

Summer school

Integral Human Development Care of Creation

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Title: STI²MA, proposal of new curricula for the primary school cycle: from overcoming “mathematical illiteracy” to education for Green Transition

Pope Francis in his Encyclical “Laudato Si” states: “*The urgent challenge to protect our common home includes the concern to bring the whole human family together to seek sustainable and integral development, since we know that things can change*”. A feeling of intimate union with other beings of nature cannot be authentic, if at the same time there is no concern for human beings in the heart. Currently, the breaking out of wars in several continents represents a strong solicitation to increase our commitment towards the care of the others, in support of human life and peace. We cannot ignore humanity. There will be no new relationship with nature without a new human being. There is no ecology without an adequate anthropology.

The crisis, that we are experiencing nowadays, shows us the importance of the Encyclical *Laudato Si*, which Pope Francis wrote on the *Care of Creation*, teaching us how “everything is interconnected”. The idea that “everything is interconnected” is inherent in the guiding principle of the Encyclical, that is the *Integral Ecology* meant as a multidimensional reality.

Education in Integral Ecology contributes to the Ecological Conversion if it includes an initiation to contemplation and *Care* of every life and the whole *Creation*, and accept the need to broaden our horizons to recognize the profound connection between the various emerging problems.

A pedagogy inspired by Integral Ecology has to focus on the child’s mind, heart and hands by adopting a personalized concept of *Integral Human Development*, that fosters the development of each aspect and of the whole person, as opposed to an economist approach that confuses human growth with material prosperity and does not care about social exclusion and identity eradication.

Actually, the Social Doctrine of the Church points out the urgency of adopting a more respectful model of *Creation* and *Integral Human Development* of all peoples which requires the adoption of a new development paradigm based on the change of lifestyles and on the strengthening of the alliance between Human Being and the Environment.

An *Integral Human Development* perspective is neither anthropocentric nor biocentric. It sees humans and ecosystems in constant interaction. The degradation of people's lives and ecosystems goes hand in hand. Within the *Integral Human Development* perspective, authentic development integrates each and every person into a humanizing process of standing in relationships of solidarity as we strive together towards promoting the common good.

The theme of "*Care of Creation*" is a central element in the educational programs of primary schools. The need to lower CO₂ emissions in order to counteract global warming and catastrophic climate change is now well established, as demonstrated by the attempts of coordination among countries (to mention the last ones: the G20 meeting in Rome and the Conference COP26 in Glasgow – Conference of Parties, conference of the countries of United Nations (ONU) on the *Climate Change*).

The shared goal is to contain the planet's temperature increase to +1.5°C, unfortunately, without an agreement on the deadline for no CO₂ emissions. On the other hand, scientists warn us that, if postponed, the corrections could be ineffective on the triggered climate process that would lead to the extinction of mankind by the end of the century.

Economic issues and planetary inequality cause the lack of determination of taking the necessary actions, as analyzed by Pope Francis in his Encyclical *Laudato Si'*. Even a generic and complicit distrust in science offers dangerous alibis. These obstacles have their roots in human conscience and sensitivity and in the culture of the individuals, areas in which primary education can graft the values that lead to "Ecological Citizenship". Environmental education, called to create an "Ecological Citizenship", is sometimes limited to informing and fails to develop habits, the general purpose of the proposal. The development of ecological attitudes and consumption habits in primary school children should rely on the provision of scientific knowledge underlying a sustainable lifestyle.

This proposal is based on the theme of education in Integral Ecology and awareness of the importance of leveraging "strong" human values to develop a series of skills for an active and responsible citizenship, along with the provisions of the goals of the European Agenda 2030.

The objective of this proposal is the construction of new curricula (teaching guides for teachers) for the primary school cycle, for the holistic training of primary school pupils, in view of cooperation in Integral Ecology and *Green Transition*.

The proposal aims to expand the original STI²MA¹ project (Scienza, Tecnica, Ingegno, Italiano, Matematica and Arte, a pilot project for a first class of primary school proposed in the Master Degree Thesis) with the aim of educate to knowledge and love for our planet and the environment, to mutual respect between individuals and peoples, to cooperative coexistence for fair exploitation and sharing of resources and a convinced *Green Transition*. This is achieved with the extension of STI²MA to the entire primary school cycle.

The proposal includes an action-research, that is carried out by proposing new curricula based on the contents and the activities of STI²MA with a view to achieving the *Green Transition*.

The proposal aims to develop children's understanding of the impact that human behaviors have on the conservation or destruction of nature; it aims to induce the new generations, through creative, playful and collaborative activities, to adopt sustainable behaviors, to reflect systematically on their practices and to improve their daily actions, at school and at home; it aims to investigate the issues of *Climate Change* and climate actions, the *Energy Transition* and the *Circular Economy*, recovering the importance of addressing these contents with determination for the health of the Planet and the Human Being; and aims to experience the efficacy of the use of playful activities and the adoption of the *Cooperative Learning* tool in helping the "novice" child to become familiar with the aforementioned topics in order to adopt correct behaviors. Scientific content and humanistic values form an excellent basis for educating change in attitudes and beliefs from an early age. This involves building good conditions for the development of an active citizenship, attentive to the problems of the environment and the people who live there.

Recipients are the pupils from the first to the fifth class of a primary school in Rome, which will be selected at the end of this month (about 100 pupils, considering an average of 20 children per class). About the contents of STI²MA the following lines explain briefly.

Scienza, in addition to the traditional background on natural sciences, introduces in the first class the topic of *Energy sources*; examines in the second class the element of *Water*; in the third class deals with the theme of *Climate Change*; in the fourth class addresses the theme of the *Circular Economy* and in the fifth class it deepens the theme of the *Energy Transition*, whose real final objective is the *Sustainability* through *Decarbonization* and *reduction of polluting emissions*.

¹ STI²MA moves from two different international approaches: STEM and STEAM.

The acronym STEM (Science, Technology, Engineering and Mathematics) was coined in the United States in the early 2000s. STEM approach removes the traditional barriers between the four disciplines integrating them into a single cohesive means of teaching and learning, based on the connections between subjects and real-world problems; in the acronym STEAM (Science, Technology, Engineering, Art and Mathematics), beyond the scientific disciplines, we find Art. Here, Art is placed at the service of the sciences as a tool for developing solutions in *problem solving*.

The gaze will always be oriented to everyday behaviors to analyze the consequences and discuss how to improve them with respect to the objectives they set and the impact on the environment. Together we will research how to collaborate in the *Green Transition* to be able to consider ourselves friends of the environment, committed to its recovery and conservation.

Tecnica and **Ingegno** are understood as creativity, the child's ability to discover, research, innovate and experiment. Creativity enhances thinking, intellectual growth and the ability to solve problems in an autonomous and innovative way.

Italiano, initially intended as knowledge and writing of the letters of the alphabet, will gradually become the ability to communicate both verbally and through the writing and reading of texts, according to increasingly elaborate schemes depending on the level. Learning the mother tongue helps to structure logical-scientific thinking. The growing linguistic skills will also allow to face readings and debates on the theme of environmental responsibility. Through the activities, the goal is to help children to broaden their vocabulary, to make associations, to promote the ability of reasoning and to create a protocol of virtuous behaviors that children can choose to engage on.

Matematica is the central discipline of this proposal. I quote Montessori's thought that defines the mathematical nature of the human mind: "*Arithmetic, geometry, algebra, but also language, natural sciences, biology etc., when fulfilled, contribute to building the mathematical mind; and the new mathematics is only a way to build the child's mind*". It is very important to introduce the several mathematical tools through applications to simple real problems (reality tasks). In the link with space and reality, mathematical skills concern the solution of problems through the acquisition of tools that can in turn become the object of reflection and analysis.

Arte, as a place of sensory experience, freedom and creativity, has the role of representing the child's interiority and experience and educating him to beauty. This is functional to the general objective of the proposal, since learning to pay attention to beauty, and to love it, helps to go out from the "utilitarian pragmatism" that leads to the use and/or abuse of everything without scruples on the consequent effects, up to criminal actions against the environment.

The relationship between adequate aesthetic education and the maintenance of a healthy environment should not be overlooked. If you want to achieve profound changes, you have to keep in mind that thought patterns really affect behaviors. Education will be ineffective and its efforts will be sterile if we do not also care about spreading a new model regarding the human being, life, society and the relationship with nature. Otherwise, the consumerist model transmitted by the media and through the effective mechanisms of the market will continue to move forward. In this proposal, art is intended as a means to investigate, define and understand the world through activities similar to those used in

scientific investigation and it is placed at the service of the sciences as a tool for developing solutions in problem solving.

The philosophy and pedagogy of the proposal are understood through the tools adopted: game, the *Cooperative Learning* tool, the strategy of *Learning by doing* and the practice of silence.

Game supports knowledge and self-awareness, curiosity, the ability to discover and research, the development of frames of mind, the acquisition of autonomy and the comparison with the others.

The *Cooperative Learning*² tool is adopted not only for the help deriving from the “novice” student, but also for the protracted experience of the famous motto “*All for one, one for all*”: each member of the group behaves in a collaborative way because aware that the success of the group, like the personal one, depends on the level of cooperation that is established among the members. It represents an opportunity to verify and internalize the benefits of cooperation in sharing merits and results, which is a crucial attitude to effectively address the problems of the planet.

The strategy of *Learning by doing* aims to stimulate the creativity of children; according to this didactic strategy, developed by John Dewey, one of the greatest thinkers and innovators in the pedagogical field of the twentieth century, practical, concrete experience that can also be collaborative, playful, creative, constitutes the starting point of all educational knowledge.

Another important tool for forging the new humanity is the practice of silence. Active silence and attention amplify the natural ability of each of us to feel the world around: people, animals, plants. It is an inner seeing and listening that seem to have a lot in common with a particular human emotional experience: *empathy*, necessary to respect “our common home”. Practicing silence implies arising awareness of one’s subjectivity and inner richness. Therefore, setting up games that develop in silence implies suggesting the students a way of living that will help them lifelong, even when they will find themselves choosing whether to do good or bad to our planet.

Before starting the project, it is necessary to meet the teachers of each class to introduce them to the contents and activities of the experimentation and to present them the curricula, essential documents that guide them along the entire path and make them participants and co-responsible of the program. During the first meeting, the project first of all foresees the administration, to the pupils of the different classes, of questionnaires on the themes established to evaluate the level of their previous knowledge and therefore understand the starting situation.

² This method, widespread in the Anglo-Saxon and Scandinavian countries, is also spreading in Italy. There are numerous variations and different approaches to Cooperative Learning, such as: Learning Together; Student Team Learning; Structural Approach; Group Investigation and Complex Instruction. The specific approach that will be adopted in the present project is still object of consideration.

Each meeting consists of two steps: theoretical explanation of the topic. The concepts learned in the explanatory phases of each meeting leads, at the end of the project, to the creation of video clips; and didactic activities related to the defined scientific topic: practical, playful, creative and collaborative activities for a direct involvement of children, through the methodology of *Learning by doing*, where Italian and Mathematics are founding disciplines for the *Green Transition* and where we sometimes experience the practice of silence.

As for Mathematics, the leading discipline, through the activities, it is important to build the reasoning ability by formulating hypotheses, supporting one's own ideas and comparing oneself with the point of view of others. This with the aim of overcoming "mathematical illiteracy" and hostility towards scientific disciplines often perceived as difficult, making them more malleable. Mathematics suffers from the prejudice of being a theoretical discipline, made up of mechanical rules only, with which children often feel inadequate. Approaching this cultural condition represents a first fundamental step in contrasting the slowness of progress towards systems that respect the environment and life, in contrasting the denial raising from the doubt about the validity of projections based on experimental data and mathematical models (for example, regarding climate change, impact on ecosystems and human life etc.). It is necessary to develop a positive attitude towards Mathematics, through meaningful experiences, which lead children to understand how the mathematical tools they learn to use are useful for operating in reality. Pupils should experience the essentiality of Mathematics either as inspiring source for other scientific disciplines and as basic tool for knowledge. Mathematics is the science that most of all allows each individual, from an early age, to refine the arts of *problem solving*. In each class, the penultimate meeting is dedicated to the development of a final product that summarizes the topics covered or represents an essential aspect: in the first class, a model of Energy sources; in the second class, a Lapbook on Water; in the third class, a poster on the effects of human inactivity/activity in the fight against *Climate Change*; in the fourth class, the protocol of virtuous behaviors with representative drawings (developed in this specific case in the context of the *Circular Economy*) is transformed into a small illustrated booklet; finally, in the fifth class it is useful and fun to imagine reusing the CO₂ captured in the atmosphere by building wooden material, a miniature "biological house" thus launching the message of the importance of ecological construction that keeps a lot of carbon dioxide with it, that, in the atmosphere, if it is present in excessive quantities, causes only damage.

At the end of the project, the questionnaires administered at the beginning of the proposal are re-administered to the pupils as a testing method to evaluate the pupils' individual progress.

In addition, the observation of pupils' behaviors and attitudes is also useful as a real data collection technique. It is a participatory observation, not obvious (so that the children feel free from any type

of evaluation) and experiential, a type of observation that passes through the recording of events and behaviors.

Finally, in each class, the project ends with a “class drama”, entitled according to the topics examined, through which a final evaluation can be made. Pupils express what they did in a funny and original way by exhibiting the products obtained during the learning path.

Concluding, we should ask ourselves: “What more can we do?”. We know what’s going on and understand much of the science behind it. We know what needs to be done and we have the technical skills to do it. Some individuals already implement this knowledge and practice elements of sound environmental living. We have memorized the mantra: reduce, reuse, recycle. But this is not enough. We need to think bigger, much bigger. As individuals, this generation increasingly affirms that the earth is in crisis and that the *Care of Creation* is a priority for Christians. Time is running out. It’s time to join together in action.

Every personal action toward a greener lifestyle count. The smallest of our contributions are important and we should never judge its significance by how effective it appears to us in the grand scheme of things. Environmental stewardship starts but does not stop at the individual level. We need to bring others onboard to work together to truly make a difference on a large scale. Some of us have a lighter environmental footprint than others, but we all impact the planet at some level.

We all share the responsibility. All of us need to pursue becoming less of the problem and more of the solution. Education is the fundamental tool in order to grow an aware and ready-to act humanity.

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*Related to IHD and *Care of Creation* topics.