general and more specifically, were assessed for the appropriateness of the contents and language for the level of comprehension for young participants;
- modifications considered appropriate and agreed on were made to the modules;
- the teachers were presented with the teaching material prepared by the SCIESA group for each module;
- this material was examined regarding its effectiveness, and appropriate modifications were made.

The teachers had the task of delivering the single modules to the classes. The SCIESA group of experts were occasionally present during the teaching activities to create direct contact with the children and to assist teachers in delivering this experimental programme which was different from the normal school curriculum. This monitoring activity described in detail regarding the section "Assessment of Results".

3. Participation in the assessment of results

Inasmuch as the assessment of results represented a fundamental characteristic of the project, particular attention was given to training for the teachers in this type of activity. This phase—conducted in the presence of the teachers, under the guidance of the SCIESA group of experts—had the

aim of evaluating the significance and importance of the various tools to be used for assessment and for the elaboration of results.

4. Conclusions

From the initial phase of this project, it was evident that its success was greatly dependent on obtaining the full collaboration of the teachers, and consequently, on the quality and solidity of their specific training and preparation in the various subject areas. Indeed, the SCIESA project proposes important innovative elements, such as:

- anticipating educational activities focusing on the structure and function of organs and apparatuses of the human body to the first year of the primary school cycle when these are normally dealt with in the last two years of the same cycle;
- the systematic and experimental application of an inductive didactic methodology which unfortunately is not widespread in the general school system;
- the use of a teaching methodology based on the active participation of the children—possibly divided into small groups—in the experimental activities pertaining to the programme.

The teachers—generally already aware of the effectiveness of an inductive approach in teaching—reacted positively to the challenges posed by these factors. Indeed, their participation in the training phase of the programme was widespread and constant, and they showed a growing interest in the various issues raised as this phase of the project progressed. We can therefore confirm that not only the teacher-training activity was helpful in achieving the target objectives, but also the teachers themselves—through their experience and dedication—made a significant contribution in finalising the teaching programme.

ASSESSMENT OF RESULTS

Overview

The SCIESA project for the development of an academic programme focused on health sciences for primary school children, took into consideration various aspects such as the course contents, and the teaching

methodology to be used to plan a model teaching environment to guide the students along a pathway from theoretical principles to achieve a set of pre-defined learning goals.

This experiment, which takes the form of a case study, was implemented in a real scholastic environments with many variables—both independent and dependent—which were external to the control of the group.

The selection of the sample group (four year 1 classes) was based on two criteria: interest of the teachers in the project and a marked socio-cultural differentiation between the classes.

This project can therefore be considered as a research–action project characterised by systematic enquiry implemented through studied practice. The characteristics of this type of project defined in literature on research into the application of similar teaching methodologies are as follows:

- a spiral model based on a pathway alternating between moments of presenting hypotheses, moments dedicated to the analysis of the activities carried out, and the assessment of the final results;
- long-term monitoring of the teaching/learning process;
- participative observation and analysis by all those involved in the project and sharing of experience and good practice between the participants;
- application of quantitative ethnographic analytical tools for data gathering and definition of protocols, semi-quantitative analytical methodologies by identifying a system of categories, the use of checklists, and Likert scales;
- use of triangulation and cross-referencing of assessed criteria and the intersubjective application of grids for data interpretation;
- the assessment of the level of acquisition of the teaching methodologies examined in the preparatory and their application during the delivery of the programme; integration with summative evaluations of the students' learning over time.

The documentation used in the first year of experimentation was the following:

1. log book (with predefined entries) compiled by the teachers;
2. self-evaluation forms for the teachers in the form of questionnaires focused on eliciting their assessment and to identify any problematic or potentially positive factors regarding the project;
3. analysis and observation of the individual and group work in class conducted by children in the pre-reading and writing phase;
4. evaluation of "factual knowledge" (knowledge defined by the goals indicated in the course modules);
5. evaluation of "procedural knowledge" (methodological skills regarding the acquisition and generalisation of knowledge);
6. opinions of children's families gathered through questionnaires.

The results of the first analysis of the cognitive material which was gathered are detailed below.

1. Teachers' log book

The "log book" is an instrument used by the teachers to record and comment on the teaching activities conducted in class. The analysis of these entries made during the teaching sessions demonstrated the following results:

- in delivering the first module ("Us and the Environment") there was some initial organisational difficulties as the start of this module coincided with the start of the academic year. Dealing with first-year children; having to deal with children who had to adapt to a new environment such as the school had a negative influence on the regularity of the teaching activity. Regarding the contents, a greater part of the teachers observed difficulties in some of the younger children in identifying the positive or negative relations that exist between the individual and the surrounding environment. Some environments presented through pictures or images (e.g. mountainous environments) were not recognised by some children (especially non-EU children). The positive and negative aspects of the environments were not always interpreted as such by the children who are more interested in the content of the pictures

rather than their didactic significance. Regarding the methodology, some teachers judged that the active experimentation context of the module had not been sufficiently developed. All teachers agreed, however, that there was further opportunity to reconsider and develop the environmental themes in future editions of the project;

- the teachers agreed that the second module ("The Human Body and Movement") was followed with great interest by most of the children who participated actively in all experimental activities proposed. Some useful criticism was noted in the logbook regarding the contents and experimental methodology that had been proposed. Many reservations that were made by teachers during the meetings regarded organisational difficulties such as lack of space or time to carry out experiments, or the necessity of co-teachers to divide the class into smaller groups to facilitate the activities;

- overall examination of the logbooks showed that the delivery of the first section of the third module ("The Journey of Air") was certainly facilitated by the previous introduction of the experimental methodology experienced by the children in the previous two modules. Regarding the contents, there were no difficulties regarding interpreting the diagrams, comprehending the journey of the air and the structure of the respiratory ways. All teachers considered that the simple experiments aimed at demonstrating the presence of air in the atmosphere were effective. More difficulty was found when following the methodological scheme that had already been prepared in tackling—albeit in an extremely simplified form—the theme of gaseous exchange (oxygen–carbon dioxide) in the lungs This difficulty could be attributed to the impossibility of constructing a framework of concept organised around the progressive acquisition of cognitive skills and the consolidation of general know-how. This hypothesis merits further consideration as it underlines once again the importance that must be made to the problem of language comprehension and the need of gradual definition and fine-tuning of the subject matter pertaining to the teaching programme and delivered at a level appropriate for the students;

- regarding the second part of the third module dedicated to "The Journey of Food", the comments made in the logbooks were mainly analogous to those made regarding the section "The Journey of Air". Again in this case, the illustration showing the general layout of the digestive tract did not create any great problems whereas greater difficulty was found when tackling the topic of the "functions" of the intestine. In particular, the children encountered great difficulty in understanding "the function of absorption". From a methodological point of view, it was demonstrated that at this point in the teaching process, the children were already at a level to appreciate and to benefit from the experimental teaching methodology adopted.

2. Self-evaluation forms for teachers

On completion of each module, the teachers complete a self-evaluation form on the work completed. These forms, one for each module, offer the possibility of attributing a synthetic quantitative grade (scale from 1 to 10), regarding the following information:

- possibility or impossibility of achieving the target objectives for the module with children from the first year group;
- level of achievement of the general objectives of the module;
- level of achievement of the specific learning objectives of the by the single participant;
- level of attention of the children (for each specific learning objective of the module);
- level of active participation of the children (for each specific learning objective of the module).

For each of these items, the teachers were also able to make further observations considered useful to integrate and complete their quantitative assessments.

Briefly, from the information that was gathered, the following conclusions can be made:

- there was decided and unanimous agreement that both the general and specific target objectives for all three modules were feasible.

This result is of primary importance as it is confirmed by teachers with consolidated classroom experience and thus, eliminates any doubt or perplexity regarding the possibility of tackling topics such as health sciences with children in the first year of primary school;

- on a more concrete operative level, it was observed that no teacher considered any of the general or specific objectives of the modules as being "not achieved";

- regarding the first module ("Us and the Environment") both the general and the specific objectives were considered only partially achieved. The level of attention of the children was considered good whereas the active participation in general was considered mediocre. These results confirm what was already observed from the analysis of the logbooks. For the reasons already mentioned, the delivery of the first module presented some difficulties and therefore the causes for this should be examined in greater detail for future editions of the programme;

- regarding the other teaching modules, in the great majority of cases the teaching objectives were considered as having being achieved. Evaluations of partial achievement of the teaching objectives were sometimes expressed—and confirmed by the corresponding entries in the log books—regarding more complex contents such as the relationship between signals from the brain and the muscular-skeletal apparatus, gaseous exchange at the level of the lungs, and intestinal absorption;

- in general, the level of attention and active participation of the children was considered satisfactory. It is interesting to note that the teachers' assessment was more positive as the course progressed from module 1 to module 3; from a merely satisfactory evaluation for module 1, the evaluations for the successive modules were markedly positive. In particular, from the teachers' evaluations and comments we can also see a progressively growing level of participation and appreciation by the children in experimental activities of this kind;

– an important general observation regarded the differences encountered—even in the self-evaluation phase—between the two different centres where the programme was delivered. Although sufficient in general, the level of attention of the children in Via Asmara was considered to be less than the children in Via Novara, which was often assessed as excellent. This difference can most likely be attributed to the different socio-cultural origins of the children in the two centres. Indeed, the children in the Via Novara centre in most cases are from middle to upper-middle class families whereas the children in the Via Asmara centre are generally from less affluent families, and also with a significantly higher proportion of non-EU backgrounds.

3. Assessment of learning as defined by the teaching objectives indicated in the programme modules.

The general target objective is that of rendering the learner autonomous and more aware of his/her own learning needs, attained by developing a capacity to monitor one's own learning. *Assessment of learning* is not something that is added to the learning process but is an integral part of it.

In scientific education it is important to have a well-defined learning objective and that this be an integral part of any activity in which thought processes are involved.

The assessment process proposed for the end of year is coherent with this approach and is considered as a first phase of a wider cycle of activities to continue in the following academic year and for other groups of children. Another aim is to produce a series of booklets together with the children containing information and stories of what has been learnt in class. This assessment activity was started at the end of the first academic year and will continue at the start of the second academic year of primary school. This phase is planned around three class sessions with members of the working group, the teachers and the children who—using a series of drawings or short sentences produced by the children during the year—assemble this material into booklets which are then photocopied.

During the first meeting, after having shown the children some booklets containing the works of children from other classes, one of the working group proposes to make a new booklet on the subject matter acquired during

the academic year about the human body and its relationship with the surrounding environment.

Each child was asked to say what it was that he/she remembered best about the various teaching activities, and the researcher, with the help of the teacher, noted down the children's phrases on specially prepared posters.

During the second meeting, the teachers showed the children a semi-completed version of the booklet produced in various copies and containing the phrases that were written down on the posters. After examining carefully these draft booklets, the children were asked to complete them by inserting their drawings in correspondence to the phrases that were chosen during the year and considered by the teachers as worth conserving. During this phase the children were also asked to add new drawings—if necessary—to complete those already existing.

The third session will be dedicated to the individual children. Each child will be given a copy of the booklet and asked to add any personal contributions on specifically introduced blank pages.

The cognitive concepts verified as having been acquired through the assessment exercise at the end of the first year is summarised as follows:

- the most vivid and recurrent memories of the children were not those "listened to" or "observed" but mainly those "carried out by themselves" (listening to the heartbeat; listening to the sound of air filling the lungs during breathing; balloons inflating when air is blown into them; biscuits which become softer in the mouth when chewed and mixed with saliva; etc.). Didactic excellence seems to have been achieved primarily through the "participative" experimental activities.
- there were many references to memories regarding awareness of the structural functions of the body ("bones can be felt with the hands"; "our legs move because our brain tell them to do so"; "food is mixed with saliva; etc.).
- for didactic purposes it appeared important to use images or pictures able to capture the attention or imagination of the children (X-rays of bones, scarecrow, chicken legs which move when tendons are pulled; the head of a pig; the joints of a doll; the candle which goes out under a glass dome, etc.).
- the numerous phrases expressed by each child (and therefore, corresponding to equally numerous memories) was singular and

evident proof of the validity of the teaching method adopted and the possibility of tackling, even in a first year primary school class, issues which could appear to be relatively complex.

- as imagined, some phrases appeared to be stereotyped or in general said to please (school is a nice place because "we learn a lot"; "I am happy when I'm with my family"; etc.) and therefore were not used in the assessment process.

4. Assessment of the acquisition of reasoning skills and of the ability to generalize knowledge.

This aim of this process was to assess the elementary reasoning skills acquired by the children through this inductive teaching methodology; this was carried out in class with the children, teachers and also members of the research group. Assessment was conducted through the "footsteps game" which was organised in every class during the programme.

This game consisted in defining a specific space (in this case, the classroom) in which some pathways were indicated using cut-out cardboard footprints glued to the floor; these footprints were of different people or animals (an adult man, an adult woman, a child without shoes, a child with tennis shoes, a dog, a bird, etc.), following different directions through the room and engaged in some activity (sitting on a chair, standing on tiptoe is, looking at an object, looking out of the window, etc.) which could be deduced from the form or the position of the footsteps. The different pathways followed specific directions and also intersected. The children were asked to observe the footsteps and the pathways carefully to identify the person/animal, the type of action being carried out and also the direction followed. After examining the footsteps, each child explained to the teacher their findings, motivating their reasoning and these conclusions were recorded.

From this information it was possible to determine the following for each child:

- their capacity to identify the different persons.
- their correct/incorrect interpretation of the actions being carried out by these persons.
- the fundamental element of inference between: data from observable facts; data from realistically possible facts; previous

knowledge regarding personal experience; data from implausible facts.

– eventual reference to imaginary elements.

These results were elaborated and are summarised in the following table.

Table 1. Results of statistical inference from the footsteps game

RESULTS	via Novara centre		via Asmara centre	
	Class A	Class B	Class A	Class B
Correct identification of persons	82.8	90.4	72.5	72.9
Correct inference of the actions	89.2	86.6	70.0	78.6
Based on observable facts	60	52.9	41.1	51.3

As can be seen, the capacity for inference is generally high and contrary to what was found in other assessed criteria, there are no significant difference between the two different centres. For a more precise and detailed interpretation, these data should be compared with another sample of children of the same age but who have not followed any similar teaching programme in this specific sector. For organisational reasons, this comparative assessment has been programmed for the following year of the project.

5. Opinion of the families

The opinion of the children's families regarding the nature and the progress of the programme was gathered by means of a short questionnaire containing closed questions which was distributed at the end of the academic year ***(see Enclosure n. 5)***. Due to some organisational difficulties, this questionnaire was not distributed to the families of one class (Via Asmara, Class A) which was not included in the analysis. A total of 28 questionnaires were gathered.

The elaboration of these questionnaires gave the following results:

- The majority of parents who replied to the questionnaire had also participated in the various meetings organised to inform them on the progress of the programme;
- In about two third of cases, the children made some reference to their families regarding the progress of the programme;
- In all cases, the parents replied that they thought that the programme should continue in following academic years.

6. Summary of conclusions

This first analysis of data to "assess the product" of the first year of the SCIESA training programme permits us to formulate the following conclusive considerations:

- Firstly, it should be noted that the examined "product" is very specific as it is an educational programme aimed at creating awareness regarding mechanisms to prevent pathological conditions which—although manifest primarily in adult age or beyond—may be have precocious origins in early age. Therefore concrete results are difficult to evaluate as they will have an effect in the long or very long-term. Currently it is possible only to assess the quality of the educational valence of the programme, whereas no type of inference can be made regarding the long-term consequences.
- From the data gathered for assessment, it was seen that the principle target objective was not only implementable but also very significant, i.e. to create an educational programme to be delivered

from the first year of primary schooling and specifically focused on health sciences.

- Regarding the contents, a choice was taken to dedicate the initial part of the programme (the first two years) to the functional anatomy which can be directly perceived by the young participants and which was shown to have a decisive importance in guaranteeing their understanding, particularly at such an early age in the educational process.
- Regarding the capacity of children to use cognitive skills as a source of knowledge, the preliminary results showed that the children possess a capacity of rational inference. The activities programmed for following years will permits the continued evolution of these skills, if stimulated by an appropriate teaching methodology.
- The critical issues that were encountered (lack of space and time, lack of certainty of the teachers in tackling this type of teaching etc.) were not sufficient to impede the delivery of the programme but should be carefully addressed to improve the quality of teaching for future editions.

EVALUATION OF THE FEASIBILITY OF THE PROGRAMME

The fundamental objective proposed by the SCIESA project is that of evaluating the possibility of including a teaching programme focused on health sciences in the normal curriculum of the first year of the primary school cycle of compulsory education. This programme will be founded on an experimental teaching methodology using an inductive approach aimed at transferring simple but essential skills. The target teaching goals regard the structure and function of the human body, and on those appropriate lifestyles which should be adopted from infancy to promote good health and to avoid any risks associated with the insurgence of invalidating pathologies, either infectious or degenerative.

This experimental teaching activity conducted throughout an entire academic year allowed multiple aspects to be assessed, for example the possibility or not of:

1. Designing an academic programme focused on health sciences appropriate for the level of comprehension of children in the first cycle of compulsory education.
2. Sharing with the children contents typical of a health science programme (structure and function of the human body, risks for health, healthy lifestyles, etc.) systematically and through an organic programme delivered over the entire five-year cycle of primary education;
3. Adopting an inductive approach in teaching which stimulates the active participation of the children and thus, encourages the consolidation and retention of the subject matter acquired.
4. Delivering of the programme using the regular teaching faculty already engaged in primary schools.
5. Creating awareness in the children's families regarding the aim and usefulness of this programme.
6. Operating with a level of costs compatible with the financial resources normally available.

Regarding the innovative character of the programme, the preparatory phase of the curriculum involved detailed study of materials, bibliographies and the examination of similar international experiences already carried out in this sector. Preparation for the project also benefited from the contribution of experience from various other on-going research projects in Italy regarding either scientific teaching methodologies or the implementation of educational curricula focused on health sciences conducted abroad in contexts similar to our primary schools. To date we can affirm that there is a strong body of knowledge, especially abroad, to facilitate the design of experimental curricula similar to that referred to in this publication, especially regarding the appropriate teaching methodologies to be adopted and also the course content.

Regarding the second point above (usefulness and level of comprehension of the subject matter), this project conducted in particularly demanding conditions (teaching of very young children from four different year 1 primary school classes) demonstrated that even such young children are perfectly capable of acquiring the know-how and concepts set by the programme. Indeed this project pays great attention to using the children's own experience base and their own way of expressing themselves to guide the teaching process in a direction of "creating awareness", and of direct experience opportunely guided and oriented rather than relying on

memorisation of passively acquired concepts. At this point it was important to take the decision to structure the entire curriculum on the "perceived functional anatomy" and thus, on the understanding of the structure and functions of the human body that the children are able to comprehend through the guided observation of personal experience, or through simple and opportunely supervised experiments.

Regarding the third point, (adoption of an experimental and inductive teaching methodology) it was immediately evident that teaching based on experience and on the creation of awareness was not only able to activate the interest and participation of the children but was also functional in consolidating their knowledge base and to create a rational network between the acquired skills and concepts. The critical elements, however, were not represented by the receptive capacity of the children but rather, the quality of the organisation of the teaching activities, especially regarding time and space as well as the preparation of the teachers in adopting this experimental and deductive methodology.

Regarding the fourth point—the level of preparation of the teachers and their capacity to share the subject matter of the curriculum using an inductive approach—it was found that this experience did not have any positive or negative effect. Indeed, it was found that the teachers were able to contribute easily in defining the appropriate language level to be used in teaching which was coherent with the level of comprehension of such young participants. It was likewise noted—clarifying any previous doubts—that the shift from a traditional type of teaching (apodictic-mnemonic) to a method based on direct experience and a patient maieutic approach of experimentation and observation and the creation of awareness requires a specific preparation of the teachers engaged in this type of activity. Another fundamental requirement is a scholastic environment which has sufficient means to support and promote this type of initiative. In our case, a "collaborative" approach between teachers, and between teachers and researchers within a shared methodological framework was certainly fundamental and functional to overcoming these difficulties. This created, however, a necessity to organise specific meetings for each didactic module with the aim of defining a level of language effective to guarantee comprehension of the subject matter, and above all, to practice the use of the experimental methodology and the relative teaching support materials.

No problems were encountered with creating awareness and support from the children's families. During a series of specific meetings, the children's

families showed no objection whatsoever regarding the programme, and quite the contrary, showed great appreciation and satisfaction for this innovative initiative. This positive attitude was also confirmed by the analysis of the questionnaires conducted at the end of the programme which were generally very high (see document Assessment of results).

Regarding costs, it is noted that the greater part of expenses—still relatively moderate—incurred by the project were mainly attributable to the first experimental phase which involved the collaboration of a qualified team of experts and sector practitioners. These costs are obviously destined to end with the completion of the experimental phase and the commencement of a "regular" or tested regime integrated into the current teaching curriculum. The costs for this regular phase will still have to take into account the costs for the production of the teaching support materials. Due to their low-technology format, this material has very low costs which are entirely compatible with the normal costs set aside for this type of activity by schools. One further point to take into consideration is to consider some form of professional gratification with the issue of certificates for the teachers and coordinators involved in the programme delivery, as well as financial remuneration for these same persons, in return for the effort and dedication shown.

In conclusion, from this analysis we can state that:

- Regarding the feasibility of this project, there is no problem to prepare a teaching programme which includes health science related issues in the normal primary school curriculum, and in particular, in the first year of this cycle.
- For the implementation of such a programme, there are no evident obstacles from the school authorities, the teachers, nor the families.
- Starting to teach health science related topics from the first year of primary education is not only possible but should be encouraged as it allows a very early structuring of the learning process based on evidence and the promotion of healthy life styles.
- When operating at full capacity, the costs for this type of programme are relatively low and in any case, entirely compatible with resources normally available for this type of activity.
- Regarding the organisation, when delivering future editions, the critical points identified from the assessment of results phase (see relevant document) will have to be addressed.

– Once again it was found that the most critical point for the success of this project is represented by the commitment and preparation of the teachers. Thus, it is necessary to consolidate the teachers' scientific preparation and familiarity with an inductive teaching methodology from a very early phase when involved in delivering the project, as well as encouraging different forms of cooperation and sharing of good practice.

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